The Power of Peer Feedback: Research on the Learning Process within Virtual Action Learning

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by

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Examination Committee:

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	Prof. Dr. E.C. van der Sluis
	Prof. Dr. N.H.M van Dam

Table of contents

A word of thanks

The research project that ultimately resulted in the current dissertation started rather informally, in 2000, and gradually became a more formal enterprise in the years following 2006. Throughout the project, I was fortunate to cooperate closely with university teachers, lecturers, scholars and students to work on the design and application of a new educational concept: Virtual Action Learning (VAL). Our endeavours required a considerable effort from all those involved for an extensive period of time, and I would like to express my sincere thanks and gratitude to all contributors. The final responsibility for the results as presented in this manuscript lies with me, but I would never have been able to write this dissertation without the help of all the experts and students who contributed to its completion.

First and foremost, I want to thank the many teachers and programme managers who implemented the VAL concept and integrated it into their education programmes and who shared their experiences with me, together with their students who were enrolled in these programmes and used the concept. I owe a special word of thanks to the core teachers of NHVT Breda and Hogeschool Rotterdam, where the formal research cases were carried out.

Researching and applying educational innovations such as VAL requires a certain degree of distance, critical reflection and especially – at least in my opinion – a meaningful dialogue. Engaging in such a dialogue requires a lot of time, as does conducting research as a self-funded and external PhD candidate who has to finish the task in his own time after working hours. This explains why the final completion of the project took the time that it did. Nevertheless, its topic of investigation has remained relevant to this very day.

Throughout my PhD project, meaningful dialogues were conducted at many levels and in many different situations, and this process was finalised in hundreds of discussions and evaluations on the VAL educational concept that were held in schools, universities and various commercial businesses. From 2000-2015, Internet-based feedback rounds were organised, research adaptations were made, manuscript drafts were improved and lively discussion sessions were held in Breukelen and Amsterdam. Concepts and constructs were tested and validated, theoretical foundations and connections were integrated, our research was re-adapted whenever this proved necessary, and the final manuscript was compiled.

A very special word of thanks is due to the four members of the Thesis Committee for their thorough work: they meticulously scrutinised the manuscript and offered strong but legitimate feedback. Their sharp observations enabled me to improve this dissertation even further. That said, I also took the liberty of not following their suggestions when these concerned topics on which I held a slightly different view. I decided to do this because I expected these matters to be discussed during the actual thesis defence, thus ensuring a continuation of the meaningful dialogue.

I would also like to express my heartfelt thanks and gratitude to my eminent supervisors, without whose support I would never have achieved my goals. Robert Jan Simons (Utrecht University) inspired me as early as the nineteen-nineties to think about social-constructivist learning and subsequently to develop and apply this concept in practice. From 2006 onwards, his reflections fuelled new ideas and stimulated me to develop more abstract thoughts, adopt greater distance and immerse myself in the scientific literature. Robert Jan acted as my promotor in the literal as well as the figurative sense of the word. I am also indebted to Rob Blomme (Nyenrode University) for providing extra focus and strength during my PhD project. His reflections greatly contributed

to the quality of the final manuscript and made it what it is today. Rob offered valuable insights with respect to my research methods and the manuscript itself, and he encouraged me to improve the scientific quality of my research even further. As my supervisor, he offered exactly the right challenges with respect to enhancing abstract thought, the study's methodological approach and its scientific justification. Together, Robert Jan and Rob formed a truly unique team, and they gave me all the room I needed to improve myself and my work. I feel pleased and honoured to have worked with them, and I thank them with feelings of great satisfaction and tremendous respect.

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Finally, I owe a big 'thank you' to all the people in my personal environment. This group has often seen rather little of me, especially during all those activities with our family and friends when I missed out on the fun by being conspicuously absent. To my dear Julia and her children Alain, Merel, Thierry and Yves, to my children Gabor and Merel and to all my other dear family members, friends and colleagues: thank you so much for your support and understanding and for encouraging me to hold on and not give up. Now the time has come to start new things.

Jos Baeten,

Breda, August 2016

Dankwoord

Dit promotietraject begon informeel in 2000 en is vanaf 2006 formeel vormgegeven. Gedurende dit traject werkte ik nauw samen met docenten, wetenschappers en studenten aan het ontwerpen en toepassen van Virtual Action Learning (VAL), een nieuw opleidingsconcept. Dit heeft van alle betrokkenen veel tijd en energie gevraagd, en ik wil ik al deze mensen hartelijk bedanken. De uiteindelijke verantwoordelijkheid voor het resultaat zoals weergegeven in dit manuscript ligt bij mij, maar zonder de steun van alle betrokkenen zou ik dit proefschrift niet hebben kunnen voltooien.

Mijn dank geldt allereerst de vele docenten en opleidingsmanagers die het VAL opleidingsconcept in hun opleidingen hebben geïmplementeerd en die hun ervaringen met mij deelden, samen met hun studenten die op deze manier onderwijs hebben gevolgd. Mijn dank gaat hierbij in het bijzonder uit naar de kerndocenten van het NHVT Breda en de Hogeschool Rotterdam, waar de formele onderzoekscases plaatsvonden.

Het onderzoeken en toepassen van onderwijsinnovaties zoals VAL vraagt om distantie, om kritische reflectie en - in mijn opvatting - vooral ook om een betekenisvolle dialoog. Het voeren van zo'n dialoog vergt veel tijd, evenals het uitvoeren van onderzoek als buitenpromovendus in eigen tijd, naast mijn dagelijkse functie. Dit verklaart waarom dit promotietraject zo lang heeft geduurd. Het onderwerp is desalniettemin nog steeds actueel.

De betekenisvolle dialoog heeft op veel fronten plaatsgevonden en dit proces is succesvol afgerond in de honderden besprekingen en evaluaties van de toepassing van het VAL concept in scholen, universiteiten en bedrijven. In de hele onderzoeksperiode zijn er vele feedbackrondes gehouden via het Internet, is het onderzoek aangepast en het manuscript verbeterd en zijn er besprekingen gehouden in Breukelen en Amsterdam. De ingebrachte concepties zijn gevalideerd, de theoretische verbindingen zijn gelegd en waar dat nodig bleek is het onderzoek opnieuw aangepast en het manuscript verbeterd.

Mijn grote dank gaat ook uit naar de vier leden van de leescommissie: zij hebben het manuscript grondig gelezen en stevige, maar terechte feedback geleverd. Hun scherpe waarnemingen hebben mij in staat gesteld het proefschrift nog verder te verbeteren. Sommige onderdelen van hun feedback heb ik echter niet verwerkt wanneer deze onderwerpen betroffen waar ik een iets andere kijk op heb. Ik heb dit gedaan in de verwachting dat deze onderdelen tijdens de verdediging van het proefschrift aan de orde zouden komen en dat daarmee de betekenisvolle dialoog kan worden voortgezet.

Een speciaal woord van dank wil ik uitspreken naar Laetis Kuiper (TaalAanBod), Maarten Fraanje (Eburon) en Els Sonneveld (Nyenrode Business Universiteit) voor hun toegewijde ondersteuning tijdens de laatste fase van de ontwikkeling van mijn proefschrift.

Ik wil zeker graag een speciaal woord van dank richten aan mijn uitstekende begeleiders, zonder wie me dit alles niet zou zijn gelukt. Robert Jan Simons (Universiteit Utrecht) inspireerde me al in de jaren negentig om over sociaal-constructivistisch leren na te denken en dit vervolgens concreet in de praktijk te ontwikkelen en toe te passen. Zijn reflecties brachten me vanaf 2006 op nieuwe ideeën en zetten me ook aan tot meer abstractie en distantie en tot verdieping in wetenschappelijke literatuur. Robert Jan was mijn promotor in de dubbele betekenis van het woord. Daarnaast zorgde Rob Blomme (Nyenrode Universiteit) voor extra scherpte in mijn promotietraject. Zijn reflecties hebben ertoe bijgedragen dat het manuscript geworden is wat het

nu is. Hij heeft kritisch gereflecteerd op de onderzoeksmethode en het manuscript, en hij heeft me aangespoord om het wetenschappelijk niveau steeds weer verder te verbeteren. Rob was mijn uitdagende promotor in de zin van het abstraheren, methodologisch werken en het afleggen van wetenschappelijke verantwoording. Robert Jan en Rob vormden een unieke combinatie en gaven me de ruimte om me te verbeteren. Ik ben heel blij en trots dat ik met hen heb mogen samenwerken, en ik dank hen met een goed gevoel en een groot respect.

Tenslotte gaat mijn grote dank zeker ook uit naar de mensen in mijn naaste omgeving. Deze omgeving zag me de afgelopen jaren tijdens allerlei leuke activiteiten schitteren door afwezigheid. Mijn lieve Julia en haar kinderen Alain, Merel, Thierry en Yves, mijn kinderen Gabor en Merel en al mijn andere lieve familieleden, vrienden en collega's dank ik voor hun begrip en stimulans om door te gaan. Er is weer ruimte voor nieuwe dingen.

Jos Baeten,

Breda, augustus 2016

Chapter 1 General Introduction

Does the use of the Internet in any way contribute to a student's learning process, and if yes, precisely what added value does this represent? This question – and more specifically the attempt to answer it – is what lies at the heart of this dissertation, which considers the issue from a number of perspectives based on experiences, opinions and academic theories. The current work focuses on Virtual Action Learning (VAL), a new educational concept that was designed and developed to include a specific learning process and for which two instruments were designed to measure the progress and the results of the student's learning process.

Before we continue with a further elaboration of the VAL educational concept itself, we need to consider some of the terms and phrases used in this dissertation to describe the way in which students learn with the help of VAL, simply because many different terms are found in the literature to describe identical or near-identical concepts. When we speak about 'using the Internet', 'learning on or via the Internet', 'digital learning' or 'virtual learning' in our discussions of VAL, we mean these terms to include what many researchers and educators often refer to as 'e-learning', 'blended learning', 'virtual learning' or 'online learning': learning through the interactive use of a computer that is linked to a network. VAL uses a digital learning platform (the Virtual Learning Community or VLC) specifically designed for virtual learning interaction and constructive feedback exchanges among an online community of students and teachers. This platform is set up and managed by the school itself, and access is restricted to those who follow the course and those who teach it. VAL is not geared towards serious gaming or virtual reality learning: although these applications have become increasingly popular and important, they fall outside the scope of our VAL platform.

Our research was executed in two stages. The first involved Design Based Research that was carried out from 2000 until 2007 and that encompassed ten projects involving students and teachers from a number of Dutch universities of applied sciences. In close cooperation with these groups, the VAL educational concept and its accompanying measurement instruments were designed and developed. The second stage of our research took place from 2007 until 2008, when these validated instruments were used to perform quantitative measurements with the aim to investigate the learning processes of three groups of students (N=276) from a number of Dutch universities of applied sciences who had embarked on a six-month course in an environment designed on the basis of the VAL concept. In the years that followed, findings were analysed, interpreted and embedded within a theoretical framework to form the basis of the current dissertation.

The scope of our study was broad, its research required a fair number of years to complete, and the process proved to have its own special dynamics. This is reflected in the six chapters of the current dissertation in which we also include a number of key VAL ideas that have been reported in earlier publications (cf. Baeten, 2007, 2009, 2011); in this way, the reader will be able to develop a full appreciation of our work and our analyses. Chapter 1 presents our research question and five research statements. Chapter 2 considers six specific features of the VAL concept and connects these to theoretical insights. One finding shows that the learning process within VAL (termed Collaborative Creation) meets the requirements set by process theories of learning. Chapter 3 presents a detailed description of the VAL concept as such, without its connections to theory. Chapter 4 describes the first phase of our research and the two instruments with which the learning

process can be measured. Chapter 5 describes the second phase of our research and considers the results of the measurements concerning the progress and the results of the learning process in VAL with which the five research statements are tested. Chapter 6 presents a brief summary of our findings, a final discussion and our conclusions, and it also places our findings in context while offering a theoretical perspective. This dissertation ends with a description of the implications of our results.

Returning to our initial question as stated in the first paragraph above, the current chapter considers the relevance of determining whether the various options offered by the Internet would present any reasons to adapt or change today's system of formal education so that students may experience a different way of learning with better results. The chapter also considers the question how formal education can be organised and executed so that students' learning processes are stimulated and enhanced in the best possible way. The chapter ends with the formulation of concrete research issues to be addressed and answered in this study.

1.1 Virtual learning in education

In these days of challenging technological and social developments, very few of the business strategies, objectives, processes and services that were prevalent in 1997, the year in which Google was launched onto the market, are still relevant to business practices in 2016. A new landscape has taken shape as a result of the creation of new markets, services and business models by companies working in fields where ICT, including the Internet and social media, is playing an increasingly important role (Wirtz, Schilke, & Ullrich, 2010; Davenport, 2013). This could only be achieved through a transformation of these companies' entire operations - from new strategies and innovative products to the redesign of their business processes. This transformation has led to new customer relationships and to changes in interactions with suppliers (Brynjolfsson & Hitt, 2000).

The transformation is most noticeable in markets with strong financial incentives (Davenport & Short, 1990; Hammer, 1990). However, in markets without direct financial incentives and where organisations have to deal with budgets, the landscape still resembles that of the pre-Google period; in these fields, ICT, the Internet and social media have generally been used as a substitute for existing processes. The education sector is one of these budget-driven sectors in the sense that ICT has led to substitutions of existing products and processes rather than transformations of these products and processes. If one were to compare a schoolroom photograph of a class from the pre-Google period with one from the present day, it would be difficult to spot any major differences: the teacher would be very prominent (even literally speaking) as he or she goes about expounding knowledge and assessing progress, one would see the neat rows of students (seated) watching and listening to their teacher, and the blackboard or overhead projector would also be a prominent feature and under the direct control of the teacher. The pattern in the process is clear to see: the teacher is responsible for the transfer of knowledge, the progress of the educational process, the process of assessment and the control of content. The students carry out their work according to their teacher's instructions, in groups or otherwise, with or without digital teaching aids, and at the end of the course, they evidence their acquired knowledge and skills through exams, projects and presentations, which are then assessed and given a grade accompanied by some marginal comments. Learning interaction and written feedback between teachers and students resembles a monologue rather than a dialogue (Nicol, 2010).

Nevertheless, a comparison of schools over the years shows that they have changed to some

extent. The overhead projector has been replaced by the digiboard, new buildings have been designed, traditional classrooms have been replaced by multifunctional rooms, the library has become a media library complete with a digital learning environment and the good old piece of chalk has given way to the board marker. The zenith of all of this innovation in educational processes, at least with respect to the Dutch higher education system in general, was reached in 2000 with the introduction of digital portfolios that required teachers to adjust their teaching methods in such a way as to be able to respond to the 'products' placed there by students. This study is about Dutch higher education: its processes and educational results have been improved under pressure from student satisfaction surveys and the watchful eye of governmental departments in the Netherlands, particularly the Accreditation Organisation of the Netherlands and Flanders and numerous inspectorates. These improvements have been achieved through sweeping changes in work structures that allow teachers to make improvements in terms of their didactical skills under the supervision of advisers, fellow employees, coordinators and managers from their own institutions. When it comes to changes in the educational system, improvements in its processes and educational results are of critical importance.

In education, change is generally considered synonymous with improvement, usually achieved through substitutions and sometimes incidental transitions, but all too rarely through innovation or the transformation of entire processes or operations. The overall expectation currently held in the Dutch education system (Oostdam, Peetsma, & Block, 2007) is that the principles of new forms of learning may provide many schools with inspiration for the realisation of educational innovations, but that these innovations will be limited and that the total number of schools implementing them will remain a minority.

For me and many other experts in the field, it seems all too obvious that the educational landscape has changed very little since (and even long before) the emergence of Google. This can be attributed largely to the relatively high quality of education in the Netherlands (OECD, 2012): the need for change appears to be absent. In general terms, the quality of education is determined on the basis of results and general process indicators such as educational contracts, satisfaction levels, the level of unionisation or the adequacy of the flow of information. These vary, of course, depending on the educational system as such and on educational levels. In higher education, quality is determined mostly by the level of satisfaction among students and the learning results in the various courses. One cannot realistically expect any transformation of the educational system to occur as long as the quality of education remains relatively high and the absence of direct financial incentives prevails. Still, the lack of transformation is quite remarkable, considering the fact that an essential aspiration of every self-respecting educational institute is to contribute not only to the development of each new generation of children and society as a whole, but also to the development of the role played by knowledge, in scientific theory as well as in reality. The shared visions and aspirations of all educational institutions should actually serve to legitimise the transformation of education. However, it still tends not to result in innovation with respect to processes and operations within the educational system. As long as the quality remains good and a focus lies on short-term results, there seems to be no pressing need for transformation.

Ever since the emergence of Google in 1997, I have participated in many innovation projects in the Dutch educational system. As a result, I have had the opportunity to design and develop the Virtual Action Learning (VAL) educational concept and its supporting electronic learning environment, the Virtual Learning Community (VLC). This took place from 2000 until 2007 and in close cooperation with many other teachers, colleagues and students. In many cases, we were able to transform the educational and assessment processes and – to a slightly lesser extent – the actual daily operations

of a number of higher education institutions. In most projects, we held many discussions about the desired result of certain educational transformations. This could be related to the quality of both the processes and learning outcomes. Within VAL, it is assumed that the quality of good education is mainly determined by the way in which interaction within certain processes is perceived to be reinforcing; it is much less determined by the learning outcomes as formulated by the school at the end of a course. The type of learning interaction among students and between students and teachers that is focused on improving the competency development of students within a formal learning environment is the Meaningful Dialogue: a free and open exchange of views (Baeten, 2009, 2011).

The objective of the current study is to contribute to the discussion about educational innovation and transformation in higher education, focusing on our attempts to stimulate the Meaningful Dialogue in learning environments. I also wish to determine whether Virtual learning (learning via the Internet) as part of an educational programme within the VAL educational concept leads to better learning results for students. In recent decades, the world has changed dramatically through the use of ICT in personal as well as professional environments. This means that education should prepare people for both settings, and therefore I assume that a constant fine-tuning of both the content and the form of education is required. However, Dutch education - and specifically Dutch higher education - has insufficiently adapted to this new situation. The essential characteristics of this situation include other forms of interaction, greatly increased availability of information (knowledge) and thus a greater need for the meaningfulness of acquiring knowledge. This makes demands on higher education that are tailored to current as well as future personal and professional environments. The collaborative creation of knowledge with ICT could be a learning process that bridges the current gap.

1.2 The societal and academic relevance of research on Virtual learning

During the past fifteen years, entrepreneurship has facilitated tremendous growth in terms of the range of technological possibilities to handle information and in terms of their subsequent use in economically successful applications. The impact on organisations has been equally tremendous: we have seen the rise of new services and companies, the disappearance of certain businesses and the redesign of company processes and business models, to name but a few examples. The impact on the information industry has in fact been so extensive that it has given rise to an entirely new landscape of information sources, social media and distribution channels, not to mention a bewildering array of new players in the market. The impact on the way in which people acquire and process information has changed dramatically. Information users now have a stated preference for a more image-based, audio-visual, attractive, interactive and game-like approach to information processing. There is a significant need for visual learning and visual training. The impact has also been felt in the education sector, especially in the context of professional practice. However, the educational process in this sector has somehow managed to keep many of these developments at arm's length, as described above. That said, many initiatives have been launched in the areas of transition and transformation in education, including VAL. If we look at the information sources generally used by students, we can see that the use of digital information is fast overtaking the use of non-digital information. This development is evident in, and indeed accelerated by, the increased use in educational circles of mobile devices such as laptops, tablets and smartphones. In time, the education sector should inevitably bow to the changes driven by social developments and innovations in ICT because everything in learning is about the processing of information, and the content and format in which information is presented is radically changing.

The changes in society described here ask for new forms of education and learning, integrating new media and information technology. This is what VAL tries to reach and what makes the philosophy behind the VAL concept and the results of this study all the more socially relevant.

When we consider the possibilities of virtual learning, a large number of questions arise. Do students learn differently when they use ICT? Are students able to use media and external sources in a safe and reliable manner? Can Internet principles such as cooperation 'any time and any place' be integrated into the educational system? If so, can they then be mutually beneficial? And can the learning process become more demand-based? Who determines what sources are to be utilised, and who qualifies sources when free Internet content is used? What effect does this have on the supervision and assessment of students, the role of the teacher, the question of responsibility, the educational forms used in the classroom, communication and learning interaction, learning results, educational content and a school's resources? How can the transition to the labour market be optimised and what effect will this have on employment levels in general? We all want a good educational system: this is why it is important, for society as a whole, to study the potential and consequences of new educational concepts and new quality criteria, such as the Meaningful Dialogue, that are designed to incorporate the potential of new media and ICT and to ensure an adequate response to developments in the professional working world.

The VAL educational concept contains features that are applied as a coherent whole (see Chapter 3). Compared to other concepts, the features of VAL – particularly when taken as a whole – are so radical that no current educational theory covers the concept as a whole. Moreover, little to no research has been carried out to obtain insight into these features and their effects on the behaviour of students or teachers. The same holds true for the structured manner of virtual learning in a community in the form of virtual learning interaction, the new setup for the three primary processes (learning, educational and assessment processes) that take place within any educational organisation, the pedagogy and methodology that govern the behaviour of the teacher and the coherence between the activities and information sources of all involved, all aimed at realizing a Meaningful Dialogue. In scientific terms, the number of blind spots is quite large.

Much research has been carried out into the significance of feedback in the student's learning and assessment processes and into the differences between peer and teacher feedback (Cho, Chung, King, & Schunn, 2008; Bangert-Drowns, Kulik, Kulik, & Morgan, 1991; Gibbs & Simpson, 2004; Gielen, Peeters, Dochy, Onghena, & Struyven, 2009; Hattie, 2003; Kluger & DeNisi, 1996; Topping, Smith, Swanson, & Elliot, 2000). However, to the best of my knowledge, no research has been carried out into a peer feedback and reflection cycle that takes place in an online learning environment, nor has any research been conducted on the added value of providing peer feedback to the individual who provided the initial feedback. Scientifically speaking, this is largely unexplored territory. In their study of peer feedback in online discussions and the impact on self-regulation, Ertmer et al. (2007) conclude that students struggle to understand the requirements for the peer feedback process, including the requirements for posting and responding to their peers within online discussions. This is why many students in Ertmer's study failed to provide the required number of peer ratings and why it is sometimes difficult to discern specific benefits from the peer feedback process. It can safely be concluded that there is a need for additional research on how to eliminate this confusion for students in order to enable researchers to identify the (possible) added value of the peer feedback process.

In his study, Mory (2004) argues that the role of feedback is likely to become an increasingly complex and important part of the online learning process and that it is important that teachers have access to relevant information regarding ways to use peer feedback effectively in order to

increase student learning. While the VAL concept suggests that peer feedback is a viable alternative to teacher feedback, additional research is needed to determine the most effective means of facilitating the process in an virtual learning context. In scientific terms, the greatest relevance is to be gained by providing an insight into the VAL concept in the realm of educational theory, into the Learning process with the virtual learning activities, into the peer Feedback and Reflection Cycle, into the specific provision by students of peer feedback on the learning products of other students, and finally into the validation of the quality of that feedback by the teacher.

1.3 The challenge of VAL

VAL is an innovative concept in which the three processes (learning, educational and assessment processes) that form the primary organisation and management of education are transformed into new activities, roles and responsibilities, for students and teachers alike, by using a new social-constructivist didactic as well as a work form and a methodology that arise from placing ICT at the heart of education: in the form of electronic learning environments, social media, tools and Internet content (Baeten, 2007, 2009, 2010, 2011).

Within VAL, we can consider educational practices to be good when the provision of information and communication between teachers and students as well as among students themselves are effectively combined within these three primary processes. Each individual student has his or her own way of processing information, is responsible for his or her own learning process and must show in his or her own self-assessment that he or she has attained the levels of competency required by the teacher. The educational task is performed in teams of two teachers with different roles. Together, they carry out all the activities of the educational process and the assessment process to facilitate the learning process of the student: designing learning arrangements, moderating the virtual learning interaction, organizing meetings and managing the Feedback and Reflection Cycle. The assessor also validates peer feedback and a proportion of the learning products that the student completes, organises the assessment day, evaluates a student's self-assessment and competency development and helps the student to reflect on his or her learning achievements and potential for further development.

Students work on their competency development by making their own learning products (text, audio, video, graphic design). They provide peer feedback (Given and Appreciated Peer Feedback in VAL terms) on each other's learning products in a virtual environment and they identify the relevant underlying concepts. They participate in Virtual Learning Interaction concerning the subject and improve their learning products, some of which are then presented to the teacher in the form of best practising. The teacher then validates the quality of a number of these learning products as well as the Quality of the Given Peer Feedback that has been provided to fellow students. The learning activities and results of each student are stored in the virtual learning environment from the very start of the course and can be accessed by all members of the community for learning or assessment purposes. Based on this information and the student's results collected during the periodic assessment days, including the self-assessment, the teacher then assesses the competency development of the student and discusses this with him or her via evaluation and reflection. A proper execution of this Feedback and Reflection Cycle can then lead to a Meaningful Dialogue with an appropriate assessment and the definition of a flexible development perspective for a student.

The consequences of this way of working are that students and teachers – within the goals of the programme – agree on planning and assignments, that students can work at their own tempo

and within their preferred group, that the learning questions and progress made in the virtual learning environment remain central, that there is no fixed content, no exams and no tests, and finally that not all of the learning products have to be assessed. Within VAL, students are allowed to select information themselves, which implies that the knowledge they acquire may differ per student. This learning process, in which the student has more freedom to decide how and what he or she learns and whether or not to do this in collaboration with fellow students, is challenging and exciting. A greater degree of freedom, however, also introduces greater unpredictability. As a result, it is difficult for an educational institute to determine precise course contents in advance. Nevertheless, the institute can determine the competencies and knowledge objects as well as the learning arrangements on offer. In combination with the information selected by students, this means that a flexible curriculum can be offered. The outcome of this Learning process within VAL should be that the Student Perceives a different Way of Learning as well as a better Learning Result. The application of VAL is a challenge for any educational institute because it means a transformation of all three processes, as will be described in Chapter 3. This transformation is very much at odds with what the majority of teachers in the Netherlands are used to doing at the moment. Nevertheless, in the Netherlands many courses have been developed in which teachers, trainers and students work with the VAL concept to varying degrees. The number of courses is growing steadily, which highlights the relevance of carrying out a thorough study into the background, impact and results of the VAL concept and of participant's work within it.

1.4 The central problem and statements

Challenging as the task may be, there is every reason to design and implement an educational concept such as VAL and to investigate how this different way of learning and its intended improved learning results can be measured. A primary aim is to determine what students perceive in terms of learning results following from a different approach to learning and to determine the extent to which these experiences are generated by virtual learning. The next question to be answered would be whether the school concerned can actually determine these learning results. This brings me to the central problem of the current research study: we need to investigate the possibility of designing an educational concept to be introduced in schools that incorporates the various opportunities offered by the Internet in such a way that students experience how they may learn in a different way, with better results, and that schools will be able to determine that the intended virtual learning results have indeed been achieved.

Since the VAL educational concept, by definition, is a challenging concept to investigate in terms of its entire scope and the extent to which it is implemented, we have placed a main focus on the way in which students experience their learning process and their learning results rather than on the objective quality of their learning products or their competencies as assessed by their teachers. What matters in VAL is the cognitive image that a student creates of various conceptions (and misconceptions) and how he or she actually learns by connecting content and goals and by reflecting upon the learning interactions in which he or she is involved. An additional challenge encountered in VAL concerns determining the authenticity of a student's learning products, because students develop these products together with fellow students through their many learning interactions. We *can*, however, speak of authenticity when we consider the exchange of peer feedback: students give feedback by qualifying other students' learning products and they receive constructive feedback on their own learning products. This is why we decided to investigate the quality of peer feedback as validated within VAL by the teacher (i.e. the school). To this end, we expressed our problem definition in a framework

including five statements as listed below, each of which is described in greater detail in Chapter 2.1.3, and a number of Design principles, which are presented in Chapter 2.1.6.

In this dissertation, where the focus lies on the Learning Process of the students, the following statements will be tested:

1. Giving and appreciating peer feedback to fellow students is the driving force in students' learning processes in VAL; as such, it is the main determinant of the other constructs in our research model.
2. The amount of given peer feedback by students determines the quality of feedback as validated by the school.
3. Students who participate more actively in Virtual learning than their fellow students experience a more intensive learning process, within as well as outside the virtual learning environment, and hold the opinion that they have learned more as a result of this engagement.
4. Students who participate more actively in virtual learning interaction than their fellow students are able to provide higher-level and better-quality feedback to their fellow students.
5. The quality levels of feedback given by students to fellow students during the virtual learning process, as validated by the school, improves as the learning process progresses and even without any intervention from teachers.

In sum: by collaborative learning via the Internet (through VAL), students adopt a more active learning approach throughout their educational trajectories, within as well as outside the virtual learning environment. In this way, they experience a different way of learning and notice that they actually achieve better learning results; they also demonstrate better learning results in terms of improvements in the quality of the feedback they provide to fellow students. Learning via the Internet is definitely worthwhile.

Now that we have elaborated on Virtual learning, the VAL educational concept, our research question and our five research statements, we are ready to consider a number of specific features that are typical of the VAL concept and connect these to theoretical insights. This will be done in Chapter 2.

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Defining a theoretical foundation for many features of the VAL educational concept is no easy task: the concept is new and has not yet been widely researched. To address this issue, the first part of this chapter focuses on the specific features of VAL as an educational concept, and it connects individual features with other theoretical viewpoints as much as possible. The second part focuses on the relationship of VAL and its Learning process with existing learning theories and process theories. The chapter ends with our main conclusion: the Learning process within VAL as analysed in this chapter is a Process theory of learning that is strongly related to Engeström's theory of expansive learning.

2.1 Specific features of VAL as an educational concept

VAL is an educational design: an educational concept about learning, teaching, assessing and organizing formal education with the help of learning technology. It is best labelled as the Collaborative Creation of knowledge within a Meaningful Dialogue among students and between students and their teacher, enabled by a virtual learning environment. To facilitate all the learning, teaching and assessment activities of VAL, a Virtual Learning Community (VLC) was designed specifically for this purpose. This learning technology follows the relevant didactics and facilitates all virtual learning activities. The theoretical framework of VAL as a process theory of learning was discussed in the previous chapter; here, we focus on the specific features of the design of VAL as a model relating to our central questions.

In theory and practice, the terms 'educational concept', 'educational model', 'training concept' and 'training model' are used interchangeably. Frequently, they describe the direction, components and even the execution of educational programmes in certain institutions. The role of learning technology can then be seen as an addition to these components and applications. Educational processes are also described by many different terms, including 'educational learning process', 'primary process', 'supporting process', 'administrative process', 'educational assessment process', 'training process' and finally 'learning process', even though the terms 'process' and 'learning process' are missing from the indexes of handbooks such as *How People Learn* (Brown & Cocking, 2000) and the *Cambridge Handbook of the Learning Sciences* (Sawyer, 2006). The VAL educational concept describes the primary process of an educational institution and takes the learning process of the student as a starting point. This is necessary because the increasing use of ICT in society has led to the emergence of new processes and the fading of the old boundaries between processes and their working environment. The VAL concept aims to design processes in such a way that they are more consistent with these contemporary developments.

In today's educational environment, formal learning is central; within this environment, the primary process is the application of ICT. As shown in the previous chapter, this primary process is divided into three processes: learning, educational and assessment processes. The way in which the Learning process takes place in the VAL design determines the way in which the Educational and Assessment processes take place, which in turn determines the activities of the teacher. The student's learning process on one side and the Educational and Assessment processes on the other should be aligned and coherent: they are both part of the same interaction. Each process includes

a dialogue between students and teachers on the validation of the conceptions being learned. These processes are connected through a feedback and Reflection Cycle and placed in a virtual learning environment. This means that the dialogue takes the form of giving and appreciating peer feedback, learning interactions, validation, assessing, evaluation and reflection. These forms lend depth to the dialogue that emerges in VAL as a Meaningful Dialogue. The consequence of the application of VAL is that each of these three processes has to be transformed to enable the Meaningful Dialogue to develop and to make use of the possibilities of learning technology. Figure 2.1 shows the specific features of the VAL concept.
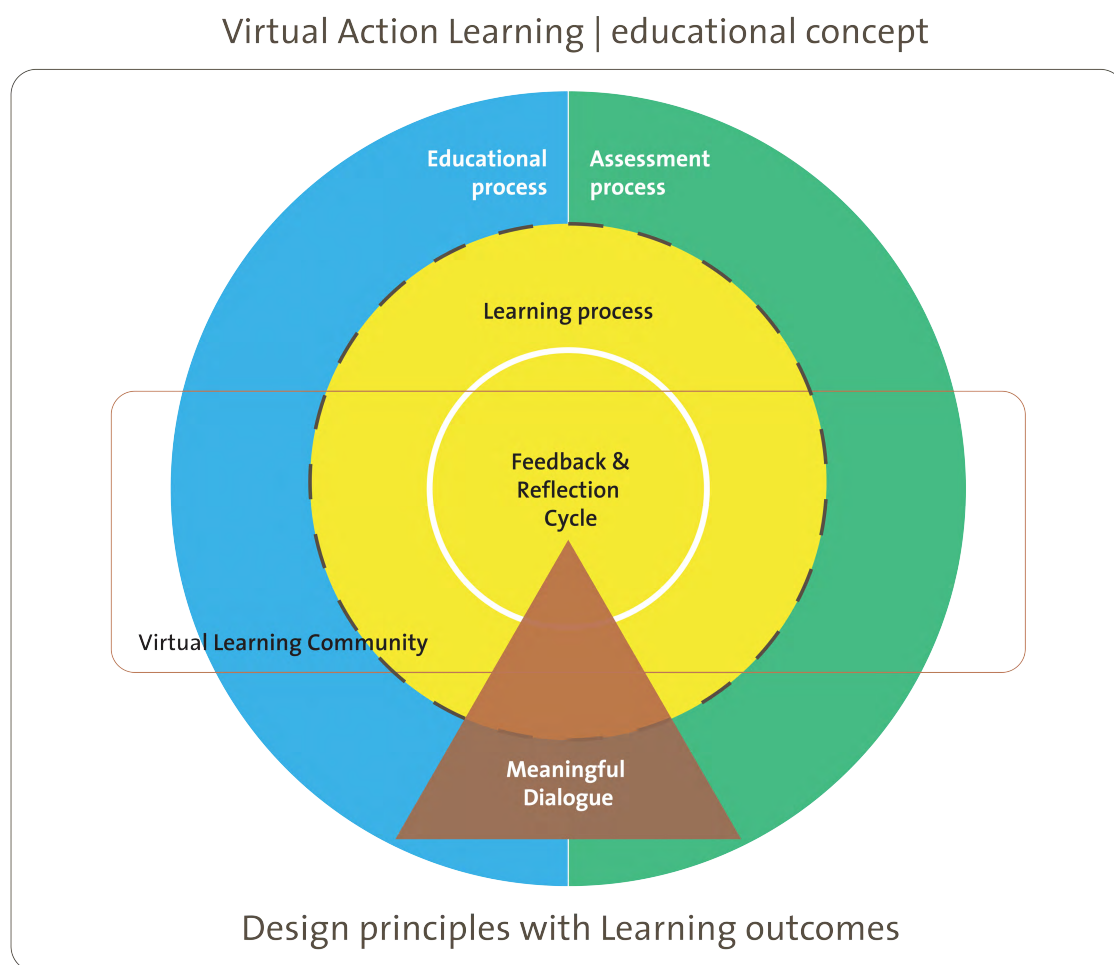
Figure 2.1 Specific features of the VAL concept

The specific features of VAL as an educational concept include the following:
• The Framework of three processes;
• The Meaningful Dialogue;
• The Learning process;
• The Feedback and Reflection Cycle;
• The Virtual Learning Community;
• The Design principles with Learning outcomes.

2.1.1 The Framework of three processes

Virtual learning denotes learning via the Internet: this kind of information technology changes formal education. At the start of the development of VAL in the late 1990s, the question was not so much whether information technology should change learning and teaching at school, but rather in what way. Would virtual learning be a substitution of parts of existing learning activities or would it have more influence on learning and teaching? Electronic learning environments that included a digital portfolio showed that the changes were more than mere substitutions; the students put learning products into their personal portfolios and these products became input for teaching and learning. This was a transition in which parts of the educational program had to be changed into demand-driven (i.e. student-driven) activities. Such a transition is also mirrored in business. Theories from business environments such as those formulated by Hammer and Champy (1993) showed that a redesign of activities is required to transform or re-engineer corporations so as to enable them to make the best possible use of information technology in order to remain competitive in business.

Davenport (1993) stated that the key to change is process innovation, a revolutionary new approach that fuses information technology and human resource management to improve business performance. The cornerstone to process innovation's dramatic results is information technology - a largely untapped resource but a crucial "enabler" of process innovation. In turn, only a challenge like process innovation affords maximum use of information technology's potential. In definitional terms (Davenport, 1993), a process is simply a structured, measured set of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how work is done within an organisation, in contrast to an emphasis on what is done. A process is thus a specific ordering of work activities across time and space, with a beginning and an end, and clearly defined inputs and outputs: a structure for action. Taking a process approach implies adopting the customer's point of view. Processes are the structure by which an organisation does what is necessary to produce value for its customers. Mittelmeyer en Stratum (2014) emphasises that the stress had to be on the consistency of the activities.

In the 1990s and even in the early 2000s, this approach of transformation processes was unknown in formal education, but it proved to be very well suited for the design of VAL, a completely new educational concept that aimed to use information technology in a way that Davenport (1993) mentioned. The proposition formulated by Hirsch (1988) stating that the more computers we use in education, the more we need shared stories was another incentive to develop an educational concept from scratch. We started our VAL journey with five assumptions: the concept should be about learning and teaching, the focus should be on learning, there will be an intensive use of information technology, there will be clear responsibilities for the student and the teacher, and there will be a connecting mechanism between learning and teaching. At the time, there was no single 'recipe' for such an educational concept, but we found a reliable and effective framework for it in theories about business processing. At an abstract level, the framework of the VAL educational concept consists of three processes (learning, educational and assessment processes) with specific features (Collaborative Creation, reversed onus) and a connective mechanism (Feedback and Reflection Cycle) which mostly take place in a virtual learning environment. As a result, the learning activities and the student's development should be realised within the context of a Meaningful Dialogue with fellow students and teachers. The three processes are discussed in greater detail below.

The Learning process consists of the coherent whole of learning activities that a student executes sequentially in varying cycles of learning activities during which he or she seeks help from fellow students, teachers and attributes (e.g. content, learning technology) in order to achieve certain learning outcomes and to ensure continued development according to a personal strategy. The other two processes, the Educational process and the Assessment process, can be formulated as an extension of this Learning process. All three processes and the Meaningful Dialogue are shown above in Figure 2.1, as are the connecting Feedback and Reflection Cycle and the supporting VLC. The educational process entails the coherent whole of activities that teachers consistently execute in order to facilitate their students' learning processes, learning interaction between students and between students and teachers themselves, and finally the desired learning development. In this process, the teacher seeks help from fellow teachers and attributes (e.g. content, learning technology), taking into account his or her own personal strategy. This process is also called the teaching or instructional process. Finally, the Assessment process refers to the coherent whole of activities executed by an assessor (one of the roles of the teacher within VAL) in order to consistently facilitate the students' learning processes and learning interactions so that they are capable of demonstrating their own learning development. The assessor is able to judge this with the assessment information and learning technology, taking into account his or her own personal strategy.

A defining feature of VAL is that it involves an inverse burden of proof (reversed onus), one in which students must use evidence in self-assessments in order to show their assessor that they have mastered certain competency levels. In a personal evaluation and reflection, the assessor explains and discusses his or her assessment together with the student and reflects on the student's learning achievement and development. The personal strategy is important for both the student and the teacher. For the student, a personal strategy might include gaining respect or status or obtaining good grades, study credits, a diploma or a job. In the case of the teacher, the personal strategy might include gaining respect or status, increasing professional satisfaction or rewards, improving prospects of better working conditions or an improved career perspective. The student owns and is responsible for his or her own learning process. The teacher owns and is responsible for the Educational and Assessment processes. In this context, we need to consider the impact of the Assessment process on the Learning process.

The Assessment process in the design of VAL shows parallels with the findings from the educational research literature in several ways. Assessment has a great impact on the way in which the student learns throughout an educational programme (Gielen, 2007). Firstly, in VAL the task of providing feedback falls to fellow students and is part of the assessment. Peer feedback has been shown to lead to the same learning results as teacher feedback (Gielen, Tops, Dochy, Onghena, & Smeets, 2009), provided that assessment criteria are clearly set (Patri, 2002). In fact, peer feedback elicits more revisions that change the quality of learning products, whereas teacher feedback tends to elicit revisions only at the surface level (Miaoa, Badger, & Yu, 2006). Furthermore, VAL assessment is competency based and focuses on the skills that allow students to complete real-life tasks. It has been argued that assessment should always be focused on whole tasks and that determining these tasks early in an educational period helps guide students towards the assessment (Sluijsmans, Prins, & Martens, 2006). Moreover, the competency method of VAL is knowledge-oriented because in its design knowledge precedes application. In other words, carrying out any activity requires knowledge. By requiring the student to form a coherent whole from what he or she has

learned regarding a certain competency, deep learning may be facilitated. Deep learning allows a student to transfer what he or she learns to contexts other than the one in which the learning took place (Atherton, 2010). In VAL, the student should take responsibility for his or her own assessment. If the student is barely involved in preparing and completing the assessment, the learning effect of the assessment is minimal (Gibbs & Simpson, 2004; Dochy & McDowell, 1997). Consequently, responsibility for assessment enhances learning. As described by several authors, self-assessment has many benefits for students when it comes to learning, such as deep and thoughtful engagement with their own performance (Lundstrom & Baker, 2009; Bahous, 2008).

In addition to self-assessment, VAL places strong emphasis on peer evaluation. Peer evaluation encompasses students evaluating the performance of their peers as well as providing peers with constructive feedback (Sluijsmans & Prins, 2006). This has been shown to contribute to learning. Students in classes where peer evaluation is used achieve better learning results than students in classes where peer evaluation is not used (Sluijsmans & Prins, 2006; Gibbs, 1999). The peer review process allows students to display higher-level thinking, including critical thinking, planning, monitoring and regulation (Liu et al., 2001). It has also been argued that reciprocal peer review fosters skills in students that are essential for life and for employment after higher education is completed (Sadler, 2010). As suggested by Kane and Lawler (1978), peer evaluation is best combined with other forms of assessment.

Because of the Feedback and Reflection Cycle in VAL, students become less dependent on the instructor as the sole judge of the quality of their learning. This facilitates more autonomy and independence and allows students to develop the skills required to assess their own learning (McConnell, 2002). A focus on reflection in the interview between the student and his or her teacher ensures that in addition to the learning outcomes, the learning process is included in the assessment (Garrison & Kanuka, 2004). This is important because such reflection can enable a student to become conscious about his or her previous behaviour and thus direct his or her future actions in an intelligent way (Tannenbaum, Beard, McNall, & Salas, 2009; Dewey, 1964). In other words, reflection gives students the opportunity to learn from their mistakes and prevents these mistakes from re-occurring in the future (Cannon & Edmondson, 2001). Finally, in the VAL evaluation and reflection process, the teacher should provide both an assessment result and guidelines for further development (Mory, 2004; Delandshere & Petrosky, 1998).

Learning technology is the ICT-based element of VAL that is necessary to support all three processes. Firstly, it involves the VLC as well as the Internet, social media, software, web applications and other tools with which learning activities can be performed. Learning technology increasingly determines how, when and what a student learns. As such, it reduces the role of predetermined and coherent content. It is no longer a mere means to an end, but also a source of information, and it has a determining role in how learning interactions occur. Gradually, the theory supporting VAL will be described as a technology-embedded learning theory. Both students and teachers participate in all three processes in a dialectic on the correctness, reliability and truth of each participant's representations of explicated knowledge in relation to pre-agreed learning goals and competencies. The criteria that play a role in this dialectic are sometimes determined by the teacher, sometimes by the student and sometimes by both the student and the teacher. If the dialectic is such that it allows the best possible talent development in the individual student, and if it is also directly related to the agreed competencies, then we can speak of a Meaningful

Dialogue. Thus, the Meaningful Dialogue is also the main quality criterion for the way in which the three processes unfold and for the quality of the teacher's and student's functioning.

2.1.2 The Meaningful Dialogue

The Meaningful Dialogue is the most important specific feature of the VAL concept and is described as "the learning interaction among students themselves and between students and teachers within a formal learning environment which is focused on the validation of conceptions and improvement of the measurable competency development of the student" (Baeten, 2009, p24). The Meaningful Dialogue is the common thread running through all communication within a VAL educational programme and ensures that students learn more deeply. Mercer and Littleton (2007) show that the quality of spoken dialogue in the classroom improves the quality of thinking as well as educational attainment. They also show that this dialogue improves the collective construction of knowledge.

The Learning process of the student in the VAL concept consists of reciprocity between the Educational (teaching) process and the Assessment process. In each process, a dialogue should take place between teachers and students about the meaning of the conceptions learned. In order to realise a Meaningful Dialogue in terms of a broader substantive consistency and in-depth learning, the three processes (i.e. the Learning, Educational and Assessment processes) are connected by a Feedback and Reflection Cycle in the VLC. Together, they enable the dialogue to develop in the form of giving and appreciating peer feedback, learning interaction, validation, assessing, evaluation and reflection. This is only possible if the supporting processes, especially the VLC, fully support the learning activities and interaction. The four conditions for creating a Meaningful Dialogue are illustrated in Figure 2.2 below (Baeten, 2009, 2011).

The Meaningful Dialogue in conditions	
Conditions	**Elaboration in the design of VAL**
Open in connectedness in the facilitation by the supporting processes	The entire Feedback & Reflection Cycle can be seen in the VLC, except for the Evaluation and Reflection between the teacher and the individual student. The interaction, however, is only between the members of the VLC.
Reciprocity in the virtual learning process	Students should provide a lot of feedback, and often (almost daily) receive, feedback on their Learning products. It is precisely this process of rewarding, together with the fact that the feedback can be submitted as evidence at the assessment level, that leads to increased interaction among students.
Focused on validation of conceptions in the educational process	The student's feedback consists of subjective and objective information. The teacher validates the Learning products nominated by the students and the related feedback. The dialogue should be strongly focused on the accuracy, reliability and objectivity of their conceptions.
Focused on improvement of measurable competency development in the assessment process	The teacher assesses the learning results of each student in the context of improving their competency development and reflects on this together with the student. The dialogue is focussed on what the students have produced during their learning process, how they can improve certain competencies and how they can provide evidence for their competency development.

Figure 2.2 Conditions for the Meaningful Dialogue

Each learning activity and interaction within the Learning process is part of this dialogue, through which it can be determined, repeatedly, whether comprehension has been correct and follow-up would be desired. Control is partly in the hands of the student who is looking, naturally, for clarity

about the learning content and the learning results. The Meaningful Dialogue can take place virtually as well as face to face with respect to the following:

- Competencies, application levels, learning objectives and intentions during the assessment;
- The improvement of learning products and knowledge objects during meetings such as Campfire Stories and Forums;
- The virtual learning interaction;
- The validation of learning products and the related feedback during editorial reviews.

2.1.3 The Learning process: Collaborative Creation

The Learning process is described in greater detail in Chapters 3 and 4; here, we limit ourselves to the learning process within VAL as illustrated in Figure 2.3 and to a description of its theoretical framework.

When we compare the learning process within VAL with learning processes that are commonly seen within higher education and universities of applied science, up to this very day, the distinguishing features of the VAL educational concept become apparent:

- Students take greater responsibility for the learning process and teachers refrain from steering, but the continued substantive interaction with and among fellow students ensures effective steering from and within the group of students involved;
- Students learn by collecting content (all or most of it) themselves and by designing learning products that are geared towards their professional practice;
- Students learn more: they add extra expertise related to their existing knowledge and learning goals;
- Students learn from their fellow students' learning products, which are available 24/7 in the Virtual Learning Community's portfolios;
- Students learn from giving peer feedback to others as well as from receiving and appreciating feedback on their own learning products;
- Students learn through the reflection process that develops during their virtual learning interactions as this enables them to view learning products and peer feedback on their own products from different perspectives (mirroring);
- Students' learning is deeper and less strongly based on mere memorisation techniques;
- Students can use the peer feedback that they received to demonstrate their own competency development;
- Students first and foremost learn from and together with fellow students; it is in this joint venture that virtual learning interaction takes place before learning demands and questions are submitted to the teacher.

To conclude, the learning process within VAL is characterised by a social-constructivist approach rather than a situation in which a teacher exclusively decides on content and in which learning interaction is concentrated around meetings with teachers organised at school. Another of VAL's distinguishing features is that virtual learning forms the point of departure for the learning process and that the teacher aligns his or her teaching and assessment processes with this learning process. Virtual learning takes place in a Virtual Learning Community in the form of Virtual learning interaction. Here, giving and appreciating peer feedback is the driving force behind all virtual learning activities and learning activities carried out at school. It is also where the quality of given feedback is used to gain a firm indication of a student's competency

development. This means that the development of the learning process within VAL and its results can be expressed in the form of the five statements as presented in Chapter 1.4.

Virtual Action Learning
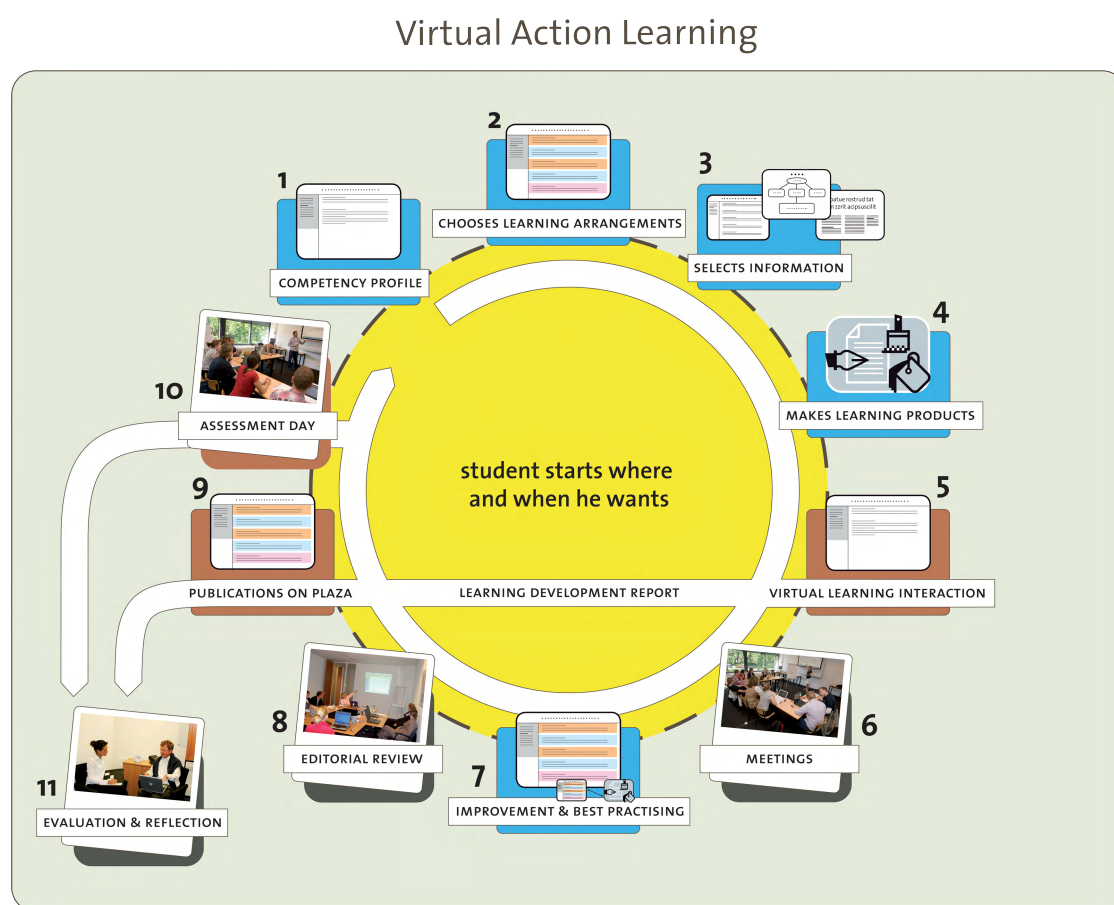
Figure 2.3 The Learning process within VAL

Collaborative Creation with ICT versus cooperative learning
Collaborative Creation of knowledge with ICT is – partly due to the role of learning technology – so different from existing concepts that it is difficult to compare them. In practice, one often compares Collaborative Creation to cooperative learning (Johnson & Johnson, 2002), but there are clear differences. In the cooperative learning concept, five essential elements need to be carefully structured in the situation: positive interdependence, individual and group accountability, promotive interaction, appropriate use of social skills and group processing (Johnson & Johnson, 2002).

Positive interdependence exists when group members perceive that they are linked in such a way that one cannot succeed unless everyone succeeds. This is comparable to Collaborative Creation with ICT because students learn by giving feedback and because their assessment is partially based on this feedback. The second essential element of cooperative learning is individual and group accountability. The group must be accountable for achieving its goals. Each member must be accountable for contributing his or her share of the work (which ensures that no one free-rides on the work of others). In the design of Collaborative Creation with ICT, students should help each

other in the virtual learning interaction in order to obtain the agreed competencies. This is partly because the individual contributions to other students' work (giving feedback, answers, arguments) are taken into account in the final assessment. The third essential component of cooperative learning is promotive interaction, preferably face to face. Promotive interaction occurs when members share resources and help, and when they support, encourage and praise each other's efforts to learn. The fourth essential element of cooperative learning is teaching students the required interpersonal and small group skills, which is comparable with the learning activities that take place during the meetings at school within VAL. In terms of the third and fourth elements, Collaborative Creation with ICT clearly differs from cooperative learning: promotive interaction is virtual rather than face to face. The fifth essential component of cooperative learning is group processing, which exists when group members discuss how well they are achieving their goals and maintaining effective working relationships. Collaborative Creation with ICT also differs from cooperative learning in this respect: learning is Collaborative Creation, but goal achievement is quite an individual effort.

To the best of my knowledge, no research is available on the way in which learning processes are structured that take place in part on the Internet. However, we can consider what Laurillard (2002) defines as the five characteristics of a good learning process. An effective learning process implies that students should carry out the following five interrelated activities (Fransen, 2006; Laurillard, 2002):

1   Understanding the structure of a knowledge domain. In Collaborative Creation with ICT, this happens when the student carries out the learning arrangements (step 2 in the learning process within VAL) in which learning objectives are derived from the knowledge objects associated with certain competencies (step 1);
2   Interpreting different forms of representation. This takes place in the design of VAL when the student selects information (step 3), makes a learning product (step 4), emulates this with products of other students in the virtual learning interaction (step 5) and in meetings at school (step 6) and nominates his or her improved representation (step 7) to the teacher to have it validated (step 8);
3   Working with descriptions of reality is a matter of course in VAL because the learning products are aimed at authentic work situations;
4   Intrinsic as well as extrinsic feedback is used where the latter dominates (see Feedback and Reflection Cycle, step 5) the former (e.g. skills training);
5   Reflecting on the goal-action-feedback cycle is characteristic of the entire learning process within VAL (in particular steps 1, 10 and 11 in the VAL Learning process).

These five activities have strong mutual effects, and within a learning process they cannot be considered independently. Therefore, they should be assessed in combination in order to decide on the quality of a learning process.

2.1.4 The Feedback and Reflection Cycle

As the Feedback and Reflection Cycle (see Figure 2.4) is described in greater detail in Chapters 3 and 4, the current focus lies on the theoretical framework.

Virtual Action Learning

Reflects with Assessor on the explanation of the accomplished learning performance and intended learning activities

Makes learning plan with intended competency levels and learning activities

Assessment by expert based on evidence included validated Learning products and feedback

Receives feedback from peers on his Learning products

Peer assessment by colleague students on his learning performances

Feedback & Reflection Cycle

Gives feedback on peers Learning products

Receives feedback by expert on his nominated products (Editorial Review)

Receives substantiated appreciation on his feedback

Continually receives information on performed and intended learning activities

Gives substantiated appreciation on his received feedback

Receives appreciation on his best Learning products (Best Practising)

Figure 2.4   The Feedback and Reflection Cycle within VAL

There are many articles and studies elaborating the importance of feedback and reflection within formal learning, but there is little scientific research on the relationship between the two variables. Hattie (Hattie, 2011; Hattie & Timperley, 2007), who is known for his extensive studies on the impact of learning interventions including feedback, focuses on teacher feedback and sees assessment for learning as a powerful intervention in the learning of the student. In VAL, the student has an important role in the assessment for learning by giving, receiving and appreciating feedback on learning products in the portfolios of fellow students. Black and William (1998) note that assessment for learning is based on five key factors that fully match the progress of the Learning process within VAL: students are actively involved (steps 1 to 9, see Figure 2.3), effective feedback is provided (step 5), teaching activities are adapted in response to assessment results (steps 6 and 8), students are bootable to perform self-assessments (step 10) and the influence of assessment on students' motivation and self-esteem is recognised (step 9, the learning development report). The design of VAL includes a Feedback and Reflection Cycle (see Figure 2.4). Its function is to ensure that the relevant information and activities facilitate a Meaningful Dialogue among students and between students and teachers in three distinguishing processes. It aims to let the student's development towards an agreed end goal be as successful as possible.

Orsmond and Merry (2009) reveal that for non-high-achieving students, receiving a large amount of teacher feedback may result in increased dependency on teachers. Moreover, there are large differences in feedback skills between full-time and part-time working students and students with different cultural backgrounds. For example, African and Asian students do not immediately start

providing suggestions for improvement as Western students do. Instead, they start by giving a personal compliment or showing understanding for the difficulty level of the learning product (Driessen & de Vos, 2008). VAL and the VLC make phased feedback possible, where students can start by emphasizing their personal relationship, then move onto comprehension and elaboration and finally move to improving and enriching other students' learning products.

Dealing with feedback is a learning process in its own right, especially if this takes place in a virtual learning environment; it is a new activity enabled by new ICT. In the early phases of a learning period, feedback is frequently shallow or involves misconceptions. By integrating this learning activity into the online learning environment with other activities such as posing questions, providing arguments, taking a position and discussing, the virtual learning interaction should emerge as the driving force of the Learning process. As a result of this, the community dialogue can become sharper and more focused, feedback quality can improve and misconceptions can be reduced. Student peer feedback, particularly feedback on other students' learning products, plays a central role in the design of VAL. It has a learning aspect and an assessment aspect. To be able to provide good feedback, the student will need to read the learning products of other students and must understand them in order to be able to improve and enrich them. Equally importantly, students receive feedback on their learning products and are asked to appreciate this by indicating if and why they consider the feedback to be important.

As stated by Brown (2004), if assessment is to be integral to learning, feedback must be at the heart of the process. Students can learn from other students by receiving feedback with which they can improve the quality of their own learning products. They can also can learn from the appreciation of their own feedback by other students as well as from the teacher's validation of their learning products and feedback. Internet technology can only partly be used as a means for individual competence development (Blomme, 2014) and peer feedback in VAL by the Internet could increase this because it is an example of peer tutoring (Topping & Ehly, 1998). Peer tutoring is based on Vygotsky's theory that interaction is essential for learning (Topping, 1998; Vygotsky, 1962, 1978). Its goal is for students to help each other improve their learning products (Topping & Ehly, 1998). A peer assessment can be seen as an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status (Topping, 1998). In the design of VAL, this arrangement is a major issue because students are well informed about the learning behaviour and results of fellow students in the VLC.

In VAL, peer feedback is reciprocal in that students alternate between the role of tutor and tutee (Ginsburg-Block & Fantuzzo, 1997). There is evidence that providing feedback helps both the provider and receiver of feedback to learn (Li, Liu, & Steckelberg, 2010; Nicol, 2010; Ertmer et al., 2007; Hattie & Timperley, 2007; Liu, Lin, Chiu, & Yuan, 2001; Boud, Cohen, & Sampson, 1999) by fostering an understanding of what makes a learning product good or bad (Boud & Molloy, 2013; Sadler, 2010; Van den Berg, Admiraal, & Pilot, 2006) and enabling deeper engagement with the content of the work (Fallows & Chandramohan, 2001). Playing the role of a tutor has both cognitive and metacognitive effects on students (Roscoe & Chi, 2008). Another mechanism through which peer feedback enhances learning results is that it increases the transparency of the review process and consequently improves student confidence (Smith, Cooper, & Lancaster, 2002).

Given sufficient time, frequent feedback loops can lead to 95% of students commanding the educational material, as reported by Bloom, Hastings and Madaus (1971). Feedback is also an

essential requirement for social-constructivist learning: because each student's learning is different, feedback is necessary for one student to compare his or her knowledge with that of another student (Ertmer et al., 2007). Moreover, the meaningful interaction that results from students providing each other with constructive online feedback means a high overall perception of social presence and increases perceived learning and perceived satisfaction with the instructor (Richardson & Swan, 2003).

In online learning environments, feedback plays an important role, possibly a more important one than in offline learning environments (Sayed, 2010; Lynch, 2002; Palloff & Pratt, 2002). Peer feedback in online learning environments is more timely and more individualised than offline peer feedback (Topping, 1998). In addition, peer feedback in an online environment is mostly written, and written feedback is delivered in a more neutral manner than face-to-face feedback (Kluger & DeNisi, 1996). Other advantages of using peer feedback in online learning environments include new learning opportunities for the providers and receivers of feedback, which leads to a more humanised environment and community building (Corgan, Hammer, Margolies, & Crossley, 2004).

Feedback generated by peers is generally held to be of lower quality than feedback from experienced tutors, but although tutors write longer comments than peers and provide more specific feedback, the differences in appreciation by students were not found to be significant (Hamer, Purchase, Luxton-Reilly & Denny, 2015).

Feedback is considered to be useful when it can be used to improve or enrich the learning product. Research evidence suggests that students use their own learning products as a standard when providing peer feedback and in turn reflect critically on their own work through doing so (Nicol, Thomson, & Breslin, 2013). Van der Pol and colleagues (van der Pol, van den Berg, Admiraal, & Simons, 2008) find that feedback including recommendations for revision leads to more revisions being made to students' work. Through the VLC, where students read comparable learning products and answer learning questions, students can also learn to accept compliments from fellow students, to develop or complete knowledge tests and to respond with arguments to other students' statements. The learning activities and interactions of students within the Learning process of VAL are based on Design principles 1–4 (see Section 2.1.6) and put together in Figure 2.4 in a Feedback and Reflection Cycle.

Receiving feedback can be considered to enhance learning if it is specific, goal-related and brief (Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008; Schunk & Swartz, 1993). Nicol (2010) argues that students are dissatisfied with the feedback they receive when it is perceived as one-way communication and that for feedback to bring satisfaction to the student it should take the form of a dialogue. Voerman, Meijer, Korthagen and Simons (2012) focus on the function of feedback to close the gap between different levels of performance. Progress feedback concerns specific information to students that confirms their progress and conveys that goals are attainable (initial level). Discrepancy feedback concerns information about the missing aspects or necessary improvements that are needed to close the gap between the current and the desired level of performance. The feedback provided by students and teachers within the VAL concept can be considered to be discrepancy feedback (see DPs 1–3). Voerman (2014) concludes that there should be an effective balance between discrepancy feedback and progress feedback.

In the design of VAL, the effect of feedback is considered from a fairly cognitive perspective. It focuses little on the social emotional aspects that play a role. Feedback evokes emotion, which in

turn influences learning. It is important to know what kind of emotion is elicited by feedback. Generally, positive feedback gives rise to positive emotions and negative feedback to negative emotions (Losada & Heaphy, 2004). In the design of VAL, the focus is mainly on positive feedback. Students add their feedback directly to the learning products included in the portfolios of fellow students in the VLC. Through the transparency of communication in this environment, the VLC directs students to use types of feedback that can enhance learning. That being said, the way in which new mechanisms come into play here is striking, because it seems that there are certain patterns such as 'I shall give you feedback if you do the same to my products', 'I shall wait with giving feedback for as long as possible in order to try to copy or learn from other types of feedback provided', or 'I only appreciate feedback from students with whom I am friends'. Students receive a notification when they have been given feedback, when other students have validated their feedback and when the teacher has validated their feedback. These notifications prompt the student to log into the VLC, view the reactions they have received, possibly using these to improve their own products, and provide others with feedback. When this process of learning interaction has picked up steam, there should barely be a need for the teacher to direct it (Baeten, 2009, 2011). Thus, providing peer feedback in a virtual learning environment seems evidently more stimulating than providing face-to-face feedback because it is tailored for each student and allows students to view learning products from fellow students. This topic is a promising challenge for future research.

2.1.5 The Virtual Learning Community (VLC) as the virtual learning environment

VAL and its virtual community VLC enable students to learn in a virtual learning environment. Research has shown that virtual collaboration can enhance students' confidence and the perceived value of their educational programme (Ertmer et al., 2011). The VLC of VAL also enables students to be free to choose how and when they learn. Self-regulated learning has been shown to make students more responsible for their own learning and more oriented towards the intrinsic rewards of learning (Chang, 2005). As indicated earlier, there is a scarcity of research on the progress and outcomes of learning processes that take place in a virtual environment for longer time periods. Most publications are mainly based on research into small parts of particular learning processes or specific results of learning in an online (virtual) environment. The previous section covered studies on peer feedback and reflection in a face-to-face learning process. In this section, a main emphasis is placed on the virtual side of the Learning process.

The use of a virtual learning environment has several benefits for students' learning as well as the control capabilities of the teacher. Several studies have shown that online (virtual) environments ensure a high degree of anonymity, making students more willing to analyse one another's work (Wen, Tsai, & Chang, 2006; Liu et al., 2001). This concerns environments in which students feel that they can trust fellow community members to facilitate the development of social cohesion and enhance learning (Liu & Carless, 2006). A further advantage is that the freedom which comes with the student taking responsibility enhances deep learning (Nijhuis, 2006) because he or she is encouraged to transfer learnings from one context to another. Studies by van der Pol et al. (van der Pol, van den Berg, Admiraal, & Simons, 2008) showed a significant relationship between feedback containing concrete suggestions and a successful uptake of the feedback. Research by Wang (2009) showed that friendship and meaningful learning tasks in a virtual learning environment helped to promote individual accountability and positive interdependence; the use of progress reports and product versions was useful for coordinating and monitoring the learning

process. In a Virtual Learning Environment, students prefer virtual forums to other tools, and assessment-related activities attracted higher participation rates than other tasks (Hampel & Pleines, 2013).

Another benefit of online environments is that they allow students greater freedom of time and location (Tsai, Liu, Lin, & Yuan, 2001). Students perceive peer review in a virtual environment as a strategy that promotes their learning motivation (Liu et al., 2001). Moreover, in online environments the learning products of students are more often submitted on time (Wen et al., 2006; Liu et al., 2001). It is also possible in online environments to collect exhaustive data about the learning processes of students, which helps teachers obtain information on the student's learning activities and performance (Liu et al., 2001). In virtual learning communities with online asynchronous discussion platforms, the user's role shifts from viewer tot main actor (Tobarra, Robles-Gómez, Ros, Hernández & Caminero, 2014).

It is precisely the subjective appreciation among participants that makes visiting a virtual learning environment (and experiencing its group dynamics and learning interaction) so stimulating. Students actively collaborate on learning activities, discuss ideas and problems with each other, incorporate new information into their discussions, summarise, reflect on the content of their discussions and share social experiences with their group members that are not directly related to the task at hand (De Laat, Lally, Simons, & Wenger, 2006). The principles of observing learning activities and learning products from fellow students and promoting learning interactions in an online learning environment are in agreement with social-constructivist learning perspectives such as Vygotsky's zone of proximal development (1978), which states that students can learn certain skills only by observing them in others.

One important aspect in which VAL differs from many other approaches to education is the way in which it connects formative and summative assessments in a virtual environment. These two kinds of assessments are frequently considered to be separate parts of learning. VAL differs in this respect by connecting formative assessment, where the student monitors his or her own progress through peer feedback, with a summative assessment at the end of the learning period in which the student can use the feedback as evidence of his or her competence development. This connection is made possible by technological advances that enable us to quantify formative assessment in the form of peer feedback during the course and use it as evidence for the summative assessment at the end of the course.

Evidence that innovations focusing on improving the feedback that students receive lead to considerable learning gains is provided by the review compiled by Black and William (1998), in which several studies are described that support this claim. In the review by Nicol and MacFarlane-Dick (2007), it is also suggested that students are already assessing their own work and generating feedback and that educational programmes should tap into this. Finally, the review by Dochy, Segers and Sluijsmans (2006) presents evidence that a combination of assessment forms leads to higher responsibility and reflectiveness in students. Of course, differences in terms of student attitudes and characteristics influence these outcomes in virtual learning processes.

2.1.6   Design principles (DPs) with Learning outcomes

Learning in a formal setting is centred on why, what, when and how one learns at school. Whenever any course is set up, its ultimate objectives and competencies formulated, the curriculum and all accompanying literature decided upon and students' tasks set out, it is the school (management) that determines what, when and how the student will learn. Both the content and the direction of the course are predetermined. This requires the use of proven Design principles (DPs) that can be based on any one of a number of different approaches, such as 10 steps to complex learning (Van Merrienboer & Kirschner, 2012). These principles cover the design of learning tasks, assessment instruments, cognitive strategies, mental models, procedural information and cognitive rules. Of these, VAL makes use of the principles covering the design of learning tasks and the development of assessment instruments, but the rest are not suitable to VAL as DPs because they are based on different terms of another context of the educational system.

The VAL concept is based on the idea that the school, the teacher and the students all work together to determine the 'what, when and how' of the learning process. A student will base his or her choice for any given course on certain objectives or a competency profile, with the ultimate aim of following a particular career or working in a particular profession. The school, therefore, will already have answered the 'why' question for that student. In VAL, what one must learn in order to achieve one's objectives is derived from the competency profile by determining the required set of knowledge objects and skills to be used in the learning arrangements designed by the teacher. These learning arrangements indicate what can be learned by specifying a learning product and by directing the student towards the relevant sources of information. However, the student has more autonomy and retains the power to choose whether to do these learning arrangements or to opt for a different learning product. Within VAL, the question of 'what' is to be learned is determined by both the student and the school. Although the competency levels over the years and semesters must meet certain requirements in terms of progress, sometimes even per month, it is the student who determines his or her own pace of learning. The student also determines when he or she wishes to demonstrate his or her competencies and can do so over the course of three years instead of four (in the case of a four-year course) if so desired. The student is also allowed a degree of flexibility when it comes to making up lost ground in his or her studies. The VLC, which is available 24/7, allows students to learn whenever they want to. This means that to a significant extent it is the student who determines how he or she learns within VAL. There is no set learning path and students may determine the learning cycle themselves. The can also choose the information sources they see as most relevant and decide whether or not to participate in the meetings and the recommended learning interaction. Under these conditions, a student can demonstrate certain competencies during the assessments.

The role of the school is to set up the educational (teaching, instructional) and assessment processes in such a way as to enable and stimulate students to demonstrate their level of development. This can be achieved by designing activating learning arrangements that can be carried out primarily in the VLC, ensuring a stimulating level of supervision and process-oriented moderation in the VLC and setting up effective meetings and assessments. In VAL, good education is achieved by designing and implementing the three primary processes in a way that ensures that a Meaningful Dialogue can take place and that ICT plays a facilitating role in those processes.

There are at least eight specific principles behind the design and implementation of these processes within VAL, which are explained below and placed within a theoretical framework. The following may help clarify the eight important DPs in the VAL educational concept:

1. Enable and stimulate the Collaborative Creation of knowledge;
2. Give the learner a sense of responsibility;
3. Stimulate meaningful learning;
4. Use peer feedback as formative testing;
5. Design learning arrangements that matter for competency development;
6. Start from reversed onus in assessment;
7. Realise a coherent and consistent synthesis among the processes;
8. Let ICT facilitate a connecting structure between the processes.

In order to arrive at a more precise formulation of the Design principles of VAL, we must start by focusing on the Learning process in a way that clarifies the activities of students and their teachers. The entire Learning process within VAL is described in detail in Section 1 of the next chapter. Part of this information is used here to clarify the main Design principles of the VAL concept.

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1. Enable and stimulate the Collaborative Creation of knowledge

At the level of learning activities, the student starts by linking the targeted selection of information to the knowledge available to him/her (steps 1–3, see Figure 2.3), which he/she then uses to make his/her first construct – a learning product (step 4). He/she compares his/her product actively and in various ways with other constructs (step 5): he/she views similar products by other students, gives feedback on their products, receives feedback and reflects on how he/she will appreciate the received feedback. He/she also takes part in the discussions about this knowledge object. Gradually, his/her construct becomes clearer to him/her, which is helped by meetings at school (step 6). By using this information, he/she can then improve his/her product and compare it with other products (step 7) or take part in best practising (step 8) on learning products. If fellow students nominate his/her product for discussion with the teacher (expert), it can be validated (step 8) and published on a public website (step 9) outside the community if the product meets the necessary requirements. The product is produced individually and the learning is done collaboratively.

In this process of active learning, knowledge Creation by the student is enabled and organised in a production process; the student thus learns by making learning products. Getting a student to learn in this way requires the teacher to facilitate the Learning process instead of hindering it by providing unnecessary or unwanted instructions or solutions. The teacher's instructions remain limited in scope and focus primarily on enabling the student to come up with his/her own ideas, to ask his/her own learning questions, to make mistakes and learn from them and to learn when his/her constructs (products, comments) are ready to be validated. The teacher facilitates this process by designing learning arrangements (DP5), moderating the VLC and setting up meetings at school. The VLC enables Collaborative Creation and must possess certain functionalities in order to allow the student and the teacher to carry out their activities in an effective manner.

Stimulation is achieved through the process-oriented moderation of the virtual learning interaction in the VLC. The teacher chooses the most opportune moment to post messages on the communication

platform that meet the learning needs of students and/or that are compatible with the student group's learning environment. In the case of both the individual student and a group of students, this can be done in the form of a compliment, a supplement to a learning activity or a suggestion aimed at encouraging the further exploration of a particular topic. The teacher can also stimulate students by uploading learning arrangements that may help them delve deeper into the subject in question. In addition, the teacher can stimulate their learning processes during meetings at school to explore substantive developments within the VLC.

2. Make the learner responsible for his/her own Learning process

The student is responsible for his/her own Learning process and for determining how, what (partially) and when (for the most part) he/she learns. The student decides which learning activities he/she will carry out and which learning performances he/she will deliver, using the approach that best suits him/her at that moment in time. He/she decides for him/herself what and how he/she will learn. This means he/she can take more initiative during a course. The VLC remains the point of departure at all times, as that is where the learning arrangements are found (step 2) and where a student can see how fellow students have been carrying out their own learning activities (step 5). This has more in common with time and location-related learning preferences (Ruijters, 2011) than it has with relatively stable styles of learning (Kolb, 1984; Kolb & Kolb, 2005), because learning in a virtual learning environment is spread over numerous, short log-in sessions in the VLC. The teacher intervenes only at the last possible moment and then only when students explicitly ask for help. In this way, each student can construct his/her own knowledge and make the learning product that is best suited to him/her.

A number of stimulants are built into both the Learning process and the VLC, whose aim is to promote the student's sense of independence and responsibility:
• The group (the community) is active on a daily basis in the VLC and each week during meetings at school, both of which result in social pressure and agreements to participate;
• Each student's learning process is completely transparent in the VLC. Everyone can view their own and each other's learning activities, learning performances and learning development online;
• All of the learning arrangements are focused on steps 10 and 11 in the learning process in which the student must be able to demonstrate certain competencies;
• All VLC input, such as feedback, learning products, arguments, answers, propositions and best practising, can be stored from day 1 and used at a later stage as evidence of one's competency development.

3. Stimulate meaningful learning in the Learning process

Learning is considered to be an active process of knowledge construction in which an individual selects information from his/her Personal Learning Interface and then transforms it in collaboration with other students into behavioural change that he/she can explicate to others (Baeten, 2009, 2011). Säljö (1979) classifies learning conceptions into categories with a clear qualitative shift in the views that underpin surface learning strategies or are related to deep learning. Surface learning (memorizing) means acquiring and storing information that can be reproduced. Deep learning means acquiring facts, skills and methods that can be retained and used as required, making sense or abstracting meaning and comprehending the world by reinterpreting knowledge. Within the Learning process of VAL, the freedom that comes with the student's responsibility is the kind of freedom that enhances deep learning (Nijhuis,

2006) because the student is encouraged to transfer what he/she has learned in contexts other than those in which he/she has already learned (steps 5 and 9). The student has an intrinsic information need that he/she needs to understand, and he/she knows that this will never be definitive but part of his/her own concepts and development. The Learning process of VAL stimulates him/her to focus more on the content of the course. Learning is meaningful when a connection is made between new information and existing concepts. It is a form of deep learning that includes understanding and interpretation (Entwistle & Entwistle, 1991), as is apparent in VAL steps 3, 4, 5, 8 and 10. Learning within the VAL process of collaborative Creation is only meaningful when this connection is made through deep learning and when the learning and Educational process allow a Meaningful Dialogue to develop among students and between the students and their teacher (steps 5, 6, 8, 9, 10 and 11). This form of meaningful learning sets requirements for the design of the learning arrangements aimed at steering the Learning process of the student.

4. Use peer feedback as formative testing in the Learning process

The starting point of a learning cycle within VAL is always a visit to the VLC to find out exactly where the focus lies and what the progress is of other community members. This is also the beginning of the virtual learning interaction (step 5) aimed at producing and improving (step 7) learning products. Feedback is considered to be useful when it can be used to improve or enrich the learning product. Through the VLC, where they read comparable learning products and answer learning questions, students also learn to accept compliments and deal with criticism from fellow students, to do progress tests and to respond with arguments to other students' statements. In this production process, students can learn from one another. They should only submit their learning questions to the teacher if they cannot figure them out among themselves. Students engaged in a collaborative learning environment, of which the VLC is an example, report many benefits, although they do find it difficult to provide feedback to their peers (Topping, Smith, Swanson, & Elliot, 2000; Dochy, Segers, & Sluijsmans, 1999). Students tend to search for a standard in order to find out whether or not their own approach to the learning arrangement is correct. In this, the giving, receiving and appreciation of peer feedback (step 5) works as a kind of formative assessment. The content consists of sentences in which one indicates whether one understands the product or considers it to be a good one (literally feed 'back'), but also of messages in which one indicates the ways in which the product could be supplemented, improved or enriched (literally feed 'forward'). The student sees this as a kind of formative assessment and he/she will usually receive feedback on more than one occasion on his/her learning product from fellow students. He/she will view this as a quality standard, but will only be sure of that standard if and when that product or a similar learning product and the associated feedback are discussed by the teacher (expert) during the editorial review (step 8). The feedback he/she receives from the teacher then functions both as a confirmation of the quality standard for the product and as feed forward information that can be used to make improvements. This implies that the teacher should not make any judgments regarding the quality of a learning product during moderation, as that is something best done later on in the learning cycle during the editorial reviews.

5. Design learning arrangements that matter for competency development

The teacher (Assessor-Designer) designs the learning arrangements, and each arrangement is focused on one or more competencies. The student can develop his/her competencies by executing the learning arrangements and providing learning products with related peer feedback and host evidence for his/her competency development in the VLC (step 10). Learning arrangements must possess certain features in

order to enable social-constructivist learning (steps 1 to 11) and the virtual learning interaction (step 5) in particular. This is why arrangements consist of four separate features, each of which meets the requirements associated with working from a computer screen:

a) A learning objective in which a link is created to one or more competencies and knowledge objects;
b) A learning product made by the individual student in an authentic manner and aimed at an external target group to make both deep learning and publication possible;
c) A learning path allowing for learning activities recommended by the teacher: this has to be outlined at various levels of steering and may be used by the student to make a learning product by drawing on previously gained and new insights in such a way as to enable him/her to compile evidence of his/her competency development;
d) The virtual learning interaction in which a student learns by comparing his/her own view as a cognitive representation in a flexible manner with those of fellow students and to explicate it in the form of questions, answers, feedback, arguments, appreciation and propositions. In addition, the use of all of these interactions stimulates a Meaningful Dialogue among students and between students and their teacher about their learning products.

All of the above features relate to steering information that can be read from a computer screen; this is very different from the situation in which a student reads the information in printed form or receives it verbally from a teacher. Furthermore, virtual learning results in a new kind of learning behaviour. The student logs in when it best suits him/her. This can be for an individual session lasting only a few minutes or for short sessions that form part of a longer learning cycle in which a student reads an article or browses the Internet. In some cases, the student will log in to concentrate on the learning products of other students and to provide feedback. Moreover, there is no fixed location for these sessions: a student can log in when sitting at his/her desk, at school, in the canteen, on the train or even from the comfort of his/her own bed. This places specific demands on the way in which learning arrangements are designed (Baeten, 2009, 2011).

6. Reversed onus in the Assessment process

A study comparing traditional education with social-constructivist education in a university setting revealed that students in the constructivist learning environment acquire more diversified knowledge than the students in the traditional learning environment (Tynjälä, 1999). What cannot be tracked, however, is what the student learns, when he/she learns it and from whom. The easiest way is to express these learning outcomes with a grade, but that is not in line with the constructivist method of learning where the perception of the student is the grade. According to Black and William (1998), grades are the weakest form of feedback, as they do not motivate students to continue learning. Feedback has been shown to be more effective than grading (Black & William, 1998; Crooks, 1988). This is supported by results found in action research (Driessen & de Vos, 2008) showing that producing for an audience leads to more serious learning interaction, better feedback and better learning products.

The responsibility for demonstrating competency development lies with the student. This results in a reversed onus in the Assessment process. The student collects information about his/her learning activities in the VLC (steps 5 and 7) from the very start of the course, which he/she can then use as evidence on the assessment day (step 10). These activities, including the validation of learning products and related peer feedback (step 8), are made visible in the VLC in the learning development report. During the assessment day (step 10), the student presents his/her self-assessment, including evidence

of his/her competency development. Through his/her own participation, he/she can elaborate on and add to this. Based on this evidence, the assessor determines whether and to what extent the student has achieved certain competencies. After the assessment day, the assessor reaches his/her conclusions based on the demonstrated information in the evaluation and reflection (step 11). Next, the assessor and the student reflect on the learning behaviour that has led to these learning achievements and on ascertaining interpretation faults such as misconceptions, falsehoods and inaccuracies. The optimal learning effect is reached when the student has become aware of his/her interpretation faults and is able to recognise and explain that with a different approach and content his/her learning achievements would have been of a much higher level.

7. Realise a coherent and consistent synthesis among the processes

Using VAL requires a transformation of all three processes (learning, education, assessment). The responsibilities, roles and activities within the Educational and Assessment processes must therefore be made compatible with the Learning process of the student. Only then can a coherent and consistent synthesis among the processes be realised in which a Meaningful Dialogue can take place so that the student is in a position to develop his/her competencies to the full. This is not unlike a football match: only by making clear the agreements regarding the goals, the lines on the pitch, the rules of the game and the role of the referee can the footballer (i.e. the student) be given the freedom to play in an unrestricted and creative manner. This is why VAL uses clearly described educational forms for meetings (steps 6 and 8), the assessment day (step 10) and the evaluation and reflection stage (step 11).

8. Let learning technology facilitate a connecting structure between the processes

In VAL, all information streams within any given course run through the VLC. The steering information is contained in the learning arrangements (step 2) and this includes references to (external) sources of information. The Feedback and Reflection Cycle shows exactly which objective information provided by the student during the virtual learning interaction (steps 5 and 7) can be used in the Assessment process, and this also applies to the information regarding validation provided by the teacher (step 8). All objective information is compiled in the learning development report in the VLC. The teacher can also see from the information in the VLC which assignments and what particular content are proving most difficult for the students and then organise his/her meetings accordingly. In this way, learning technology, such as used in the VLC, can ensure that there is a connecting structure between the processes.

Learning outcomes
If VAL and the underlying Design principles are applied as intended, the following Learning outcomes may be expected:
- The student is more motivated to study;
- The student is able to construct more knowledge himself or herself;
- The student spends more time studying because he or she is more interested in topics concerning the course;
- The student experiences more knowledge construction and less knowledge transfer by the teacher;
- The student needs less time to learn and is less dependent on the teacher.

2.2 General learning theories

VAL is in closest agreement with the *social-constructivist approach* for learning and is strongly distinctive from well-known learning theories such as behaviourism and cognitivism. It also shows overlap with connectivism. Although there is no single *social-constructivist learning theory*, in the social-constructivist Learning process within VAL, new information is considered to be linked to existing knowledge and new, unique representations are constructed for which the responsibility lies with the learner (Boekaerts & Simons, 1995; Simons & Bolhuis, 2003). The Learning process in VAL consists of the associated learning activities that a student performs in varying cycles and in which he or she calls on fellow students, teachers and attributes (content, learning technology) to achieve certain learning outcomes and developments that are focused on a personal strategy. A major importance is placed on the learning activities carried out rather than the way in which information is processed. According to the social-constructivist approach, knowledge is not constructed individually, but continuously mirrored on the ideas of others. Knowledge is constructed through the interpretation of information. Because interpretation depends on the pre-existing knowledge and associations of the learner, its nature is subjective by definition. By mirroring individual knowledge to that of others, knowledge is not only enriched, but it also arrives at a higher level of inter-subjectivity (Adams, 2000). It is precisely this inter-subjectivity that becomes possible through the virtual learning interaction within the VAL Learning process, because many different knowledge representations are expressed in a great variety of given and received peer feedback.

VAL, if it is applied as intended and described in Design principles 1, 3 and 4, also meets the six fundamental criteria of social-constructivist theory described by Paris and Byrnes (1989): 1. intrinsic informational need; 2. understanding is more than absorbing information; 3. mental representations are dependent on development; 4. understanding is never definitive; 5. development limits learning, and 6. reflection and reconstruction stimulate learning. The details of the 11 steps of the Learning process within VAL are described in Section 3.2. The leeway that students are allowed if they are made responsible for their Learning process requires self-regulation (DP2). Students are expected to direct their own learning process as much as possible, and the fuel they must consume for their efforts is supplied by the emotional sources that every human has access to (Boekaerts, 1997).

According to Paris and Byrnes (1989), self-regulated learners seek challenges and overcome obstacles, sometimes through persistence and sometimes through inventive problem solving. They set realistic goals and utilise a battery of resources. They approach academic tasks with confidence and purpose. The combination of positive expectations, motivation and diverse strategies for problem solving are the virtues of self-regulated learners. An important aspect of self-regulation is the students' ability to direct their own learning (Boekaerts, 1997). Zimmerman (1989) defines self-regulated learning in terms of self-generated thoughts, feelings and actions, which are systematically oriented towards the attainment of students' own goals.

The use of metacognitive skills such as orienting, planning, executing, monitoring, evaluating and correcting (Weinstein & Mayer, 1986) makes up various parameters of a successful learning process. According to Winne (1995), all students engage in self-regulation because they can be seen planning, monitoring and evaluating their behaviour. He also explains that being able to plan a learning activity and monitor and evaluate it does not automatically imply that one can steer and

direct one's learning process without the help and support of the teacher or the textbook. For the most part, VAL matches *social-constructivist learning theory* (DP1–DP3), but it differs from this theory to the extent that it pays explicit attention to the use of ICT. The responsibility for the learning process lies with the student, and the necessary self-regulation in learning requires metacognitive skills. As argued by Boekaerts (1999), self-regulation concerns three layers: the regulation of the processing modes, the regulation of the learning process and the regulation of the self. VAL largely meets the conditions in the second and third layers. In VAL, self-regulation is stimulated by the Feedback and Reflection Cycle and during evaluation and reflection with the assessor. The student also experiences his or her responsibility because of the reverse onus in the assessments process which encourages him or her to continuously collect evidence in order to demonstrate competency development. Using the virtual learning environment should stimulate metacognitive skills because students can monitor the process of their learning activities and compare them with the processes of other students (learning analytics) and because the environment serves as a dashboard for stimulating skills such as planning, monitoring and reflecting. DPs 1 to 4 are focused on the regulation of the self.

Cognitive learning theory aims to answer the question how learning processes can develop optimally through instruction. It distinguishes between declarative knowledge (knowing that something is the way it is, knowing facts) and procedural knowledge (being able to use and apply knowledge, including the ability to use knowledge in different contexts). Declarative knowledge can be promoted by offering students learning materials that they can link with pre-existing knowledge. Procedural knowledge requires training and practice (Boekaerts & Simons, 1995). According to cognitive learning theory, it is the teacher's role to provide instructions on what is to be learned. As a result, the teacher determines what and how the student learns. Learning processes within VAL are entirely different because it is the student who determines how he or she learns and (in part) what he or she learns (DP1–DP3). Procedural knowledge can be obtained in VAL through training and practice. The Learning process in VAL is expressed in terms of learning activities with a certain cognitive development as its result (DP1 and DP3). By contrast, cognitive learning theory is expressed in terms of an information processing process that leads to a certain cognitive development.

At the core of *behaviourist learning theory* lies the idea that desired behaviour should be encouraged and strengthened by offering students both positive and negative stimuli. The teacher provides the student with the appropriate stimuli. One premise is that the stimulant, the reinforcement, follows directly after the response: direct feedback. This feedback may be positive or negative (Boekaerts & Simons, 1995). It is the teacher's role to provide this direct feedback to direct the learning process. The behaviourist learning process is the opposite of the Learning process seen within VAL. In VAL, stimuli stem primarily from virtual learning interaction with fellow students. The teacher's role is to provide feedback at the end of the learning Cycle on learning products that have been selected by students to be validated by the teacher (DP4 and DP5). This means that the students determine the formal quality status of the learning products that they have nominated and of the feedback they have received. In VAL, as in behaviourist learning theory, learning behaviour is influenced by consequences (Atkinson, Atkinson, & Hilgard, 1983). The feedback a student provides to fellow students is validated by the teacher and if it is judged positively, the student is rewarded with appreciation and study credits. However, the more

important aspect in VAL is rewarding the motivation to learn, whereas in behaviourist learning theory the student is rewarded for what he or she has learned.

VAL is more akin to connectivism (Siemens, 2005) than to cognitivism or behaviourism, because in connectivism learning is viewed as a process where sources of information are connected, knowledge is absorbed and new knowledge is created. By joining a network, the student can increase his or her knowledge (DP4). Learning occurs in many different ways, and there is virtually no distinction between formal and informal learning. Knowing how to learn is more important than what is learned. Connectivism is strongly expressed in the network learning concept (De Laat & Coenders, 2011). Network learning can be described as the participating in or creating of relations between learners and additional sources of information for exchanging and developing knowledge and experiences concerning learning questions, with the aim of jointly solving existing problems. The overlap with the VAL Learning process is that the student seeks and connects his or her own sources (DP1 and DP2), and that the student does the same with his or her learning products, which he or she can connect to professional practice. The difference between connectivism and the VAL Learning process lies in the closed nature of the group, which in VAL is assembled by the educational institution. Other differences are the use of the virtual learning environment and direct guidance of the Learning process through the learning arrangements in VAL (DP5).

Of general learning theories, the Learning process within VAL can best be placed in social-constructivism learning theory, and more specifically in the theory on self-regulated learning (it also shares some characteristics with the connectivist perspective). However, when it comes to the role and impact of ICT (DP8), such as the mirroring of each other's representation in the form of learning products and peer feedback, on the progress of the Learning process and development of metacognitive skills, no conceptions are offered by these theories.

2.3 Educational psychology theories

Other insights arise when VAL is connected to theories from educational psychology, especially in the areas of information processing. Two theories illustrate this point. Ausubel, Novak and Hanesian (1968) formulate cognitive educational theory where the emphasis lies on the connection between new information and previously acquired knowledge. It states that meaningful learning only occurs when such a connection between new information and existing concepts is made. All other cases lead to rote learning. In learning, the points where new information can be grounded in existing knowledge must be emphasised as much as possible. In addition, three possibilities must be taken into account: specific new information is connected to general information (subordinate learning); general information is connected to specific information (superordinate learning), and new information is connected to broad information that is neither superordinate nor subordinate to the new knowledge (combinatorial learning). In learning as well as in VAL, rote learning always takes place. However, a DP of VAL is that there is also a combination between deep and meaningful learning. This is achieved by working with a competency methodology (Baeten 2011, chapter 2: Assessing within VAL) where the information that a student selects in order to create a learning product and explicate it to other students (deep learning) is continuously connected to superordinate learning goals as well as to knowledge objects, knowledge domains and competencies (meaningful learning). Because the VLC makes this information processing visible and because a Feedback and Reflection Cycle is involved, it is

possible to give meaningful learning the character of a Meaningful Dialogue. In the VAL concept, this occurs most strongly during evaluation and reflection held between the student and the teacher. Compared with other educational psychology theories, VAL is more closely connected to the cognitive flexibility theory of Spiro (1991), who states that learning is mainly dependent on the extent to which a knowledge domain is structured. Mathematics is an example of a well-structured domain, whereas the fields of economics and the social sciences may have structures that are less clear and that may include many different visions. In the latter type of domain, learning does not progress as well because knowledge, once obtained, is difficult to apply to different situations. For this reason, it is necessary to learn how to solve problems from various perspectives.

Cognitive flexibility theory further states that learning is enhanced by using pre-existing knowledge flexibly. Of importance are the representations onto which knowledge and skills are stored in the memory. The more different representations have been stored, the more flexible the new representation will be. In beginner learning and learning in structured domains, the new representation can be connected to a single pre-existing representation. In advanced learning and in unstructured domains, a flexible representation is possible. VAL uses flexible representations as much as possible, because they enhance inter-subjectivity and because, as a result, they strengthen the virtual learning interaction in the VLC. Students can choose learning arrangements in order to help them reach their goals and develop their competencies. Because students aim their learning products towards external target audiences (not their fellow students or teacher) and base them on differences (including individual differences) in pre-existing knowledge, learning products are different for each student. This means that the explicated representation is different for each student. In the portfolios within the virtual learning environment, students view each other's representations, ask questions about them, provide feedback and receive feedback with which they can subsequently improve their learning product, after which they present it (together with the given peer feedback) to the teacher for validation. These differences in representation lead students to connect them to different kinds of pre-existing knowledge and to change their own representations as a result. It can be stated that the flexible representation in VAL leads to more learning interaction and an acceleration of the Learning process. However, not all students acquire the same knowledge, which is a challenge for their assessment in VAL.

2.4 Process theories of learning

Another theoretical approach to VAL is offered by the perspectives of process theories of learning. The Learning process in the VAL concept is called Collaborative Creation with ICT. To begin with, there is a difference between Collaborative Creation and Educational and Assessment processes and most other theories that mainly emphasise the Learning process, sometimes in relation with instruction by the teacher. By analysing the connection between the Learning process and Educational and Assessment processes, it is possible to gain a better insight into the meaning of the different roles of the teacher, such as the role of trainer, coach and expert in the educational process and the role of expert, developer and assessor in the Assessment process. The Learning process of students is the main process within VAL, and in this section it is compared with existing process theories of learning. These theories are to some extent prescriptive, because they propose a sequence of learning activities or phases that is assumed to be optimal. However, the very assumption of complete instructional control over learning is unattainable. Learners will always proceed differently from what the teacher had planned and attempted to impose.

Vayda, McCay and Eghenter (1991) establish three requirements that a well-developed process theory must meet. Firstly, such a theory of learning describes a sequence of actions or events that is assumed to have some generality. Secondly, it presents a general principle that explains why the actions or events follow one another in a certain order. Thirdly, it presents a causative mechanism that generates the transitions from one action or event to the next one. Engeström and Sannino (2012) expand these with a fourth and a fifth requirement with the aim of comparing their theories with other leading theories. The fourth requirement is that a process theory of learning must not be based on universalism. Instead, it should describe the type of learning it focuses on and the historical and cultural grounds that it is based on. The reason for this requirement, according to Engeström and Sannino (2012), is that normative cultural expectations shape human learning to a high degree. These expectations change over time and are very diverse at any given time. As a result, human learning processes vary strongly and change continually. A process theory of learning therefore should not state or imply that there is a single biologically determined, universal or appropriate way to learn among humans.

Furthermore, a well-developed theory of learning processes should connect learning and instruction. Sutter (2001, p. 13) suggests that "to grasp the idea of learning and development, we have to get a better conception of instruction". In cognitivism, learning and instruction are separated, and they have remained separated in most theories that have followed cognitivism. According to Lave and Wenger (1991), from a viewpoint of situated learning, there is a fundamental distinction between learning and intentional instruction. As a result of this, instruction and learning (i.e. what instructors plan and the actual actions taken by learners) must be viewed as two dialectically linked processes. This is the fifth requirement of a learning process theory, as described by Engeström and Sannino (2012). Practically, this means that a theory of learning processes must also compare and/or contrast processes as the teacher plans and prescribes them to the processes that the learners actually perform. Instruction and learning never overlap entirely. It is important to take into account the fact that there is a gap between the two and that while they may be aligned, they are also often a cause for struggle and negotiation. Engeström and Sannino (2012) use this model with five requirements for a well-developed theory of learning processes to compare leading theories. I use this model to compare Collaborative Creation with ICT (VAL) with other theories of learning processes, specifically with the theory of expansive learning (Engeström, 1987).

2.4.1 The Theory of Expansive Learning

The challenge of universalism was tackled by Davydov in his theory of learning activity (Davydov, 1990, 2008) and by Engeström in his theory of expansive learning (Engeström, 1987). In his theory, Davydov (2008) mentions that a learning activity is achieved through specific epistemic or learning actions. An ideal typical sequence of learning activity consists of the following six learning actions:
1. Transforming the conditions of the task in order to reveal the universal relationship of the object under study;
2. Modelling the identified relationship in material, graphic or literal form;
3. Transforming the model of the relationship in order to study its properties in "pure form";
4. Constructing a system of particular tasks that are solvable by using a general method;
5. Monitoring and assessing the performance of the preceding actions;

6. Evaluating the assimilation of the general method that results from solving the given learning task.

Because the purpose of Davydov's theory was to transform teaching and learning in schools, it confines the concept of learning to the assimilation and appropriation of culturally based contents. Instructional guidance is the mechanism by which one learning activity progresses to the next. This transition is described as voluntary and rational in nature. Davydov's theory also had the purpose of guiding a new type of school curriculum and instructional practice. Instructional guidance is what allows learners to transition from one learning activity to the next. The theory does not incorporate the possibility of differences between planned instruction and actual learning activities. The learner's actions are limited to those determined by the instructor's intentions. According to Engeström and Sannino, this puts the theory at risk from becoming a self-fulfilling prophecy. The theory demonstrates how learners take actions that significantly deviate from the script planned and implemented by instructors or interventionists. Davydov does differentiate learning activities from learning (Davydov, 2008). In his view, a learning activity is a specific type of activity aimed at forming theoretical generalisations. As such, it is not a universal form of learning but a recently emerging type of learning, not yet fully formed and not frequently observable.

In his theory of expansive learning, Engeström builds on Davydov's work and extends the treatment of the cultural and historical specificity of the type of learning identified by the theory (Engeström, 1987; Engeström & Sannino, 2012). In the theory of expansive learning, the subject of learning is no longer individual; it has become a collective system of activity (or network of activity systems). Learning begins when individuals start questioning the order and logic of their activity as it currently exists. Following this, others begin to collaborate in analysing and modelling, and a zone of proximal development emerges. Expansive learning culminates in the formation of a new, now expanded object and activity pattern related to the object. Expansive learning is achieved through specific epistemic or learning actions that together form an expansive cycle or spiral. The seven learning actions are the following:
1. Questioning, criticizing or rejecting aspects of accepted practice and existing wisdom;
2. Analysing the situation that involves a mental, discursive or practical transformation of the situation in order to find out causes or explanatory mechanisms and relationships. The analysis can be historical–genetic or actual–empirical;
3. Modelling the newly found explanatory relationship in some publicly observable and transmittable medium;
4. Examining the model, running it and operating and experimenting on it in order to fully grasp its dynamics, potential and limitations;
5. Implementing the model by means of practical applications, enrichments and conceptual extensions;
6. Reflecting on the process and evaluating it;
7. Consolidating the outcomes into a new, stable form of practice.

Engeström and Sannino's theory of expansive learning is based on the idea of multiple types of learning. It is modelled on Bateson's (1972) analysis of levels of learning. Specifically, it is defined as similar to Bateson's "Learning level III", which describes it as a rare and risky type of learning even in human beings (Bateson, 1973). On this level, a learner not only learns, but simultaneously

learns how to learn, and simultaneously learns how to learn how to learn. Engeström and Sannino (2012) examine these two theories as possible springboards for revitalizing interest in process theories of learning by using their theoretical model with five requirements. Both Davydov's theory of learning activity and Engeström's theory of expansive learning are based on a rationale for the sequence of learning actions that is a rise from the abstract to the concrete (Ilyenkov, 1982; Kosík, 1976). The theory of expansive learning considers a stepwise evolution of contradictions inherent to the learning object (i.e. the activity that is being transformed) to be the mechanism by which learners transition from one learning action to the next. Such contradictions may appear in different parts of the learning process such as dilemmas, conflicts and contradictory messages (Engeström & Sannino, 2012).

Engeström and Sannino (2012) also conclude that there are two central shortcomings in the three prominent post-behaviourist learning theories, namely universalism and the separation of learning from instruction. The theories of Davydov and Engeström and Sannino share the strength of rejecting universalism. An additional strength of the theory of expansive learning is that learning and instruction are dialectically interconnected and that a central emphasis is placed on the gap between these two concepts. An implication for empirical research is that actual actions by learners, as well as the plans, intentions and actions of instructors or interventionists, must be examined without assuming that they will be perfectly aligned. Engeström and Sannino's second conclusion is that learning and instruction are intimately related and that this relationship is dialectical in nature. The gap between the two concepts gives rise to creative deviation and agency on the part of learners and deserves detailed analysis.

2.4.2 VAL as a Process theory of learning

A strength of Engeström and Sannino's research is that they revitalise process theories of learning. The five requirements they formulate are highly suitable for testing whether a concept deserves to be called a process theory of learning. The need to give up explicit and implicit universalism as well as the need to recognise the intimate relationship between learning and instruction and the gap between them as a source of creative deviation and agency are necessary requirements in a theory about learners who will always proceed differently from what the teacher had planned and tried to impose.

Despite these advantages, Engeström and Sannino devote little attention to three important factors that are of critical influence to the way in which a learning process takes place. Firstly, there is the Assessment process. In my General Introduction, I indicated that the influence of assessment on students' learning activities is large. Formative and summative assessment and the validation of products and learning interactions all influence the quantity and quality of learning activities, and even the extent to which the student takes responsibility for his or her Learning process (DP1 and DP6, see Section 2.4, p 31). Moreover, validating conceptions sharpens the dialectic, because it allows the student to mirror his or her conceptions to those of the teacher and to test whether the teacher accepts them. The student also realises to what extent his or her conceptions differ from the norm. This allows the student to reflect on his or her learning behaviour (DP2, DP3, DP4 and DP7). The connection between the activities and roles of the student and the teacher within these three processes and the coherent way in which the Feedback and Reflection Cycle is applied

allows a Meaningful Dialogue to take place, which is a way to bridge the gap between instruction and learning.

A second factor not included in Engeström and Sannino's model is the impact of ICT. The Learning process of students who are engaged in a virtual learning environment for a substantial proportion of their study time is different, can be controlled differently and can give rise to a different dialectic. First, this happens among students and later also between students and their teacher. Research on Collaborative Creation with ICT (VAL) provides insight into these processes. The third factor missing from the model is a connecting mechanism between the three processes (i.e. learning, education/instruction and assessment). As Engeström and Sannino do with process theories of learning in their paper, I analyse the concept of Collaborative Creation with ICT (VAL) in the light of the five requirements for a well-developed process theory of learning. Because the designed Learning process in VAL is closely tied to the Educational and Assessment processes, I have applied the requirements from the broader perspective of all three processes.

Requirement 1: Sequence of events or actions
In Collaborative Creation, the Learning process is divided into 11 sequential steps (see Section 2.3 as well as DP1 and DP2) that consist of coherent learning activities organised around collaborative learning and learning product creation. In the designed process, students perform some or all steps of the Learning process, and this happens partially in the virtual learning environment. A learning cycle is a sequence of these steps in terms of learning activities. The sequence of the steps is as follows. In order to join the collaboration, a student must first read selected information aimed at creating a learning product and upload this product to his or her portfolio. In order to join the virtual learning interaction as part of the Feedback and Reflection Cycle, the student has to give feedback in order to receive feedback in return or to get an appreciation of the given feedback. In order to let the teacher validate his or her feedback, the student has to give (good-quality) feedback to peers. In order to collect evidence for his or her competency development to be shown to the assessor, the student has to participate in the virtual learning interaction and participate in the best practising and editorial reviews.

Requirement 2: Rationale of the sequence
The student is responsible for his or her Learning process and gathers evidence to convince the teacher of his or her competency development during the course of the educational programme (this happens mainly in the virtual learning environment). The main part of the evidence can be submitted in the virtual learning environment by answering questions, giving arguments, taking a position on a certain subject, providing peer feedback, participating in a dialogue, taking a progress test or contributing to the best practising on improved learning products. The rationale for the sequence of learning activities progresses from the abstract to the concrete in order to deliver evidence for the agreed competency development.

Requirement 3: Mechanism of transition
The mechanism by which one learning activity progresses to the next is the Feedback and Reflection Cycle (see General Introduction). This Cycle is only possible because most of its content is transparent in the virtual learning environment. Students can see the products that other students create, they see the conceptions and misconceptions that other students have, and they see how they estimate their peer feedback. Students constantly mirror their products with those of others; in this way, they gain knowledge that they can submit for validation to the expert. This

process of mirroring flexible cognitive representations (Spiro, 1991), combined with the Feedback and Reflection Cycle, ensures that the student knows when a new learning activity is desired.

Requirement 4: Universality versus plurality of learning

While the Learning process in VAL is structured, the steps and learning activities differ: not only between one learning cycle and the next, but also between one student and another. This is caused by differences in previous knowledge, choices of content that are made possible for the student, learning preferences and the sociocultural background of the student. The way in which a person learns cognitively, however, is not the subject of this study. There is a culturally and historically determined plurality of learning, but in our investigations the focus lies on output in terms of knowledge products and evidence for competency development.

Requirement 5: Relationship between learning and instruction

In Collaborative Creation, instruction is viewed from a broader scope because in addition to the Learning process, the Assessment process is involved. Because the Feedback and Reflection Cycle serves as a connecting mechanism between the three processes, dialectic gains the most value. Through the search for the correctness of the argumentative case, the truth regarding an event, the quality of a learning product or the professionalism of the learner, differences in conceptions become apparent. This, too, occurs mainly in the virtual learning environment.

By contrasting different conceptions of the topic of conversation during student meetings, a Meaningful Dialogue can emerge at group level. Later, during evaluation and reflection (see Section 3.2, step 11 of the Learning process within VAL), these conceptions can emerge at an individual level. This way, the student continually constructs new knowledge and insights, learns a lot from this and adapts his or her learning behaviour. The teacher does the same, but from an educational perspective. The teacher adapts his or her activities and images flexibly in order to give the right form to the content of the Meaningful Dialogue. It is not likely that the teacher is able to prepare fully for the learning cycles before they have started; he or she will (have to) delve into new developments with respect to the learning topics and find new ways to guide students in their learning processes. As a result, the Meaningful Dialogue becomes the quality criterion by which an educational institution determines to what extent the teacher can tap into his or her students' talents.

By placing the above findings on VAL in the model proposed by Engeström and Sannino to test whether a theory is a well-developed theory of learning process, it can be concluded that the Learning process within VAL meets all five requirements (see Table 2.1).

Table 2.1 The extent to which the VAL Learning process meets the requirements of process theories of learning

Requirements	Sequence of events or actions	Rationale of the sequence	Mechanism of transition	Universality vs. plurality of learning	Relationship between learning and instruction
Collaborative Creation with ICT (the Learning process within VAL)	The 11 steps of VAL	Progressing from the abstract to the concrete in order to deliver evidence of the agreed competency development	Mirroring flexible cognitive representations in the Feedback and Reflection Cycle	Plurality of learning that is culturally and historically determined	The Meaningful Dialogue connects the three processes and bridges the gap between learning, teaching and assessing

Engeström and Sannino's model and Engeström's theory of expansive learning may benefit from being expanded because no explicit attention is given to two factors that strongly influence the way in which a learning process occurs: the role of ICT combined with learning technology as is introduced in a VLC and the connection to the Assessment process. Collaborative Creation with ICT is the name of the Learning process within VAL; as described and analysed in this chapter, it is a process theory of learning that is strongly related with Engeström's theory of expansive learning.

2.5 Final remarks

In this chapter, we discussed a number of specific features that are typical of the VAL concept, and we connected these to theoretical insights. That being done, we also need to consider the wider context of VAL and offer a more extensive description of VAL as an educational concept and the way in which it allows learning to take place. This includes elaborations on the basics of VAL, the Personal Learning Interface, the Meaningful Dialogue, Feedback and Reflection, visual learning and designing, assessing and moderating within VAL, to name but a few topics. These issues will be dealt with in our next chapter.

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Chapter 3 Virtual Action Learning, the educational concept

Aiming to offer a comprehensive description of VAL as an educational concept and elaborating on the ways in which VAL allows learning to take place, the current chapter focuses on a number of issues that are central to the concept, including the basics of VAL and formal learning, the personal learning interface, the importance of creating meaningful dialogues, offering feedback and reflection, incorporating visual learning and designing, assessing and moderating Within VAL (digital didactics). This chapter also offers a number of examples to illustrate how students can develop their skills and competences within VAL through virtual interaction with the help of specific VAL applications. This chapter describes in detail the five main objects of the VAL educational concept: Learning (3.1), Designing (3.2), Assessing (3.3), Moderating (3.5) and Organising (3.5) within VAL.

3.1 Learning Within VAL

Learning
Learning is shifting. Learners cannot learn to the best of their abilities due to the for them slow transfer of knowledge, teachers struggle with the question of how to use new media, parents consider the media generation gap to be the explanation for inadequate transfer of knowledge to their children, companies can barely indicate how the individual learning development can strengthen their organisation's development, and politicians and educational managers know especially how this is not to be solved.

The evolution of formal learning
Everyday learning is either interrupted or – depending on the applied teaching method – enriched by (formal) learning at school. The question is not whether but how computerisation and new media will influence formal learning. The latter is illustrated by means of a learning pyramid with four levels, of which first the abstract terms are listed first:
- data are symbolic representations of numbers, magnitudes, quantities or facts;
- when someone gives meaning to data, we call it information;
- when someone can explicate this information by applying it (essay, product, activity) and can link it to other information or experiences, we call this knowledge;
- wisdom is the superlative of knowledge, though critics prefer tend to refer to it in terms of an attitude towards knowledge.

In the traditional approach to formal learning, the educational programme selects information (which learning materials at what moment), analyses how educational material can be applied in a coherent and didactically responsible manner, and assesses the educational material available. Formal learning occurs in a stable learning environment (structure, building, arrangements, method, persons, planning and organisation) with sources that have been detected and selected by the educator and in which transfer of knowledge is of utmost importance. ICT is at best a substitute for existing activities within learning processes. In pyramid-terms: learning is top-down. The educational programme determines what, how and when students learn.
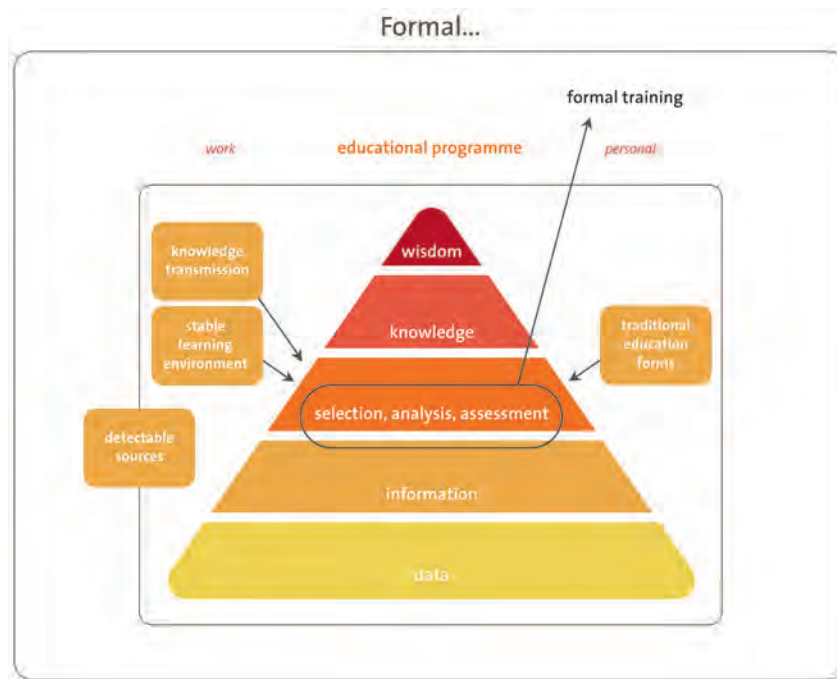
Figure 3.1 Formal

In the modern approach ICT and computerisation play an important role. Books and notebooks are supplemented with Internet and all sorts of resources. The sources that students use are therefore more difficult to trace for educators. The current generation of electronic learning environments do not serve to solve the problem. On the contrary they amplify it. Often it is unclear whether it is the educator or the learner who selects the information, let alone who analyses and assesses this. Both the learner and the educator select information, but the quality of the information selected by the learner is not assessed for accuracy, reliability, logic or even its source. This is further compounded by the changes in forms of education (more practical assignments, more assignments that include internet searches). This change is merely a shifting around of the parts: the method remains the same.
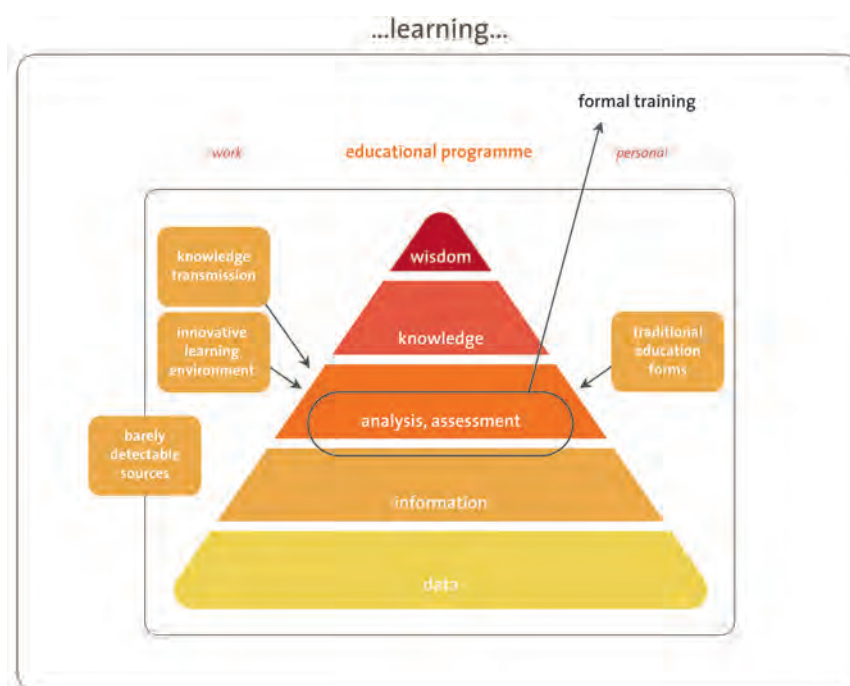
Figure 3.2 Formal learning

The emergence of learning with a Portfolio does signify a change towards more demand driven learning. Nonetheless, this is not part of a method or educational concept that adapts to the development of the personal interface of learners. Students are still largely dealing with knowledge transfer. In pyramid-terms: learning is sometimes top-down, sometimes bottom-up. The educational programme still largely determines what, how and when students learn.
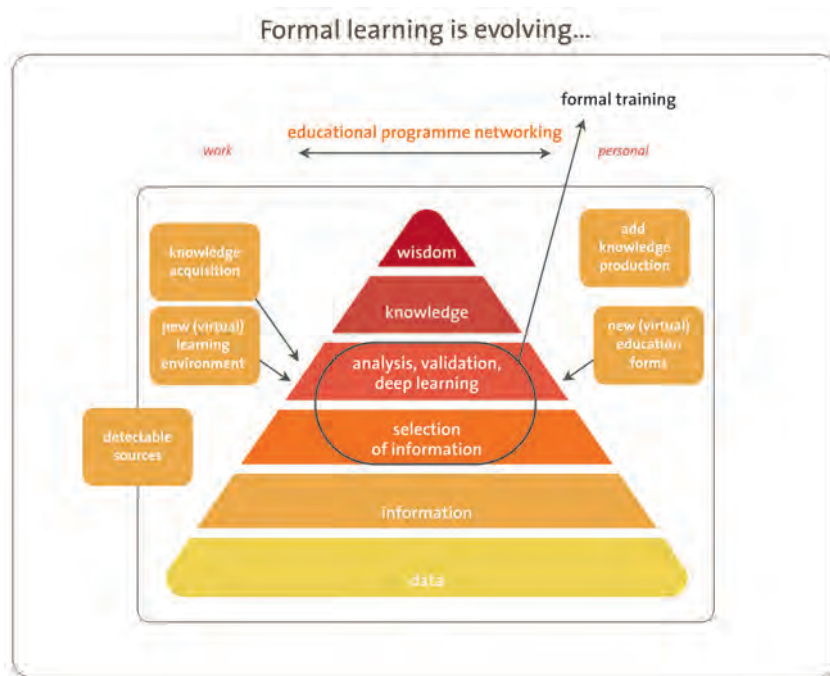
Figure 3.3 Formal learning is evolving

Should the world of education adapt to the new learning interface and start wielding ICT as a powerful educational tool, formal learning will evolve into a completely new approach. More integration with professional situations (work) and students learning more and more in other networks the boundaries of the educational programme being extended in terms of their content. Information selection will become a core component of the learning process, whose primary focus then on the making of products. Acquiring knowledge is the key, demand-driven education the logical progression. Learners will work together more and thus learn more from each other in this production process. Teachers become educator and acquire other tasks, such as validating the produced information (products), participation in a Meaningful Dialogue with learners and colleagues, stimulating deep learning and digital assessment of the learner's development. The latter can be done in the form of knowledge or competencies. This way of learning requires transformation into a completely new educational concept: with a new method, new (virtual) educational forms, different educating roles and a new learning environment. Learners will then be able to convert knowledge into authentic products that are validated by the educator. In Pyramid-terms: learning is bottom-up, but is validated top-down. The educational programme can still determine what students learn, but less and less how and when. This form of education fits in with colourful computerisation and new media; it also anticipates the development of the Personal Learning Interfaces. The gap between everyday learning and formal learning will thus become smaller. A theoretical basis can be found in social-constructivist and connectivist learning theories. These assume an individual knowledge construction that develops through interaction with fellow learners and in which ICT can serve as animator.

take responsibility for
own learning process

ask concrete
learning questions

explicate knowledge object

relate knowledge object
to similar objects with
which one in familiair

devise original solutions in
terms of content and form

construct new knowledge

tap into sources that are in
line with previous knowledge

learn from fellow students
and share knowledge

public-minded presentation

Figure 3.3 Formal learning is evolving and demands social constructivist learning

Virtual Action Learning (VAL) is, however, more than just a learning theory. This educational concept has a novel view on the organisation and implementation of educational and assessment processes. A vision that enables contemporary learning – and enriches it. It is about education in which ICT enables different educational forms (enabling) and at the same time enhances educational programmes with new educational forms and completely different – virtual – learning activities. VAL is designed to tempt learners who work together into active and productive learning. In order to achieve this, a completely different design and implementation of educational and training programmes is needed, with educators who want to achieve more results in their work.

Over the last ten years, VAL has been applied in more than one hundred projects and pilot programmes. The method has been continuously developed and adapted. This has led to new insights about learning, of which three are addressed here:
- Personal Learning Interface;
- Learning through gaming.

These insights form the basis for learning in VAL. To illustrate this, a few aspects through which a VAL-inspired learning process differentiates itself will be presented, namely:
- VAL: the basics;
- Collaborative Creation;
- Meaningful Dialogue through feedback and reflection;
- Visual Learning;
- Knowledge Production;
- The Virtual Side of the Story.

3.1.1 Personal Learning Interface

The Personal Learning Interface is a design that certainly deserves the qualification 'new insight with fresh experience'.

Colourful Computerisation and New Media

We learn every day by processing new information and applying it in a broader context. The range of information, not to mention the number of data sources, carriers and channels, has grown explosively over the last two decades. Not only is there more information, but it is also more diverse and comes to us in numerous ways. Information is, you could say, colourful. New media provide new opportunities and existing information ages faster. As people seek ever increasing amount of information – though supply still outweighs demand – they need to search, filter and select more. Moreover, certain media, such as the Iinternet and games, have a fundamental and intrinsic effect on learning behaviour. The question is thus not only how to handle the information explosion, but more importantly how we process information. To speak in ICT terms: it is not the space on the hard disk but the processor that matters. The colourful computerisation has consequences for both the individual learner and education in general. After all, who decides which information to use in the learning process? Who searches and selects information? Who analyses and tests the selected information? Does knowledge transfer by the educator therefore remain more effective than knowledge absorption by the student? What autonomy do receivers and providers of education have in this respect? How can educational programmes sensibly respond to the developments? Can they do that at all?

The Personal Learning Interface

Not only is there more information available nowadays, there are also many new media. 'New Media' is a collective term for all sorts of data sources (data systems, websites, Wikipedia), data carriers (such as pcs, dvds, cds, pdas, usb-sticks, smart phones, digital television), data channels (telephone, cable, gps, wireless networks, rss), games and all sorts of social media (LinkedIn, YouTube, Facebook, Twitter). Each person makes his own selection from this array, for example because he is keen to learn. But choosing is tricky because most of the information that people process lacks a clear sense of purpose. If you add to this that learners increasingly use several media at once (they produce an essay on their pc while the television is on and music playing in the background; and Whatsapp in between),then it becomes quite clear that selection of information and choice of media is a complex process that, moreover, differs from one person to the next. A learner does not have a different, specific learning style for each data source, situation or medium. He is forced into creating a gateway, an interface in which he – perhaps even subconsciously and independent of the medium or situation – filters and categorises data (do/do not remember, do/do not use). This actually happens before he has ever give the data meaning and transform it into information. It starts even before a child goes to school. Education is aimed at groups of learners, and they all have their own interface with a variety of ways of processing data. And the differences diverge more and more over time. There is barely even a recognisable learning style, but there are learning preferences that vary according to situation and time. Each individual can develop an increasingly personal interface as a result of colourful computerisation and the possibilities presented by new media. We define a personal learning interface as a gateway or a filter that the user creates in order to process media and the underlying data. There are a

number of preferences that have become more common to learning interfaces, such as: more audio-visual, more multi-media, more graphics, richer learning environments, more information by oneself, more knowledge construction by oneself, more object-oriented onscreen reading instead of reading books. Examples of successful exploitation of the new learning interface can be found in the world of gaming.

Learning From Gaming

There are very successful ways of learning outside the mainstream of the educational system. The most successful and contemporary of those is gaming. Millions of people all over the world play games of an even increasing complexity. They learn quickly because gaming elements are presented in an attractive fashion. What can the educational system learn from gaming? There are games of all kinds and varieties: extremely simple games (Tetris, Wotic), games that are continuously online (Ultima Online), popular virtual environments (World of Warcraft, Everquest) and games in which the player can take on a different role (avatar). Veen and Rozen have created a concise overview of this. It would be a step too far, and the gaming world is too complex, to try and make a didactical analysis here. What we do want to emphasize is that gaming has a significant influence on the learning interface. Research clearly shows that games contain a lot of didactical triggers. They look flashy and are fun to play. Gaming relies on intuition and does not require a manual, but is does have a high sense of purpose. Each action instantly leads to feedback and reward (hit/miss, bonus/no bonus). The step-by-step attainment of higher levels (scaffolding) is an enticement for the player and keeps him (or her, as a quarter of all players are female) glued to the screen. There is a lot of competition, but also a lot of cooperation. Gaming is spreading like wildfire: from young to old, from boys to girls. And into the educational system. There is a place for games in the system, but then at most as teaching aid or working method. Gaming will not, however, become a learning method and certainly not an educational concept. This is because games are programmed at action level and educational material is primarily adapted to activity levels within learning processes. It would not be not very practical to replace education with serious games or to create a comparable flashy electronic learning environment. However, the educational system can learn something from the way in which gamers learn (at action level). They are more engaged with each other, are more competitive, are susceptible to attractiveness and use the computer screen as starting point. Games reward clever solutions immediately solutions, provide quick feedback, use scaffolding and are more intuitive.

3.1.2 VAL: the basics

New insights and recent experiences have made it possible for VAL to gradually – through trial and error – be developed in practice. As an educational concept VAL facilitates several ways of learning, but excels in social-constructivist learning, especially when sufficient use is made of ICT and various media and when this is aimed at the new Personal Learning Interface. The basics of VAL learning summed up:

- VAL is Collaborative Creation geared towards competency development;
- the student possesses knowledge when he can explicate information in a formal environment in which validation takes place (school, work);
- the student has acquired a competency when he can apply knowledge in a professional manner in a formal environment in which validation takes place (school, work);

- learning is then a process of behavioural change that has resulted from meaningful interaction with the acquirement of knowledge;
- the learning interaction takes place during the joint production of Learning Products;
- the learning interaction fits in as closely as possible with the Personal Learning Interface of the student and his situational and time-dependent learning preferences;
- students learn mostly from each other;
- coherence in content is mostly sought primarily in Learning Products related to competency-linked knowledge objects;
- the learning process is transparent and all learning activities and products remain visible;
- the educator stimulates deep learning, meaning that the learner can explicate his acquired knowledge in applying a higher level of abstraction and for a different target group;
- the virtual learning question is the starting point of the learning cycle;
- the students can partly learn independent of location;
- the students is assessed on his actual competency development, regardless of the educational period (utilisation);
- the Meaningful Dialogue ensures coherence of all learning activities and learning achievements.

The basic learning process at which the educational programme is aimed consists of eleven steps that can be applied flexibly, but starts with virtual learning activities.

There are thus different learning cycles. They can differ in duration from several days to one month. In practice each student follows his own steps: one student might start by looking at Learning Products in Portfolios of fellow student, another might follow the path of the Learning Arrangement, some might only provide feedback and are extremely active in the Virtual Learning Interaction, while others might only start making a Learning Product after a CampfireStory and try to get this validated in an Editorial Review.

Collaborative Creation

Collaborative Creation of knowledge with ICT is the best way to describe the learning process within VAL. The student learns from other students by receiving feedback with which he can improve the quality of his own Learning Product. He also learns from the appreciation of his own feedback by other students, as well as from his educator's validation of Learning Products and feedback. Feedback is considered useful when it can be used to improve or enrich the Learning Product. Through the Virtual Learning Community, where they read comparable Learning Products and answer Learning Questions, students also learn to accept compliments from fellow students, to develop or do knowledge tests and to respond with arguments to other students' statements.

In this production process students learn from one another. They only submit their Learning Questions to the educator if they cannot figure it out amongst themselves. The educator in the production process only intervenes at the last possible moment and even then only when students explicitly ask for help. In this way each student constructs his own knowledge and makes the Learning Product that is best for him. What cannot be tracked, however, is what the student learns when he learns and from who. But that is not really all that important. In searching, the student constructs a framework that determines whether or not his knowledge construction is correct. The results of late(r) intervention by the educator, on the other hand, are well-known: more deep knowledge development, more personal learning behaviour with specific learning preferences, and 'clicking behaviour' on the VLC which matches the Personal Learning Interface of the student. The

optimal situation is achieved when the educator considers the Learning Products good enough to be published on a public Plaza or, together with the feedback and comments, to serve as innovative, authentic knowledge product. Such a knowledge product could be useful to the commercial or professional sector, or to everyone on the internet (for example on Wikipedia). In any case the educators or fellow students should not be the target group for which the Learning Product is made. The kind of public-minded Learning Production has two powerful effects:

- deep learning;
- a sense of audience.

This change of target groups forces the student to explicate his acquired knowledge for another receiver and / or to place it in a new context. This form of deep learning is much difficult than making something for fellow students or the educator. When students make products to which an external audience can also respond they develop a 'sense of audience': a feeling that encourages them to make good Learning Products. This is something quite different from doing an assignment, placing it in the educator's (virtual) pigeonhole and waiting for the educator's assessment (often merely a grade with marginal feedback). Along the way we have discovered that producing for an audience leads to more serious learning interaction, better feedback and better Learning Products. Instead of filling educators' (virtual) pigeonholes with exams and assignments, the students' output now goes to a website with a new audience.

Meaningful Dialogue through Feedback and Reflection

Over the years we have arrived at better understanding of the (virtual) interaction amongst students and between students and their educators. We have continuously discussed these experiences with teams and groups of educators who were following a VAL educational programme. Each time, we directly adapted the VLC and the educational forms so that digital communication and flow of data gradually developed into Virtual Learning Interaction. By organizing this properly, a Meaningful Dialogue becomes possible between students and their educators. This Meaningful Dialogue is thread running through the communication within a VAL educational programme and ensures that students learn in a more thoroughly manner. Of course there is also a lot of other programme information that influences the student's behaviour. Information about planning, the registration system and the recording of study progress also effect his learning behaviour. The objective of the Meaningful Dialogue is to make the student's learning process more efficient and effective. Each learning activity and interaction within the learning process is part of this dialogue, through which can be determined, again and again, whether the comprehension is correct and follow-up desired. Control is partly in the hands of the student, who is searching, naturally, for clarity about the learning content and the learning results.

The Meaningful Dialogue takes place virtually as well as physically:

• on competencies, application levels, learning objectives and intentions during the assessment;
• on Learning Products and feedback during CampfireStories, Forum, Dialogue, Statements and Best Practising;
• on feedback during Virtual Learning Interaction;
• on validation of certain Learning Products and the related feedback during an Editorial Review.

Experience has shown that providing feedback within a VLC is a process in which students need time to develop. There are moreover large differences between young and old, fulltime students and working students, and students with different cultural backgrounds. Thus, African and Asian

students do not immediately provide suggestions for improvement, as Western students do. They first give a personal compliment or show understanding for the difficulty level of the Learning Product. In the VLC, phased feedback is possible: first with emphasis on becoming accustomed, then on comprehension and elaboration and finally on improvement and enrichment of other Learning Products.

Visual Learning and Training

Visual Learning is an education form that was gradually developed within VAL by playing to the preference for learning with the aid of visual materials (pictures, photos, video, drawings) combined with interaction on the Internet. Is it a learning-friendly supplement to training of skills or for real life situations with virtual follow-up on the VLC. Working with photos has a greater learning effect than working with video. This is because the information in photos can be processed in a more compact and traceable manner by the student (in his head) than is the case with video, for which an entire series of images must be processed. Additionally, most students have a cell phone with a camera of reasonable quality. It starts with a training situation (for example a role playing) or a practical situation (such as giving a lesson) in which a student poses certain questions to all involved. At the same time a fellow student takes a series of photos of this student. After this meeting the student selects, together with others if required, six photos that according to him illustrate Critical Incidents. The approach can be positive (look how well I did that) as well as less positive (that did not go well). He then uses this to make a Learning Product in which he analyses his Critical Incidents and forms new learning objectives. This is done by posing five questions:

1. Why is this a Critical Incident?
2. Would a good professional have done this differently? Why or why not?
3. Where (source) can I find information about the behaviour in this incident?
4. If I should have intervened, what would I have had to do? With what result?
5. Which learning objectives do I still want to realise in this field? How will I do this?

He then places these outcomes as a media product in his Portfolio and asks his fellow students for feedback. They are happy to provide feedback because they are curious (which points does he wish to improve), because they themselves might be in the photos and also because they are eager to find shared meaning for their own Critical Incidents.

Students put a lot of time into providing feedback and learn a lot from each other, often on points that were missed by the educator. Their feedback is wide-raging and serious in nature, regardless of their personal inter-relationships. Validation of the product and the subsequent feedback require a high level of expertise on the part of the educator, partly because of its intersubjective character. Visual learning products are also used as material for discussion during Assessment and Reflection.

Knowledge Production

The student does not leave his products in the educator's pigeonhole; the vast majority is not even read by the educator. Only those products nominated as best by the group – usually three or four per Learning Arrangement – are discussed at the end of a learning cycle in an Editorial Review. If the expert validates them there as 'to be published' they can be published on the internet for relevant target groups. The two most popular forms of publication are the Plaza Product and The Knowledge Construction.

A Plaza Product is a product validated by the educator 'to be published'. If the student wants to, he can ask the educator to place it on a public website. It works even better when the educational institute sets up its own Plaza or links to public websites such as Wikipedia, Teacher's Plaza, Health Plaza, E-LearningPlaza or BusinessPlaza. One's own Plaza is a website which is managed by the educational institute and is meant for a specific target group (regional entrepreneurs, a professional group, companies for internships).The Plaza Product that is placed here receives the status 'published'. The expert who validates is also chief editor of the website. It is also possible to let students manage the Plaza. This is certainly recommended provided the expert remains chief editor and when it concerns an interactive website on which visitors (for example internship supervisors) can respond.

Due to the number of Plaza Products, and depending on their relevance to the target group, not all products can be published and thus retain the status 'to be published'.
The Knowledge Construction is more than a Plaza Product and contains:
• the original (video)assignments of a principal;
• the validated feedback of the students in the form of a series of suggestions for improvement and enrichment (ticker tape);
• the feedback of the expert;
• the spoken comment (short audio fragment) on the validated product of the principal and others directly involved.
Placing this together leads to an authentic and rich knowledge product that can be published on the relevant Plaza and which can serve as case study for students in subsequent educational periods.

3.1.3 The Virtual Side of the Story

The Virtual Learning Community is a user-friendly Internet application with an intuitive interface by means of which all sorts of components (functionalities) can be used by everyone. In this way the learning process and the educational and assessment process (for which the educators are responsible) are supported in a attractive and educational manner. The VLC has many members: the students and their educators, naturally, and also external experts and internship or thesis supervisors. At the primary and secondary education levels it is possible for a parent to be linked up to the Portfolio of his/her child.

All the programme information (from planning, member profiles to educational material, Learning Arrangement and sources) is on this VLC and can be accessed by all members. Only the educators are allowed to change or remove information. This requires specific knowledge of virtual learning processes (see Moderating). The educator can transfer (a part of) this task, under certain quality requirements, to a student. At the start of the programme, agreements are made about the quantitative participation (number of log-ins and responses, number of products per period) and the qualitative participation (language use, confidentiality). Each time something new is added, all users are informed of this when logging in or via a text message on their cell phone. Other data or communication channels are no longer used. The VLC renders a separate website, digital learning environment and email correspondence superfluous.
Research has shown that it is precisely the subjective appreciation among participants that makes visiting the VLC (and within this the group dynamics and the learning interaction) so stimulating.

Students experience the VLC visits as an educational activity with a social character, just like chatting or gaming.

The VLC interface combined with effective moderating give rise to two unique characteristics: screen captivity and the Virtual snug (see Moderating). The VLC cannot compete with other new media such as Facebook, YouTube or SecondLife, but good organisation and a process-oriented way of moderating (see Moderating) supports the student's learning process in a very effective manner. Virtual Learning Interaction is the driving force behind the learning process within VAL – this is where the Meaningful Dialogue, which leads to knowledge construction, takes place. Right from the start it is clear that placing 'half-baked products' on the VLC does not generate appreciation. That is why students only place their (at that time) best Learning Product in their Portfolio. When a student uploads a Learning Product, fellow students are notified of this. They can then look at the Learning Product and provide feedback. Although at first they have to get used to the system, students gradually become better at it using is. Better still: after several months they achieve learning results they had not considered possible.

3.2 Designing Within VAL

Thinking about designing based on critical analysis leads to different insights and preferences than when we think about designing based on several years practical experience. Practical experience is taken as a starting point in VAL, if only because of the scarcity of functional theories on digital didactics. Evaluations and critical reflections made during numerous teacher training courses made it possible to regard designing as a knowledge object: an adequate application of design principles and rules based on experience results in a powerful learning process for students.

'Designing' is written for teachers, designers, educational experts and education managers who want to facilitate a social-constructivist learning process that makes intensive use of ICT. VAL is a good example of this. The knowledge object 'Designing' contains individual descriptions of eleven knowledge items, including six design principles. Together with practical applications, slides, photos, screenshots and critical reflections, they provide readers with a cohesive impression of Designing within VAL. Knowledge items include the following:
• Digital Didactics;
• Towards Constructional Design;
• From Application to Knowledge;
• Differences in Learning Paths;
• Choice of Learning Arrangements;
• Suitable for Publication and Knowledge Production;
• Manner of Distribution;
• The Art of Designing;
• Onscreen Display Language;
• Designing Tests and Assessment Components;
• The Virtual Side of the Story.

Digital Didactics
The designing of Learning Arrangements facilitates the learning process with which students are able to develop their competencies. For some time now, the educational sector has been debating

whether ICT-based learning, which operates differently to paper-based learning, requires a different method of facilitation. ICT-based learning lacks verbal directions from the teacher as well as non-verbal communication. On the other hand, ICT opens the way up to other possibilities – increased individual work, viewing and reacting to the Learning Products of other students, taking online tests, and faster communication with other students and teachers. In addition, it appears that learning within a virtual environment results in a new set of group dynamics (see also Moderating). All these possibilities demonstrate that we are indeed dealing with digital didactics; not as a separate discipline, but as a component within the field of didactics. After all, we are dealing with general didactical principles such as learning functions, learning methods, knowledge transfer and acquisition, teaching formats, tests, assessments and the way in which the teaching and assessment process is tailored accordingly. One aspect of VAL is 'blended learning', a combination of face-to-face meetings and virtual learning with the latter taken as a starting point. The first step is to design Learning Arrangements to be completed by the students and then the scheduling of meetings. This means that the Design phase must include the construction of a bridge that connects with the actual learning process during meetings. Digital didactics is still in its infancy as most electronic learning environments (ELE) exclusively focus on the distribution of course and teaching materials. Furthermore, ICT is usually the basis of the design and, consequently, of educational innovations. The functionalities (Portfolio, announcements, discussions, FAQ, project rooms) of the virtual learning environment (Blackboard, Moodle, VLC Butterfly, Sharepoint, It's Learning) usually determine the type of Learning Arrangements designed by an educational institute. ICT and ELEs in particular, have consequently become the yardstick with which to measure educational innovation. VAL, on the other hand, is based on didactics, while remaining mindful of the opportunities presented by ICT. This method has been used in dozens of projects with many teachers and groups of students. The Virtual Learning Community (VLC) is configured accordingly. This makes the VLC an extension of the training concept and the corresponding Learning Arrangements. Teaching and assessment can be organised in such a way that it facilitates a social-constructivist learning process for students. This demands new design principles for the (digital) didactics. Through trial and error the principles of VAL have been developed on the ground in the teaching profession. The experiences of the teachers will therefore be discussed in detail in the following pages.

Towards Constructivist Design
VAL controls the learning process at different times and in different ways:
- the type of Learning Arrangement;
- the recommended Virtual Learning Interaction (particularly the feedback);
- distribution of the Learning Arrangements;
- moderating in the Virtual Learning Community;
- the planning of and interaction during meetings;
- the set-up of the assessment;
- the reward system (evaluation, distinction, assessment, credits);
- personal contact with other students and teachers.

The first three control mechanisms will be discussed here in greater detail. The others are discussed in the sections on Moderating and Assessing. The AssessorDesigner designs Learning Arrangements, progress tests and assessment components. VAL is a form of Collaborative Creation

in which students produce Learning Products that closely correspond to work products in the professional world.

The first part of a learning cycle is known as the virtual phase, one which students follow Learning Arrangements in order to create a Learning Product. This is followed by the Virtual Learning Interaction process, in which students improve each other's products, discuss and debate issues, answer each other's Learning Questions and study information sources such as the Internet, literature and articles. Virtual Learning Interaction is the driving force behind all learning activities and is experienced differently by each student. It is not until the second phase that students bring their Learning Questions to meetings (CampfireStories, Forum, Storytelling, Training). This input is used by students to improve their Learning Products. During a Best Practising session, students nominate Learning Products for discussion and validation by the AssessorDesigner in an Editorial Review. This learning process places particular demands on the design of Learning Arrangements; especially when one takes into consideration the fact that students differ considerably in terms of level, motivation and available study time. The design principles have been developed through experiment. More variations are of course possible, but this didactic approach guarantees the quality of learning interaction and results.

The design principles
The following design principles are used together to form the Constructivist Design of the Learning Arrangements:
1   Geared towards Collaborative Creation (see Learning);
2   From application to knowledge;
3   Difference in Learning Paths;
4   Choice of Learning Arrangements;
5   Virtual Learning Interaction as a driving force (see Moderating);
6   Suitable for publication and knowledge production;
7   Distribution procedures;
8   Onscreen display language.

Practical experiences
Experience with this design method teaches us that with regard to courses:
• a Learning Arrangement must be made available once every week or two weeks;
• the average Learning Arrangement has a four to six hour study load;
• there can also be Learning Arrangements with a thirty to fifty hour study load;
• three quarter of the arrangements can be designed well in advance;
• 65 to 80 percent of well-designed Learning Arrangements are reused in the long term;
• the distribution (release) of Learning Arrangements determines the learning rhythm;
• the motivation and learning activities of students increase significantly with the interim design of attractive Learning Arrangements;
• students will probably only read literature in depth when given the chance to provide feedback;
• it is a challenge to establish a link with the student's knowledge construction;
• use of specific onscreen language is a help;
• books have a diminishing role, but greater use is made of Internet (articles) and work experience;

- the AssessorDesigner manages all Learning Arrangements.

The art of designing in VAL is the combination of design principles and practical experiences in the Learning Arrangements so that students can participate in Collaborative Creation.

From Application To Knowledge

Learning Arrangements correspond to competencies in the professional world and facilitate the learning process and consequently the competence development of the student. Students will get off to the best start if they are able to visualise these competencies accurately. The Learning Arrangement Visualisation has been specially designed for this purpose. It invites students to create images (photos, videos, pictures, animations or screenshots) of the work products, activities, roles and characteristic situations that are to found in the professional world. The resulting outcome – the virtual learning interaction containing discussions on work products and specific situations – is used when designing new Learning Arrangements. This also applies, albeit to a lesser extent, to everyday reality and developments in the professional field. It is only afterwards that the designer adds knowledge objects (content from the field of study). An optimal design of the Learning Arrangements can be achieved by basing it, as much as possible, on the students' individual experiences. Adding sources is an option, but a more stimulating approach is for the students to go and find these themselves. A good sequence of steps for determining the content of Learning Arrangements is as follows:

1. start with the student's personal development, the competencies the student wishes to pursue, the learning objectives he wishes to achieve by completing the Learning Arrangement and the progress of his learning process;
2. then use aspects from experiences outside of school (such as an after-school job or a club the student belongs to);
3. try to make use of topical matters;
4. pay attention to developments in the professional field (e.g. a shortage of nurses);
5. link all this information to the content of the field of study (knowledge object).

This sequence is not suited, of course, to every learning phase and learning objective, but a VAL Learning Arrangement must be based at the very least on points 1 and 5, and also on one of the other three where possible. The greater the variety of content, the more attractive the learning process will be. This design sequence allows students to visualise the application before it is embedded in knowledge. This design principle is particularly suitable for Collaborative Creation. Students record their interpretation of the real world in the Learning Product, the contents of which can then be discussed by means of Virtual Learning Interaction.

Difference in Learning Paths

If you want to know whether someone is a good designer, ask him about the his Learning Arrangements study load. Then check this with his students. A good designer bears in mind the learning path to be taken by the student. He is also able to indicate when a teacher or student can, or must, take responsibility for certain learning functions. This can be worked out in detail using three situations where the designer must make a choice:

- takeover of the learning functions by teachers;
- activation of the learning function;
- independent execution of the learning functions by students.

VAL is based on these three situations and, consequently, on three types of Learning Arrangements. The design therefore contains control levels which are all aimed at different learning paths. It is extremely difficult to determine the outcome beforehand. However, this is possible during the training period, as the VLC renders the student's learning process transparent.

This design principle allows the designer to follow the students' development during the learning process. By developing new Learning Arrangements in the meantime, he is better able to facilitate this process. Designing Within VAL is therefore an educators role, one taken on by the AssessorDesigner (see Organising).

Choice of Learning Arrangements

Learning Arrangements are customized descriptions that encourage the student to engage in learning activities to develop a specific competency. There are three types of Learning Arrangements:

- Learning Assignments, with strict control of the learning activities;
- Learning Advice: control with options;
- Learning Challenges, with very little control.

Experience has shown that Collaborative Creation in a virtual environment requires Learning Arrangements with a specific structure. This type of structure elucidates the relationship between the desired competencies and learning objectives, the corresponding Learning Products and the target group, and, of course, the way in which learning activities can be undertaken. Control of this learning path differs for each type of Learning Arrangement, but there is also another factor that determines control - the Virtual Learning Interaction. One of the characteristics of undertaking learning activities on screen is that the Virtual Learning Interaction must be included in each arrangement as there is little chance that the student will do this himself. The student will also see this as control, which blurs somewhat the boundary between a Learning Assignment and a Learning Advice. A Learning Advice with a detailed description of the expected Virtual Learning Interaction (such as: upload in your portfolio, provide three suggestions for improvement, improve your Learning Product) will be regarded by the student as a Learning Assignment.

Various Learning Arrangements are designed for each competency, sorted for instance according to knowledge object. The student himself can choose what type of Learning Arrangement he wants to complete. A student who chooses to work on a Learning Assignment can either choose another Learning Assignment for the next Learning Arrangement or opt for a Learning Advice or Learning Challenge. It is the student's choice. In practice, this depends (in descending order) on:

1. available study time;
2. choice made by other students;
3. interest in the Learning Product to be produced;
4. interest in the knowledge object;
5. study motivation;
6. learning process phase and learning plan (also see Learning).

The degree of difficulty seems to have very little influence on the choice of Learning Arrangements. The term 'available study time' deserves some further explanation; it is, after all, a relative concept. Experience tells us that when they log in, students already know the maximum amount of time they are able or willing to spend studying. The student first familiarises himself with the Learning Arrangements. He quickly estimates how much time he will need to complete them and tends to

choose a Learning Arrangement that can be completed in one or two sessions. The average Learning Arrangement could therefore require a study load of four to six hours, including Virtual Learning Interaction. A student often works on several Learning Arrangements at the same time.

Suitable for Publication and Knowledge Production
In VAL, Learning Products are produced for the ultimate purpose of being published for an external target group and certainly not so that they merely end up in the teacher's inbox. The educator, as subject expert, does not need to read the vast majority of them. After all, only the products nominated by the group as the best are discussed at the end of a learning cycle. This is done during an Editorial Review in which three to four products are discussed per Learning Arrangement. If the teacher validates them as 'to be published', the relevant target group can view them on the Internet if the student so wishes. The most appealing forms of publication are the Plaza Product and the Knowledge Construction (see Learning). In addition, there are Learning Products that are given a 'to be published' status but are not published on the Internet. These are work products such as a marketing plan for a specific company.

Output Format
Producing Learning Products that may eventually be published on the Internet creates a new audience for the student, but also places specific demands on the design of the Learning Arrangement. The Learning Products must be of limited size, preferably two to three screen pages and no more than six. Internet users do not usually read text from a screen for more than ten minutes. It must be clear beforehand whether a product is qualified for publication, which target group it must reach, and what the required format is. There is a range of formats possible that meets these requirements and that can be made using onscreen language with an attractive layout. If a course starts with the implementation of VAL, it is better to opt for gradual introduction of a Plaza; and yet it is important to work with Learning Products that are suitable for publication. After all, this is what makes deep learning possible (also see Learning). Furthermore, this working method reduces the educator's correction load to such an extent that much more room is created for feedback, validation and reflection.

Manner of Distribution
The distribution, the moment at which Learning Arrangements are released in the VLC, has a significant influence on the learning process, the Virtual Learning Interaction and the Learning Questions during face-to-face meetings. This is a typical characteristic of digital didactics. Each course is different and educators can choose from several manners of distribution. Below are the advantages and disadvantages of five manners of distribution. 'Full Swing' is the most suitable for VAL and produces the best learning results. The educators must, however, be ´VAL-competent´ and the students must take responsibility for their learning process.

Structured in Time
Based on the progress of the learning process (first assignments, then advices and challenges respectively), the educator determines which Learning Arrangements to release and when.
+ The teacher maintains control of learning processes as these are fairly homogenous
+ Effective in the orientation phase of a training course

- + Students learn to understand the didactic approach properly and gradually gain more independence
- + The educator can encourage deep feedback
- - Release determines the rate of the student's competency development, certainly if he wishes to develop quicker
- - Students feel it is too controlled
- - Students who want to spend more time studying are unable to continue working
- - Virtual Learning Interaction becomes repetitive (sometimes even boring)

Clustered

The teacher releases the Learning Arrangements in stages in two or three sorted clusters. The advantages and disadvantages listed above apply to a lesser extent. In addition:
- + Better response to learning phases (orientation and elaboration)
- + Students learn to understand the didactic approach properly
- + Students are better able to work in advance
- + Students learn more from each other through variation in learning processes
- + Better distribution of the AssessorDesigner's workload
- - The complexity of meetings increases because more knowledge objects are used
- - Increased workload for the educator

Full Swing

At the start of the course, the educator releases the complete set of Learning Arrangements. The student is expected to first complete the Competencies Visualisation Learning Arrangement and discuss them with the Assessor. He then creates a learning plan in which he specifies which arrangements he will use to demonstrate his competencies and when. In a subsequent arrangement the student will learn to select information sensibly.
- + Typical of VAL
- + Stimulates social-constructivist learning
- + Students achieve a higher level of development
- + Students study more and are more active
- + High degree of Virtual Learning Interaction
- + Increased educator involvement
- + Substantial Meaningful Dialogue
- - Significant increase in complexity of moderation and meetings
- - Higher demands placed on educator qualities
- - Increases educator workload
- - Incidental competition arises between students
- - Some students need guidance

Suitable for project-based Learning

In order to stimulate Virtual Learning Interaction within project-based learning, a different method of distribution is needed. The VLC makes it possible to work with a group portfolio whilst registering everyone's contribution individually. This requires a (large) project assignment to be subdivided into several Learning Arrangements, e.g. for the introduction, the definition of a problem, the

analysis, the design, the conclusions and recommendations, the summary and finally the whole report. The most effective method is gradual release of the selected arrangements by the educator.

+   Effective with group work and project-based learning
+   Individual registration of learning activities
+   Variation in educational forms
+   Different group dynamics
+   Validation per sub-project possible
+   Virtually impossible for students to succeed by free-riding
-   Less Virtual Learning Interaction
-   Increased complexity of moderation and meetings
-   Less subject-specific depth

Focused on Challenge

The educator releases Learning Arrangements which only contain competencies, knowledge object(s) and a few minimum conditions. To make Virtual Learning Interaction possible, the student looks for at least one co-student who wants to take on a similar challenge.

+   Student development is much faster and more specific
+   Less workload for the educator
+   Surprising results
-   Difficult to create connection to meetings
-   Very little Virtual Learning Interaction with other students
-   Selection of a Learning Challenge may signal a student's intention to drop a course
-   The theory is more interesting than practical learning

3.2.1 The Art of Designing

The ability to design Learning Arrangements based on the aforementioned design principles whilst taking into account the rules of experience is a skill in itself. This is the art of designing. Although changes can be made to existing material, it is better to start with a clean slate. This requires some sort of guidance, however. 'The art of designing in VAL' is a tool designed for this purpose. This score list tests the design principles and a substantial number of the rules of experience. One of the rules – enticement – has been worked out separately. In order to guarantee the quality of an arrangement, a list of criteria has been drawn up. When creating a Learning Arrangement, an attempt must be made to meet as many of these criteria as possible. However, not every Learning Arrangement has to meet all the criteria (a 100 percent score) to make Collaborative Creation possible. The Learning Arrangements included in this book as practical applications achieve scores of more than 70 percent and can still be improved. Learning Arrangements that do not lead to concrete Learning Products (self-study only) naturally score lower on quality criteria.

Onscreen Display Language

The application of digital didactics requires special onscreen display (OSD) language. A student logging into the VLC does not enter an anonymous virtual learning environment. He enters, even if it may only be virtually, through the doors of his own school. The OSD language must therefore be correct to start with. It is not easy to communicate via the screen. After all, computers offer not only opportunities but also implies certain limitations. Computers enable users to do several things at once, such as instant messaging, YouTube or Facebook, or games. On the other hand, the user is

unable to process all information to the same depth and, as a result, clicks rapidly on the screen to select only the information he wants, based on his personal preferences. Screen language must therefore differ from language written down on paper - there are a lot of images, lists are commonplace, and punctuation marks (full stops, commas etc.) are often omitted. Use of the internet places demands on the structure of the information. Here we will discuss three particular aspects that are important when designing Learning Arrangements. First of all, Learning Arrangements are read on the screen. It must be possible to execute them without printing them out. To avoid frequent scrolling, lists are preferred to complete sentences and punctuation marks are omitted (see Moderating). Secondly, the educator must realise that design information comprises control information and source information. Control information tells the students which learning activities he can carry out; they are part of the arrangement. Source information concerns the content of the knowledge object and is therefore placed alongside other components in the VLC, such as 'Relevant articles', 'Interesting links' and 'Documents'. This division makes it very user-friendly. The effect is even greater when the Learning Arrangement contains internal links and hyperlinks that can be opened within the VLC. Thirdly, the compact form of OSD language is often seen as literal instructions in itself. It is a good idea to vary the descriptions, at the performance level in a Learning Assignment and at activity level in a Learning Advice. The learning process is made up of a collection of learning activities (research, studying, summarising) and actions (reading, writing, formulating, uploading, clicking). In order to allow the student to engage in social-constructivist learning at a high level the use of language, and with it control, can best be described at activity level.

Designing Tests and Assessment Components

The aim of a test is to facilitate the development of the student's competencies. One of the major advantages of digital testing is that students are given direct feedback on their performance. They can then immediately measure their progress, also in relation to other students. A test consists of a set of multiple choice questions or short answer questions about a certain knowledge object and is placed on the VLC. Once a student has completed the test, he can compare his answers to the correct answers, which will also contain hyperlinks to relevant information inside or outside of the VLC. The student can also compare his score with the scores of the rest of the group and with the results of earlier tests. Students may only take the test once. One of the resulting effects of this is that students often go on to study certain knowledge objects (e.g. a book) on the basis of the questions in the test. These tests, however, do not count in the assessment, as their reliability is extremely difficult to determine. We will not be discussing here what makes a good test as VAL is no different when it comes to other ideas regarding the value or otherwise of tests. There are many excellent publications available for those who want to explore this further. We will, however, mention a number of specific experiences with regard to testing in VAL.

Knowledge Test

With courses that are more theoretical, it is good idea to design Learning Arrangements in which students themselves must devise a test on a complex knowledge object or on an article dealt with during the particular training period. The educator validates the test via the Virtual Learning Interaction, followed by an Editorial Review, and can then enter it into the VLC so that other students may take the test.

Reflection Test

This is a new type of Progress Test that gives the student insight into the relationship between his learning performance, the learning efforts made, resolutions and learning objectives. This is only made possible by the fact that the VLC can make an analysis of the students' learning process and those of his fellow students. This type of digital didactics offers new opportunities, but is still in its infancy. Assessment components can be designed using many different forms of evaluation, which are described in the section on Organising. Two fixed components of an Assessment Day are the Self-Assessment and the Peer Assessment. Which other subparts are chosen depends on the information the assessor still needs to collect to assess the competencies from the previous period. Designing consists of selecting suitable components and adding to them the appropriate questions and propositions that can be deduced from the information available in the VLC. This is discussed in detail under Assessing.

3.2.2 The Virtual Side of the Story

In the Virtual Learning Community (VLC), the educator has a set of components he can activate to better facilitate the students' learning process. This includes components containing source information, such as 'Talking Images', 'Interesting links' and 'Relevant articles'. In addition, the educator has tools for placing and distributing Learning Arrangements and tests. After texts have been entered, with or without the help of an editor, a Learning Arrangement is linked to one or more competencies and knowledge objects. The Learning Arrangement is also given a publication date and sometimes hyperlinks to sources on the Internet or in the VLC. During completion of the Learning Arrangements, the educators are able to follow the progress of the learning processes. They can also see whether there are any Learning Questions that are not being solved in the group. Sometimes, a decrease in motivation for a certain type of Learning Arrangement can be seen. In such cases, the educator will design a Learning Arrangement that is tailored to the problem or situation. This can be placed online straightaway. Students then receive notification about the release of a new Learning Arrangement. The choice of a specific procedure of release (distribution, see above) for the Learning Arrangements has a significant influence on the learning process and, consequently, on the Virtual Learning Interaction. A publication date for each Learning Arrangement can simply be set in the VLC. The VLC provides the educator with even more options for influencing the effect of the Learning Arrangements, such as the option to allow, or not to allow, students to download Learning Products produced by others or to create their own Learning Challenges, or even to change the number of improved versions. The VLC also provides insight into the quality of the Learning Arrangement. The Learning Process Report gives an indication of the students' learning cycle. The effect of the arrangement om each step of the learning cycle is only one mouse-click away.

3.3 Assessing with VAL

This knowledge object describes the assessment process within VAL from the perspective of the design of the educational programme and the carrying out of the educator's activities. This is done using the most important knowledge items:
• From Taylorism to AssessorDesigner;
• Coherence in processes and roles;
• Knowledge-Oriented Competency Method;

- Competency Profile on a single sheet of paper;
- From 'Red Pen' to 'Blue Eyes';
- Responsibility and Evidence;
- Evaluation and Validation;
- The virtual Side of the Story;
- Assessment Day;
- Evaluation and Reflection.

The last two knowledge items are described in more detail under Organising.

3.3.1 From Taylorism to AssessorDesigner

Who is not familiar with the image of the teacher with his bag overflowing with exam papers, essays, reports and theses to take home for grading? We estimate that the average (fulltime) teacher spends 250 to 300 hours a year on this. Not to mention the fact that in the production of essays and theses the copy and paste buttons are probably used more frequently than the letter and number keys. On top of this, lack of time means that the teacher marks rather than corrects, which limits feedback to simply providing a grade. In VAL, the time spend on this by teachers is reduced by ninety percent. This demands a radical redesign of the assessment process and a different use of ICT support. In most educational concepts it is the end terms that are formulated first. Then the content is determined and spread out over the curriculum of the entire educational programme. Several assessment moments (exams, handing in assignments) are planned into the programme in order to gauge the student's mastery of the subject matter. The set-up of the educational programme is the most important element in terms of coherence and, subsequently, the assigning of teachers to the subject areas. Up until now, it has been customary to differentiate vertically in as far as possible according to subject areas and teachers, spread over a number of programme years: Taylorism in education. Admittedly, over the last few years, a great number of educational programmes have been switching to competency-based education, but their set-up retains the characteristics of vertical differentiation. This approach results in an increase in bureaucracy: a detailed elaboration of assessment activities and guidelines, lists with achievement indicators for measuring the competency development of students, and subjects and grades that remain unchanged. Such a laborious concept requires a lot of coordination and regulation. As a result, attribution within the assessment process shifts more and more away from the teacher and mote towards the supportive systems and processes. On the one hand, one can see a choice for centralised control of ICT; on the other hand too much of the teachers expertise is directed predominantly at the assessment of the students. Since this institutionalization is a fact in most educational programmes, the external attribution is difficult to change. With VAL we see a different approach: vertical differentiation becomes horizontal integration. The autonomy in the assessment process comes to reside with the educator, who, at the same time, becomes the designer of the educational material. The educator is, thus, AssessorDesigner. In order to achieve this, the assessment process must be redesigned using of an activating competency method. Aligning the educational process with this enables the student to make his learning process as demand-driven and flexible as possible. This also requires the abandonment of old working practices (exams. reading essays), as will be shown later.

Coherence in processes and roles

The intention of the VAL concept is to be as demand-driven as possible. With this, the education and assessment processes are inter-combined, but dual roles of the educator are not. The assessment process can be accurately described from the educator's perspective. For this, two methodologies have been designed: a competency methodology and an assessment methodology. These ensure coherence within the assessment process. The coherence is explained in such a way that it can be used to accurately ascertain the quality of the assessment process. VAL opts for horizontal integration, meaning that the competencies that are central to a specific period (e.g. a programme year) are the starting point for the education provided. The assessment is the differentiating process of an educational programme, since within this process crucial information about the learning results of the students is gathered in a structured manner. Within the educational process it is difficult to maintain such a structure because information is gathered from an increasing array of sources, especially from the Internet. The position of the teacher as omnipotent source of knowledge can therefore not be maintained. The educational process in VAL is derived from the assessment process. The learning process of the student is at the heart of both the educational and the assessment process for which the educational programme is responsible. The responsibility for the learning process lies with the student himself. As a result, the student can learn in a social-constructivist manner. Because there are several assessments within an educational programme, the assessment made of a student's performance (summative assessment) is simultaneously an incentive for the student to adjust his learning process (formative assessment). The link between these is the Evaluation and Reflection after the Assessment Day. The primary objective of the assessment within VAL is to stimulate the student in discovering whether, and subsequently how, he can adjust his learning activities and Learning Products. This happens during the programme from two different perspectives:

- fellow students provide feedback on Learning Products and appreciate the feedback that they receive;
- the educator provides reviews of the best Learning Products and the feedback provided.

VAL in practice shows that a student almost continuously knows what his development level is compared to fellow students. In this way the three functions of assessment (receiving feedback, development-oriented adjustment and qualification) are explicitly and coherently addressed within the assessment process. It is within the assessment process that coherence is most sought after. Competencies at different levels determine the content of the educational programme. Because competencies are dynamic in VAL – due to their adjustment to developments in the professional field – the content is continuously adjusted. In practice this means that educators are linked to competency levels rather than to subjects. In VAL, educators therefore facilitate a group of students for a specific period in working on their competency development. In a four-year programme, for example, one pair of educators facilitates for a period of six months a group of students striving to achieve the same competencies. At the end of that period a different pair of educators takes over. The educator's roles are further elaborated upon under Organising.

In the VAL educational concept, educating is synonymous with facilitating the student's learning process and assessing his competency development in a professional manner. In more concrete terms, this means that:

- the student is entirely responsible for his own learning process;
- the educator facilitates his learning process;
- the student must demonstrate his competency development;

- the educator assesses the results and provides feedback;
- the educators are entirely responsible for the educational process and assessment process.

Typical of VAL is what is not done: no setting and checking of exams, no supervision, no re-examinations. There are no time tables and the educator does not even read students' assignments or essays. The considerable reduction in these educational activities is used in VAL to be able to 'look the student in the eye': personal contact in the form of feedback on his achievements and products, and reflection on his learning behaviour.

Knowledge-Oriented Competency Method

The competency method is derived from the manner in which many companies and institutes apply competency management. In this system the manager assesses the performance level of the employee by referring to the information he already has himself and that which he can glean from colleagues and clients. Within competency management there are different views on competencies and methods. One notable feature is that a competency is often seen as a skill, such as 'being able to work in a team'. Still, there is an important difference between education and corporate life. Within corporations, competency development is a way in which to achieve maximum productivity. In education, competency development is a goal in itself. Other than is customary in the world of education, VAL looks primarily to the assessment process to provide coherence between educators' activities. The objective is to assess and stimulate the competency development of students in a professional manner. A derived objective is to ensure that education remains organisable and affordable. This naturally places high demands on the professionalism of the assessor. A competency profile consists of a set of abilities that one needs to be able to function successfully in a specific professional context. A professional context is given expression in work products, activities, roles and Critical Incidents. For a manager it involves for instance:
- work products such as a strategic plan, policy paper, company plan, selection of suppliers, corporate presentation and application for dismissal;
- activities such as analysing, assessing interviewees, conducting performance assessments, listening, taking decisions, leadership, formulating, presenting and conferring;
- roles such as leader, boss, colleague, listener, decision-maker, judge of character;

76

- Critical Incidents (moments that determine the course of an activity) such as opening and closing of negotiations, holding back momentarily instead of rushing in headlong during a board meeting, delivering bad news in a firm but satisfactory manner, radiating calmness or dominantly leading a meeting.

The competency methodology of VAL is knowledge-oriented because we believe that knowledge must precede application. In other words: carrying out any proceeding or activity requires knowledge. When an educational programme facilitates the competency development of its students, the emphasis is on the selection of knowledge objects to match the competencies. To keep it organisable, the entire competency profile is spread over several programme years. Students can demonstrate their competency development at any given level by carrying out Learning Arrangements based on these knowledge objects. The educator's activities are combined in one educational role, that of AssessorDesigner. In this way the content of the Learning Arrangements can be adapted to the students' competency profile and the competency development of the students, making assessment possible.

Competency Profile on a single sheet of paper
The educational programme determines the competency profile, which consists of three elements:
a) a subject-related knowledge domain;
b) the level at which this domain can be applied;
c) the professional manner in which this can be realised.
A knowledge domain relates to a subject or knowledge area, here, for example, the functioning of organisations, which is split into knowledge objects such as management, leadership, organisation, culture, structure, rules and guidelines, marketing, logistics and communication.
The level of application has been divided according to form and content into eight dimensions: cumulative (increasing) levels of application and their relationship with the social interaction process of these activities. The steps must be completed one after another, in a fixed order. Within VAL, competency development can be summarised as the student's learning and growth process. A competency level is thus his cumulative development level which, once proven, can only grow.

Cumulative application levels of a competency		
8	Innovation & leadership *)	Student can personally provide leadership in innovation within this domain and in the changes within the related social interaction process.
7	Managing	Student can purposefully and coherently manage this domain and the social interaction process
6	Advising	Student can coherently analyse this domain and the related social interaction process and offer reliable advice
5	Developing	Student can develop objects within this domain into tangible products (e.g. software, website, project plan, media presentation, training, advisory report)
4	Analysing	Student can coherently and clearly analyse objects within this domain

3	Coordinating	Student can interpret objects within this domain and coordinate the related social interaction process
2	Interpreting	Student can interpret objects within this domain within their context
1	Describing	Student can describe objects within this domain within their context
*) In a more academic context, 'publishing' will be the highest application level		

The professional manner is expressed in skills and characteristics that are needed to adequately carry out the activities. They have not been described per competency because, due to their general nature, they have been clustered into skills that can be demonstrated on five levels:

- barely demonstrated;
- somewhat demonstrated;
- partly demonstrated;
- largely demonstrated;
- fully demonstrated.

The educational programme determines two to eight skills and characteristics for each programme phase that have been derived from the professional context, and divides these over the relevant competencies. For the sake of organisation, the sequence is often linked to related programme components. The educational programme can also choose to repeat certain knowledge objects, skills and characteristics in a long educational trajectory (three or four years), or postpone them to other years within the programme. This makes it easier for students to hold over certain undemonstrated competencies until subsequent programme years, thus preventing them from falling behind in their studies. At the start of a programme phase, the programme determines three to eight knowledge objects per competency. These can be derived from the students' visualisation of specific professional situations, work products and roles. To prevent exhaustive descriptions and endless amount of performance indicators, the description needs to be concise and relatively abstract: it becomes a competency profile that fits on one sheet of paper.

Within VAL the competencies are not overly elaborated in advance since it is crucial that the student first constructs a framework himself and then discusses this with his fellow students and his assessor. The educator does, however, link relevant knowledge objects to certain competencies. The first thing that the student does is form an image of the competency profile. This can be done in an effective manner, through by searching for relevant professional situations. To this, we have developed the Learning Arrangement 'Visualisation competency profile'. With this, the student creates (visualises) an image of the work products, activities, roles and Critical Incidents that match with the competency profile he wishes to attain. He collects information about this through a diverse range of sources in the professional world, such as the Internet, trade journals and interviews with professionals. Based on these Learning Products, the educator can begin a dialogue about the individual competencies or the entire competency profile. In this way the educator also keeps his own practical knowledge up to date; after all, the image are assessed with reference to developments in the actual working world. This approach initiates a certain dynamic process in learning and educating as typical real-life situations are introduced in the programme. Moreover, this approach enables a strong internal attribution of the assessment. Such an approach negates the need for countless exams and tests for numerous educators.

3.3.2 From 'Red Pen' to 'Blue Eyes'

The VAL assessment method strives for as much internal attribution for the AssessorDesigner as possible. He is the one responsible for all the individual aspects as well as the complete assessment process, and for doing this in a professional manner. He knows his students and is very well informed as regards their competency development. This can only be made possible by handling information in a different way than is customary, and aligning it primarily with assessing. This is why VAL does not work with exams, grades, re-examinations and timetables, and much less with complex student progress and registration systems. Rather, VAL entails a new division of roles, other kinds of assessment activities and an interconnecting flow of digital information. If the supporting electronic learning environment can become a flexible tool for the AssessorDesigner and his Educational forms, it will offer tremendous advantages in terms of efficiency and effectiveness. That is why the Virtual Learning Community (VLC) fully facilitates VAL. The assessment of a student has learning functions and administrative functions. Learning functions are the provision of feedback on products produced, the expression of appreciation, the confirmation of the direction of development and development levels. Administrative functions include granting study credits and awarding a certificate. As mentioned before, the attention within many educational programmes has shifted from the learning functions to the administrative functions. In the latter situation the didactical contribution of teachers primarily consists of using the red pen. VAL ensures the autonomy of the educator in strengthening the learning function (also see Moderating and Organising). The design of the assessment, and subsequently the flow of information, is geared primarily towards the attributing of the assessor. He must, after all, use information that is as authentic as possible when assessing the student and when engaging him in discussion. This is why a differentiation is made between an Assessment Day and Evaluation and Reflection: in order to strengthen the learning function. The manner of the subsequent discussion stimulates the student to reflect critically but positively on his development. The objective is to ground the result in behavioural change. The number of assessment moments and assessors is limited. The tasks of organising an Assessment Day, collecting objective digital information (Learning Development Report) and the responsibility for assessment are assigned in as far as possible to one assessor (see Organising). The learning process, in relation to the flow of information (see Learning), is made transparent via the VLC Learning Development Report. In practice, it is this change of roles that turns out to have the most impact on both the educator and the educational programme. The administrative function is subordinated to the learning function, and the education function is made subordinate to the assessor function. The time saved on the administrative side and the grading of papers can be used for addressing the student himself. The assessor can thus provide feedback more feedback on the Learning Products and the learning results, and help the student reflect on his Learning Product. The Assessment Day and the Evaluation and Reflection are educational forms that are of great importance to the learning process of the student, since going deeper into the subject material happens in combination with reflection on learning achievements. The approach is such that the assessor places emphasis on what has been done well rather than on what is incorrect (the 'Red Pen'). For this new role, the educator must be better equipped and more professionalised.

Responsibility and Evidence

The assessment method of VAL differs from the norm. This is the result of the use of the VLC and its educational forms, the student's responsibility for providing (digital) evidence for his learning

process, and the assessment. The responsibility for demonstrating competency development lies with the student. In VAL he collects information about his learning activities from the very start of the programme, which he can then use as evidence during the Assessment Day. Because there is a process of Collaborative Creation rather than one single moment for appraisal, the student can continuously provide feedback, submit arguments concerning statements, answer Learning Questions and have his Learning Products published. These activities are made visible in the VLC with one click of the mouse.

During the Assessment Day the student presents his Self-Assessment, which includes evidence for his competency development. Through his own participation he can elaborate on and add to this during the Assessment Day. Based on the evidence, the assessor determines whether, and to what level, the student has achieved certain competencies. The assessor may be able to indicate which competency level the student has demonstrated, but he cannot say with al certainty whether or not the student is fully competent.

Evaluation and Validation
The assessment within VAL is for a large part based on information from the Virtual Learning Community (VLC). A student is assessed based on the information about his learning activities and the information from the Final Assessment. Right from the start of the programme, information that contributes to the final assessment is collected in the VLC. All information relating to Learning Activities in the VLC is registered in the VLC per individual student. The student can make use the components activated by the educator. These can vary per programme period. The learning progression can, at any given time, be assessed from the Learning Development Report. In this way it is possible to adjust the assessment to the actual competency development of the student.

The VLC splits information into objective information, which contributes to the assessment, and subjective information, which is primarily meant to stimulate group dynamics and does not count towards the assessment. The objective information is integrated into the assessment so that the assessor has continual access to evidence on the competency development of the student. Objective information is:
- feedback on Learning Products of fellow students;
- arguments responding to content-related statements;
- answers to Learning Questions of fellow students;
- Learning Products that have been validated by the educator.

Subjective information consists of:
- argued appreciation of the received feedback;
- compliments;
- ratings via Best Practising;
- results of the Progress Test.

When a Progress Test is part of the Assessment Day, it can be included under objective information.

Validating
A crucial and regularly recurring activity in the VAL assessment process is validating. The assessor validates as subject expert. This means that he determines the formal status of the Learning Products that students have nominated and of the feedback they have received.

Validation of Learning Products

The validation of Learning Products happens after the Learning Products of students have been improved, i.e. at the end of the learning cycle. Together, the students themselves nominate certain Learning Products for validation. The assessor validates these by giving them a status and providing feedback on the product itself. This can be done both orally and virtually. A detailed description can be found under Organising.

The criteria for validation differ per Learning Product and educational programme and are determined by the relevant expert before Best Practising. It concerns combinations of objectivity, quality, reliability, accuracy, relevance, news value, innovation and language.

The status of the validated Learning Product can be:	
Rejected	The Learning Product is of such low quality that it cannot play any further role in the learning cycle
Rewrite	The Learning Product is in need of serious adaptation and is as such unsuitable as evidence for the competency development of the student
Fine-tune	A revised version of the Learning Product, which incorporates the feedback of the educator, can be used as evidence for the competency development of the student
To be published	The quality of the Learning Product is sufficient for use as evidence for the competency development of the student
Published	The Learning Product is published on the Plaza or altered into knowledge product (The Knowledge Construction)

Validation of Feedback

The Feedback & Reflection cycle within VAL consists of three phases (see Learning) with each two types of feedback. All feedback can be validated, but only the feedback from the enrichment phase can be used by the student as evidence for competency development.

Phase	The status of the validated feedback can be:
Familiarisation	**compliment:** from the feedback it is obvious that the student positively appreciates the Learning Product
	proof of reading: the feedback shows that the student has read the Learning Product thoroughly
Elaboration	**comprehension:** the feedback shows that the student can make a meaningful link between different aspects of the Learning Product
	supplement: the feedback shows that the student has provided a relevant supplement to the Learning Product
Enrichment	**improvement:** the feedback shows that the student has used new information within this knowledge objects to indicate how and with what result the Learning Product can be improved

	enrichment: the feedback shows that the student has used new and relevant information outside this knowledge objects to indicate how and with what result the Learning Product can be substantially improved or the feedback shows that the student is capable of indicating which underlying theory the Learning Product can be linked to and how this adds substantially to the quality of the Learning Product

3.3.3 The Virtual Side of the Story

The Virtual Learning Community (VLC) provides information that contributes to the Assessment. This information is automatically added by the student when he carries out learning activities. The VLC directly summarises this information online in a Learning Process Analysis. This consists of:

- the Learning Activities Report, a selection of all quantitative data from the student's learning process, such as the number of visits, the components used and the kinds of learning activities carried out. This report is best suited for process guidance by the TrainerCoach;
- the Learning Development Report, a selection of all qualitative data from the student's learning process, such as answers, arguments, feedback and validation. This report can be examined at any moment by both the educators and the students, and provides the assessor with vital input for the assessment.

Each programme module can be different: this enables the educator to set up and adept the VLC in a flexible manner. The educator prepares the VLC in accordance with the competency profile, the size of the group and the group interaction. In order to do this he can make use of a variety of components and settings which he can activate throughout the programme period. Examples of components are the following:

- Portfolio: in this, the student can upload his own Learning Products and view and provide feedback on fellow students' products.
- Learning Questions: here, the student can answer other students' Learning Question. The answers are incorporated in the assessment.
- Statement: the students and educators can place their statements and vote on them with backed up by argumentation. The students' arguments are incorporated in the assessment.
- Images: photos and animations of working situations and professionals themselves, which all the members of communities can place in the VLC on a continual basis and without need for comment. The images speak for themselves. Other community members can use the images in their Learning Products.
- Best Practising: each student can nominate his best Learning Product(s), for which his fellow students can submit comments. This results in a nomination of the best Learning Products. The nominated Learning Products are discussed in terms of their content and validated during an Editorial Review with the educator (expert). He then decides whether they are good enough to be published on the Plaza.

The educator can also activate a number of settings that influence the Virtual Learning Interaction in the community, such as: 'Improve multiple Learning Products', 'Comment on own Learning Products', 'Comment on each other's submissions', 'Invite guests' and 'Group Portfolio'. The student can use the objective information from the VLC as evidence during the Assessment

Day. During the educational period, the educator validates certain Learning Products and some of the feedback that are included in the Learning Development Report. There is no need for reading assignments and essays or correcting tests or exams. The time saved is used in VAL to provide more and better feedback, to assess the competency development of the student and to reflect together with him on his development. This requires a specific design of the Assessment Day.

The AssessorDesigner starts on the actual assessment shortly before Assessment Day. He assesses the Learning Development Report of each student and plans the content for the Assessment Day. The level of the student's learning development is not the same as the level of his competency development, but rather, at most, an indication. Nevertheless, experience shows that the predict even before the Assessment Day (sometimes with a certainty of over eighty per cent) what the competency level of the student is. As a result, the dialogue on this during the Assessment Day is fairly definitive, and even after just one assessment students have a good idea of what their competency levels are and of how evidence can be provided for this.. A short analysis of the data by the assessor is enough to provide a good indication of the application level of each student. If he does this for several students, he immediately gets a general idea of the level that the group as a whole has achieved. This provides him with a useful framework for devising a good Assessment Day. He can choose, for example, to give the students an assignment that will provide him with the information still missing. Plagiarism and copying other peoples' texts and Learning Products cease to be a problem. After all, the validation is limited to a small selection of Learning Products, together with their respective feedback, which have already been addressed earlier in the Virtual Learning Interaction. It is, of course very important to verify the authenticity of the student's feedback in the VLC, since students can copy each other's feedback. This can be checked very easily: the computer can search for key words in the feedback and sort them according to when the feedback was provided. This makes it possible to immediately see who it was who originally thought of the feedback. The use of digital information reinforces the accuracy of the assessment, but also makes large demands of the professionalism of the assessor. In incidental cases, as with the assessment of a specific or scarcely virtual skill, the trainer himself may deem the student to be competent, provided, of course, that the assessor gives his approval.

Self-assessment
by student

Student provides evidence of competency development

Peer assessment
students assess each other from various perspectives

Assessor evaluation
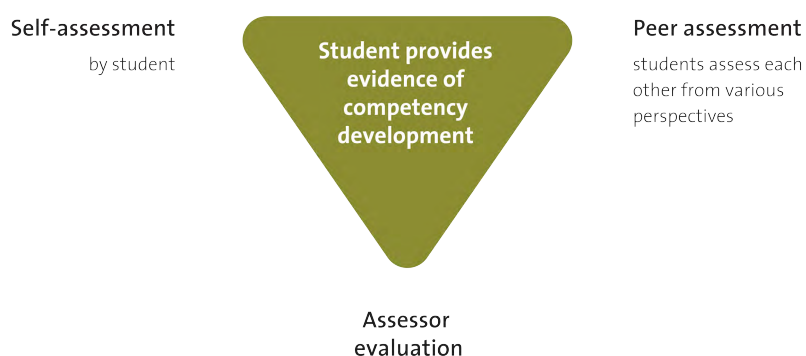
Figure 3.5 The Assessment triangle

Assessment Day

The VAL assessment methodology, including the competency profile, is the fundament of the Assessment Day. This is a meeting in which the student has the opportunity to demonstrate, using authentic evidence, to what extent he has attained the intended application levels of his competency profile. The assessor's objective is to determine whether the evidence is convincing enough in demonstrating these application levels. The group assessment takes place in the last weeks of the learning cycle and is planned together with the students. Any student who wishes to be assessed will take part.

The Assessment Day is a fairly formal affair. It is led by the AssessorDesigner and contains components that provide sufficient scope to adequately assess the student from different perspectives. There is no fixed framework for the Assessment Day, but there are two fixed components (Self-Assessment and Peer Assessment). Depending on time available and group size, these fixed components are supplemented with at least one and at most three variable components, such as a screenshot test, Role playing, a progress test, a press conference or a Testimonial Video. The components are described under Organising. The assessor plans the assessment and tries to adapt this as well as possible as he can to the competency development of the participants. These will have diverged gradually throughout the Learning Cycle. In practice, it turns out that, with this approach, there is little difference between the Self-Assessment, the Peer Assessment by fellow students and the final assessment by the assessor. This can be explained by the way in which assessment information is dealt with in VAL and the VLC right from the very start. Everyone can, at any given moment, access the ll Learning Development Reports, and everyone evaluates and appreciates the feedback that others provide them with. Students are aware of each other's current level. Only the objective information from the VLC counts in the assessment. It is integrated into the assessment in which the formal assessment of the competency development is determined by the assessor. In addition, information collected during the entire Assessment Day is also used. In certain situations the student can be declared competent by having the educator provide a statement, one that has been approved by the responsibility of the assessor. This may be necessary in the case of a specific skill that cannot be properly assessed during an assessment, such as 'carrying out exploratory surgery'. It can also be possible that a student provides evidence of a competency he has acquired and demonstrated elsewhere.

Evaluation and Reflection

After the assessment, the AssessorDesigner reaches his conclusions based on the information from the two aforementioned sources: the Learning Development Report and the progress during the Assessment Day. Subsequently he sets up an interview with the student. It is crucial that a Meaningful Dialogue arises between the assessor and the student regarding the application level of the competencies. At the same time they agree on an explanation of the learning behaviour that has led to these learning achievements and Learning Products. The dialogue forms the assessment and the explanation of the reflection. The assessor first provides his assessment in the form of application levels of the competencies for which the student has provided evidence. He also rates the development that has been demonstrated in study credits (utilisation). This may mean that no study credits are awarded if little progress has been made, or that extra credits are awarded (even above the year average) if the student has shown significant learning progress. If he can demonstrate that he has achieved all of the previous agreed final levels of the competency profile, it is quite possible within the VAL method, for a student to complete a four-year programme in two

and a half years. The Self-Assessment and the assessment by the assessor turn out to closely resemble each other in over 82 percent of the cases. If it so happens that there are clear differences between the assessment by the assessor, the Peer Assessment and the student's Self-Assessment, an explanation can be sought by, for example, making reference to Matchscores (see Organising). The assessor may be able to indicate which competency level the student has demonstrated, but he cannot say with all certainty whether or not the student is fully competent. The student might be extremely competent, but may have simply provided too little evidence to support that premise. This may seem like a very insignificant detail, but out in the real world it takes on great importance. The assessment is not subject of discussion, but the student may ask for further explanation. Subsequently the assessor can provide feedback on certain Learning Products. Next, the assessor and the students explore the learning behaviour that has led to these learning achievements and Learning Products. It is also about ascertaining interpretation faults (misconceptions, falsehoods and inaccuracies) in the learning achievements and the Learning Products. The optimal learning effect is reached when the student has become aware of his interpretation faults and is able to recognise and explain that with an entirely different approach and content his learning achievements and Learning Products would have been of a much higher level. This learning effect is elaborated upon in Organising and in Learning. The meeting between the student and his assessor is not a discussion, but rather a Meaningful Dialogue about the assessment of the competency development, the feedback and the reflection on the learning behaviour. The idea is that, at the end of the meeting, they have a shared understanding of the assessment and the reflection. The dialogue ends with drafting the formal Evidence. As digital information is still not considered in legal terms as evidence, this will, for the meantime, have to be set down on paper. That can be done by combining three documents: the Learning Development Report, the student's Self-Assessment handout and the updated competency profile. The Evidence can then be used by the student for the (re)formulation of a Learning Plan. There are various ways of ensuring an effective dialogue (also see Organising), one in which feedback and reflection are addressed.

3.4 Moderating Within VAL

Of all VAL knowledge objects, moderating attracts the most attention. It is after all a new discipline among the didactic skills that are required of each educator. Moderating is not just something that the educator does on the side, especially when you consider that the VAL student learns in a very active fashion and communicates more virtually than physically with his fellow students and educators,. Communication at school and in a virtual learning environment influence each other strongly and in a different manner than is the case with, for example, emailing.

Moderating is a new discipline, an educator activity with a specific character and with teaching aids that can only be enabled through the use of Internet technology. Despite the risk of turning this knowledge object into cumbersome jargon, a vocabulary has been developed that contains such terms such as monitoring, screenshots, Virtual snug and screen captivity. In this way the difference with moderating in more traditional virtual learning environments such as Blackboard (Classic, Angel, Next Generation), Desire2Learn, Sakai, Sharepoint LMS, First Class becomes clearer. This is not to say that moderating within VAL cannot take place in another virtual learning environment – hence the attention to this matter further on. Moderating is also a dynamic knowledge object and we will address that in this book. The skills required can be learned through a special training course and by applying them – based on theoretical knowledge – as educator. Practical experience described

in this book can also contribute. To help the reader understand moderating and the role of the VLC, a number of questions must be addressed. What makes moderating à la VAL so special? What are the underlying model and the moderating methodology? How do you make students learn collaboratively through the Internet? How do you apply moderating à la VAL? What does it demand of the educator? Can it be applied in any virtual learning environment? These questions are answered through in text and images on the following pages:

- What Makes Moderating à la VAL Special;
- The Moderating Methodology;
- Coherence with Other Educator Activities;
- Process-Oriented Moderating;
- Can You Moderate à la VAL in Any Electronic Learning Environment?

3.4.1 What Makes Moderating à la VAL Special?

Within VAL, moderating is considered a precondition for the success of Collaborative Creation with ICT. What is special about moderating à la VAL is the manner in which this happens: in a learning community, with moderators who monitor and stimulate the students in their learning activities, using a lot of Virtual Learning Interaction, and with a focus on construction of knowledge in a Meaningful Dialogue with fellow students and educators. VAL does not opt for a virtual environment in which educational material (courses, subjects, assignments) are the focal point, but for a learning community to which interaction is the key. There are several reasons for this choice:

- the student can take more responsibility for what, when and how he learns;
- the student can learn more from Learning Products and learning interaction with fellow students;
- the student can better construct his own views;
- the student can learn from his mistakes in a transparent but protected environment;
- the educator enjoys more autonomy and more room to include contemporary developments in the programme;
- the educator can approach his subject area in a more creative manner;
- the educator is offered more insight into, and can react to, the progress and competency development of students;
- the educator is afforded more insight into, and can stimulate (virtually) the learning processes within the group;
- a learning community creates team bonding and a learning atmosphere between students and their educators.

The VLC achieves all of the above. It is a stand-alone Internet application, for which the educator as moderator is responsible. He sets up the VLC, places Learning Arrangements and tests, inserts interesting links and relevant articles, places documents, monitors progress and stimulates learning interaction. All these activities we call moderating. This occurs within VAL in a specific, process-oriented manner. That males is possible to encourage students (virtually) to prepare themselves content-wise for meetings at school and formulate Learning Questions together. Of particular interest is the pact that successful moderating results in new didactic phenomena, such as associative click patterns and the presence of screen captivity and a Virtual snug. Every

programme faces the challenge of stimulating students to learn in a focused and motivated manner. VAL also demands that learning be result-oriented and may require longer ours of study. Of course for this to happen the five educational forms must be sufficiently coherent so that the student is able to study more efficiently and is not hampered in his learning ambitions. The Meaningful Dialogue enables a link between the learning activities in terms of their content. Moderating ensures that the educational and assessment processes are adapted to the student's learning process. To enable both the link and the adapting, a moderating methodology is required. The division of time allocated to learning results in VAL and to learning results within Virtual Learning Interaction as described on the following page are an excellent reflection of the desired targets when employing the VAL educational concept.

3.4.2 The Moderating Method

There is a lack of suitable literature and research on moderating social-constructivist learning in communities. This has been the case for years. That is why VAL has been developed from educational practice. Over the past nine years many VAL pilots have been carried out with groups of students and teachers in the education sector and corporate training, and a lot of training given to teachers who wished to become skilled in VAL. Their learning activities, learning results and experiences have been thoroughly (sometimes down to action on the ground) researched and discussed with VAL experts, after which the concept was successively adapted. The educational concept has thus become a coherent structure, for which a supportive virtual learning environment has been gradually developed. This is why the Virtual Learning Community (VLC) fits in perfectly with the VAL moderating methodology. The design of such a methodology starts with describing the communication forms possible within a VLC. The interaction between members of a virtual community consists of communication regarding organisation and preconditions, and communication on the learning interaction and performing of learning activities. In VAL the former is called digital communication; the latter we call Virtual Learning Interaction. Digital communication within the virtual community takes place in the form of messages uploaded by students and educators on the central Platform. This communication between educators and students and among students themselves does not directly lead to learning results. The educator moderates this communication by reading and interpreting messages and by placing instructive messages himself. He monitors the progress and if necessary stimulates the learning interaction. In the latter case he intervenes in the students' learning processes. The Virtual Learning Interaction takes the form of various educational disclosures (feedback, appreciations, arguments, Learning Questions and answers, nominations) that are placed in the components of the virtual community. Digital communication is subordinate to the Virtual Learning Interaction, as the latter forms part of the learning process. In short, moderating is the process whereby the moderator monitors and stimulates digital communication between and with students in such a way that it enables result-oriented Virtual Learning Interaction. Moderating is primarily an educator activity, but it can also be carried out by one or two students from groups that have been using VAL for a longer period of time.

Striving For Shared Meaning: A Typology of Interactivity

The importance of good communication between students and with educators speaks for itself. Both seek for shared meaning in the jumble of their information exchange. Is the information correct? Have I interpreted it correctly? Di I understand? What do you actually mean by that question, sentence or answer? Is this source information (such as the content of an article) or control information (such as: when must the student do an assignment, attend a meeting, respond to messages)? Do I need to be able to reproduce the information and, if so, when and in what form? The education and assessment processes are the reverse of the learning process. Educators have power: the may assess students on correct understanding of the information that they themselves provided. It is precisely for this reason that striving for shared meaning in the communication between students and educators is a precondition of quality education. Digital education has the additional drawback that there is no non-verbal communication (from intonation to body language and smell). In order to achieve as little ambiguity as possible about messages that people send each other, a lot of value is attached to digital communication on a central platform in the community. The basic precondition for successful moderating is that the educator can properly judge what students mean with their messages on the Platform, and can respond appropriately. To properly adjust the quality of moderating to the Collaborative Creation by students, a typology of interactivity has been developed based on the exchange of messages on the Platform. This typology reflects the intentions of students and the interventions of educators. Students' messages are either targeted at evading interaction with educators and fellow students or at the enabling of learning interaction. The possibilities between these extremes are endless. In the communication pattern of educators the respective extremes are instructivist and constructivist intervention. The division of interactions and interventions has been worked out in separate classification scales. These have been incorporated in the tables below and illustrated with actual Platform messages.

When the divisions of the student interaction and the educator interventions are linked, a typology of their interactivity within an Internet context (and thus within the VLC) can be made. There are four possibilities:
1. Ballistic interactivity: evading interaction with instructivist intervention;
2. Pleading interactivity: evading interaction with constructivist intervention;
3. Controlled interactivity: focussed interaction with instructivist intervention;
4. Process-oriented interactivity: focussed interaction with constructivist intervention.

Moderating within VAL should be directed at process-oriented interactivity thus enabling Collaborative Creation. This is often tricky since educators are used to stepping into their student's shoes when the latter does not do what the educator wants or, conversely, does something the educator does not want him to do. Added to this is the fact that the transparency of learning processes within the VLC and the use of onscreen display language 'presses' the educator into controlled interactivity. The fact that the student is fully responsible for his learning process does not mean, however, that there can be no steering by the moderator. After all, making a plan, organising meetings and designing and distributing Learning Arrangements are steering elements for the student. Moderating implies that the educator partly steers the student's use of the VLC. This is a deliberate choice, as an absence of steering generally results in low interaction, possibly to the disadvantage of the whole community. Moderating the Virtual Learning Interaction is part of the educational process and just as much an educator activity as the Editorial Review. Compared

to the presence of an educator during an actual meeting, however, moderating is less directional. What is also different is that the actions of the moderator are supplemented by interaction within and control of the group. The learning behaviour of individual students is mainly influenced by interaction with fellow students; the effect of the educators' intervention is less in comparison. In turn the interaction with fellow students is heavily influenced by safety within the group, the level of confidence in one another, the learning interaction and the moderating style of the educator.

Typology of interactivity
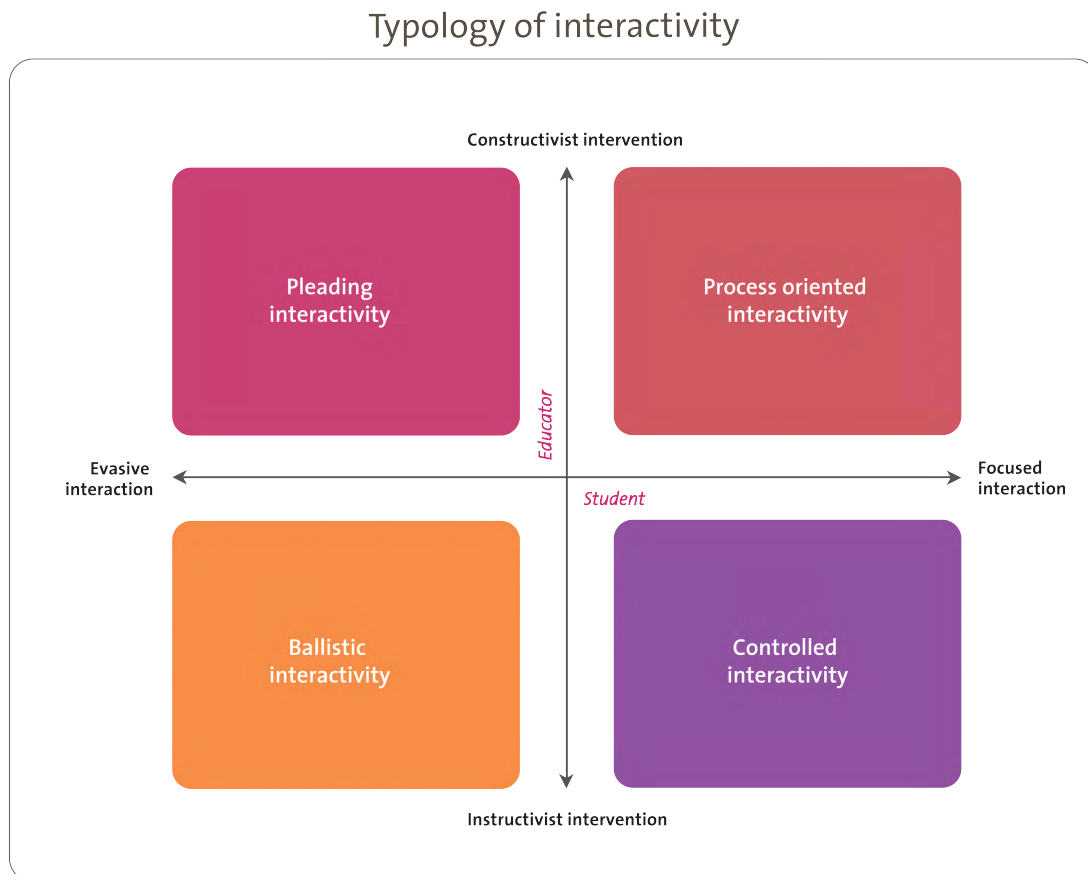
Figure 3.6   Typology of interactivity

To be a good moderator it is imperative to stick to a clear path (here this is called process-oriented interactivity) and to be able to adequately judge the intentions of students within digital communication. In addition, it is necessary to gain an insight in their virtual participation so that it can be stimulated when necessary. To gain insight into the participation levels of students, we have opted for a common Internet set-up for which special components (functionalities) have been developed in the VLC:

- Visit: the student logs into the VLC, sees his personalised welcome screen (Dashboard) and sees who else is online.
- Use: the student clicks on VLC components containing information, such as Programme, Documents, Learning Arrangements, Interesting Links or Competencies.

- Learning Activities: the student clicks on VLC components with which he will carry out learning activities. This can be: uploading Learning Products in the Portfolio, posing or answering Learning Questions, making a Progress Test, providing and appreciating feedback, providing Statements and arguments, making a Learning Process Analysis or participating in Best Practising.

Getting students to make visits is called relation management and is of course a precondition of all learning activities. This may vary from physical start-up sessions to calling all the students about whether the performance of the VLC at home meets their needs. The activity pattern on the Internet is different from that at school. When students go to school they have already planned to take part in learning activities and have freed up the time that is necessary for this. When they log into the VLC they sometimes only do this to see what's going on, whether there is new information and who is online. Sometimes they are enticed to respond or to undertake learning activities, and they stay logged in for longer than they had originally planned. Practice shows that there are three types of login sessions:
- short visit and quick departure;
- short visit and being enticed to carry out learning activities;
- planned, long visit to carry out learning activities.

Through the way in which he places messages on the Platform, the moderator can influence login sessions in various ways. It is even possible to use certain messages in the VLC to encourage the student to make another visit. Or rather: the strength of a good moderator lies in his approach to the second type of login sessions. With interesting messages, exclusive information and attractively tailored Learning Arrangements, the moderator can entice students to carry out learning activities. This is explained further on, but can actually only be learned through training and by putting it into practice. This makes moderating a didactic skill that educators involved simply must possess. The moderating methodology can help in this. The VAL moderating methodology consists of a moderating model with objects a moderator should look at, and of the manner in which he should moderate these as educator. The model contains the following:
- the delineation and description of the objects digital communication, Virtual Learning Interaction, student interaction, educator intervention and interactivity between them;
- the typology of interactivity in a virtual learning environment, which is based on an arrangement of interactions between students and of interventions by the educator;
- the distinction that is made in this between the three participation levels of students that are open to influence.

Moderating consists of two activities:
- monitoring the digital communication and analysing the process of the Virtual Learning Interaction;
- stimulating the Virtual Learning Interaction by placing messages and information in the VLC and by placing new Learning Arrangements. This method can also be applied in learning environments other than the VLC.

Monitoring starts with the ability to judge what students intend with the messages and information that they place. The table 'Students' Messages divided according to type of interaction' is useful

when practising this. Subsequently, the moderator uses the messages on the Platform and in the special Learning Activities Report to determine the learning atmosphere and progress being made. 'Learning atmosphere' is that indefinable feeling that both students and educators share when students are intrinsically motivated by the subject and the learning process in which they are involved. It is important that monitoring takes place regularly; educators are gradually becoming more efficient in this. In a fulltime programme with communities of forty students monitoring takes place three or four times a week, in a part-time programme or training programme this happens once or twice a week. Due to the asynchronous nature of the communication, the moderator does not need to respond directly. He can take the time required for deliberated, careful monitoring and only then decide to stimulate the interaction in a more focussed manner. Waiting can sometimes even be desirable in a well-run virtual group process as students will be helping each other anyway with solutions and information. Stimulation occurs mostly through messages placed on the central Platform by the moderator.
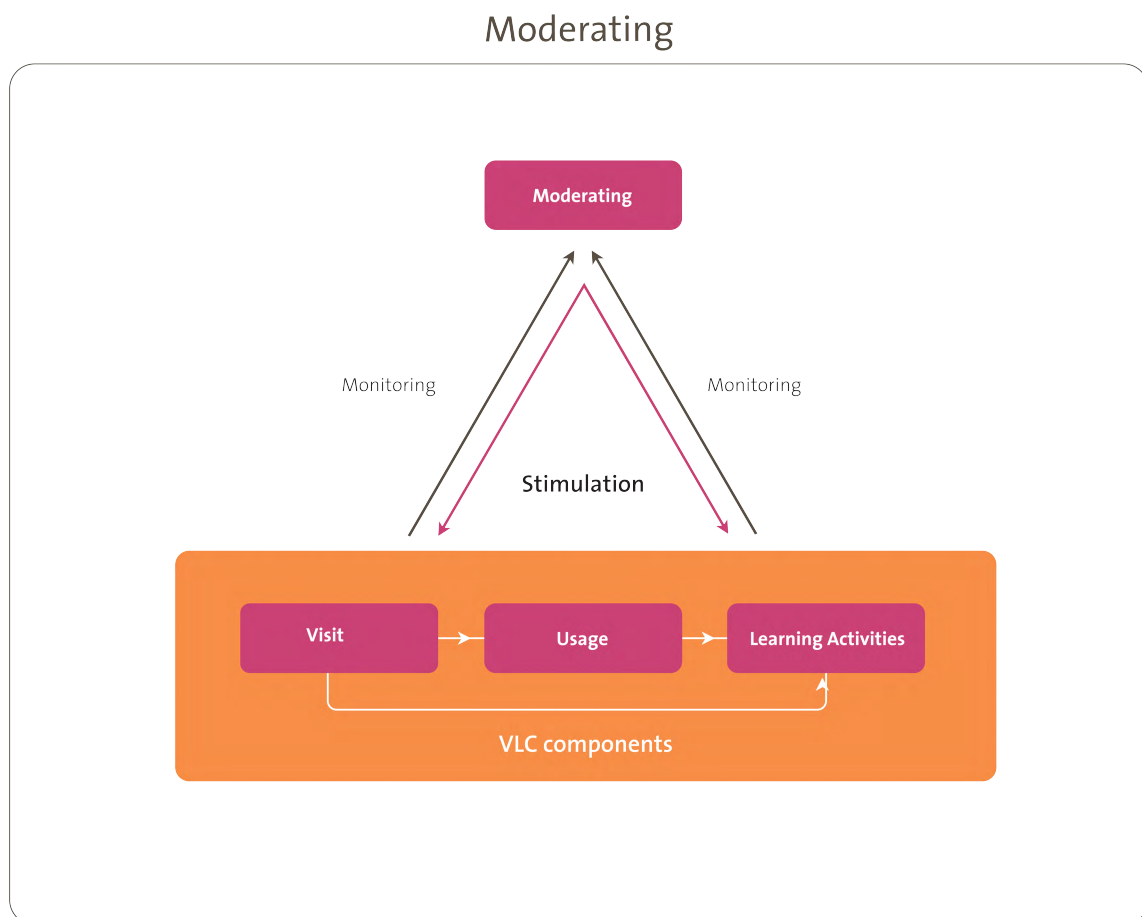
Figure 3.7   Moderating

There are several types of stimulation:
1. pro-active stimulation: the educator takes the initiative by placing a message drawing the students' attention to information or activities that will take place in the virtual setting;
2. atmosphere stimulation: the educator places a message primarily aimed at improving the learning atmosphere between students;

3. information-oriented stimulation: the educator places a message primarily to draw students' attention to new information;
4. reactive stimulation: the educator places a message as a response to (the lack of) a student's activity;
5. evaluative stimulation: the educator places a message with the objective of positively responding to activities jointly carried out by students.

One message can contain several types of stimulation, and the demarcations between different types of stimulation may be vague. The stimulation gains in strength when the message is aimed at increasing the participation level of students. The message can motivate them to use more or different components of the virtual environment or to undertake more learning activities.

The VAL moderating method has been translated directly into the design of the VLC. Components have been added that improve the possibilities for making Learning Products and having a Meaningful Dialogue. Moderating should fit into the process of the Virtual Learning Interaction. In the start-up phase it is mostly geared towards providing the right information, planning, participation of all group members and creating a learning atmosphere. When this has been achieved, the elaboration phase can start. Here the focus is on proper progress of the Virtual Learning Interaction and possible content-related problems. In the completion phase heralds the arrival of Assessment Day, for which students collect evidence in the VLC (feedback, answers, arguments, validated products) and in which the Learning Development Report plays an important role. The elaboration phase takes the longest and consists of consecutive learning cycles. These vary per programme and even per student, but can be differentiated through good moderating. It is this phase that often includes the VAL learning cycle (the eleven steps) around one or two Learning Arrangements. Because these have a beginning and an end, moderating can be assigned to virtual sessions: one virtual session per learning cycle.

Coherence with Other Educator Activities
Within each type of education or training there is steering: from choice of study materials and literature, to planning, learning assignments or the manner of assessment. In certain types of education the steering is very thorough, and the programme even determines per day what, when and how the student learns. Within VAL there is less steering, and it is done in a different way to that in instructivist education. The educator activities within assessment and moderation steer the most, followed by designing and to a lesser extent organising. The activities influence each other, providing an additional reason for having educators work in pairs so that the steering enables social-constructivist learning. In addition, learning takes place through the Internet using onscreen display language, which, in itself, fulfils a steering function (click here, upload there, provide feedback). A Learning Arrangement designed as Learning Advice can, through strong steering during moderation and the effects of onscreen display language, become an instructivist assignment. And the validation of Learning Products and the associated feedback can force a student to focus on this specific Learning Product in order to provide evidence for his assessment. When the student is responsible for his learning process, the question is where does steering and the stimulation of the Virtual Learning Interaction end? The answer: moderating is similar to any other kind of education that is provided in meetings using certain Education Forms. VAL is demand-driven education; it is absolutely not demand-driven learning. Students can follow a larger part of their educational programme independent of time and place, nothing is compulsory, and they themselves determine which Learning Arrangements they

will do and what evidence they will provide for their assessment. Such an Education Form fits a manner of moderating that monitors the interaction of the students and stimulates learning activities. The AssessorDesigner and the TrainerCoach moderate the VLC together. The TrainerCoach is prime moderator: he monitors study progress and stimulates the Virtual Learning Interaction. He is also responsible for the setup of the VLC, and moreover determines who can take part, what components they can use, which phase of the Feedback and Reflection cycle is active and to what extent steering takes place. The AssessorDesigner, in his role as moderator, extracts information from the VLC to see how Learning Arrangements are turning out in terms of their content and to find out which components students are struggling with. Both educators provide a bridge between Virtual Learning Interaction and the learning activities during the actual meetings. Moderating is the cement between the other three VAL educator activities (assessment, designing and organising) in the education and assessment process.

3.4.3 Process-Oriented Moderating

Moderating cannot be learned from a book: you simply just have to do it. It is a didactic skill that you develop gradually, not in class but through training and from sitting at your computer. A skill whereby you need to be aware of the fact that students spend 35 to 60 per cent of their study time being active online with Virtual Leaning Production and Interaction. Educators initially experience moderating within VAL as challenging because it is a new didactic skill including, sometimes, a new virtual environment. When they get used to is they find it less difficult and extremely interesting and enticing. However, when they see the extent of their influence on the (transparent) students' learning processes, they again deem moderating as rather complex. Some educators actually find it addictive because they can more or less see the effect their moderating behaviour has on the learning behaviour of their students. Proper moderating therefore first requires training, then plenty of experience, and finally reflection and adaptation. It is a Learning Challenge for the educator himself. As indicated in the typology, process-oriented moderating is what supports Collaborative Creation by students the most. All information in this book, including the examples, is based on practical experience in hundreds of VAL pilots, projects, trainings and educational programmes. These have also shown that process-oriented moderating can also be successful in educational concepts other than VAL.

Success Factors
The success of moderating depends on a number of preconditions. They may seem obvious at first, but if they are not fulfilled or if they are unclear, Virtual Learning Interaction comes to a halt, or there arises constant discussion – even irritation – among students.

A Reliable Virtual Learning Environment With Excellent Performance
The moderator cannot work without tools. His tool is an environment like the VLC, with components that he can easily and flexibly apply: from planning or dialogue to a test or Learning Arrangement. The educator is moderator and functional administrator of the environment and enjoys full autonomy. He can apply components to support his own moderating activities and the student's learning process when necessary. The VLC is an Internet application with an excellent level of performance and good security. If, for instance, it takes a long time to open Portfolio

products or files, users will not get round to providing feedback. If users experience the security as being insufficient, they will withhold information or use other means of communication (e.g. MSN or email). Passing of information to other systems or allowing observation by others besides the educators and users severely undermines student confidence. An excellent level of performance also means that the VLC is so user-friendly that participants almost intuitively know how to use it. Exclusive and Appealing Provision of Information. The virtual environment is the only information channel between the educational programme and its students. Students do not receive programme information by email, and there is no programme information in another digital location. All information (planning, classrooms and facilities, as well as achieved results) about the relevant programme component is available at a click within the community. The information is provided in an appealing manner: i.e. as personalised as possible, well-organised using onscreen display language and with download options. The VLC is completely transparent: users can see all of each other's information. The student can look at everything and add information, but cannot remove any information. In contrast, the moderator can change or remove information but will only do so as a last resort in case in the case, for example, technical problems or inappropriate use of language.

Prior Expectations

Educators may assume that they can carry out their work properly – including within the community. Of students it can be expected that they partake in order to learn. Students do not need to like the community or the interaction (although this helps), but should find it educational, interesting and sometimes motivating or enticing. It is important to set out the rules in advance concerning their virtual behaviour (Netiquette) and sometimes also their quantitative participation (e.g. logging in at least four times a week and providing feedback at least three times a week). Students are also entitled to expect the VLC to provide for educational communication. This means that the student must perceive entering the virtual environment as entering a classroom or training venue. This is why correct English – or another language – is used in a consistent manner, something that participants are entitled to remind each other of. Every form of 'popular' Internet language must be avoided, something in which the moderator should lead by example.

Reward System

Students don't just learn, but do so with a purpose. It would be ideal if this purpose was a learning objective, but the reality is somewhat different. What they want is a reward that is clear right from the start. A good final assessment or the awarding of study credits do not suffice in themselves. No reward signifies poor interaction and certainly no positive interactivity.

The good thing about a virtual community is that the student's interaction is online and thus can be very swiftly rewarded: in combined with long-term rewards. It is important to point out that the one depends on the other. The student experiences as short-term reward:

• the appreciation by fellow students of his provided feedback and of his Learning Products submitted for Best Practising;

• the validation of his Learning products and provided feedback by the educators.

The long-term reward, in the eyes of the student, is of course completing the programme component with a final assessment of his competency development, including the possible award of study credits. A qualitative description of the demonstrated level and skills, together with a certificate, is viewed in a similar way. In corporate situations the same applies for participating

professionals. Employees want a certificate, a salary raise or another form of appreciation for their virtual efforts. These continuous appreciations and rewards, and how the moderator administrates them, are an absolute precondition for success when applying VAL. This also applies to the moderating skills of the educators.

Moderating Skills
Educators often say that moderating is difficult after being used for years to guiding their students with subject information and having experienced learning processes outside the sessions at school as a black box. This changes in a virtual environment as learning processes become transparent and the community members receive an abundance of information about the content and process-related progress of the students. Additionally, VAL has fixed pairs of educators per programme period who deal with several competencies and knowledge objects, instead of having one teacher per subject. Moderating illustrates the transition of the traditional teacher to a new role as educator in which he has more grip on the personal development of his students and can provide them with more feedback. As mentioned earlier, moderating skills cannot be learned from a book. It is therefore sufficient to deal here with knowledge items that are of importance to moderating in a VLC. To put it in VAL terms: the moderating competency is the application of knowledge (the moderating methodology). Educators apply this moderating methodology using the Meaningful Dialogue (see Learning) as guiding principle. They gauge the intentions and progress of the students, keep an eye on the interaction process and stimulate this in such a way that it can give rise to effective Virtual Learning Interaction. Stimulating is adjusted to fit the learning process phase (start, elaboration, completion) as well as the student's current learning cycle. Experience shows that a good moderator can get the most out of a group in terms of learning activities by combining process-oriented moderating with the relation management. Moderating also requires non-intervention (letting go) in the learning interaction. Not providing feedback, not answering Learning Questions, not providing arguments for students' statements. The more one lets go, the more the responsibility comes to lie with the students themselves. Process-oriented moderating in VAL and with the VLC requires two more specific skills: community-orientation and information-awareness.

Community-Orientation
A virtual community requires a different way of communication than, for example, email correspondence. It is a closed community in which all information and digital communication are quickly and easily accessible for all group members who, moreover, have a shared responsibility in this. Placing a message therefore means that everyone can read it offer their interpretation. A moderator places messages on the central Platform for the entire group but sometimes they are meant for one student only. The latter can be indicated by the use of a (colour) code. This kind of dialogue with a single student goes against the grain of the interaction and requires therefore specific language use. For example: first entering the student's name on the VLC and only then place a message conveying that that the content is for that student alone and not for others.
Sometimes the moderator intends precisely the opposite. In that case he places a message for a certain student but with the intention of prompting a reaction from the rest of the group. Generally speaking the communication is fairly direct. It fits in with a safe, closed learning community in which making mistakes is allowed. Communication on the central Platform can take place horizontally (between students and educators) and vertically (between students). If the group

process goes well, the vertical communication will follow suit. The group then starts learning together in an efficient manner and begins solving its own Learning Questions and challenges.

Information-Awareness

Information-awareness is also an important moderating skill. It is reflected in the manner in which the educator takes certain information aspects into account. These aspects are dealt with below, sometimes clarified with VLC messages from real-life situations. Initially it is all about asynchronous communication, which means that other users only read and are able to respond to the information later (sometimes days later). During the process of communication the receiver may interpret the text or image completely differently to what the sender intended. It necessary to strive for as much shared meaning as possible. Onscreen display language is different from written language (folio). The average student tends to ignore sentences longer than eighteen words and prefers his onscreen information to be compact and object-oriented (see also Designing). The distinction between source information (articles, text files, other websites, object descriptions) and control information (guidelines, planning, learning paths) is one of the most striking characteristics of a virtual environment. In the information provided in the VLC this duality is maintained particularly because the user, reading from the screen, wants to able to use the information quickly (almost intuitively) without having to print out everything. The components of the Virtual Learning Interaction mostly contain control information; the other components contain source information. Placing a message on the Platform implies that all group members see this every time they log in. In contrast to email correspondence, in which a message is read once by the receiver, this happens multiple times via multiple persons in a community. Practice has shown that a negative or behaviour-correcting message ('red' in VAL terms) has a much larger impact on the person to whom it is addressed than a positive (blue) message. Indeed, a negative message that is repeatedly read, sometimes for weeks, by all will have a growing negative influence on the person in question and those most closely involved with this person.

Finally, it is worth paying some attention for information that is either targeted or focussed on student's awareness. Information can be placed with the objective of stirring someone – or the entire group – into a reaction or some other activity, but also to make someone – or the group – take account of it and deliberate on it. When a moderator provides information or places messages he tries to take into account as many aspects as possible. This makes messaging fairly complex and prone to unintended responses. It takes time and effort to fully grasp this skill but the results are visible in the student's Virtual Learning Interaction.

Virtual Didactic Phenomena

Some didactic phenomena only occur in a virtual community, specifically the VLC. There are no rules, strictly speaking, and have not yet been scientifically researched, but they crop up repeatedly in the process of moderating. Observing these phenomena can help the moderator understand certain behaviour and intervene when necessary –or, on the other hand, decide not to do so at all.

Transparency of Learning Processes

In the VLC all of the information can be studied by each community member, resulting in a detailed picture of the student's learning process and Learning Production. This is possible because their clicking behaviour is registered. With one click each participant can make a detailed learning

process analysis of each student or the whole group. Students have no difficulty with this in a closed setting. It actually activates their learning behaviour. They look at each other's Portfolios and see each other's learning interaction. Copying is allowed in this situation. They also become aware (partly because they cannot alter information that has been added) of the fact that their interaction and Learning Production is targeted at an audience (sense of audience, see Learning).

In contrast to their students, educators are ambiguous regarding the transparency of learning processes. On the one hand they value it because (often for the first time) they can much more clearly see whether the learning processes of their students match up with what they intended with the Learning Arrangements that they originally designed. On the other hand it makes them nervous as they can see precisely what the students do and what they neglect to do. If students have radically shifting study patterns or contributing nothing for a certain period of time, then educators tend to ascribe this to their own style of moderating or their Learning Arrangements. They feel like intervening. But it is exactly in such cases they should sometimes wait until the students resume their learning activities. Only when learning activities decline structurally does the educator place one or two more messages or organise a Progress Discussion.

Associative Click Patterns

As students have been working with VLC for a significant period of time they develop fairly fixed patterns in clicking on components and Learning Products after Platform visits. It has all the characteristics of a habit: we call it associative click patterns. Four of these crop up quite often: viewers, followers, planners and players. Students choose a click pattern or switch to another click pattern when there are messages on the Platform that have relevance for them. The moderator can therefore use his messages to influence of choice for a click pattern.

- Viewers: student who first click on fellow students' Portfolios in order to look at the Learning Products and their feedback. They move on to the Platform and/or Learning Arrangements but then log out. Only after two, three or more login sessions do they themselves set about making Learning Products and/or Virtual Learning Interaction.
- Followers: students whose click pattern matches the eleven VAL steps: they first click on to the Learning Arrangement, then make a Learning Product or provide feedback on placed Learning Products. Followers tend to follow thus, to a large degree, the Virtual Learning Interaction in the Learning Arrangement.
- Planners: students who follow the planning of meetings or the study load linked to the Learning Arrangements. They first alternate between clicking on the Programme (the planning), the Learning Arrangements and the Platform. Then they click on to the Learning Products of others, usually with the intention of gaining more insight into the actual study load. Generally they log out after this. When they return, they work on producing and interaction.
- Players: students who start with short login sessions. They then click on to the Portfolios of fellow students with whom they associate themselves and from whom they expect good Learning Products. Their next step is to make a Learning Product themselves. They only place this, however, further on in the learning cycle (just before Best Practising) and then click straight on to the Platform to ask for feedback. After this they repeatedly click (often also in follow-up sessions) on to their own Portfolio to see what feedback they have received and from who. They respond to this by rewarding those others with feedback on their respective Learning Products.

In addition to these four groups there is a category that exhibits no fixed click behaviour. There is no connection, however, between the three types of login sessions mentioned earlier and these four click patters Virtual Snug and Screen Captivity. Virtual Snug and Screen Captivity are phenomena that can either be observed on the Platform or that have been determined in the various evaluations. First the definitions: we can speak of a Virtual snug situation when the user feels sufficiently comfortable in the digital learning or working environment due to the pleasant atmosphere and the confidence in the interaction with fellow users that makes him want to participate. It may sound strange, but active participation in a virtual community can be experienced as pleasant, personal and warm. So far, the educational sector has only ascribed this feeling to meetings at school. Virtual snug leads to students being logged in for much longer than planned so that they can participate in the Virtual Learning Interaction and to provide feedback on each other's Learning Products. Students influence the Virtual snug much more than the moderator can.

Screen Captivity arises when a user in a digital learning or working environment remains logged in longer than planned in order to look at products and interaction with fellow users or undertake learning activities. A student stays logged in for longer than planned when the Learning Arrangement entices him to do so, when there are interesting messages on the Platform or when Learning Products or Virtual Learning Interaction appeal to him. The latter two cases fall outside the scope of influence of the moderator but he can influence the Learning Arrangements and messages. Both fellow students and moderator play a role in ensuring that the student remains online for longer and that he even proceeds to (inter)action (see the Art of Designing).

Looking For Virtual Leaders
In VAL, students provide feedback on Learning Products of fellow students and also nominate these during Best Practising. By comparing Learning Products with the feedback, as well as studying literature and other sources, they learn to provide feedback themselves. Students choose which fellow students – and their Learning Products – they will follow within their group. It is therefore interesting to know how they arrive at this choice. In the start-up phase of a programme they usually follow students with whom they have close personal contacts. After the first Editorial Reviews they find out that they have not always read the best Learning Products. They therefore start looking for leaders in the group of whom they expect that their Learning Production will give them an added learning value.

There are three types of leader: the Clicker, the Socialiser and the Activator. The Clicker clicks the most on the community components but – compared to the group average – carries out relatively few learning activities. The Socialiser is often seen on the Platform and leaves behind a lot of messages but does not stand out in terms of Learning Activities or click behaviour. The Activator carries out the most Learning Activities compared to his fellow students. A student can find out who the different leaders are by activating the Learning Activities Report. Sometimes he find this out from the messaging on the Platform.

The average student does not only look for a virtual leader but also for a fellow student on whose Learning Product he can provide feedback. Often students look at the Learning Products and correlating feedback of the leader before they – using what they have learned from this – provide

feedback on Learning Products of other students. Students only find out in the elaboration phase which of their fellow students have attained good learning achievements as these are the people whose Learning Products and feedback are validated at that stage. The moderator has very little influence on this search process. At most he can use the Platform to draw students' attention to interesting Learning Products or feedback. This is, however, not recommended as by doing so he steers the content too much and has then already actually started with the assessment.

Can You Moderate à la VAL in Any Electronic Learning Environment?

In the educational sector (more so than for corporate education and training institutes) the decision to implement VAL often depends on the virtual environment that is already in use or desired. The question as to whether every virtual learning environment is suitable for moderating à la VAL can be answered without using too much IT jargon. The VLC is a virtual learning environment. Such an application or system has certain functionalities that support users in carrying out (digital) actions and activities, which in turn are part of a broader process (the application). Work and learning processes have for years been supported by Internet technology. This varies from websites and email correspondence to electronic agendas, groupware and complex Internet applications (packages). Support is expressed in functionality, and this is again split into components. The functionality which is enabled by the current leading virtual learning environment producers is expressed below in components that support six successive application levels. This makes it possible to determine the place of the VLC. The Virtual Learning Community is a closed virtual learning environment consisting of the components necessary for applying all six levels, except for content management with the using metadata systems.

Level of application	Functionality for learning and working processes
Knowledge management	· Qualification of the most suitable products · Fast knowledge sharing · Management of casuistry and authentic working products incl. improvements and feedback · Integration of text with sound and images · Content management with metadating · Exportation to business systems or public websites
Joint production	· Best Practising · Joint production for own organisation · Validation of quality of products and feedback · Collaborative Creation
Learning and working interaction	· Virtual production for portfolio · Feedback on each other's products · Appreciation of each other's products · Collaborative learning · Meaningful dialogue
Communication	· Mailing, chatting, bulletinboard, discussion, message platform, question and answer
Document exchange	· Speaks for itself
Data exchange	· Speaks for itself

Figure 3.8   Levels of application and functionality of electronic learning environments

99

The VAL moderating method can be applied to any virtual learning environment with a central message platform. The virtual learning environments with the largest market share in the educational sector – Blackboard (Classic, Angel, Next Generation), Desire2Learn, Sakai, Sharepoint LMS, First Class – reach, at most, the level of Learning and working Interaction. On the whole, the functionalities of these five virtual learning environments are fairly comparable. To see to what extent they enable VAL education we will now elaborate on the components that support the most important VAL learning activities. VAL distinguishes itself especially through the Virtual Learning Interaction, for which certain components are needed. These are incorporated in the table under VLC terminology and listed in descending order of importance. Community Compactness means that learning can take place in a closed environment in which all necessary components are, at most, three clicks away from a central point. The comparison here is made between the VLC and the combined virtual learning environment versions that were used by the Dutch educational sector at the end of 2009. Naturally, this comparison leaves room for criticism, especially since it is made from a VAL and VLC perspective. An important point of departure for determining the suitability of an virtual learning environment for VAL is the primary entity. In the VLC the user is the primary entity to which all interaction data are linked. In pretty much all other virtual learning environments the course (content) is the primary entity, and interlinking all data entered by the student is not possible. The table provides an overview of components needed for applying VAL in its entirety. See 'Organising' for a detailed description of the components. The next column (pink) shows that are all available in the VLC (pink cells), which comes as no surprise. In the right hand column you can see to what extent these components are available in other virtual learning environments or whether and to what extent these can be made available with software adaptation. The overview shows that quite a few adaptations are needed for VAL to be supported in its entirety by an average virtual learning environment. If a (corporate training) programme or training centre only wishes to apply part of the VAL education concept, this need not be a problem. The differences in the availability of virtual learning environment components needed to support VAL in its entirety are quite large. If an virtual learning environment other than the VLC is used, a choice will have to be made between applying less VAL or investing in adapting the virtual learning environment being used. The answer to the question of whether every virtual learning environment can be used for moderating à la VAL is that some virtual learning environment can support parts of VAL and within this the Virtual Learning Interaction. Experience shows, however, that the positive results for students, educators and programme quality that are attained through the application of VAL (see Organising) are only marginal. It is certainly recommended to find out beforehand which VAL parts will not function to their full when using another virtual learning environment. The current VLC has been successively and simultaneously designed and developed with VAL, which means that they are a perfect match.

3.5 Organising Within VAL

To enable students to learn à la VAL, education needs to be organised differently. This is fundamental change and one of which many educational and training institutes are wary. The consequences are, after all, considerable: new educator roles, different organisational characteristics, adjustments to ICT and many new Educational Forms. Managers therefore first want to know what the financial implications are of implementing VAL. The cost for the transformation process itself, including the training of educators, appears to be primarily determined by the point of departure: is it a concept resembling VAL that is to be gradually adapted

based on practical experience and other insights, or is it the VAL concept as described in this book that is to be gradually adapted to one's current situation. The first option costs about two or three times as much as the second one. Even only the integral adoption of all VAL descriptions and formats (Educational Forms, Learning Arrangements) saves two to seven months' work. But there are also arguments for choosing the first option, such as the personal development of employees or learning to innovate oneself.

The full implementation of VAL can lead to a cost reduction of up to 25 per cent once the actual education starts. This is because the supporting processes experience a significant reduction in activities such as organising, coordination meetings, drawing up timetables, planning, registration of grades and study progress, ICT support and educational advice.

The primary work processes, on the one hand, experience a significant time reduction as a result of the removal of email correspondence, exams and re-examinations, correction and reading of assignments and also as a result of more efficient communication. On the other hand, however, VAL requires more attention to moderating, assessment and feedback, and to contact between educator and student. On the whole, therefore, the reduction is felt most in the supporting processes.

Organising is described using five knowledge items:
- Results of Applying VAL;
- Ode to The New Educator;
- Various VAL Applications;
- The Virtual Side of the Story;
- Overview of VAL Education forms.

3.5.1 Results of Applying VAL

The results of implementing VAL have been extensively evaluated and recorded in research reports in collaboration with the educational institutions below. Fully applying VAL means a transformation of the educational process, the assessment process and the underlying processes, but also requires innovative educational leadership. The transformation consists of 65 different points that need adapting: they have been placed in a matrix with which the transformation score (%) can be determined, measuring the extent to which each point has been applied. Even when one only partially applies VAL (for instance 60 %), the effects on the behaviour of educators and students are excellent. A reduction in costs, however, only occurs when VAL is more radically (80 %) applied. The most important effects are listed below.

Ode to The New Educator
In working à la VAL, the most difficult thing for educators and educational managers is to let go of old habits. They steer the students considerably, sometimes too much, and feel responsible for their learning achievements. This can be avoided if responsibilities are clearly assigned within the different processes (see Assessing). In order to achieve this, the educational programme is horizontally differentiated: in each period it is focused on certain competencies and their corresponding knowledge objects.

The educator's task is split into two educator roles, carried out by different persons: the AssessorDesigner and the TrainerCoach. Together they are responsible, over a period of at least three months, for a group of students striving to attain certain competencies; for this they carry out all educator activities. Occasionally, they invite an expert (a colleague or a professional) for Storytelling or participation in an assessment. The AssessorDesigner is the expert on content, and during this period he is primarily responsible for the designing of Learning Arrangements and the qualitative assessment of students (see Assessing). In this he enjoys extensive autonomy. This demands specific skills such as planning, designing, moderating, providing feedback, validating, virtual Learning Process Analysis, designing and carrying out assessments, assessing competency development and reflection.

The absence of correction work, coordination meetings, email correspondence and supporting activities means that there is now time available for virtual interaction, face-to-face discussions about Learning Products, advice and feedback to students. With this expertise and in this role, the educator as content-oriented expert becomes significantly more important than in a more traditional learning environment. In his new role as AssessorDesigner he can be deployed more broadly and is able to incorporate new developments from his own and related fields of expertise, as well as those from professional practice, into his education methodology. As a result, he is much more involved with his own field of expertise and with knowledge acquisition by students. The TrainerCoach takes care of Educational Forms such as competency trainings, progress discussions and individual reflection or coaching sessions. He is primarily responsible for moderating the Virtual Learning Interaction in the VLC. In this way VAL becomes an ode to the new educator.

3.5.2 Various VAL Applications

Applying VAL in a short course or training is of little value. Not only for organisational reasons, but also because it takes time for the educators to master the teaching method. To give an impression of the consequences of VAL for the organisation of an educational programme, three versions have been worked out. The orange cells indicate that the educator activities are carried out within that specific version. Below that is found the capacity needed to carry out the educator activities in this version.

The Fixed Principle
A pair of educators works according to the Fixed Principle, which is to say that their educator activities are fixed and planned over a longer period of time. The educators are together responsible for carrying out the educational and assessment processes:
• for a fixed group of students;
• on fixed programme days (no other tasks);
• in a fixed location with sufficient ICT;
• with a fixed, own VLC.

The programme days are used for fine-tuning to each other, discussing content and progress, meetings with individual students, designing Learning Arrangements and other educational material, keeping up to date with their own expertise, moderating and organising VAL Educational Form meetings. A recurring topic for discussion is how to form a bridge, in terms of content, between virtual learning activities and meetings at school. The educators need the space created

by the absence of email correspondence, exams and correction work to connect to the increased demand-driven nature of their work. This is because students in VAL are more focussed on content, ask Learning Questions on the VLC and go to the educators with requests for extra feedback or (extra) meetings such as CampfireStories, workshops, trainings or Editorial Reviews.

3.5.3 The Virtual Side of the Story

Before the VAL educational methods are discussed in detail, it is necessary to focus first on the use of VLC in organising education. Both educators and students can see which activities each user carries out on the VLC. Students have no difficulties with this as long as the information is for educational purposes and remains within the closed community. This is why all VLC users whose information is incorporated in this book have been asked for permission. The transparency of the learning process leads to different learning behaviour (see Moderating) and provides the educator with more and better information with which he can work. From the information on the VLC, the educator can see whether Learning Questions have been (properly) answered or not and where the obstacles in terms of content are to be found. He can respond to this with extra Learning Arrangements or referring on the Platform to a meeting at school. Students usually work on two or three Learning Arrangements at the same time. The educator must gauge in which phase of the learning cycle they find themselves. When there are a lot of Learning Questions, and they are half way into the learning cycle, the AssessorDesigner will plan a CampfireStory or Forum. If the Learning Activities Report in the VLC shows that the group is less active, or that there are large internal differences, the TrainerCoach will plan a Progress Discussion to facilitate a positive turn of events. When instead Best Practising about certain Learning Products is in full flow, the AssessorDesigner will plan for an Editorial Review. This happens the other way around when students take the initiative and request a meeting themselves. The VLC plays a crucial role in the organisation of the meetings, regardless of the Educational Form. The VLC is constantly projected onscreen in class, enabling the educator to link in with the Virtual Learning Interaction, show Learning Products in Portfolios or to pursue Best Practising (see Moderating). The educators can also stimulate certain behaviour in the VLC. For this they have access to special VLC components and settings. They can activate a dialogue about a specific knowledge object, provide opportunities to upload or download certain websites and images, place statements or validate virtual feedback. For students, the virtual activities are the starting point of their learning cycles. The meetings are an additional step for them towards the completion of their Learning Products. They experience this way of learning as a production process.

3.5.4 Overview of VAL Education Forms

When ICT and new media are the starting point for education, existing Education Forms become stronger and more active while other entirely new Education Forms are made possible. An enrichment of education. The educators apply different Education Forms during the meetings. The extent to which these work will depend on the target group: technical students have different preferences to nurses, and younger people differ in taste from older people. Some students prefer to have the educator steer their learning process, while others prefer to take the initiative themselves. The general rule is that when the educator links in well with the Virtual Learning Interaction on the VLC, the attendance and active participation during meetings increase considerably. The question has been raised as to whether college lectures are appropriate within

VAL or not. If it fits the Learning Questions at that moment, and is part of a process of knowledge acquisition, an inspiring lecture is fitting. This is also the general qualitative norm for any of the meetings: any Education Form is appropriate as long as it activates student's knowledge acquisition and fits in with their Learning Questions and learning cycles. VAL is not so much focussed on learning styles, but rather on learning preferences, such as 'learning by example', 'participating', 'acquiring knowledge', 'practising' and 'discovering' (from Liefde voor leren (Love for Learning), dr. M. Ruijters, 2008). Each and every learning preference does appear to a certain extent in all VAL Education Forms, but some learning preferences receive more attention than others. Participating and acquiring knowledge occur most frequently in VAL-specific Education Forms. This is illustrated in the table below. In the VAL educational concept, education is divided between meetings at school, Virtual Learning Interaction, Virtual Learning Production and self-study. From the student's perspective this should be one single learning process that starts with Virtual Learning Production, with which Virtual Learning Interaction is inextricably linked and for which self-study is required. The learning interaction results in questions, statements, arguments and claims that students are not able to solve among themselves. This input maps out the road for, and is addressed during the meetings with the educators. Virtual Learning Interaction therefore precedes the actual meetings and gains in strength if there is a clear link (a bridge) between the two.

To help educators and trainers in carrying out their activities within the VAL-specific Education Forms, nine Education Forms are described in detail below.

1. Virtual Learning Production
Objective
The objective of Virtual Learning Production is for the student to use the Learning Arrangement to select information and convert this into concrete Learning Products
Learning begins, therefore, with the making of a Learning Product, gains in strength during the Virtual Learning Interaction, and becomes even more substantial during the group meetings (answering, validating, assessing), which in turn are connected to the subsequent Virtual Learning Interaction. The educator must take this into account when designing Learning Arrangements.

Preparation
The AssessorDesigner is responsible for facilitating the Virtual Learning Production, but the student decides which, if any, Learning Arrangement he will carry out. The student can also make Learning Products of his own initiative, but he will then need to find a fellow student to make Collaborative Creation possible.

The educator's preparations start with the designing of Learning Arrangements. This allows him to partly stipulate the student's learning path. The educator places the arrangement on the VLC and links it to certain competencies and a knowledge object. By setting publication dates he determines the distribution of all arrangements. This in itself is already of an influence on the learning interaction (see Designing).

Implementation
The educator plays no part in the implementation: at most he monitors in the VLC whether the

students can manage the arrangements and whether the distribution has the desired effect. For the student the Virtual Learning Production has three phases:

1. Making the Learning Product

   The student makes the first version(s) of his Learning Product on his own computer (the Studio) and selects the information required for this. He can use source information in the VLC, such as websites, articles, documents and images, or search for and select information himself. When the product has been completed, the student places it in his Portfolio. Fellow students receive a notification of this; they can then read the product and provide it with feedback.

2. Improving Learning Product

   Based on the Virtual Learning Interaction and meetings such as the CampfireStories, the student gets an idea of how his Learning Product can be improved. After he has done this he can place the improved version in his Portfolio and ask again for feedback. The educator does not read the Learning Products, except for during the Editorial Review if they have been nominated by the whole group and qualified for publication.

3. Nominating Best Learning Product

   At the end of the Learning cycle the student can submit his (improved) Learning Product from this Portfolio as Plaza Product. If it is validated as 'to be published' after Best Practising and the Editorial Review, the educator places it on the Plaza.

The Plaza is a public website, e.g. Wikipedia, BusinessPlaza or a website set up by the programme itself for a selected audience, such as local entrepreneurs, care organisations, the professional sector relevant for students, alumni, all other students or organisations offering internships.

Practical Experience

In practice, not all students go through the three phases mentioned above. This is may be due to lack of time, the (limited) added value expected by the student, and his way of processing information (Personal Learning Interface, see Learning). If VAL is applied properly, more than 95 per cent of the group of students participate in the first phase, 75 per cent in the second phase and 60 per cent in the third. This Education Form is suited to all educational and training programmes. For part-time programmes, internships and (corporate) training programmes the frequency is lower than for fulltime programmes. In corporate and other training programmes we refer to Work Products instead of Learning Products.

2. Virtual Learning Interaction

Objective

The objective of the Virtual Learning Interaction is for the student to learn, within the VLC, from the interaction with his fellow students when producing individual Learning Products. The objective of the TrainerCoach is to obtain information from the Virtual Learning Interaction about the progress of the learning process and the students' interaction. The objective for the AssessorDesigner is to gather information about the learning and competency development of the student so that he can make a proper assessment. The Virtual Learning Interaction is the driving force behind all learning activities and therefore places considerable demands on the design of the supporting VLC.

Preparation

The educators decide in advance which one of them will moderate the VLC and, within this, the

Virtual Learning Interaction. Before the start of the programme the moderator sets up the VLC with competencies, information about the participants, the programme, Learning Arrangements, Progress Tests and the required source information such as articles, websites and documents.
Implementation

Moderating is a specific educator activity. Usually it is the TrainerCoach who moderates the rate of progress and the AssessorDesigner who monitors the progress in terms of content. The former takes considerably more time than the latter. Process-oriented moderating produces the best results. How, and with what intensity this can be best done is described within Moderating.

The student decides when and how he participates in the Virtual Learning Interaction. He does this in his own way and order of sequence by reading and comparing Learning Products of others. He responds to these with questions, arguments, statements, appreciation and feedback (such as compliments, improvements and enrichments). The student can also do this by analysing the group process, finding out from which student(s) he can learn the most, going through reports about validating, learning development and learning activities or by doing tests. Experience shows that students, when using the Internet, develop click patterns that are known within VAL as a Personal Learning Interface. The educators do not read Learning Products on the VLC, nor do they answer Learning Questions, provide arguments for Statements or provide feedback. They limit themselves to moderating on the Platform.

Process-oriented moderating encourages students to take responsibility for their own learning process, which leads them to carrying out learning activities. Moderating also has a strong influence to bear on the learning atmosphere. Sometimes there are no, or hardly any, learning initiatives forthcoming from a group within a VLC. This can be solved by implementing a process-oriented manner of moderating (see Moderating).

This manner of learning production and interaction brings the knowledge construction of the students to the fore and enables the student to take maximum responsibility for his learning process. As a result, the actual group meetings develop a 'perpetual character'. During these meetings the educator deals with the student's Learning Questions and tries to establish a connection with the virtual learning activities.
- Using the VLC
  Virtual Learning Interaction can be done in any random order desired using the following VLC components.
- Dashboard
  The dashboard is a personalised welcome screen, supplemented with relevant announcements about new information on the entire VLC. It is set up in such a way that the user can participate quickly and easily. The Dashboard can be connected to other social media such as Facebook, LinkedIn and Twitter.
- Platform
  This is platform for a communication between students, and between educator and students. The communication is usually process-oriented or of an organisational nature. Communication related to content takes place through Learning Questions. The Platform consists of a left-hand column in which educators place their messages, and a right-hand column in which students

place theirs. The Platform is the educator's moderating instrument. The use of email is no longer required.

- Portfolio

  The students place their Learning Products in their personal Portfolio, which can be viewed by all the other community members. These products can be Office documents but also photos, PDF documents or video material. When placing their Learning Product they also fill in the learning objective related to the Learning Product. There is an overview showing which students placed which products and when they did so, as well as when feedback was last received.

- Learning Questions

  When a student wants to ask Learning Questions, he first does so with other students in the Learning Questions component. A notification appears on their welcome page that a Learning Question has been placed. Answers to Learning Questions are registered per student in the Learning Development Report.

- Statements

  In the Learning Development Report, students and educators can submit statements related to the content of a certain knowledge object. Students can also vote for a statement and add arguments to support their vote. Educators do not vote on statements. The objective of the Statements is to actively persuade the student to construct knowledge and to develop argumentation skills. Statements and arguments are registered per student in the Learning Development Report.

- Dialogue

  What we call discussion (forum) on the Internet is called dialogue in the VLC. In this component students can give their opinion on subject they choose themselves. The dialogue is not moderated by the educator and not registered in the Learning Development Report.

- Talking Images

  Students use this component to place images (photos, drawings, pictures, icons) related to their Learning Products and professional working situations. The images are refreshed every five minutes and can be used freely by other users in the VLC.

- Tests

  The aim of a test is to provide the student with insight into his knowledge development and learning behaviour, and to allow for necessary adjustments. The taking of tests is not compulsory and the results have no bearing on the student's assessment. The test results are shown cumulatively and can be compared statistically with those of fellow students.

- Providing Feedback

  The moderator programmes the phases of the Feedback & Reflection Cycle in advance. These include: familiarisation, elaboration and enrichment. Students can provide feedback on Learning Products in the Portfolios of fellow students. Feedback is registered per student in the Learning Development Report.

- Appreciating Feedback

  Those receiving feedback can register their appreciation, ranging from unimportant to very important, and back it up with arguments. The appreciation of received feedback is not part of the assessment. It is subjective information, primarily meant to stimulate the virtual group dynamics.

- Best Practising
  When the student is satisfied with his Learning Product he can nominate it as Plaza Product and have it rated by fellow students. They get to see several Learning Products, which they rate based on criteria determined by the moderator. Based on their ratings, they nominate products that will be discussed and validated by the educator during the next Editorial Review.
- Learning Process Analysis
  Within the VLC it is easily possible to keep a close eye on one's own and each other's learning activities and learning development. Each user can view five separate reports, for a period of time they determine themselves:
  1. The Learning Development Report provides qualitative information about content-related progress and development for each student over a specific period;
  2. The Learning Activities Report provides quantitative information about the visits, use and types of Learning Activity engaged in by the students;
  3. The User Sessions Report provides quantitative information about login sessions of students, educators, guests and moderators;
  4. The Validation Report shows the status of all nominated Learning Products and their related feedback;
  5. The Learning Process Progress Report indicates, per Learning Arrangement, the progress of the students' learning cycle and provides insight into the quality of the Learning Arrangements.

Exclusiveness

The success of the VLC can be attributed in part to its exclusivity. The VLC is the only digital communication channel used by the participants and the programme information is not published anywhere else. The use of other more virtual learning environments or of email undermines the moderating and the Virtual Learning Interaction.

3. CampfireStories

Objective

Here we describe the Education Form CampfireStories, which is part of the VAL educational process. In many educational programmes CampfireStories are only planned if and when students ask for them. The objective is to provide feedback to students' Learning Questions related to the Learning Arrangements that they have carried out, which increases their understanding of the content and helps them to further improve their Learning Products. Experience has shown that CampfireStories have a steering effect on the content-related progress of the student's learning process. It is the first meeting that takes place during a learning cycle in which the student can ask the AssessorDesigner questions related to content. These are questions that the student related to the making of the Learning Products and which could not be solved with fellow students during the Virtual Learning Interaction. The meeting is, nevertheless, optional as the responsibility for the learning process lies completely with the student.

Preparation

As preparation for CampfireStories, the AssessorDesigner first takes a look in the VLC in order to assess the progress and differences in Learning Production. He will gain a fair idea of the development in terms of content if he:

- finds out on the platform whether students are experiencing difficulties with specific Learning Arrangements and/or knowledge objects;
- activates the Learning Development Report of a number of students and checks the quality of the feedback in these;
- analyses the Learning Questions and answers placed by the students. From this it quickly becomes apparent just which subjects students struggle with most.

Using this information, the educator then chooses the most appropriate approach to the CampfireStories (see below). In practice things tend to go less smoothly than is described here, as a result of varying levels of progress and diverging content-related development. This means that the type of approach to be used can only be determined at the start of the CampfireStories. The educator makes sure that he has material (slides, models, schemes) related to the knowledge object that come up for discussion.

Approaches
1. Quickfire round (in the beginning of an educational period):
2. The educator projects all of the students' Portfolios onto a large screen and shows a number of Learning Products and the related feedback. He gives each student a few minutes to talk about his learning experience. He does not, however, pose questions himself or enter into discussion. The questions are posed by fellow students.
3. Questions session (when there are many questions):
   The educator notes down on the board those students who have questions about the Learning Products. He then shows, online, the relevant Learning Product from the Portfolio of the person asking the question. Each student is given the opportunity to ask questions. The educator first puts these questions to the group; he tries to steer them to provide the right answer. If this is does not happen, he provides the answer himself or refers them to specific literature.
4. Steering Portfolio (with the Learning Questions are quite vague):
   The educator picks out three students who them show, in succession, one of their Learning Products on the projection screen. He then asks them to point out a difficult part or critical success factor in their product. The educator first translates these into a question for the group; he tries to steer them towards providing the right answer. If this is does not happen, he provides the answer himself or refers them to specific literature.
5. Steering the Learning Arrangement (when there are few questions):
   The educator projects one or more Learning Arrangements onto the screen and asks each student to pose a question or provide an answer to the question.
6. Closing the door (when there are no questions):
   The educator starts the meeting by making an inventory of questions. If there are no Learning Questions, he closes the meeting and immediately leaves the classroom. Experience has shown that this approach that a CampfireStories meeting will only be requested in future when students actually do have Learning Questions.

Regardless of the approach employed, the characteristics of CampfireStories are as follows:
- the focus is on content, not so much on process;
- the content depends on the student's questions;
- the educator stimulates deep learning by asking the students specific questions with the help of a reflection model;

- the educator controls the meeting but does not compile a report. It is recommended, however, to ask a student to take a photo of the notes on the board and place it in the VLC.

Tips
Agree beforehand with students that participation implies that they must be able to demonstrate new Learning Products, share learning experiences (study load, level of difficulty, finding sources) and formulate Learning Questions.
Ask students who are absent or cannot show new Learning Products to show their Portfolio at the next CampfireStories.
This Education Form can be applied regardless of whether it is for an extensive educational programme or a short (corporate) training programme.

4. Forum

Objective
A Forum is a meeting of a group of students with their educator and takes about one hour. The Forum can take place throughout the educational period or during an Assessment Day. The purpose of the Forum is to debate statements related to knowledge objects that have been addressed during that specific period. Engaging in debate means that the students can acquire and test their knowledge. If the Forum is part of the assessment, the AssessorDesigner uses information from the debate (arguments, students' knowledge) for the assessment.

Preparation
In order to fully participate in this Education Form, students must already have had some experience with it and to be skilled, to some extent, in debating statements. One can prepare (virtually) for this via the Statements in the VLC. During the Assessment Day it is crucial that it is the AssessorDesigner who exercises control of the Education Form. However, an experienced TrainerCoach can also do this during the educational period as the focus is then on collaborative learning instead of on assessment. The educator is responsible for facilitating the Forum and formulating the statements. He also chooses the type of statements to be used, but otherwise remains on the sidelines from where he can assess the content.

Implementation
At the outset, the educator outlines the set-up and the reflection model that will be used. These are models from the knowledge object being dealt with, for example the Supply Chain in the case of business administration, the OSI reference model in the case of IT architecture or Porter's Value Chain in the case of marketing. The educator points out that they will be able to delve deeper into the topic if and when the student manages to use the reflection model effectively in the debate.
The educator is the director of the meeting and he projects all the statements onto a screen next to the reference model. He then assigns the students their individual roles. For a group of twelve students, which is the maximum, these are:
- six students as debaters;
- one student as chairperson who watches the time and enforces the rules;
- the rest of the students as members of a jury who make their evaluation based on content and the arguments used.

The chairperson directs the course of the debate. Debaters stand facing each other when debating, and the reflection model is projected between them. The jury sits across from the debaters. The educator makes known which debater supports or opposes the statement and projects this statement onto a screen, after which:

- all those present are given time to prepare themselves (2 minutes);
- the chairperson gives the starting signal;
- a debater supports the statement with arguments (1 minute);
- a debater opposes the statement with arguments (1 minute);
- both students debate with each other and try to make their case (2 minutes);
- the jury members decide individually who they think was the most convincing (1 minute thinking time);
- each jury member supports his choice of winner with arguments (maximum of three jury members per round, total 5 minutes);
- finally the chairperson, on behalf of the jury, names the winner (1 minute).

This basic form takes about 15 minutes and can be repeated with new statements and a different distribution of roles. A precondition of success is that the Forum is well-structured and keeps to the time schedule. During the Forum it is the educator who appoints the proponents and opponents. He also listens to everyone's arguments and the jury's commentary. This enables him to properly assess the knowledge level of all students involved.

Varieties
The Forum can be done in different ways.
1. The basic variety is described above.

For	Against
A	B
Discussion	
Jury's verdict	

Two students defend a statement, one as proponent and one as opponent, and then into debate with each other. This is followed by the jury's verdict. The total time is 15 minutes per round of debate.

2. The deep form goes further.

For	Against
A	B
A	C
Discussion	
Jury's verdict	

Three students are involved per statement: student A is the proponent in the first round, with student B as opponent. After this student A remains proponent and student C becomes opponent. After the second debate there is a discussion between the last two debaters, after which the jury gives its verdict on the three debaters. The total time is 18 minutes per round of debate.

3. The quickfire form is meant for students already experienced with the Forum.

For	Against
A	B
C	D
Discussion	
Jury's verdict	

Four students are involved with each statement: student A is the proponent in the first round, with student B as opponent. After this student C is proponent and student D is opponent. The educator can decide to change these roles during the debate. After the second debate there is a discussion between the last two debaters, after which the jury gives its verdict on both debates. The total time is 18 minutes per round of debate.

Practical Experience
Students find this a somewhat confronting but very helpful Education Form, especially when the educator provides relevant statements for debate. It is necessary, however, to have students practice this Education Form throughout the educational period and to gradually increase the difficulty level. It is almost bewildering to see just how much information can be gathered on the content-related knowledge of students in a one-hour Forum. In practice it is even possible with this method to test in one and a half hour what students know from a course book of more than two-hundred pages. This is only possible if the educator can give the dialogue his full attention during the Forum.

5. Progress Meeting
Objective
One of the regularly recurring VAL sessions is the Progress Discussion between students and their TrainerCoach. The main objective is to shed light on the progress of the students' learning process, to stimulate them to learn from each other's experiences and promote collaboration with students. Through this the student is better able to fulfil his desired competency development. The second objective is to test the extent to which the student is taking responsibility for his own learning process. The progress in competency development is to be made visible. It must therefore be clear just what everyone's desired competencies are and what needs to be done in order to achieve them.

Preparation
The TrainerCoach is responsible for the Progress Discussion and moderates the VLC. In preparation he makes an assessment of the group's progress by activating the Learning Activities Report.

Implementation
There are several different approaches to the implementation of the Progress Discussion. The choice of approach depends on the progress and attitude of the group of students. These can be derived from the learning activities on the VLC.

1. Snapshot (at least 60 per cent of the students were active in the given period)

   An effective implementation method is to begin by showing the Learning Activities Report on a projection screen and have all those present read it. Usually the students themselves pick up on differences in progress. If the educator makes a proper use of this, the group interaction will be such that students will hold each other accountable for large differences in levels of activity. Thus the educator does not, need to do not this himself.

2. Intentions (30 to 50 per cent of the students active)

   The educator displays the Learning Activities Report over the given period and asks students to read it. He then asks students what they think of the level of progress and whether this will be sufficient for them to achieve the desired objectives. The educator can illustrate this by showing several Portfolios and drawing attention to any lack of Learning Products and/or feedback. He then tries to reach agreement with the group regarding the learning activities for the coming period. Visualisation is an effective aid in this. Each student notes down on a card the objectives he intends to achieve and places the card on a flip-over sheet. When all the students have done this, the educator takes a photo and places this on the VLC shortly afterwards. It is important to return to this in the next Progress Discussion.

3. Confrontation (less than 30 per cent of the students active)

   A completely different approach is to confront students with a basic question regarding their performance by asking, for example, how can it be that part of the group is not in a position to demonstrate their competency development in this trimester? The educator gets several students to answer this question and tries to come to a general conclusion with the whole group. He then makes concrete agreements with the students regarding the number of visits and learning activities and the amount of feedback that they will provide, on average, per week. Each student notes these agreements down on a card; the educator takes a picture of this and places it soon afterwards on the Tableau de la Troupe on the VLC. It is not really necessary to revert back to this at a later stage since students can see it every time they log in.

Of course, other approaches are also possible, but the three described above have (together) already proven their value in practice. There is no need for the compilation of reports of Progress Discussion.

Tips
A good way to encourage students to engage in Virtual Learning Interaction is to show all profiles from the VLC, including people's photos, during the Progress Discussion, and to ask them to fill in any missing information as soon as possible. If the progress and/or the learning attitude are not up to scratch, students are inclined to use the group meetings to raise issues about the quality of the organisation and the educational programme and the framework in which it is provided.

Although this needs to be taken seriously, it is crucial that steering remains based on their actual level of progress. At the start of a programme there is a Progress Discussion of one or one and a half hour once every two to three weeks, regardless of the type of the programme (part-time, fulltime, corporate). As the programme proceeds and/or the students develop a more independent study attitude, the frequency drops to a minimum of once a month.

6. Best Practising
Objective
The Education Form Best Practising and Editorial Review go hand in hand and take place both at the end of the learning cycle. Their combined objective is to have the students' best Learning Products and their related feedback validated by the AssessorDesigner. The Editorial Review is discussed separately.

Preparation
At the start of an educational period, the VLC manager (the person responsible for the VLC's management tool), together with the AssessorDesigner, determines the appreciation criteria and the correlating appreciation scale for all Learning Products, and incorporates these in the VLC's management tool. There are four criteria, each with the following basic values in the VLC:
- Quality of Product: to what degree do you rate the quality of this product?
- Reliability of information: to what degree do you rate the information in this Product as reliable?
- Correctness of language: to what degree does this Product contains C1 English?
- Argumentation: to what degree does this Product contain logically described arguments?

Once the criteria have been implemented, they can no longer be altered. Last of all the VLC manager determines the appreciation scale (5-point or 10-point scale), in which 1 represents the lowest and 5 or 10 the highest level of appreciation.

Implementation By Students
In the Virtual Learning Interaction the student learns to gradually improve his Learning Product using the feedback he has received on the VLC from fellow students. Ideally the student can, once he has improved it as much as possible, nominate the product for Best Practising. He does this straight from his Portfolio. The product is then placed on the Best Practising list on which all other nominated products are to be found. When nominating, the student indicates which Learning Arrangement the product belongs to and what kind of validation he expects to receive from the AssessorDesigner. Best Practising only really begins at this point and all students can appreciate the nominated products on the VLC using the four criteria. They can also try to assess what kind of validation the AssessorDesigner will give this product. Each appreciation on the VLC automatically contributes to the overall averages on the Best Practising list. The most highly appreciated products appear at the top of the list. In this way the students who have voted nominate the products that will be validated during the next Editorial Review. The validation that the student expects to receive for his own Learning Product and other products is at the heart of the so-called Matchscore (see Editorial Review).

Practical Experience

This somewhat competitive Education Form leads to discussion and sometimes also irritation among students. The appreciation is, after all, subjective, and personal preferences sometimes weigh heavier than the quality of the products. This is especially the case during the first learning cycles. After this the subjectivity subsides as students seek out the proper standard for assessing Learning Products. In the end they only really want the best Learning Products to be nominated and discussed during the review. To enhance objectivity, the Validation Report has been added to the VLC, in which students get a clear overview of the extent to which their appreciation correlates with that of the educator.

7. Editorial Review

Objective

During the Educational Form Editorial Review, the AssessorDesigner validates the nominated Learning Products and the corresponding feedback in a positive manner. The Editorial Review can be done during a meeting at school or virtually. With a meeting at school there is considerably more scope for deep analysis.

Preparation

The students can ask the educator to plan for a Review, but he can also choose to do this himself. The Review takes place at the end of a learning cycle of one to three weeks. The AssessorDesigner is responsible as content-related expert, partly because he has designed the Learning Arrangements being reviewed. As a result he has insight in the Learning Products that have been produced. He does not, however, read any Learning Products beforehand: at most he takes a quick look at some of the Learning Products that have been nominated in the VLC during Best Practising. Although the students have been able to provide each other with comprehensive feedback and ask questions during the CampfireStories, what they really want now is a degree of certainty regarding the quality of their products. They are looking for an assessment standard. This is tangible in the atmosphere at the start of the meeting: somewhat tense, waiting for the final validation.

Implementation

The assessor starts the meeting by showing the most highly rated Learning Products on the screen and indicating which ones he considers to be nominated. After this he reads the highest-ranking product from the screen together with the students. He discusses this briefly with the student who has produced it. The educator provides answers to students' questions regarding clarification but does not allow for question rounds (as in the case of CampfireStories). He then points out what is good about the Learning Product and what thinks it may lack. He refrains to a large degree from pointing out the negative aspects. His feedback gains in strength if he manages to involve the corresponding knowledge object and establish cross-connections with knowledge that students have acquired earlier in their studies. He then projects the feedback provided on this product onto the screen and offers his verdict on this and then rounds off the first nominated product. He repeats the above steps for the the rest of the nominated Learning Products. It is imperative that the educator provides clarity, in a positive way, concerning his assessment, through the validation of the specific Learning Product and its corresponding feedback. What happens, in fact, is that a Meaningful Dialogue emerges between the students and the educator as a result of the openness concerning all the learning results, and the dialogue being focussed on exposing and solving misconceptions. The

total length of the meeting (two hours at most) determines the number of Learning Products that can be validated; usually there are three to five. It is advisable not to announce the actual status of the Learning Products during the meeting itself. This often has too much impact. It is better to click on the status of the Learning Product in the VLC's Validation Report shortly after the meeting. The educator can even add in some comments, such as the main points in his feedback.

The status of the Learning Products nominated by the students can be:	The status of student's feedback can be:
rejected	compliment
rewrite	proof of reading
fine-tune	comprehension
to be published	supplement
published	improvement
	enrichment

Matchscore

This approach has a considerable virtual knock-on effect as students regularly log into the VLC after the Editorial Review to look at the completed Validation Report and their Matchscore in the Learning Development Report. Via the Matchscore, the validation status awarded by the educator is compared with the status that students filled in beforehand. The Matchscore is expressed as a percentage. A student

• who can accurately estimate this has properly explored the knowledge object and the Learning Products and will achieve a relatively high score;
• who makes no estimates achieves no score.

The student can use his score as evidence for his competency development during the assessment.

Practical Experience

The level of attendance and the learning effect on students are optimal when the meeting takes place in the spirit of a Meaningful Dialogue. After all, the students have been busy with making Learning Products and the related Virtual Learning Interaction. They 'wrestle' with the question of whether the result is correct, is of sufficient quality and is valid as evidence for their competency development. The validation norm indicates what the status of the Learning Product is and provides clarity on trivial questions such as: are the claims correct? Do they reflect reality or are they meta-physical? Are they theoretically grounded?

Virtual Editorial Review

It is also possible to carry out the review virtually in the VLC. This can be done at any moment that suits the educator. He works from the Validation Report; in this he can not only determine the validation status, but can also provide comments on the Learning Products. The virtual variety is often used when there is a lot of Learning Production, in part-time education or training programmes, and in E-learning courses.

8. Assessment Day

Objective

Assessment Day takes place in the last weeks of an educational period. The participants are all those students who wish to be assessed. It is also possible for students, in view of their competency development, to ask the educator to plan an Assessment Day earlier. The VAL assessment methodology, including the competency profile, is the core of the assessment. The student's objective is to use authentic evidence to try and prove that he has acquired the intended application levels of the competency profile. The AssessorDesigner's objective is to assess whether this evidence is convincing enough in demonstrating these application levels. The AssessorDesigner is responsible for organising the assessment. A whole day is required for the assessment of a group of about twelve students. The VAL methodology and the use of digital information require a specific approach, split into preparation and implementation.

Preparation

The student gathers information that can serve as evidence (documents, activities, links, photos) for demonstrating his competency development. He uses this to make his Self-Assessment, usually in the form of a PowerPoint presentation but sometimes as a video product. The preparations of the AssessorDesigner involve:

1. placing a message on the platform in the VLC announcing when the Learning Development Report will be printed;
2. making an overview of knowledge objects that were dealt with in that specific educational period;
3. designing the assessment components linked to these knowledge objects;
4. printing the Learning Development Report of the students involved, after which he:
   - can validate the provided feedback (can also be done virtually beforehand) using six categories: compliment, proof of reading, comprehension, supplement, improvement and enrichment. Only the latter two are considered real evidence;
   - appreciates the answers provided to Learning Questions and the arguments provided under Statements;
   - checks the authenticity of the feedback.
5. converting these observations into an indication of the demonstrated competency levels of each student;
6. formulating the knowledge objects or items on which he wants more clarity during the assessment;
7. drawing up the competency profile chart and the Self-Assessment and Peer Assessment form, including the names of the students involved;
8. informing the students through the VLC about the components of the Assessment Day.

Implementation

Each assessment starts with:
- an explanation of the assessment procedure;
- clarification of the assessment components;
- handing out the Self-Assessment and Peer Assessment forms.

The assessor is the director of the Assessment Day and introduces each component. He notes down his observations throughout the day. At the end of the day he collects the completed Self-

Assessment and Peer Assessment forms. The assessment can be done in a variety of ways. Fixed components are the following:

1. Presentation Self-Assessment:
   - the student presents a hand-out of his Self-Assessment to the assessor;
   - the student presents his evidence (15 minutes including time for questions) in order to demonstrate his competency development.
2. Peer Assessment:
   The students assess each other using the Self-Assessment and Peer Assessment forms. Throughout the day they note down on these forms their assessment of fellow students as well as how they think the assessor will assess these fellow students.

Other components include:
- Forum:
  This form is mainly used for testing knowledge. In educational debating rounds students discuss statements and make links to a specific reference model, enabling deep learning (see Education Form Forum). Time: 30 to 60 minutes.
- Header:
  Students read a complex article about a relevant knowledge object and write a summary on the spot. Time: maximum 30 minutes.
- Testimonial Video
  Without any preparation the student does a deep interview of another student on a specific knowledge object. This interview is filmed. Time: 3 minutes per student.
- Deep Feedback
  Students are given a number of feedback examples from the VLC and have to reformulate them to give them more depth in terms of content. Time: maximum 15 minutes.
- Screenshot Test
  Students answer a number of questions about a screenshot from their VLC related to the knowledge object or item. They answer the questions on the reverse side of the screenshot print. Time: 15 to 30 minutes.
- Knowledge Test
  The student does a multiple-choice test about a knowledge object or on a method dealt with in the preceding period. Time: maximum 30 minutes.

These components can be adapted or supplemented with for example a role-playing situation or a press conference.

After the Assessment Day

The assessor gathers all the information and determines, as quickly after the Assessment Day as possible, the extent to which the competency levels were demonstrated. He then invites each student to talk things through in the Evaluation and Reflection that takes place shortly afterwards.

9. Evaluation and Reflection

Objective

It is crucial that a dialogue emerges between the assessor and the student about the application levels of the competencies. Provided that it is worded correctly, it facilitates a form of deep learning. This is

because the student is forced to evaluate his Self-Assessment in the light of the evaluation and observations of his assessor. The ultimate moment for this is the Evaluation and Reflection, in which the student is informed of his assessment. He receives feedback and reflects on his learning achievements together with the assessor. The objective is to arrive to a shared meaning of the evaluation.

Formation of Evaluation
Shortly after the Assessment Day the assessor comes to his decision.
An effective approach is to:
- evaluate the assessments components that were covered (Learning Development Report, presentation of Self-Assessment, header, video, screenshot test, Progress Test, Forum, knowledge construction etc., etc.);
- note down the evaluations on a competency profile chart in such a way that they can be addressed during the individual meeting;
- arrive at a final evaluation. This is registered on the competency profile chart and compared to the student's Self-Assessment. In this way the competency profile is in fact updated (old levels are replaced by the recently demonstrated levels).

When the assessor has evaluated all the participants, he calculates the comparative scoring on the Self-Assessment and Peer Assessment forms. These are not used for the actual assessment but are addressed during the individual meetings.

The Evaluation and Reflection
The initiative for the individual meeting with the student lies with the assessor. The style employed for such a meeting lies with the assessor and each meeting. It is similar to a learning discussion: it must be enriching for the student.

The assessor may be able to indicate which competency level the student has demonstrated, but cannot say that with all certainty whether or not the student has fully mastered the competencies. The student mat in fact be extremely competent, but may have simply provided too little evidence to support that premise. While this may seem a small detail, out in the real world it takes on great important. The following approach has worked well in practice. At the start of the meeting the assessor immediately reveals his evaluation of the updated competency profile and how he arrived at it. He then clarifies his evaluation per assessment component. The assessor asks whether the student recognises himself in this. If necessary, the assessor reveals the motivation behind his comments. It is important that the student be given the opportunity to respond to this. When the student has not demonstrated his competency development, the assessor provides concrete examples of how he could have done so. If applicable he also reveals the number of study credits that have been earned. The assessor strives for shared meaning on the demonstrated competency levels and to a lesser extent on the assessment components. The evaluation is not subject of discussion, but the student may seek further explanation. The objective is to have a shared meaning of the assessment at the end of the meeting. In the second part of the meeting the student and educator reflect together on the student's learning results. They reflect on the study behaviour that has led to these results and discuss whether the learning activities and results match the expectations and intentions of the student. If this

is not the case, they look for an explanation and try to develop new intentions or targets. The Reflective Tests in the VLC can be a useful aid in this.

Evidence

The meeting ends with the combining of the three documents (Learning Development Report, hand-out of the Self-Assessment presentation and the updated competency profile) to form the so-called Evidence. Both student and assessor sign each page of the Evidence. The assessor is responsible for filing this. Usually the meeting serves as input for new intentions and plans for the student. An Evaluation and Reflection takes 30 to 60 minutes.

3.6 Final remarks

In conclusion, we may state that VAL as an educational concept is highly flexible and that its integral implementation involves a radical change of education and training programmes. Over the years, VAL has been introduced (in part or in its entirety) in a number educational organisations, and responses have been enthusiastic. In educational practice, the concept has proven its effectiveness, not only in schools and universities, but also increasingly often in corporate training programmes. Still, to measure progress and results in terms of a student's learning process within VAL (from the perspective of the student as well as the perspective of the school) *and* to measure this in an objective way, we need good-quality instruments. This is the topic of our next chapter, where we present and discuss two instruments as well as a theoretical framework for these instruments.

This chapter presents the development of two instruments to measure the progress and the results of the Learning process within VAL from the perspective of the student as well as the perspective of the school, based on pre-research conducted from 2000 until 2007. It also elaborates on the development of Virtual Action Learning as an educational concept. After a description of the theoretical framework for the instruments and the method and result of the development process, the chapter ends with a discussion about the quality of the instruments.

4.1 Introduction

Below, we shall describe our research concerning the way in which VAL, together with its supporting VLC, was developed. This process took place from 2000 until 2007 in combination with the development of constructs with which the results of the application of VAL could be measured. Our objective was to develop two instruments that could measure progress during and at the end of the Learning process and that could be used at two Universities of Applied Sciences in new research work that was due to start in 2007/08.

We asked ourselves what would be an appropriate instrument for measuring the progress and the results of the Learning process within VAL. To answer this research question, we distinguished the perspective of the student and the perspective of the school: this is why we needed two instruments. To address the issue, we shall first introduce the theoretical framework of specific constructs of the Learning process and conclude with a design statement explaining how and why Design Based Research was used for the development of both VAL and the constructs. The quality of the constructs of both instruments was tested on the basis of three quality criteria derived from the literature. This resulted in an instrument with four constructs and a one-dimensional instrument, both of which were used in new research in 2007/08 (cf. Chapter 5).

4.2 The theoretical framework for the instruments

4.2.1 The Learning process: Collaborative Creation

Collaborative creation of knowledge with ICT is probably the best way to describe the Learning process within VAL. In order for learning to take place in a social-constructivist manner, the Learning process in VAL includes eleven steps that are executed in repeated learning cycles. This Learning process is made possible through the support of learning technology (the VLC). To illustrate these eleven steps, we need to re-introduce the figure we used in our second chapter and here referred to as Figure 4.1 (inserted below).

Virtual Action Learning
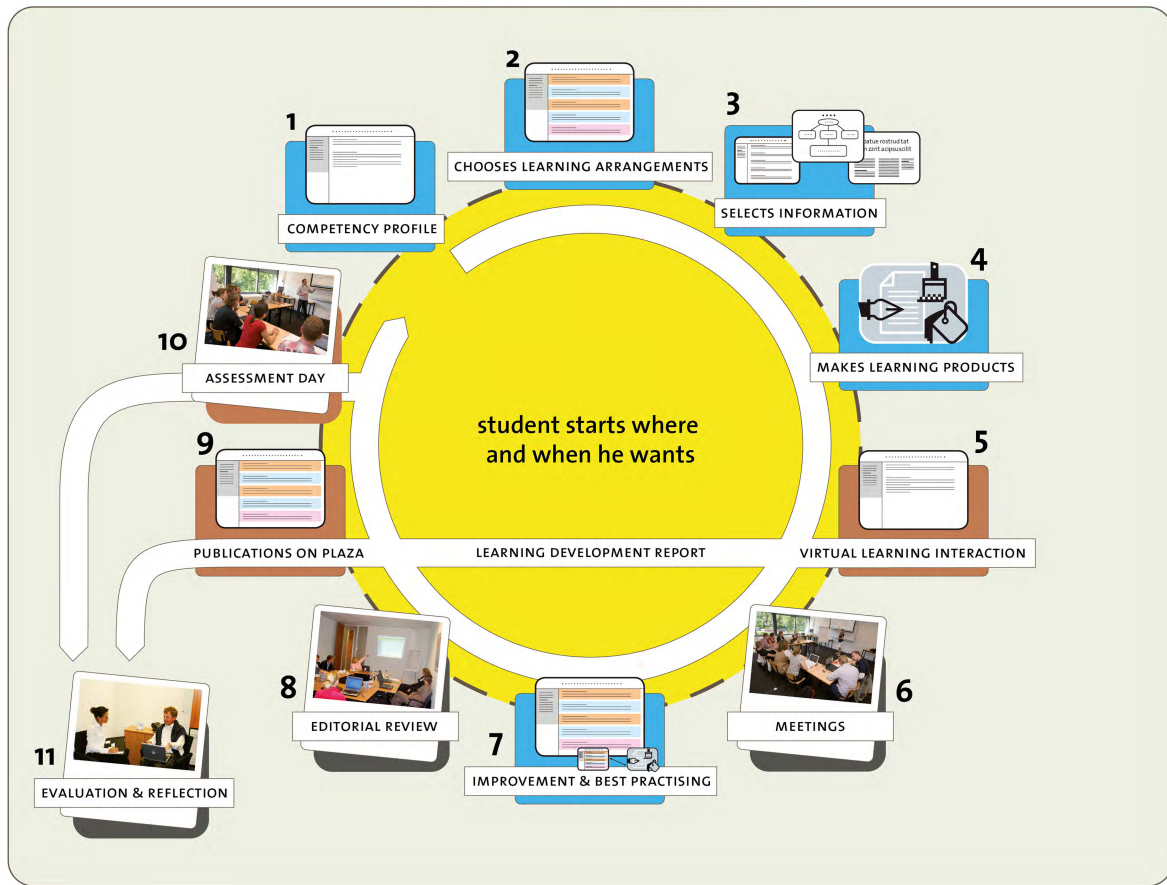
Figure 4.1   The steps of the Learning process within VAL

The student executes these eleven steps frequently: this may be done in a random order or only partially, in practice, with the help of a learning arrangement consisting of all learning activities and interactions caused by the execution of that particular learning cycle. By developing learning products, students create knowledge for themselves as well as for others when the product is published (step 9). The first activities (1, 2) are aimed at information selection; the next (3, 4) are aimed at creating a learning product, followed by Virtual Learning Interaction (5) with fellow students in the VLC. These interactions include giving, receiving and appreciating peer feedback, voting on statements, discussing and adding arguments on the knowledge object that can help the students improve their learning products. In group meetings (6) with their teacher at school, students can go deeper into that object and practise their skills. With that information, in turn, they can improve (7) their learning products or provide feedback to fellow students. All input is recorded in the VLC's learning development report. If a student feels confident about the quality of his or her learning product, he or she can upload it in the VLC for best practising, and all students can give grades for quality items specified by the teacher. The final ranking is the nomination of the product to be subject to the editorial review (8) at school. In this group meeting, the teacher validates several nominated learning products and the related feedback in the VLC. He or she can decide to publish the validated ones on a public website (the Plaza, 9). After several learning cycles are executed , the Learning process closes with an assessment day (10). During this meeting with fellow group members and the teacher (assessor), each student presents their self-assessment in

which they provide evidence of competency development, followed by testing exercises and a peer assessment. The last step is the evaluation and reflection step (11) between the individual student and his or her assessor in which the student reaches his or her conclusions based on the information from the two sources mentioned above: the learning development report and the results formulated during the assessment day. Participants finish the cycle by jointly reflecting on the learning performance and future learning activities of the student.

The student, who is part of a learning community of 15 to 50 members, can learn from the information provided by his or her teachers during the meetings at school, from self-study and from making learning products. In particular, a student can learn from other students' feedback with which he or she can improve the quality of his or her own learning product. A student also can learn from the appreciation of his or her own feedback by other students as well as from the teachers' validation of learning products and their feedback. After multiple learning cycles, the student should have reached his or her learning objectives and will have gathered enough information to demonstrate to the teacher that he or she possesses certain competencies.

4.2.2 The Feedback and Reflection Cycle

In the design of VAL, the learning effect of giving feedback and appreciating received feedback exceeds that of merely receiving feedback: the former requires much more time and in-depth information processing. VAL aims to bring this about by making it not only a part of the dialogue during the educational process, but also a part of the assessment process. Giving, receiving and appreciating feedback are examples of formative assessment but are also a part of summative assessment in VAL. This is because students use this feedback to demonstrate their development and teachers use it to judge whether the student has indeed developed his or her skills or knowledge.

Through giving and receiving feedback, the student can implicitly learn from the content, approach, insights and learning strategies demonstrated by fellow students. In VAL, students offer feedback on learning products on a daily basis, which can increase their motivation and the quality of their learning products. By appreciating feedback, students should reflect on their own learning achievements and approaches. This interchange between feedback and reflection occurs at many different moments during the Learning process (see previous section), mainly supported in the VLC. As we did for the steps of this Learning process, we now need to re-introduce the visualisation of the Feedback and Reflection Cycle as included in our second chapter and below referred to as Figure 4.2.

Virtual Action Learning
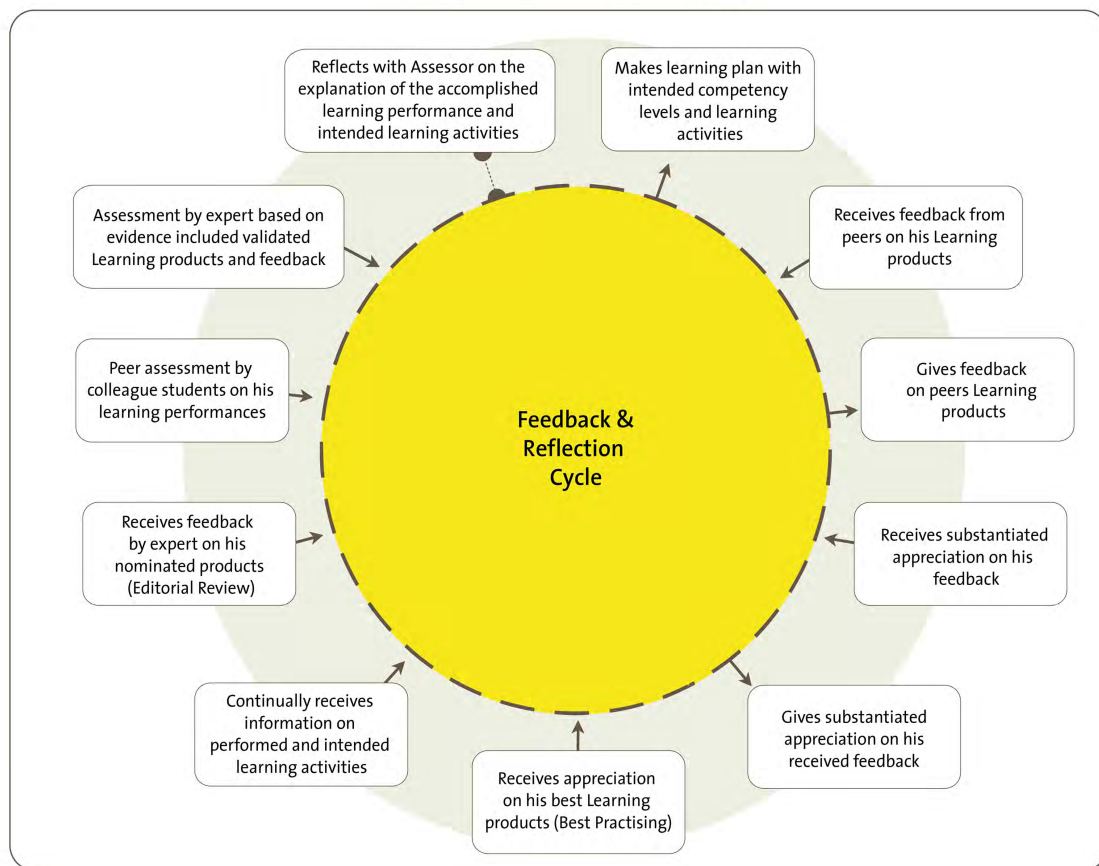
Figure 4.2 The Feedback and Reflection Cycle within VAL

The presence of a Feedback and Reflection Cycle within the VAL concept helps structure the learning activities and interactions of students as well as the educational and assessment activities of teachers. By adding learning activities and interactions as much as possible in the VLC, the student and the teacher will receive a coherent overview of the Learning process of the student, creating a Meaningful Dialogue about his or her competency development. For teachers, the interactions in the VLC allow them to decide on the most effective approach to meetings, moderation of learning interactions and dialogue with students. In the evaluation and reflection stages at the end of the educational trajectory, the assessor elaborates on his or her judgement of the student's competency development. Furthermore, student and assessor together reflect on the accomplished learning performances and how they relate to the learning activities intended at the beginning of the course. This is when the Meaningful Dialogue in VAL should be at its strongest. In research on the meaning of feedback, the focus is on enhancing learning by *receiving* feedback, mostly from the teacher (Hattie, 2011). In VAL, the focus is on *providing* feedback, which has a twofold impact: the provider of the feedback is impacted because he or she needs to become familiar with other students' learning products before providing feedback, and the receiver of the feedback is impacted because he or she should receive highly customised feedback (Baeten, 2009).

4.3. Method

The development of an instrument to measure the progress and results of Learning process within VAL was part of the development of the VAL educational concept from 2000 until 2007.

4.3.1 The design statement for the Learning process

Of particular interest in this chapter is the effect of VAL on students, and especially the way in which this effect can be measured. Over time, the way of evaluating the effect of VAL changed, which resulted in the final form of measurement used in our recent research. Our newly developed design statement states that **VAL can be characterised on the basis of four features of the Learning process: (1) Virtual Learning Interaction (VLI) and (2) given and appreciated peer feedback lead to a changed (3) Student Perceived Way of Learning and changed (4) Student Perceived Learning Results.**

As described earlier, VLI consists of several acts to improve each other's learning result, with feedback given and appreciated being a part of this process. The term 'Student Perceived Way of Learning' denotes how students perceive the way in which they have been learning during the course in comparison with the way in which they learned during previous courses in their degree programmes. The term 'Student Perceived Learning Result' refers to what the student perceives to have obtained at the end of the course, in comparison with the learning result obtained in previous courses in the degree programme. We expect to solve the problem associated with the wide scope of VAL by designing an instrument to measure the above four aspects, thus establishing the specificity of VAL.

The VAL concept was applied in a total of seven educational institutions, from 2000 until 2007. After its initial application and in close concert with participating instructors and students, the concept was continuously tested, evaluated, adjusted and improved. However, to firmly and unequivocally determine the effects of this new and different way of learning and teaching, we designed an extensive survey (post-course questionnaire) which, in turn, was also tested, evaluated, adjusted and improved in cooperation with representatives of the institutions involved in the project.

Design Based Research

This study's research is primarily aimed at developing and testing solutions for practical problems rather than presenting descriptions and analyses of the problems concerned. This approach is best described as design based research (Andriessen, 2006; van Aken, 2011; Wang & Hannafin, 2005). Compared to more explanatory forms of scientific research, design based research can be typified by the following main characteristics:

- it is solution-oriented rather than explanation-oriented;
- it is predominantly driven by practical problems rather than purely theoretical knowledge problems;
- it adopts a participant's perspective rather than an observer's perspective;
- it accounts for research results on the basis of pragmatic validity rather than theoretical validity.

Design based research (DBR) is often used in the fields of organisation development and educational reform (Van den Akker, 1999; Reeves, 2006; Plomp & Nieveen, 2009). This type of research is mostly aimed at a systematic analysis of practical issues and challenges in a particular professional environment and the design of possible solutions, which are subsequently applied, tested, evaluated and improved on a step-by-step basis. In addition, design based research aims to develop knowledge about the design process, so that newly generated knowledge may be used for new questions and, in turn, be improved in the process.

DBR is very well suited for the development of VAL as well as the development of our four constructs, which is why this type of approach was selected as the methodology for our pre-research. The theoretical framework is described in the design statement. The outcome of accepting this statement is dependent on three quality indicators (Van Aken, 2011):

- The intrinsic quality of the design statement using the VAL Design principles;
- Its contextualisation, i.e. an answer to the question whether the design statement is applicable to the specific educational situation in terms of the courses followed by the students. This relates to the quality of the design as well as to the process of developing a research instrument that is useful in any context.
- The quality of action, in this case the implementation (of VAL) as intended and the change of the social reality as referred to in the (VAL) concept. Social reality is here defined as the progress and the results of the learning process of students, determined by four constructs: their participation in Virtual Learning Interaction in the VLC, their Given and Appreciated Peer Feedback to fellow students, their Way of learning and their perception of the Learning results.

The four distinctive constructs that form the main topic of the current chapter were tested on the basis of the three quality indicators mentioned above.

The Design Based Research of VAL

The history of DBR goes back to the year 2000, the year in which some Dutch universities of applied science started to implement VAL (in part) and its supporting virtual learning environment (VLC) in their courses. In close collaboration with teachers, students and staff, we developed a way in which they could implement VAL in their processes, and we also developed an instrument for the evaluation of this implementation. Research was performed to present concrete solutions for specific educational situations such as learning and teaching. To generalise these solutions, VAL was increasingly applied in other and different projects, which also contributed to the further development of VAL. This resulted in three articles (J. Baeten, 2007, 2010; Simons & Baeten,) and in a detailed description of the VAL educational concept, laid down in the book 'Virtual Action Learning' by Baeten (2009 Dutch version, 2011 English version).

The implementation of VAL in the different projects repeatedly followed similar steps. As can be seen in Figure 4.3 below, the implementation of VAL started with designing and developing the first aspects of VAL, followed by a teacher training programme. Here, instructors were trained in the principles of VAL and social constructivism. Then, VAL was applied by the students for a predetermined period of time. At the end of the project, the results of VAL were tested and evaluated, which led to a new development phase where VAL was adjusted and improved. This development process led to the expansion of the instruments as used in our recent research study.

Phases of the Design Based Research

Figure 4.3 The Design Based Research of VAL and VLC with its research instruments

4.3.2 Operationalisation of the Learning process: from aspects to constructs

The development of VAL also led to the development of evaluation instruments (see Figure 4.3). This, in turn, led to the operationalisation of the four aspects of VAL into four constructs, as used in our recent research conducted in 2007/08: Student Perceived Way of Learning, Student Perceived Learning Result, Virtual Learning Interaction and Given and Appreciated Peer Feedback by fellow students (peer feedback). The development of each of these constructs will be described below on the basis of Table 4.1, after which their quality will be assessed on the basis of the three quality indicators formulated in the design statement. As can be seen in Table 4.1, the foundations of VAL were laid by the Amsterdam University of Applied Sciences (HvA). After two years of developing and designing the project and training the teachers, the year 2000 saw the first students (HvA) taking a course based on the first principles of VAL. In the process of developing VAL, the reviews formulated by prof. dr. P.R.J. Simons also played an important role.

4.3.2.1 Student Perceived Way of Learning and Student Perceived Learning Result.
Student Perceived Way of Learning and Student-perceived learning result were not evaluated right from the start of the project. The first implementation of VAL (at the Amsterdam University of Applied Sciences) was evaluated in an open and informal discussion; results were not reported formally. An oral evaluation was carried out with a review group consisting of students, teachers

and managers. Because VAL was only partly integrated in HvA's courses, the development of the educational concept had to be continued. However, because we wanted to collect more information about the effects of VAL, we stepped up the number of measurements at following educational institutes.

Based on our findings, VAL was further developed and applied in a course organised at RVS, an insurance company. Again, a feedback group was formed, this time consisting of students and teachers. The effect of VAL on students was measured by means of an open conversation using six statements (motivation, time spent, amount of active learning, end result, the will to proceed with VAL and the will to proceed with the VLC). This time, the results were formally reported, but the research group proved to be too small for firm conclusions (15 students per group). VAL was then further developed with the application of the concept by groups of students and teachers in a formal curriculum offered at a university of applied sciences. This was done first in courses run in the Department of Social Pedagogical Studies and Nursing of HAN University of Applied Sciences. The structure of relevant working methods, learning assignments and training programmes was further developed and directly applied in the VLC. During this project, our feedback group consisted of 155 students and their 26 teachers and managers. This group evaluated VAL in a way that was similar to the approach used for RVS: with the same six statements in an around a table setting.

Nevertheless, measuring a student's learning results at the end of a course proved to be very difficult, because most schools had exam regulations prescribing in detail how assessments should be made. An assessment is usually made by teachers giving grades for multiple components of a course, and this proved impossible for VAL. Some courses in VAL solved this by introducing the right to take additional examinations and to allow figures; others opted for assessment in the form of a semester grade. For this study, however, we need to know the extent to which the student participated in the distinctive aspects of the Learning process within VAL and how this type of learning and achievement affected his or her perceptions.

The assessment method of VAL (see Chapter 3) deviates from what is often customary. This is the result of the use of the VLC and its educational methods, the responsibility of the student for providing (digital) evidence for his or her Learning process, and the assessment. The responsibility for demonstrating competency development lies with the students. In VAL, they collect information about their learning activities from the very start of the programme, which they can then use as evidence during Assessment Day. Because there is a process of Collaborative Creation rather than one single moment for appraisal, a student can continuously provide feedback, back up statements with arguments, answer Learning Questions and have their Learning Products published. These activities are made visible in the VLC. During the assessment day at the end of the course, the student presents his or her self-assessment, which includes evidence for competency development. Through their own participation, students can elaborate on and add to this evidence during the assessment day. Based on this evidence, the assessor determines whether, and to what level, the student has achieved certain competencies and shown an ability to continue with the next level of the course.

Because we wanted to examine the effects of VAL more precisely, we decided to use student questionnaires. As can be seen in Table 4.1, since the concept was first introduced in the Master's programme Disease Control (KIT), the effects of VAL have been measured formally with the help of a post-course questionnaire. On the basis of VAL theory, we investigated the constructs Student Perceived Way of Learning and Student Perceived Learning Results. In collaboration with the feedback group, we determined what variables could be distinguished, which variables would be measured, and finally how, by whom and when they would be measured. Ten statements and one open question were used (see Tables 4.2 and 4.3) for the 29 students enrolled in the course in order to compare VAL with traditional educational methodologies. The questionnaire was completed at the end of the course by every student individually, at their own selected time, under the supervision of a teacher who handed in the completed questionnaires to the review group for further processing and analysis.

Results were reported in Driessen and de Vos (2008). Our post-course questionnaire was also applied in an E-business course at Fontys University of Applied Sciences and HRM-Masters at the Business School Netherlands (BSN). After the HRM-Masters project had ended, the post-course questionnaire was considered to be complete, and this questionnaire was subsequently applied in our recent research. All review groups involved in the various different courses shared the same conclusions. The validity of the questions and answers in the post-course questionnaire was found to be good, and the protocol used to gather the information in the questionnaires was considered correct. The table below shows an overview of the implementation of VAL in all projects between 2000 and 2008 and the instruments used to measure progress and results.

Table 4.1 Overview of the VAL implementation projects and the instruments used 2000-2008

Projects	Period	VAL Transformation score	Number of students	Number of teachers	Open conversation	Interview with statements	Teacher questionnaire	Post course student questionnair — Student way of learning	Post course student questionnair — Student perceived learning result	Pre course questionnaire	VLC Database — Virtueal learning interaction	VLC Database — Given and appreciated peer feedback	School validated feedback quality
Pre research (Chapter 4)	**2000-2007**												
Economics and Management (HvA)	2000-2001	unknown	324	16	X								
Insurances (RVS)	2002-2003	79-83%	15	2		X							
Social Pedagogical Aid (HAN)	2004/2005	63%	85	18		X	X						
Nursing (HAN)	2004/2005	63%	70	8		X	X						
Master Disease Control (KIT)	2005/2006	54%	29	2				X	X	X	X	X	by all teachers during the
E-Business (Fontys)	sept-dec 2005	64%	31	5				X	X	X	X	X	
Human Resource Management (BSN)	mar-july 2006	64%	14	2				X	X	X	X	X	
Rivio (HRO)	jan-june 2007	21%	38	4				X	X	X	X	X	
New research (Chapter 5)	**2007/08**												
Nursing (HRO)	sept07-jan2008	75%	104	8			X	X	X	X	X	X	by 1 teacher at the end
Hotel Management (NHTV)	jan-june 2008	77%	81	5			X	X	X	X	X	X	
Facility Management (NHTV)	jan-june 2008	77%	91	3			X	X	X	X	X	X	

When we consider contextualisation, the second quality indicator, it can be concluded that in all projects VAL was applied for as much as 54% to 83%. In the eight projects launched between 2000 and 2007, the post-course questionnaire and the teacher questionnaire (not used in this research) were developed into instruments to be used in different contexts, such as Master's and Bachelor's courses, full-time and part-time courses (HRM-Master), and finally Disease control and E-Business courses.

The development of the post-course questionnaire has led to a valuable new instrument for our recent research. First, with respect to the instrument's content quality, all indicators used were based on VAL theory and embedded in Baeten's VAL book (2009, 2011). Second, the process that started with an open dialogue, supported by means of six statements, and that ended with completing a formal questionnaire resulted in an instrument which can be applied in different situations. This is an indicator of high context quality. This is supported by the fact that since 2005 the post-course questionnaire has undergone only minor changes and that the implementation of this questionnaire has enabled us to distinguish two constructs (Virtual Learning Interaction and Given and Appreciated Peer Feedback). Nevertheless, it must also be borne in mind here that the answers to questions about these two constructs in the student questionnaire reflect *conceptions* of activities that students engage in when they are active in the VLC. Additional research will likely make it possible to measure these with reliable data from the VLC database.

4.3.2.2 Virtual Learning Interaction and Given and appreciated peer feedback

Although the post-course questionnaire proved to measure students' views on the progress of their Learning process in a sufficiently effective and reliable way, we wanted to measure the relationships between the items in order to obtain a greater insight into the learning behaviour of students on the Internet. This was made possible by the VLC database in which all virtual interactions of all students were registered.

Virtual Learning Interaction takes place in the VLC with fellow students. These interactions include giving, receiving and appreciating peer feedback, voting on statements, discussing arguments and adding arguments to the knowledge object that can help students improve their learning products. Given and Appreciated Peer Feedback is part of this Virtual Learning Interaction, but it is so specific within the VAL concept that it needed to be defined as two separate constructs of students' learning behaviour:

- Virtual Learning Interaction without Given and Appreciated Peer Feedback;
- Given and Appreciated Peer Feedback.

Although Virtual Learning Interaction was part of the post-course questionnaire in our pre-research, the data were only analysed from the VLC database in our recent research (2007/08). The values denote the frequencies of the variables (activities, interactions) as registered in the VLC database.

Overview of the four constructs

The constructs concerning the Learning process are derived from de Design principles of VAL with the expected Learning outcomes as described in Chapter 2 and the steps of the Learning process as described in Section 4.2. This is demonstrated in the next four tables for every item of the constructs.

Table 4.2 The construct of Student Perceived Way of Learning

Student Perceived Way of Learning construct with items	Corresponding Design principle of VAL
With VAL, I have more freedom to decide for myself how I learn	Principle 2
With VAL, I have more freedom to decide for myself what I learn	Principle 2
Because of VAL, I have taken more responsibility for my own learning process	Principle 2
Because of VAL, I have taken more initiative during this course	Principle 2
VAL has stimulated me to learn more from my fellow students	Principle 4
VAL has stimulated me to focus more intensively on the content of the course	Principle 3

The eight items described in Section 2.4.1 were involved in the construct of Student Perceived Learning Result as shown in Table 4.3 below.

Table 4.3 The construct of Student Perceived Learning Result

Student Perceived Learning Result construct with items	Corresponds with
Because of VAL, I have spent more time studying	the Learning outcomes of the VAL Learning process as described in Section 2.1.6
Because of VAL, I have become more interested in topics concerning the course	
Because of VAL, I have been able to construct more knowledge	
VAL has increased my motivation to learn/study	

Table 4.4 below shows eight types of Virtual Learning Interaction with their corresponding steps in the VAL Learning process and with the corresponding Design principles of VAL.

Table 4.4 The construct of Virtual Learning Interaction

Types of Virtual Learning Interaction in the Virtual Learning Community (VLC)	Corresponds with	
	the VAL Learning process	the VAL Design principles
Visits	Step 5	Principles 1, 3 and 8
Use of components (information selection)	Step 5	
Number of platform messages	Step 5	
Added learning questions / answers	Step 5	
Number of uploaded products	Step 5	
Voting on statements and giving arguments	Step 5	
Nominated products in best practising	Step 7	
Ratings at best practising	Step 7	

The next table, Table 4.5, shows the two types of peer feedback used in the Virtual Learning Community with their corresponding steps in the VAL Learning process (see Section 4.2) and with the VAL Design principles (see Chapter 2).

131

Table 4.5 The construct of Given and Appreciated Peer Feedback

Types of peer feedback in the Virtual Learning Community (VLC)		Corresponds with	
		the VAL Learning process	the VAL Design principles
Given Peer Feedback	Feedback given by student A on the learning product of student B in his or her Portfolio in the VLC	Step 5	Principles 1, 3, 4 and 8
Appreciated Peer Feedback	Appreciation by student A of received feedback on his or her learning product by student B, supported by arguments	Step 5	

Upon the project's conclusion, students evaluated the effects of the implementation of every VAL application; this was always done in close collaboration with the educational institution concerned. From 2005 onwards, starting with the Master's programme Disease Control, we have used the post-course questionnaire discussed in this chapter. This means that the evaluation results gathered from 2005 onwards have enabled us to shed greater light on the four constructs, as a result of which it became possible to test the three quality criteria mentioned above for the design statement.

A summary is available (Driessen & Vos, 2008) of all evaluations of all VAL projects together with the effects of the implementation of VAL on students, as shown in our next table, Table 4.6.

Table 4.6 Effect of implementation of VAL on students

Projects	Number of students	Average age	Transformation score	Effect implementation of VAL on students					
				More motivat-ed	More time spent on studies	Studied more actively	Higher final result	Would like to continue with VAL	Would like to continue with VLC
Social Pedagogical Aid (HAN)	85	22	63	yes	yes	yes	at least the same	yes	yes
Nursing (HAN)	70	21	65	yes	yes	yes	at least the same	yes	yes
Master Disease Control (KIT)	29	35	54	83%	79%	yes	yes, 52%	86%	86%
RVS Insurances	15	38	81	93%	86%	yes	yes	yes	yes
E-Business (Fontys)	31	22	64	24%	42%	yes	yes, 46%	69%	66%
HRM-masters(BSN)	17	42	64	85%	71%	yes	unknown	unknown	unknown
Rivio (HRO)	46	21	21	0	0%	yes	no	35%	28%
Source: Driessen, A. , & Vos, M. de, VAL-applications in VAL-project from 2002-2008, Breda, Citowoz									

Table 4.6 is only an impression of the results of each VAL project; it gives us no scientific insight into the Learning process of VAL. This is why we have developed the instrument based on the four constructs that measures the progress and results of the Learning process within VAL as described before. The result is an instrument with four constructs to be tested, as shown in Figure 4.4 below.
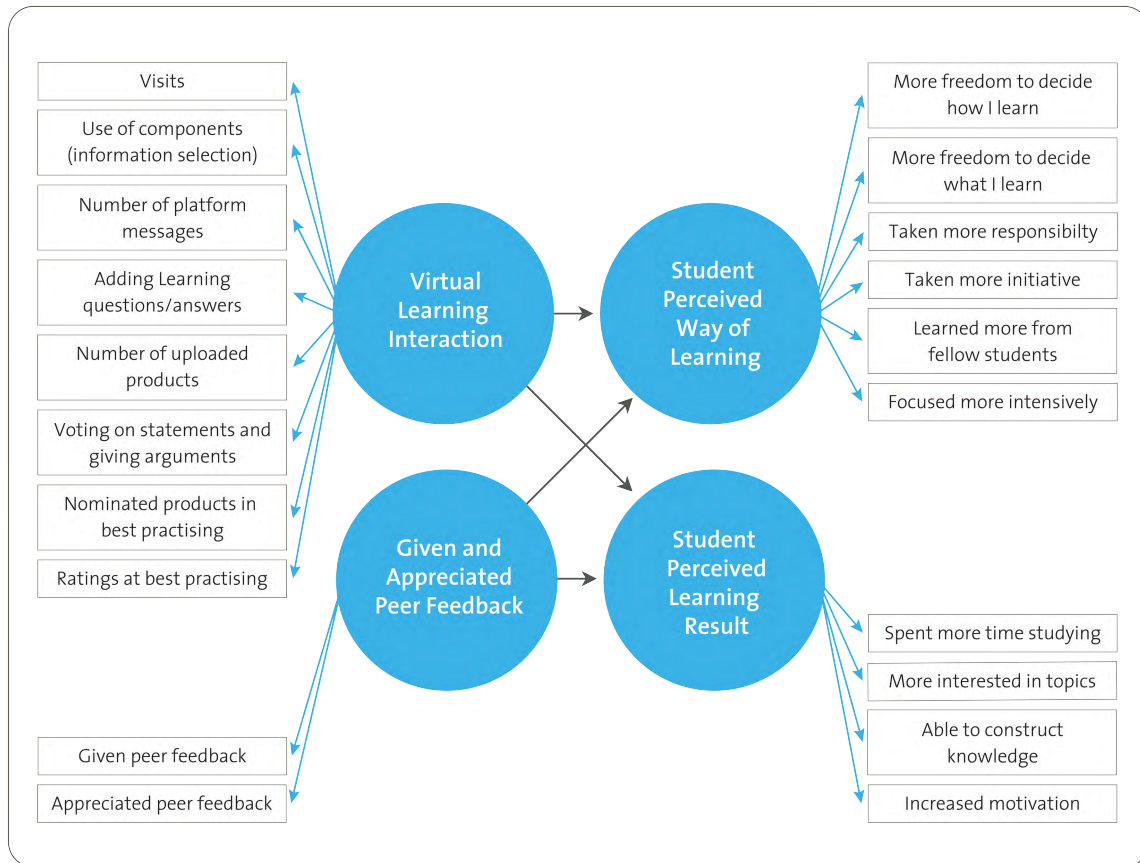
Figure 4.4 The instrument for measuring the progress and result of the Learning process

The above instrument with its four constructs and twenty items had already been used in part before our main research study was launched (cf. Chapter 5). Here, it is tested in its *entirety* in terms of validity and reliability in order to formulate sound scientific conclusions about the Learning process and to be able to continue the implementation of the instrument in similar research projects. Testing took place on the basis of the data we gathered in 2007/08 during three courses that were run in the departments of Nursing, Facility Management and Hotel Management at two Dutch universities of applied sciences. A detailed description of these three cases is presented in Chapter 5.2.2.

4.3.3 The design statement for the Feedback and Reflection Cycle

The design statement mentions that VAL can be characterised on the basis of the result of the Feedback and Reflection Cycle; this cycle structures the virtual part of the students' learning process within VAL and should result in distinguishing levels of the quality of the peer feedback they provide on learning products of fellow students as validated by the school. We expect to solve problems concerning the wide scope of VAL by designing an instrument with which the school (the teacher) can measure the quality of this peer feedback as an outcome of the virtual learning process and thereby establish the specificity of VAL.

From the year 2000 onwards, we recorded all activities associated with giving and receiving feedback, students' reflections upon this feedback and their teachers' responses. This was

subsequently discussed in all projects together with their respective sounding boards. Over time, we developed the Feedback and Reflection Cycle as elaborated in the previous section. Because the activities concerned were related to virtual learning activities, we continuously adapted the VLC to facilitate the cycle's feedback phase in the best possible way.

First, we included the peer feedback in separate documents in the VLC, after which it was validated by the teacher as being 'sufficient' or 'insufficient'. Then, starting in 2004, the Feedback and Reflection Cycle was incorporated into the VLC as a combination of four functionalities. Giving peer feedback in the VLC is done via text uploads that are linked to a specific learning product of a specific student. This student is immediately notified that feedback is available for his or her product. The student is also able to assess the quality of the feedback on the basis of four different levels.

The second functionality involves the possibility for a student to assess and value the peer feedback that he or she receives, after which the student has to include additional arguments and comments in the form of added text. It goes without saying that the feedback given by a student is identical to the feedback received by the recipient, but assessing the feedback one gives as well as the feedback one receives strengthens the reflection stages of the Feedback and Reflection Cycle.

The third functionality concerns the possibility for the teacher to validate the quality of the peer feedback that students provide. To this end, a Validation Report is available in the VLC which enables the teacher to validate the peer feedback in a systematic and highly efficient way by indicating which of the four quality criteria matches the feedback concerned. These criteria are elaborated in a separate section below.

Finally, students are actively encouraged to provide feedback or to assess the feedback they received; this is done at various locations in the VLC, for instance via annotations, dashboard announcement and personal messages.

The figure included below illustrates the way in which the Feedback and Reflection Cycle is facilitated by functionalities of the VLC.
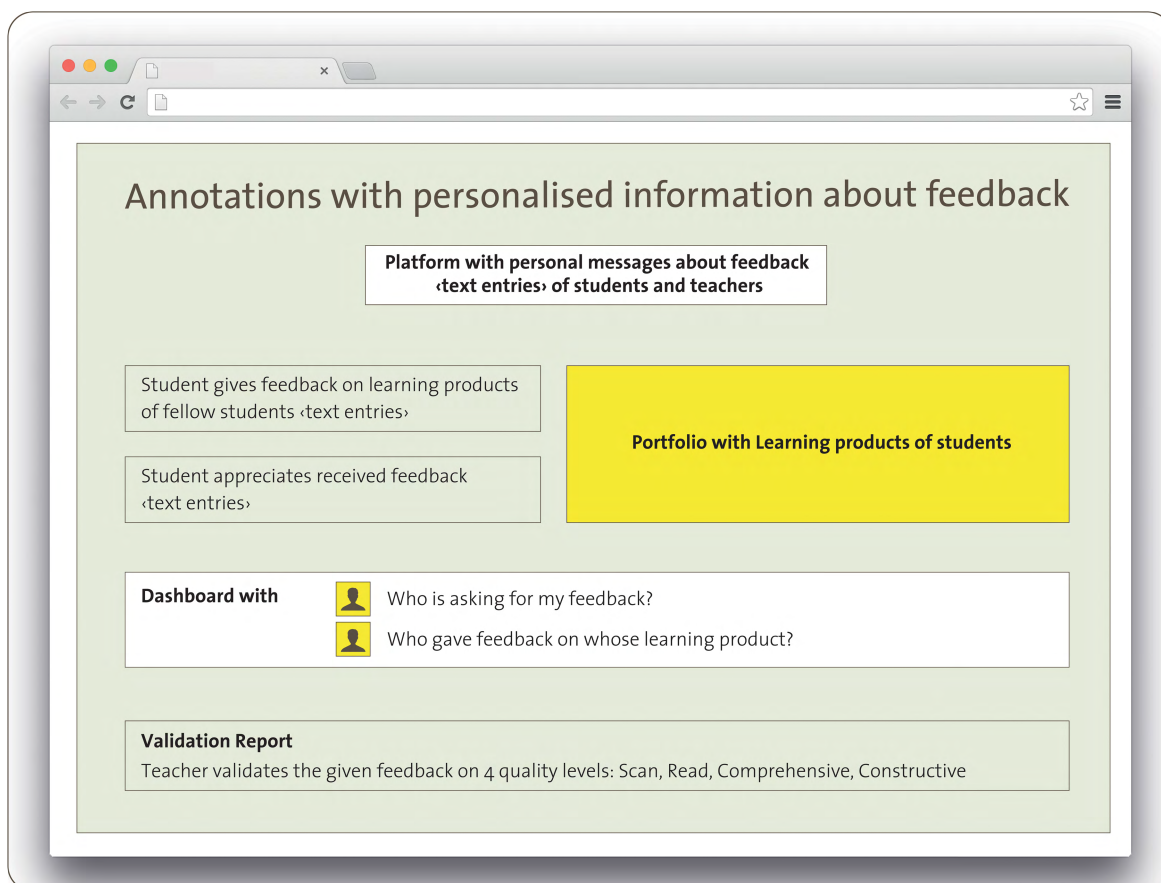
Figure 4.5   The VLC facilitates the Feedback and Reflection Cycle

By organising the Feedback and Reflection Cycle in the way that we did, this cycle is designed in the best possible way for students to strengthen their learning process in the best possible way. Determining the quality of the peer feedback itself will be discussed below.

The quality of the given peer feedback

To the best of our knowledge, no literature or studies are available addressing the qualification of student's peer feedback on one another's learning products. This is why we, in close cooperation with all schools involved, defined four levels of feedback to be used by the student as well as by the teacher.

Design principles of VAL and the quality of given peer feedback.

The application of feedback quality levels challenges the student to improve his or her feedback during the course and stimulates meaningful learning in the Learning process (Design Principle 3). For the student, these levels – even if they are only appreciated by fellow students - are a form of formative testing in his or her Learning process (Design Principle 4) because his or her given feedback is appreciated by fellow students and the student who gave the feedback can therefore reflect on his or her own learning progress. Providing peer feedback is part of the Reversed onus in the assessment process (Design Principle 6), and with his or her given feedback the student can deliver evidence for his or her competency development. Finally, the learning technology in the VLC connects the Learning process and the Assessment process within VAL; the student's given

peer feedback is the same as the validated feedback with which the teacher is able to decide whether the student has delivered evidence for his or her competence development (Design Principle 8).

The four quality levels of peer feedback

Figure 4.5 above shows that peer feedback data were collected through the text that the student entered into the VLC with the purpose of giving feedback to a fellow student's learning product. These text entries can be classified into one of four categories:

- Scan: the feedback in the form of the text entry reveals that at best, the student providing the feedback has superficially looked over (i.e. scanned) the learning product;
- Read: the feedback in the form of the text entry reveals that at best, the student providing the feedback has read the learning product;
- Comprehensive: the feedback in the form of the text entry reveals that at best, the student providing the feedback has read and understood the learning product;
- Constructive: the feedback in the form of the text entry reveals that the student providing the feedback has read and understood the learning product and is capable of improving it.

Although the level of these four categories ascends in terms of their qualitative and distinguishing nature and in terms of their clarity and preciseness, we cannot speak of clear intervals between the four individual categories. It is a valid one-dimensional scale. Within the Learning process in VAL, a student will develop himself or herself in terms of his or her ability to give feedback. The subsequent valuation of feedback (assessing and validating it) requires expertise on the part of the teacher involved. This may lead to certain interpretation differences with respect to the quality of feedback. In addition, timing is of the essence: it makes a considerable difference whether the teacher completes his or her valuation during the course or after the course, because the former situation allows the student to reflect on the quality level concerned. Especially when given peer feedback is part of the assessment of the course as a whole, *ex post* validation by one single teacher has proven to be the most reliable way to validate both the quality of the peer feedback and the quality of the feedback development process.

In the VLC, the teacher is able to validate any feedback given by any student; this can be done in a clear and organised manner in the Validation Report in terms of the four quality levels discussed above. Here, a remaining obstacle proved to be the fact that this leaves all teachers in a position where they can continue to qualify feedback using levels which they believe to be appropriate. For the new research project in 2007/2008 we decided to include the proposal to have one single teacher validate all feedback in order to increase the validity of the measuring instrument and to enhance the reliability of the measurements.

Figure 4.6 presents a Validation Report with examples of given feedback recorded during a course held in English in which students also had to complete their feedback in English. This accounts for the language errors included in the figure.

Validation report			Virtual Learning Community	
Date	**Feedback on product**		**Competences**	**Validation**
070608	LA 11: From mission, to vision, to action…		3	Read
You mentioned their goal is customer loyalty and brand loyalty, but how are they going to achieve that? By concur Asia? Why should they implement this strategy? You mentioned the changes (that is good) but what is this for Adidas?				
070608	LA 11: From mission, to vision, to action…		3	Comprehensive
How are you going to implement your strategy costs, benefits, planning, etc.? Look at the 8 steps of transformation of John Kotter (12 manage.com). By describing these steps the whole organisation will get familiar.				
070608	LA 11: From mission, to vision, to action…		3	Scan
Well done! I only advise you to extend your communication plan. Who are the exact stakeholders (primary/ secondary) which needed to be informed and how are you going to inform them, by phone? By meetings? Be more specific towards Adidas.				
070608	LA 11: From mission, to vision, to action…		3	Comprehensive
Good start! I advice you to divided the stakeholders into primary (management, internal/external clients) and secondary (suppliers, society) like you mentioned in LA 4. You want to inform all the stakeholders, but they all need a different description.				
050608	LA 8: Confronting the organisation with its market place		2	Comprehensive
Well done! I only miss the explanation of each S/W/O/T, why is it a S/W/O/T? For example no focus on customers and they are important for JvH, no attention given to them will eventually lead to less customers for JvH and more competition. Wiliam				
050608	LA 8: Confronting the organisation with its market place		2	Constructive
I will advice you to describe every S/W/O/T, why its on strategic level and what is the link with the competitors of knowledge: not competing with the competitors, decrease of clients, not innovative etc. Then you give your selection.				
040608	LA 6: Internal Analysis		2	Constructive
Well done! I advice you to extend structure with the configuration of Mintzberg, because you mean Adidas already is a flat organisation with direct supervision. Look at organizational science page 292 to determine the configuration of Adidas.				

Figure 4.6 Examples of given peer feedback within the Validation report

The result of our practical study is the development of a one-dimensional instrument entitled Quality of peer feedback as validated by the school, with which validation is done by one expert teacher and which takes place after the course concerned has been completed. This is done in the Validation Report in the VLC as shown above.

Over time, this instrument was developed in the practice of VAL, and it is very closely intertwined with validation in the VLC. Since 2005, it has been used thousands of times, much to the satisfaction of hundreds of students and teachers, all of whom felt completely comfortable with the four quality levels. However, the instrument can only be termed valid and reliable when one single teacher in the VLC is able to validate feedback in terms of these levels.

4.4 Results

This section describes the results of the testing and quality of both instruments separately. In the next chapter, the tested instruments will be aggregated into one research model.

4.4.1 Considering the first instrument

Testing the Design Statement and the quality of the measurement instrument.
As stated above, the evaluation results generated since 2005 have enabled us to enhance our understanding of two of our four constructs, in turn allowing us to test the three quality criteria with respect to our design statement. That said, Given and appreciated peer feedback as well as Virtual Learning Interaction concern data that were stored in the VLC database and that were not included in our evaluation studies; these data were, however, included in our new research as of 2007/08.

We tested this instrument and its four constructs in the model as shown in Figure 4.4 with the data of the new research as described in Chapter 5. The testing consisted of a check on reliability and validity and on the estimations of the model. The dataset is described in detail in Section 5.3; here, we give a short introduction. The research conducted in 2007/08 consisted of 278 third-year students of two Dutch Universities of Applied Sciences. They took a one-semester management or nursing course within the VAL educational concept. For testing this model, we exclusively used the 148 cases including students who participated in the Virtual Learning Interaction and in Given and Appreciating Peer Feedback and who filled in the questionnaire to collect data for Student Perceived Way of Learning and Student Perceived Learning Result.

Model characteristics
For the outer model evaluation of the instrument, we examined the validity and reliability of the constructs with the data set of 148 cases by using the Partial Least Square Structured Equation Model (PLS/SEM-model). This method to structural equation modelling allows estimating complex cause-effect relationship models with latent variables. Table 4.7 shows the factor loadings of the latent variables within the outer model only for the loading with an indicator validity of at least 0.6. Factor loadings are acceptable when they are at least 0.6 (Hair, Hult, Ringle, and Sarstedt, 2014).

Table 4.7 The PLS/SEM-model of the first instrument
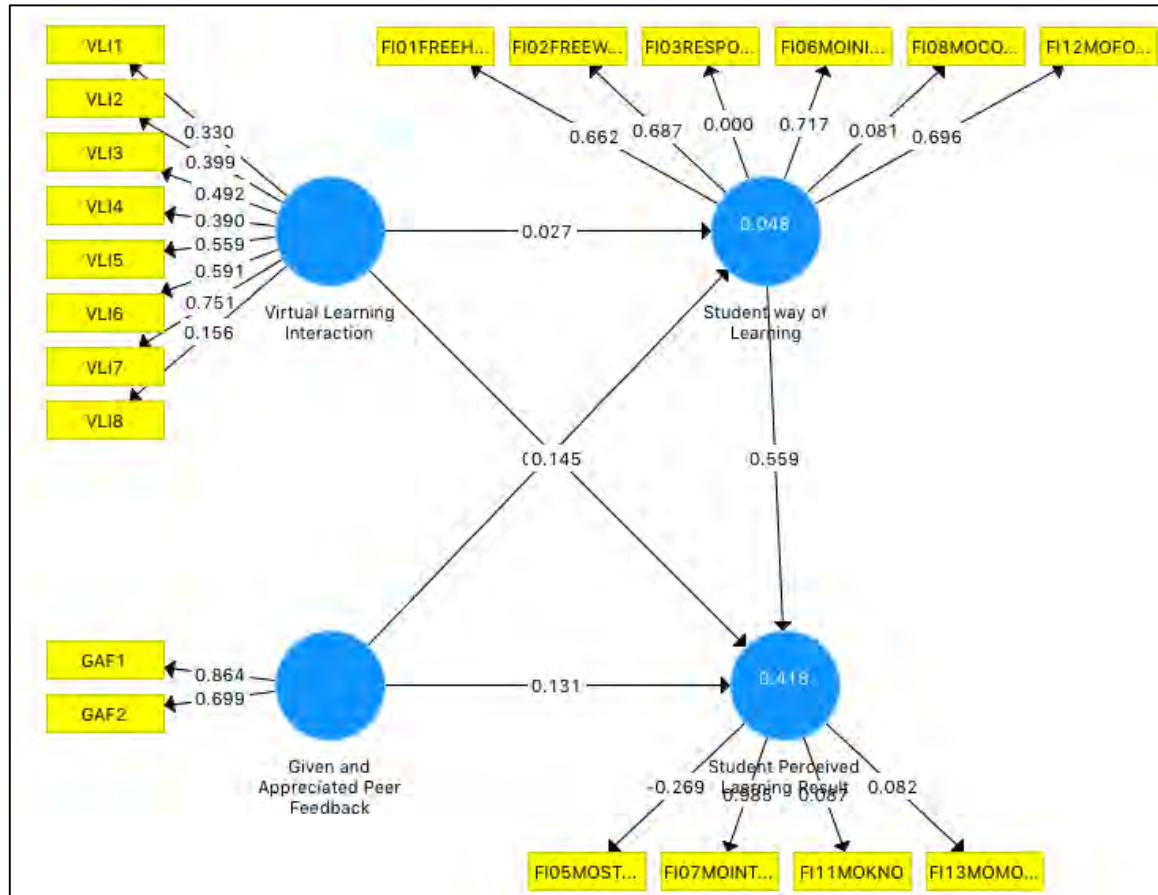
Table 4.8 The factor loadings of the PLS/SEM-model

Factorstructure and loadings		Virtual Learning Interaction	Given and Appreciated Peer Feedback	Student Perceived Way of Learning	Student Perceived Learning Result
More freedom to decide how I learn	FI01FREEHOW			0.66	
More freedom to decide what I learn	FI02FREEWHAT			0.69	
Take more initiative	FI06MOINITIA			0.72	
Focused more intensively	FI12MOFOCUS			0.70	
More interested in topics concerning the course	FI07MOINTERS				1.00
Given peer feedback	GAF1		0.87		
Appreciated peer feedback	GAF2		0.70		
Number of uploaded products	VLI5	0.57			
Voting on Statements and giving arguments	VLI6	0.71			
Nominated products in Best practising	VLI7	0.80			

Table 4.8 shows that within the construct Virtual Learning Interaction, three items have a sufficient validity: VLI5 (AVE =0.57), VLI6 (AVE =0.71) and VLI7 (AVE =0.80). Within the construct Given and Appreciated Peer Feedback, items GAF1 (AVE =0.87) as well as GAF2 (AVE =0.70) are valid. Within the construct Student Perceived Way of Learning, four items have a sufficient validity: FI01FREEHOW (AVE =0.66), FI02FREEWHAT (AVE =0.69), FI06MOINITIA (AVE =0.72) and FI12MOFOCUS (AVE =0.70). Within the construct Student Perceived Learning Result, only one item has sufficient validity: FI07MOINITIA (AVE= 0.99). This means that only 10 of the 20 items meet this standard.

Second, we examined the Composite Reliability and Convergent Validity within the model reliability, as displayed in Table 4.9. It considers the constructs after removing the 10 invalid items.

Table 4.9   Composite Reliability and Convergent Validity

	Composite Reliability	Convergent Validity
Virtual Learning Interaction	0.74	0.50
Given and Appreciated Peer Feedback	0.76	0.62
Student Perceived Way of Learning	0.79	0.50
Student Perceived Learning Result	1.00	1.00

We found acceptable Composite values for all four constructs. All four constructs appeared to be reliable with a Reliability score (α) of at least 0.7 (Nunnally, 1978, Cronback, 1951): Virtual Learning Interaction (α=0.74), Given and Appreciated Peer Feedback (α=0.76), Student Perceived Way of Learning (α=0.79), and Student Perceived Learning Result (α=1.00).

We checked for convergent validity using Fornell and Larcker's criterion of an Average Variance Extracted (AVE) for each construct above the 0.5 benchmark (Fornell and Larcker, 1981). The model demonstrated sufficient convergent validity with Virtual Learning Interaction (AVE=0.50), Given and Appreciated Peer Feedback (AVE=0.62), Student Perceived Way of Learning (AVE=0.50) and Student Perceived Learning Result (AVE=1.00).

Third, we checked for discriminant validity, comparing the AVEs of the constructs with the inter-construct correlations determining whether each latent variable shared greater variance with its own measurement variables or with other constructs (Fornell and Larcker, 1981). We compared the square root of the AVE for each construct with the correlations with all other constructs in the model (Table 4.10). A correlation between constructs exceeding the square roots of their AVE indicates that they may not be sufficiently discriminable.

Table 4.10   The Discriminant Validity of the four constructs

Discriminant Validity	Given and Appreciated Peer Feedback	Student Perceived Learning Result	Student Perceived Way of Learning	Virtual Learning Interaction
Virtual Learning Interaction	0.32	0.26	0.09	0.70
Given and Appreciated Peer Feedback	0.79			
Student Perceived Way of Learning	0.22	0.60	0.69	
Student Perceived Learning Result	0.33	1.00		

For each construct, we found that the absolute correlations did not exceed the square roots of the AVE. Hence, we may conclude that all constructs show sufficient reliability and validity.

Model estimations

Our check on the estimations of the model considered the significant paths as shown in Table 4.11 below.

Table 4.11   Check on significant paths

Check on significant paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Given and Appreciated Peer Feedback -> Student Perceived Learning Result	0.16	0.16	0.06	2.50	0.01
Given and Appreciated Peer Feedback -> Student Perceived Way of Learning	0.21	0.22	0.09	2.34	0.02
Student Perceived Way of Learning-> Student Perceived Learning Result	0.55	0.55	0.05	1.04	0.00
Virtual Learning Interaction -> Student Perceived Learning Result	0.16	0.17	0.07	2.22	0.03
Virtual Learning Interaction -> Student Perceived Way of Learning	0.02	0.04	0.09	0.25	0.81
		Explained Variances R2		Adjusted Explained Variances R2	
Student Perceived Learning Result		0.42		0.41	
Student Perceived Way of Learning		0.05		0.04	

All shown relations above are reliable: they have a P value less than 0.05. Only the relation between Virtual Learning Interaction and Student Perceived Way of Learning is not reliable with a value of 0.806.

Finally, regarding the inner model evaluation and estimates, we analysed the coefficients by using bootstrap t-statistics for their significance (Anderson and Gerbing, 1988). For this bootstrapping, we used 5,000 subsamples, with a bias-corrected bootstrap, testing for a two-tailed significance of 95%. The model showed sufficient model fit: the Standardized Root Mean Square Residual (SRMR) was 0.045, which is in line with Hu and Bentler's criterion of < 0,08 (1998).

The result of this study is an appropriate model, as shown in Figure 4.7, with reliable and valid constructs and significant paths, an instrument for measuring the progress and the results of the Learning process within VAL from the perspective of the student. However, the Student Perceived Learning Result is a single item construct.
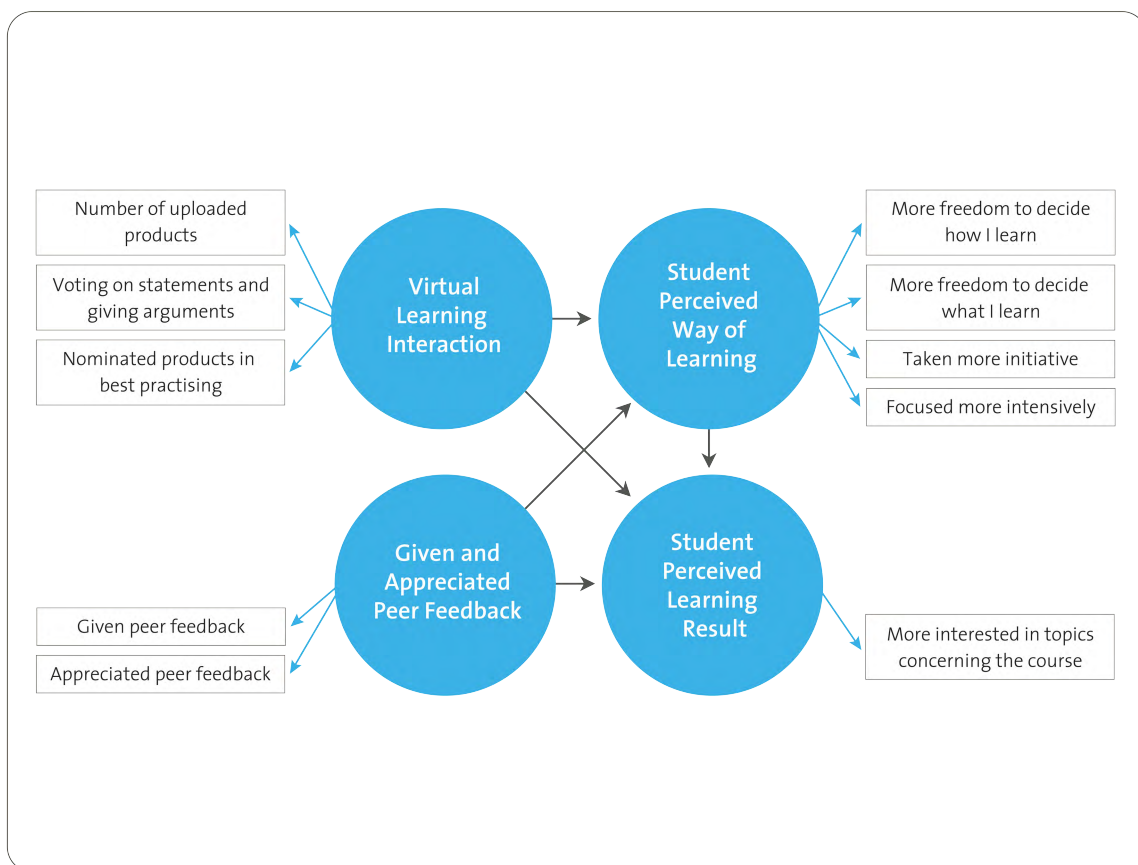
Figure 4.7   The instrument for measuring the progress and result of the Learning process from the perspective of the student

This instrument comprises four constructs with one to three indicators in each scale, representing distinctive aspects of student behaviour and the results of the Learning process within VAL. In our new research (Chapter 5), the validity of the instrument is described as well as the relation between Virtual Learning Interaction with Student Perceived Way of Learning and Student Perceived Learning Result on the one hand, and the relation between Given and appreciated peer feedback with Student Perceived Way of Learning and Student Perceived Learning Result on the other hand.

At this point, let us briefly re-mention our initial research question. It asked what would be an appropriate instrument for measuring the progress and the results of the Learning process within VAL from the perspective of the student, and it was subsequently transformed into the following design statement: VAL can be characterised on the basis of four features of the Learning process: (1) Virtual Learning Interaction (VLI) and (2) given and appreciated peer feedback lead to a changed (3) Student Perceived Way of Learning and changed (4) Student Perceived Learning Results. We also indicated that the outcome of accepting the design statement is dependent on three quality indicators:

1. The intrinsic quality of the design statement using the VAL Design principles. Here, we need to consider the aspects concerning the progress of the Learning process within VAL: Virtual Learning Interaction, Given and appreciated peer feedback and Student Perceived Way of Learning have been transformed into constructs that are directly related (Tables 4b, 4d and 4e) to the Design principles of VAL (see Chapter 2). Student Perceived Learning Result seen as

the result of the Learning process is related (Table 4c) to the learning outcomes of the VAL Learning process as described in Section 2.4.1.

2. Contextualisation, i.e. the design statement applicable to the specific educational situation for the courses followed by the students. This relates to the quality of the design as well as the process of developing a research instrument that is useful in any context. As described in this chapter, when considering contextualisation as a quality indicator, it can be concluded that VAL has been applied in all projects for more than 50%. Because the projects concerned are pilots within educational programmes of two to four years, existing regulations made it impossible to do more and apply VAL for a full 100%. In the eight projects that ran between 2000 and 2007, the post-course questionnaire and the teacher questionnaire (not used in this research) were developed into instruments for use in different contexts, such as Master's and Bachelor's courses, full-time and part-time courses (HRM-Masters) and content courses (Disease control and E-Business).

3. The quality of action: in this case, the implementation (of VAL) as intended and the change of social reality as referred to in the (VAL) concept. Social reality is here defined as the progress and the results of the Learning process of students as determined by four constructs, namely their participation in Virtual Learning Interaction in the VLC, their Given and Appreciated Peer Feedback to fellow students, their way of learning and finally their perception of their learning result.

To conclude: with the justification of these three quality indicators, the design statement for the first instrument is accepted.

4.4.2   Considering the second instrument

Here, too, we need to go back to our initial research question. This question, asking what would be an appropriate instrument for measuring the quality of the given peer feedback of students as a result of their Learning process within VAL, was subsequently transformed into the following design statement: VAL can be characterised on the basis of the result of the Feedback and Reflection Cycle; this cycle structures the virtual part of the students' learning process within VAL and should result in distinguishing levels of the quality of their peer feedback they provide on learning products of fellow students as validated by the school. As was the case with our first instrument, discussed in the previous section, the outcome of accepting the design statement is dependent on three quality indicators:

1. The intrinsic quality of the design statement. The instrument fully complies with the VAL Design principles mentioned. The explicating of feedback qualities is necessary not only for the learning of meaning and the student's learning progress, but also for the validation of this learning result by the teacher.

2. When we consider contextualisation as a quality indicator, we may conclude that VAL has been applied in all projects for more than 50%. The design statement is applicable to the specific educational situation for the courses followed by the students. Because the projects concerned were pilot studies held within educational programmes of two to four years, existing regulations made it impossible to step up our efforts and apply VAL for a full 100%. In the projects carried out between 2002 and 2007, the instrument of measuring the quality of peer feedback was developed for use in different contexts, such as Master's and Bachelor's courses, full-time and part-time courses (HRM Masters) and content courses (Disease control and E-Business).

3. The quality of action: in this case, the implementation (of VAL) as intended and the change of social reality as referred to in the (VAL) concept. Social reality is here defined as the result of the learning process of students, determined by the construct of feedback quality as validated by the teacher (the school).

SCHOOL VALIDATED PEER FEEDBACK QUALITY
4 peer feedback quality levels:
SCAN
READ
COMPREHENSIVE
CONSTRUCTIVE

Figure 4.8 The instrument for measuring the quality of given peer feedback

What follows from this study is an appropriate instrument for measuring the quality of given peer feedback as a result of the Learning process within VAL from the perspective of the teacher (the school). Nevertheless, it has its limitations for scientific research: validation has to be done at the end of the course and by one single teacher.

In conclusion, with the justification of these three quality indicators, the design statement for the second instrument is accepted.

4.5 Discussion

4.5.1 The first instrument

It would have been possible to keep the research project outside the scope of the development of VAL and to develop a completely separate instrument. However, we chose to evaluate each application of VAL with the help of a questionnaire, the quality of which improved over time with the successive components as described earlier in this chapter. It would, in theory, also have been possible to perform our measurements with existing instruments, but these proved to be insufficiently valid for measuring the progress of the Learning process within VAL, which is regrettable because a comparison with other research and concepts would have been preferred.

We opted for an new instrument, developed over time in successive projects in a process of co-creation involving teachers as well as students, with which we could measure the specific nature of the Learning process within VAL. A potential limitation could be the fact that it considers the perspective of the student only, and not the perspective of the school. Nevertheless, Design Based Research (DBR) proved to be an appropriate and effective way to assist the development of both the VAL educational concept and this instrument.

Limitations and suggestions for further research and practical implications.
In scientific terms, the instrument has its limitations. The model fits, but it has only one to four valid and reliable items per construct. In particular, this means that statements about the construct Student Perceived Learning Result remain limited at most to a student's growing interest in topics concerning the content of his or her education within VAL. In order to make this construct more representative, we changed the name (label) into Student Perceived Content Interest.

Finding scientific evidence for the impact of learning interventions in terms of learning outcomes, regardless whether these are established by the student or the school, proved to be a near-impossible task: too many variables, interactions and time factors were involved. This is true for existing educational programmes and it is especially true for educational innovations: their added value is generally deduced by teachers and programme managers on the basis of observations of students' direct behaviour rather than on the basis of scientific research. That said, academic research continues to be needed in order to obtain more comprehensive insights into students' learning processes. For this reason, educational innovations continue to require new research instruments: by no means an easy task, as demonstrated by the current study. Our work should be viewed as an initial step in the development of new instruments to measure the progress and the result of the student's learning process, from the perspective of the student as well as the perspective of the teacher, so that additional future innovations can be introduced in appropriate and effective ways.

4.5.2 The second instrument

With respect to our second instrument, our findings are the same as those in the study we conducted on the instrument that measures the progress and the results of the Learning process within VAL. Here, too, we could have kept the research project outside the scope of the development of VAL, and we could have developed a completely separate instrument. However, in every VAL project we discussed the way in which feedback could have been used as the most important element of the Learning process within VAL. We decided to evaluate the application of VAL with the help of the four above-mentioned feedback levels, the quality of which improved over time with the successive VLC functionalities as described earlier in this chapter. As was the case for the first instrument, it would also have been possible to perform our measurements with existing instruments, but these, too, proved to be insufficiently valid for measuring the quality of peer feedback within the VAL educational concept. Had these instruments been available, a comparison with other research and concepts would have been possible.

Here, too, we opted for a new instrument - as we did for the first instrument. The second instrument was developed in a similar fashion: over time and in successive projects in a process of co-creation together with teachers as well as students, allowing us to measure the specific nature of the Learning process within VAL. The conclusion is clear: the validation of peer feedback quality has to be done by one single teacher at one specific moment. Nevertheless, as we did for our first instrument, we can conclude that Design Based Research (DBR) proved to be an appropriate way to assist the development of both the VAL educational concept and this particular instrument.

Since it was only possible to determine the true value of the instruments when they were aggregated into one research model, we carried out another investigation. This large study was executed in 2007/08 and forms the topic of our next chapter.

4.6 References

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Following our description of the theoretical framework and our conclusions regarding the quality of the two instruments that we designed to measure the progress and the results of the Learning process within VAL, we can proceed with testing our research statements: the topic of the current chapter.

5.1 Introduction

In 2007/08, most of the VAL educational concept had been developed and organised on the basis of earlier findings and experiences, and we wished to determine the progress and the results of the learning process within VAL from the perspective of the student and the perspective of the school. The current chapter starts with a description of the research model with the two instruments elaborated in Chapter 4 and the research questions presented in Chapter 1.4. It subsequently discusses the method used to answer these questions; this is done by presenting three detailed cases featuring a number of students and their educational courses. Next, we shall concentrate on the way in which the research data were gathered as well as the quality of the data. Results are presented in a subsequent section in which the data are analysed by means of path analyses. This approach enabled us to analyse results and formulate answers to the research questions, as presented in the Results section and discussed in the final section.

5.2 Method

This section elaborates on the way in which the five constructs of the research model were applied in three different research cases. It also considers the tools and the protocol that were needed to gather the data to measure the relations between the constructs which allowed us to test their correlations in such a way as to confirm or reject them. This will be discussed in the Results section.

5.2.1 Research model and five statements

The result of our earlier research (cf. Chapter 4) is a set of two instruments with which the progress and the results of students' learning process could be measured. Together, they form the reliable and valid research model that is presented in Figure 5.1 below.
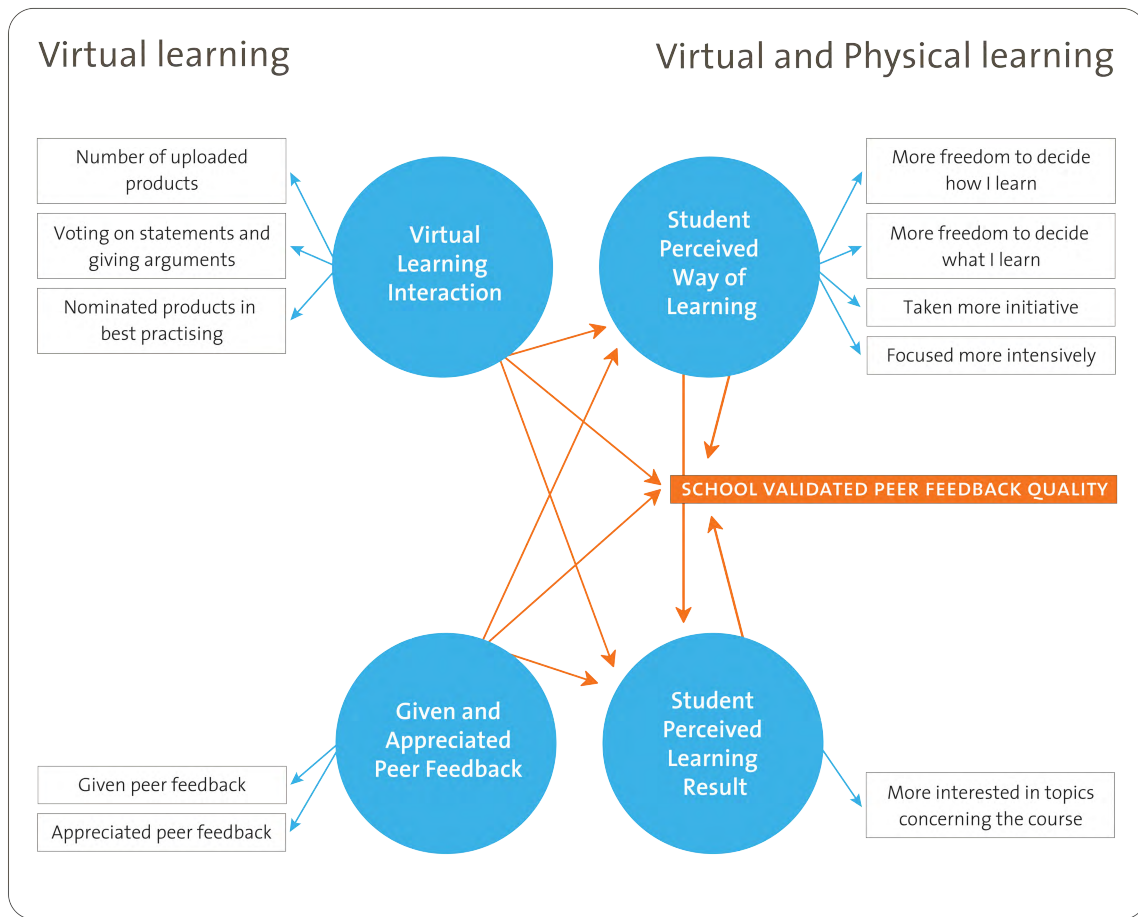
Figure 5.1 The research model

In this dissertation, the research questions have been formulated into the following statements (see Chapter 1.4):

1. Giving and appreciating peer feedback to fellow students is the driving force in students' learning processes in VAL; as such, it is the main determinant of the other constructs in our research model.

2. The amount of given peer feedback by students determines the quality of feedback as validated by the school.

3. Students who participate more actively in Virtual learning than their fellow students experience a more intensive learning process, within as well as outside the virtual learning environment, and hold the opinion that they have learned more as a result of this engagement.

4. Students who participate more actively in virtual learning interaction than their fellow students are able to provide higher-level and better-quality feedback to their fellow students.

5. The quality levels of feedback given by students to fellow students during the virtual learning process, as validated by the school, improves as the learning process progresses, even without any intervention from teachers.

The first four statements were tested within the research model; the fifth statement concerning the improvement of peer feedback during the course was tested with the same dataset with the help of a specific analysis.

5.2.2 The three research cases

This study investigated VAL in three different courses (also referred to as research cases). Each course was part of a different four-year degree programme: Facility Management (FM), Hotel Management (HM) and Nursing (see Figure 5.2). The courses took 20 weeks during one semester and they were taught at two universities of applied sciences: NHTV (for FM and HM) and Hogeschool Rotterdam (for Nursing).

Research on the Learning process Collaborative Creation
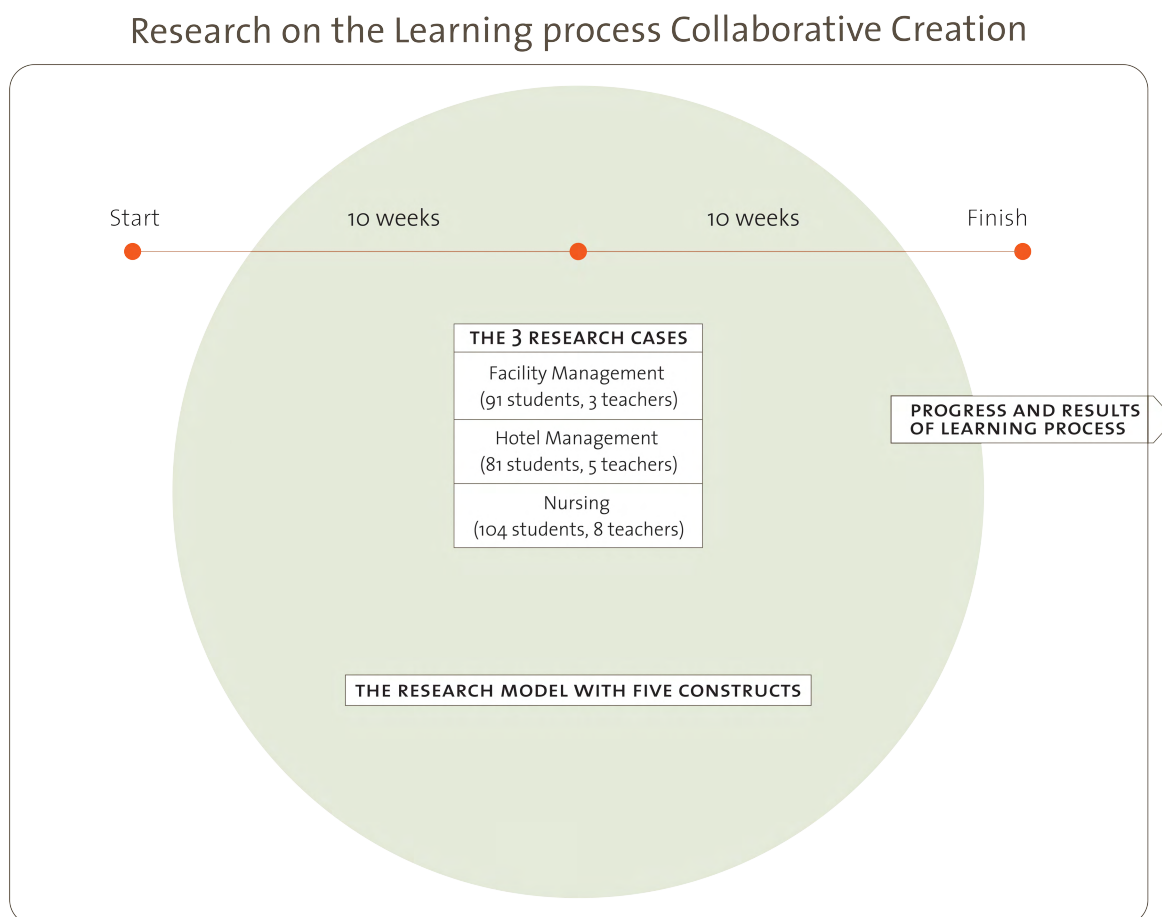
Figure 5.2   Research on the Learning process Collaborative Creation

The VAL terms addressed in this part of the research are merely listed here; they were described in greater detail in Chapter 3. Virtual Learning Interaction was part of the course that took place in the VLC on the Internet. The other part of the course (see Figure 5.3) took place in meetings at school and in Self-study and Virtual Learning Production at home. The Meaningful Dialogue concerned the learning interaction between students and teachers that was focused on the improvement of competency development.

Virtual Action Learning
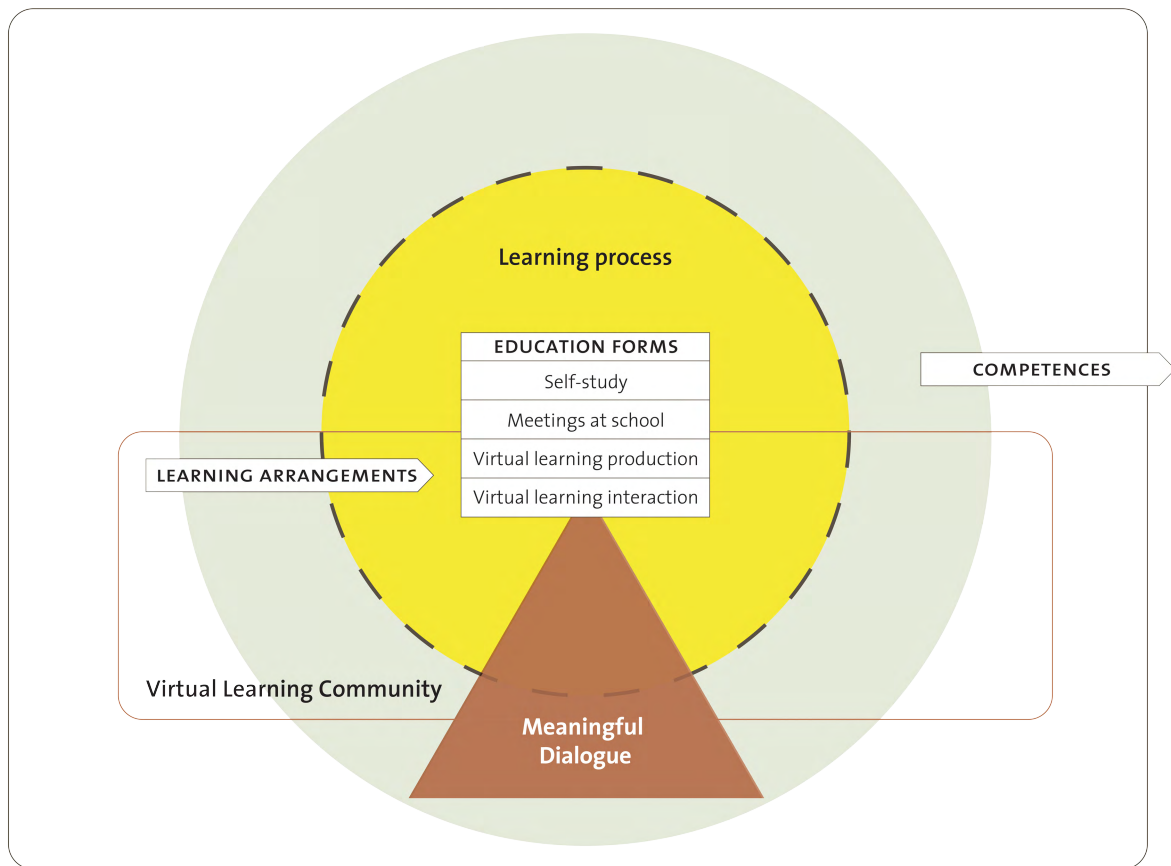
Figure 5.3   Elements of a course within VAL

The purpose of a course within VAL is to enable students to acquire certain competences. The teacher designs Learning arrangements (see the example below) with which students can execute their learning activities and have the opportunity to show their competency development. This learning process takes place in four forms: self-study, meetings at school, virtual learning production and Virtual Learning Interaction. The VLC (see screenshots in Figures 5.4 and 5.5) is the digital learning environment where students perform their Virtual Learning Interaction and in which the teacher uploads the Learning arrangements. What is important to know is that the Learning arrangements are designed with learning objectives that help the student to develop the competences required by the school; providing good peer feedback was part of the suggested Virtual Learning Interaction (see Figure 5.4).

Figure 5.4 shows an example of a Learning arrangement for the students as used in the VLC of the courses Hotel and Facility Management.

The Objective of this LA is to help you develop a feel, an understanding for what is needed to formulate an appropriate strategy for a specific company and to develop a sharp, critical mind with respect to the process to get there. Ultimately, this LA helps you to put you thinking hat on!
Related to competences 2 and 3.

The Output of this learning arrangement is filled out feedback form for the student that handed in the report that you have read. It is up to you to develop such a form and fill it out.

Sources
Documents VLC
Strategic Advise Reports

Suggested/ possible learning paths
· To get started, you pick one of the Strategic Advise Reports that you can find in the Documents Section of the VLC, in the special folder Strategic Advise Reports.
· And then... it's up to you to create the appropriate form and feedback
· If you would like to discuss ideas, don't hesitate to use the Learning Questions and Statements sections of our VLC or ask for a campfire story

Study load
Constructing the first version of your product will take you approximately 8-12 hours. The entire Virtual Learning process should take you approximately 25 hours.

Remember be critical and fair at once...

Virtual Learning Interaction
After you have created your first version of this filled out form, upload you product to your portfolio under the category "La 3". After that, got through the usual steps of VLI:
· asking for and providing feedback
· (don't forget to include useful references),
· rating feedback you received,
· improving your product,
· moving it to Best Practicing,
· rating the products of fellow students.

Figure 5.4 Example of a Learning arrangement

Figure 5.5 below is a screenshot of the Platform in the VLC within the courses Hotel and Facility Management. The Platform contains messages from students and teachers (educators) as used during the courses.

Platform		Virtual Learning Community	
Educators		**Students**	
12 06 '08	Dear Hugo, not passing ass J. means new date, new report. Tanja	11 06 '08	A question for the educators. If you fail to pass your assessment 3, will you also have second chance to hand in a revised assessment report or will you have to do a resit with the only document we'll hand in upcoming Monday?
10 06 '08	Dear all, I wish you lots of inspiration while writing you ass 3 report. Stann & myself are busy analysing your learning development reports. To be well prepared during the validation, let's hope for success in the results.	09 06 '08	Congratulations Mike! I am waiting for the day I will be happy like you. I hope it will those to come soon. Stay blessed.
09 06 '09	Mike, for you as well congratulations on your rewritten LA9. I have accepted it as a Plaza product – Stan	09 06 '08	Dear Mr Josephi, I was wondering what the status was of my rewritten LA 4. Kind regards
09 06 '08	Julia, congratulations on the Plaza status for your rewritten LA6 – Stan	09 06 '08	Dear all, thank you for your cooperation over the past 6 months, good luck to you all for validations and you assessment 3 report. I also would like to let you know that today I got a contract for very interesting placement, so I'm happy :D
09 06 '08	Dear Sonja, you moved you product (LA5) sufficiently to earn it a Plaza status – Stan	09 06 '08	Dear team members, tutor an expert. I would like to thank you for the support and knowledge shared during the past 5 months. It was a pleasure working with you all. Good luck for all of you on the preparation of Ass3 and the VALidation.
08 06 '08	Dear all, in the folder VALidation you'll find a document with 25 statements. The statements used for the Formun during your VALidation will be selected from these statements. We thought you woulde appreciate this..	09 06 '08	I am unfortunate not to attend the ER because I have an important appointment at 11.30 in BAM young-rail. Thank you all for the knowledge and fun we have shared together. I look forward seeing you on the validation day.
08 06 '08	Still did and seeing you guys putting in your last efforts makes me happy!	09 06 '08	Sorry Ayla, I have seen your question a bit late. But the answer is you do not have to give feedback on it, but you can do if you like. Also remember it is important to rate it. choal!
06 06 '08	You're wrong..... Only for a shortwhile though Stefan, see if you can upload it again so you can be rated as well. See you all tomorrow – Stan	09 06 '08	Well as you all can see by now I could not make it in time for the Bonus ER. Than you all for your inspiration, feedback and it was a pleasure to be part of this community! Good luck to us all with the coming weeks!!! xxx
06 06 '08	Dear all, under Documents, in the special folder called VALidation, you can now find the information on the group division, the start time, the time schedule and suggested preparation for the VALidation day. Good luck! STanja	09 06 '08	I found it! It uploaded to LA 5. Darn it nobody could rate it :(
06 06 '08	Silly boy... it is now under the correct LA and therefore ready to be rated!	09 06 '08	Dear Stan, a little bit late to be telling you this but I uploaded my bonus ER last night and moved it to BP. But it is still not there! Where did it go? Am I blind:
05 06 '08	Dearies who will be the first to post in the Bonus ER? Time is really ticking, see you Monday, Tanja	09 06 '08	Well if everybody is being this nice to eachother.. I had great fun with you guys and hopefully we will have a great validation and assessment! Thanks! Enjoy your days see you at 11:oo! Ciao Steven
		09 06 '08	Thanks Crescendo for cooperating in this new learning method. Thanks for the feedback and all the sessions. Thanks for the fun three years and all the trips that were great successes. Thanks! All the best for the Validation and assessment!

Figure 5.5 Examples of messages on the VLC platform

Competences of the courses

The three study programmes involved in this study are grounded in competence-based learning. This means that the learning goals are described as competences. Students work on these competences during their course, after which they must demonstrate their mastery of the competences in an assessment, partly with information about their learning performance in the VLC. Each course had its own content-specific aims regarding competences. Figure 5.6 shows an overview of the competences of each course.

Facility Management	Hotel Management	Nursing
At the end of the course the student is able, in a professional manner, to........		
To create a service experience	To create experiences by delivering hospitality	To care to the human scale
To analyse and set goals		To steer student's own professional and personal development
To make plans	To develop a vision on external developments of an organisation (partly through active networking)	
To organize and coordinate		To provide nursing
To evaluate and adjust	To create functional plans	To develop new care programs
To steer student's own personal development	To contribute to the development and implementation of HRM policies	To coordinate nursing care
To contribute to the development of the profession	To initiate change in a planned planner	
	To manage and improve business or organizational processes	
	To procure all necessary management information	
	To develop and market innovative hospitality products and services	
	To cooperate and communicate in teams	
	To steer student's own professional and personal development	

Figure 5.6 The outcomes of the three courses in terms of competences

Students

A total of 276 students participated in this research. Of these, 104 (39%) were students at the HRO Academy of Nursing at the HRO University of Applied Sciences, and 91 (33%) were FM students at the Academy of Facility Management at the NHTV University of Applied Sciences. The remaining 81 (29%) were HM students at the Academy of Hotel Management at the NHTV University of Applied Sciences. All student participants were full-time students (aged 20–27) taking the VAL-based course during the third year of study. All students, regardless of the course, started with the training course 'How to work in the VLC'. This course was set up as blended learning. This means that there was virtual communication between students, including student–teacher and student–student communication, as well as face-to-face meetings. This way, students learned to become competent in using the VLC's components and working according to the principles of VAL.

Teachers

None of the teachers (termed educators in VAL) from the three cases had any experience with VAL before being involved in the VAL-based courses investigated in this study. Prior to course commencement, all 16 teachers took part in a verbal intake meeting with VAL educational advisers. During this meeting, they discussed their attitudes towards VAL, their motivation to work with VAL in teaching courses and to participate in the training programme.

The VAL training programme consisted of three modules: VAL-teacher, VAL-trainer and VAL-expert. All teachers participated in the first module; five of them (four × FM/HM and one × Nursing) also completed the VAL-trainer and VAL-expert modules. The programme taught teachers how students learn in VAL, how to design learning arrangements with a connection to the competences, how to assess students and how to moderate and organise within VAL. They also learned how to operate the VLC. In VAL, teachers can take two different roles: assessor/designer and trainer/coach (Baeten, 2011, Chapter 5 'Organising within VAL').

All teachers were prepared before the start of their courses within VAL. At HRO, one teacher took part in the three VAL modules and taught VAL methods to his colleagues at HRO. The quality of the HRO teachers was not established in this study. At NHTV, this course was provided by (external) educational advisers specialising in VAL methods. The method of the training programme of NHTV teachers was 'practise what you preach', and this is why they had to demonstrate their VAL competences in a final assessment. All teachers demonstrated that they were able to apply VAL in their courses. During the implementation of VAL in the NHTV courses under investigation, educational advisers continued to support the teachers. These advisers also distributed and collected the student questionnaires.

Comparison between the three cases.
The three courses were very similar in terms of size, participants, duration of the course and research period, except for their competences (see Figure 5.6) and their content. There were two main aspects in which Nursing differed from the other two cases: in Nursing, there were relatively more female students and Nursing teachers were less well trained in VAL than their FM and HM colleagues. These differences are considered in greater detail in the analysis. Table 5.1 below shows the main characteristics of the three courses.

Table 5.1. Characteristics of the three cases

	Facility Management NHTV	Hotel Management NHTV	Nursing HRO
Course duration	20 weeks	20 weeks	21 weeks
ECTS	30	30	30
Study hours	840	840	840
Research period	17/1'08-19/6'08	17/1'08-19/6'08	6/9'07-31/1'08
Number of teachers	3	5	8
Number of student groups	4	4	8
Number of students[a]	91	81	104
Female students (%)	50 (55%)	53 (65%)	94 (89%)
Male students (%)	41 (45%)	28 (35%)	12 (11%)

[a] The number reported here is the number of students included in the analysis.

5.2.3 Data gathering and tools

Data gathering in this research was part of a larger study on features of students and teachers and on the progress of the other two processes in education: the educational process and the assessment process. In this section, we focus on the learning process within VAL and describe all five constructs of the research model as well as the tools with which we gathered the data to measure their mutual relations.

5.2.3.1 Data gathering

Data gathering for this study included the measurement of student characteristics prior to the start of the VAL-based course, characteristics of the Virtual Learning Interaction during the semester course, characteristics relating to the actual occurrence of VAL aspects and variables within the five constructs of the research model. The four research tools used to measure these variables are summarised in Figure 5.7, and they are further described below.

Research on the Learning process Collaborative Creation
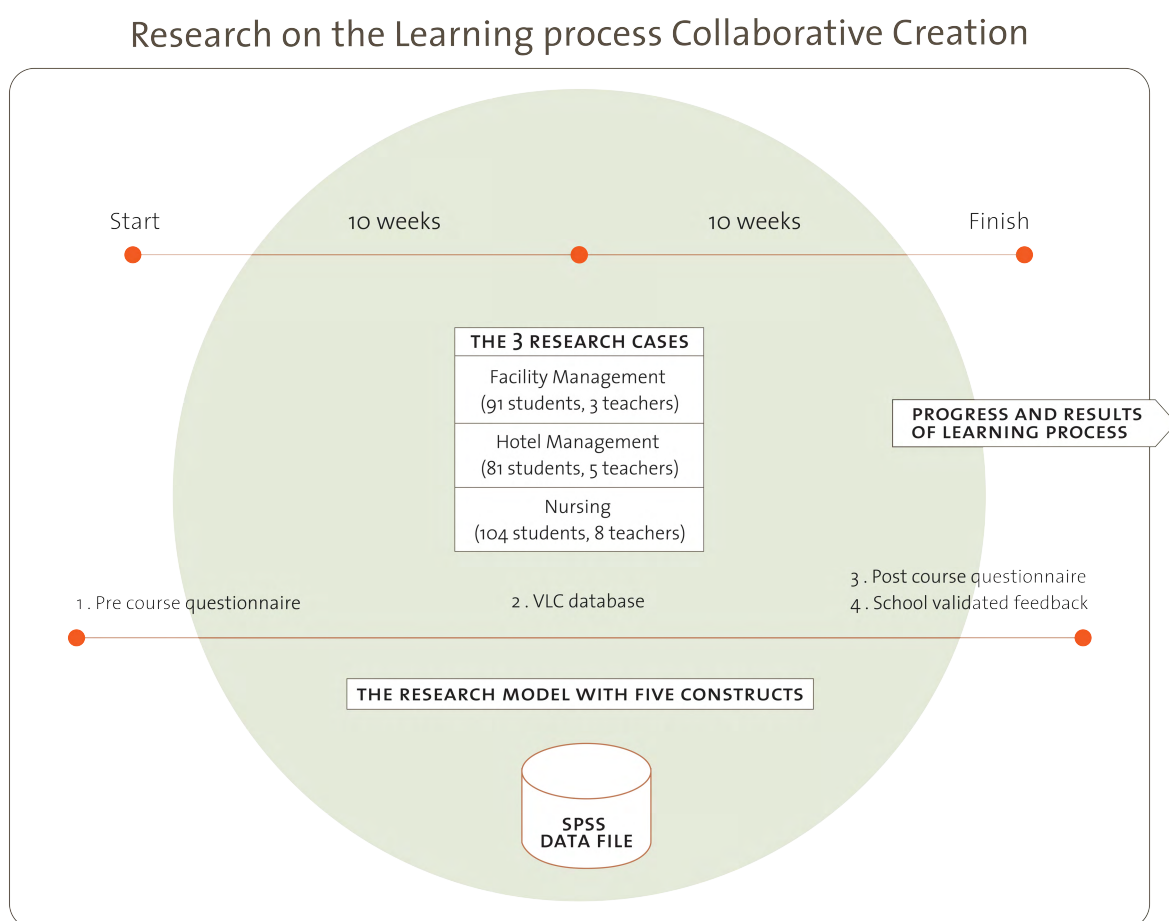
Figure 5.7 The tools in the research on the Learning process Collaborative Creation

For this study, to answer the research questions, we used four tools to elicit our data: the pre-course questionnaire, the VLC database, the post-course questionnaire and the School Validated Peer Feedback Quality. Both questionnaires were developed in collaboration with professional universities involved in the previous action research (2000–2007). By focusing on students' virtual

learning processes, this survey approach aimed to open the 'black box' of the learning processes that occur within a longer teaching period in a virtual learning environment and thereby to address a gap in the research literature. The methods chosen in the present study are tailored to this focus. With these tools, we measured variables, not only at the start of the three courses, but also during the courses themselves and upon their termination.

5.2.3.2 The Pre-course questionnaire

This questionnaire was developed in the years prior to this study in collaboration with teachers and students from other universities and business schools where VAL had been applied (Baeten, 2009, 2011). We tested the validity of the questions several times by asking students afterwards if they knew what we meant by the questions. Questions that were unclear were clarified before being included in the present research. In this research we only used four objective data: course, gender, age and previous education. The first part of the questionnaire contained 34 questions regarding students' characteristics (age, gender, previous education) and study attitude. Students were asked to indicate to what extent they agreed with statements (e.g. 'I have a great feeling of responsibility'). The response options were 'partially or completely disagree', 'partially agree' and '(almost) completely agree'. The second part of the questionnaire contained 16 questions in which students were asked to compare themselves with their peers on variables related to their self-esteem and media literacy. An example of a self-esteem question was 'Having faith in the effort of your group members'. Response options were 'less than others', 'comparable with others/average', 'better than others' and 'no opinion'. This last option was necessary because there was a possibility that the respondent had not yet met other students. An example of a study attitude question was 'During my study, I am used to taking decisions autonomously about how and when I learn'. Response options were 'partially or completely disagree', 'partially agree' and '(almost) completely agree'. The pre-course questionnaire with all of its questions and statements is shown in Appendix A.

The protocol
Two versions of the questionnaire were used. For FM and HM students, the questionnaire was translated into English because the course was taught in English. Both questionnaires are included in Appendix A. At the start of the course, the teachers held a meeting in which students were asked to complete the pre-course questionnaire. These teachers monitored completion, which took students between 10 and 15 minutes. The teacher asked whether any questions were unclear, but this was not the case. Then, the teacher put the questionnaires with the names of the students in an envelope and gave it to the research supervisor.

5.2.3.3 Database Virtual Learning Community

The VLC is a web-based digital learning environment that is accessible seven days a week and 24 hours a day. It supports all the learning activities of a student who learns according to VAL principles. The student can upload learning products in his or her portfolio, participate in the Virtual Learning Interaction including the peer feedback cycle, do a progress test or consult the products and achievements of fellow students. In the VLC, the teacher can moderate the learning process, add messages on the central platform, upload learning arrangements and formative tests, validate peer feedback and review the best learning products. With the press of one button, he or

she can obtain all the information (feedback, best products, arguments, replies, theses) needed to assess a student. In the VLC, the virtual learning process of each student becomes fully transparent. The intention of VAL is that students first produce learning products in the VLC and then participate in Virtual Learning Interaction before they submit their learning questions and problems to the teacher during the physical meetings at school. The art of teaching a VAL course lies in bridging the gap between the learning activities and progress in the VLC and the meetings at school.

Between 2000 and 2008, the VLC was developed in order to facilitate the learning process of individual students within the VAL educational concept. This was done in collaboration with hundreds of students and teachers in different disciplines. The result is a digital learning environment that fully supports the virtual learning (using components) of students and that also enables the online analysis of their learning development (learning analytics). It is also possible to run reports that provide detailed information about the learning activities and development of the student. The latter provides an overview of the input from the student such as learning products, given feedback, received feedback, feedback appreciated, provided arguments, answers to learning questions and results at best practising. This data source is directly linked to students' use of the VLC. Computer log files provide data on the frequency and duration of their Virtual Learning Interaction (e.g. providing peer feedback). These data were retrieved during the first half of the course (10 weeks long; referred to throughout this chapter as P1) and during the second half of the course (10 weeks long; referred to throughout this chapter as P2). The list of the Virtual Learning Interactions that were recoded into variables in the data file can be found in Appendix D.

The protocol
The use of the VLC is split into three types of activities: visits (login sessions), use of the components and learning activities. If no activity is registered for a VLC user for 10 minutes, the user is automatically logged off. This gives a clear picture of the user's virtual presence. The programmer retrieved all data (visits, use and learning activities) on all students in this study from the VLC database, including overviews of all feedback variables (given, received, appreciated). These data were then manually entered into SPSS. The control of these data is explained later. The VLC is a valid instrument: the variables are one dimensional and the students have submitted the values in the database themselves.

VLC variable Given and appreciated peer feedback
In VAL, students can perform learning activities in the VLC. These are stored in the VLC database. Several variables from this database were analysed as predictor variables to answer the research questions. The activities were quantified as the number of times they were performed and the average time taken per activity (for an overview, see Appendix F). Figure 5.8 describes the different forms of the variable Given and appreciated feedback, which was considered to be one of the five constructs in the analyses and which was divided into P1 and P2.

Given and appreciated peer feedback in Course period 1 and 2	
Variable number	**Description**
117	Average number of weekly given feedback P1
118	Average number of weekly appreciated feedback P1
130	Average number of weekly given feedback P2
131	Average number of weekly appreciated feedback P2

Figure 5.8 Given and appreciated peer feedback in P1 and P2

As reported in Chapter 4.7, this variable/construct was found to be reliable and valid.

VLC variable Virtual Learning Interaction

One research objective was to obtain greater insight into the time that students spent on Virtual Learning Interaction in the three courses. For this reason, we carried out additional research to construct a numerical scale (score) for the Virtual Learning Interaction of each student in order to determine the relationship between the number of their virtual learning activities and their learning outcomes. The score is the frequency of an activity multiplied by the time the student needs to execute the activity. The frequencies of the activities of the students in the VLC were already registered and processed in SPSS. First, we analysed the learning arrangements (seven from the FM/HM group and five from the Nursing group) with information about what the student ought to do in the virtual learning production, the Virtual Learning Interaction and the meetings at school. We only focused on the Virtual Learning Interaction in the VLC because the organisation of the VLC was the same for all three courses. Then, we timed (by using a stopwatch) the execution of every activity that was part of the Virtual Learning Interaction of the student of each course. The average time (in seconds) was the value of the variables with the names and numbers described in Appendix D. This norm time per activity was multiplied by the frequency results in the Virtual Learning Interaction score, which was a value that shows the extent to which a student has been executing Virtual Learning Interactions (in seconds or hours) in his or her course. The corresponding scale is described in Appendix D. This score can be analysed with or without the score of the variable given and appreciated feedback.

5.2.3.4 The Post-course questionnaire

After the completion of the course, in which the students experienced VAL and used the VLC, all students were asked to fill out a second questionnaire. The main purpose of this post-course questionnaire was to compare VAL with traditional teacher-centred education. The questions consisted mainly of three- or five-point Likert scales that may be considered to be ordinal or at best quasi-interval scales. The questionnaire with the variables and scales was developed between 2002 and 2008 in cooperation with the participating universities in the action research period that took place before this research. The post-course questionnaire with all of its questions and statements is shown in Appendix A.

The first part of the questionnaire contained 15 statements in which students were asked to compare VAL with their previous, more traditional educational experiences. For example, they were asked to evaluate the statement 'With VAL, I have more freedom to decide for myself what I

learn' with response options 'largely disagree', 'partly disagree', 'neutral', 'partly agree' and 'largely agree'. The second part of the questionnaire contained 16 statements about the extent to which VLC had supported their learning during the course. For example, students were asked to evaluate the statement 'To what extent have the following VLC components (messaging, feedback, learning questions, portfolio, best practising) supported your learning activities' with response options 'strongly negative influence', 'negative influence', 'neutral', 'positive influence' and 'strongly positive influence'. The final 15 statements were related to specific learning experiences in VAL and the VLC. They considered variables such as 'my fellow students took my constructive feedback seriously'. Response options were the same as in the first part of the questionnaire. Finally, open questions were included in which students were asked to write down suggestions for the improvement of VAL and the VLC.

The protocol
The protocol for the post-course questionnaire was identical to that for the pre-course questionnaire. At the end of the course, teachers held a meeting and invited students to complete the questionnaire. After 15 minutes, all students had completed this task and the teacher asked whether any questions were unclear; as with the pre-course questionnaire, this was not the case. Then, the teacher put the questionnaires with the names of the students in an envelope and gave it to the research supervisor.

All items of the constructs Student Perceived Way of Learning and Student Perceived Learning Result were measured by means of the Post-course questionnaire. Chapter 4.4.1 lists the items/variables which were found to be reliable and valid as part of these two constructs.

5.2.3.5 School Validation of Peer Feedback Quality

Chapter 4.4.2 considered the meaning and content of the four peer feedback quality levels; this is repeated here for the sake of clarity.

In this research, peer feedback data were collected through the text entered by the student into the VLC with the purpose of giving feedback to a fellow student's learning product. These text entries can be classified into one of four categories:
- Scan: the feedback in the form of the text entry reveals that at best, the student providing the feedback has superficially looked over (i.e. scanned) the learning product;
- Read: the feedback in the form of the text entry reveals that at best, the student providing the feedback has read the learning product;
- Comprehensive: the feedback in the form of the text entry reveals that at best, the student providing the feedback has read and understood the learning product;
- Constructive: the feedback in the form of the text entry reveals that the student providing the feedback has read and understood the learning product and is capable of improving it.

School Validated Peer Feedback Quality
In applying VAL, it is important that a student's learning results are partly based on the quality of the peer feedback he or she has provided to the learning products of fellow students. The school (the teacher) validates this peer feedback. This has resulted in the variable School Validated Peer Feedback Quality; a validation of the quality of peer feedback provided by a student to another

student's learning product into one of the four categories. In this research, student feedback was validated by the head teacher after the completion of the course. Prior to validation, head teachers received training on feedback validation. The given and appreciated peer feedback was a score (frequency) with the number of times the student gave or appreciated feedback. The quality of peer feedback is the validation by the head teacher of this given and appreciated feedback divided into one of the four feedback categories: Scan, Read, Comprehensive and Constructive.

Peer feedback scores per period (P1, P2)

Each of the four feedback types contained a score reflecting the number of times a student used that particular type of feedback. Feedback style at P1 was calculated as follows. First, it was determined which of the four student feedback types that each student used most frequently at P1 was validated by the teacher. Thus, four groups were created: a group who mostly scanned at P1, a group who mostly read at P1, a group who mostly used comprehensive feedback at P1 and a group who mostly used constructive feedback at P1. To measure changes in feedback, quality scores were used from each of the four feedback types, at P1 and at P2 (totalling eight variables). The VAL concept currently distinguishes six levels of peer feedback quality (Baeten, 2009, 2011) in order to generate a better scale; nevertheless, the validation of peer feedback quality by the head teacher in terms of the above four levels was shown to make the instrument valid and the measurement reliable.

The protocol

Several months after course completion, the head teacher of each course was asked to validate the quality of all student feedback (7189 instances). This teacher received all instances of student feedback on fellow students' learning products in the form of text entries extracted from the VLC database. Prior to the course, head teachers received training in performing the validation. After the validation was performed, they returned the lists of validated feedback to the research team. Altogether, 98% of the feedback of Nursing students was validated, compared with randomly selected 32% for FM and HM students.

5.3 Data

5.3.1 The quality of the SPSS data file

The previous sections described the protocols for each tool used to gather our data. The data collected with the help of these tools were manually entered into an SPSS data file; only the data from the VLC database were directly imported in the SPSS data file. The current section discusses the quality of the data in the SPSS data file in terms of a check on data entry, a check on nonresponse and a check on participant nonresponse. How the data from the three research cases (collected by means of the four research tools) were used as input into the SPSS data file was shown earlier in Figure 5.7.

All data obtained from the above sources (except the VAL application score and Meaningful Dialogue score) were merged into one SPSS data file (BaetenFileV6 20121027.sav). Student codes, unique to each student, were used as a key variable for organising the values per student. The list of data (variables) including the recoded ones can be found in Appendix B.

5.3.2 Check on data entry

In the study, the values of 101 variables from seven different sources for 276 students were entered into the SPSS data file. All available data were entered, even if only some were relevant to this research. Finally, 83 variables were used in the analysis. The data on all students were entered, including those who only showed up on the first day and then did not participate in the course.
In order to determine the deviations between the results on the questionnaires and the SPSS file, we took a selected sample of 31 cases (11%) with all variables and compared them with the data on the authentic resources (instruments). The deviations were very low: 0.46% for all SPSS inputs (see Appendix E). Data entry checks were also conducted by using a random sample of 31 students out of the total dataset.

5.3.3 Check on participant nonresponse

Before the start of this research, there were 329 students: 123 students in the Nursing course, 106 students in the FM course and 100 students in the HM course. Altogether, 23 students did not start the course, were stopped during the course or did not participate in the assessment at the end of the course. These students were excluded from the analysis.

A student's data were retained in the dataset if he or she completed both the pre-course and the post-course questionnaires. A student's data were analysed if the student attended the course (i.e. if the student logged into the VLC at least once in each week of the course). Table 5.2 shows the study response rates per course. The resulting data file contained data on a total of 306 students (93% of students present at the start of the study). In total, 119 of these were in the Nursing course (97% of students present at the start of the course), 98 were in FM (93%) and 89 were in HM (89%).

Table 5.2. Responses per case

	Number of students at start of research	Number of students that completed the courses and both questionnaires	Students included in the analysis	
			Number (>1 VLC visits per week)	Percentage of B
Case	**A**	**B**	**C**	**D**
Facility Management	106	98	91	93%
Hotel Management	100	89	81	91%
Nursing	123	119	104	88%
Total	**329**	**306**	**276**	**90%**

Two categories (C and B) are representative of each other (a=.42, 2-tailed). Levene's test (Levene, 1960) shows equal variances with a=.56. This means that the active participation in the VLC of all three groups of students who completed the course is comparable.

5.3.4 Check on nonresponse

A close examination of the data revealed varying degrees of item nonresponse. For most variables, item nonresponse proved to be evenly spread over the three courses. For the variables age and highest level of previous education, approximately 12% of values were missing. For the variables study attitude and self-image, approximately 12% of values were missing. Missing value percentages for the variables on the media literacy scale ranged between 12% and 23%. Missing values were not randomly distributed among students – they belonged to the same student for each variable. One of the dependent variables, school-validated feedback quality, shows a large percentage of missing feedback (41% in the overall dataset). This is mainly due to the very large percentages of missing values in FM (63%) and HM (69%). In Nursing, only 9% of values on this variable were missing. An explanation would be that there was so much feedback (6.015) on FM and HM students that the head teacher validated only a selected sample of 33% several months after completion the course.

5.4 Result

In this section, results are analysed with the help of the research model and data from the SPSS data file. First, attention is paid to the influence of the descriptive data in order to better answer the five research questions.

5.4.1 Descriptive data

The descriptive data of the three courses consisted of information about the virtual learning component of the course within VAL with a view to obtain a better understanding of virtual learning in practice.

Time spent on Virtual Learning Interaction
The learning activities of students within VAL are divided into participating in meetings, self-study, Virtual Learning Production and Virtual Learning Interaction (VLI). This learning interaction is only a part of all four learning activities that constitute the overall study load of the programme (40 hours per week), but the actual study load is considerably less, as confirmed by students. The Learning process within VAL starts virtually as the student makes a learning product and uploads this to his or her portfolio in the VLC, after which Virtual Learning Interaction takes place between students. This interaction largely determines the content and the progress of the other three forms. For the purposes of our investigation, only the time spent on Virtual Learning Interaction was measured. The time spent on Virtual Learning Interaction concerns the actual period of time that a student needs to perform one of the virtual learning activities in the VLC. From the perspective of a student, he or she spends more time on Virtual Learning Interaction because they experience all of the login time, including reading all kinds of learning products and VLC content and waiting for responses.

Table 5.3. Time spent on Virtual Learning Interaction including feedback (N=276)

	Average time spent on VLI per student per week				
	P1	**P2**	**P1 + P2**	**SD**	**p**
Facility Management	1 h, 20 m	2 h, 48 m	2 h, 04 m	0h57	0.000
Hotel Management	2 h, 01 m	2 h, 49 m	2 h, 25 m	1h07	0.000
Nursing	0 h, 50 m	1 h, 16 m	1 h, 04 m	0h30	0.000

Table 5.3 shows the average time in hours (h) and minutes (m) per student per week spent on Virtual Learning Interaction including given, appreciated and received peer feedback. In each of the three courses, the increase in time spent on Virtual Learning Interaction from P1 to P2 is significant ($p < 0.001$). FM and HM students spend a majority of time in both periods. FM students even double their time (1h20 and 2h48). Nursing students spend the least amount of time on Virtual Learning Interaction (1h04) with more time in the second period (0h50 to 1h16). This means that Virtual Learning Interaction as part of the official study load (40 hours per week) ranges from 2% (Nursing) to 6% (FM and HM).

Types of Virtual Learning Interaction
In Table 5.4, we take a closer look at the types of interactions that students of all three cases (N=276) execute in their learning processes. The table shows the patterns of Virtual Learning Interactions and average weekly frequency with which they occurred during the entire course period (P1+P2). It also shows the mean differences between the groups as well as the results of post-hoc t-tests to determine whether the means differ significantly between groups.

Table 5.4. Types of Virtual Learning Interaction per week per course

	FM (N= 91)		HM (N= 81)		Nursing (N=104)		FM-HM	FM-Nursing	HM-Nursing
Average weekly	**M**	**SD**	**M**	**SD**	**M**	**SD**	**p**	**p**	**p**
Visits	18.2	7.0	18.8	7.1	12.3	6.5	1.00	<.001	<.001
Use of components (information selection)	69.9	30.0	80.4	36.4	44.1	21.8	0.061	<.001	<.001
Ratings at best practicing	1.7	1.3	3.4	2.2	1.4	1.2	<.001	0.408	<.001
Number of platform messages	2.2	1.4	3.0	1.8	1.4	1.0	<.01	<.001	<.001
Added learning questions / answers	1.3	0.9	1.3	0.9	0.5	0.7	1.00	<.001	<.001
Number of uploaded products	1.6	0.6	1.6	0.5	1.0	0.4	1.00	<.001	<.001
Voting on statements and giving arguments	1.0	0.6	1.9	1.2	0.2	0.3	<.001	<.001	<.001
Nominated products in best practising	0.7	0.4	0.8	0.3	0.2	0.1	1.00	<.001	<.001
Reciprocity in peer feedback:									
Received feedback	2.0	1.5	2.1	1.3	0.6	0.5	1.00	<.001	<.001
Given feedback	3.7	2.0	3.4	1.7	0.9	0.5	0.805	<.001	<.001
Appreciated feedback	2.0	1.3	2.0	1.2	0.5	0.3	1.00	<.001	<.001

Total Virtual Learning Interaction as well as each separate type is significantly higher in the FM and HM groups than in the Nursing group (except for ratings for best practising). The post-hoc t-tests

show hardly any differences in the Virtual Learning Interaction patterns of FM and HM students, but the means for both groups differ significantly from that for Nursing students. When it comes to the reciprocity of peer feedback, the heart of the virtual learning process, FM and HM students receive, give and appreciate significantly more feedback than Nursing students. The feedback reciprocity between FM and HM students differs hardly. When students visit the VLC, the use of components (information selection) occurred the most frequently, followed by given feedback and added messages on the platform. This means that the average student visits the VLC to take part in Virtual Learning Interaction every day. All differences together explain the limited amount of time that Nursing students spend on Virtual Learning Interaction.

5.4.2 Test results concerning the research model

We wish to gain insight into the behaviour and results of those students who actually did participate in the learning process within VAL as determined in the five constructs. To this end, our analysis was only executed for 148 cases (i.e. students) that had no missing values on the 11 items and with 12 cases that had a maximum 5 missing values. In the latter group, each missing value was replaced by the average of the whole population.

Model characteristics

Testing the outer model of the instrument, we examined the validity and reliability of the constructs with the data set of 148 cases. This was done in SPSS by means of a Partial Least Square Structured Equation Model (PLS/SEM-model). This method to structural equation modelling allows estimating complex cause-effect relationship models with latent variables. Table 5.5 shows the factor loadings of the latent variables within the outer model only for the loadings with an indicator validity in terms of an Average Variance Extracted (AVE) of at least 0.6. These factor loadings are acceptable when they are at least 0.6 (Hair, Hult, Ringle, and Sarstedt, 2014).

Table 5.5. Factor structure and loadings within the outer research model					
Items	Virtual Learning Interaction	Given and Appreciated Peer Feedback	Student Perceived Way of Learning	Student Perceived Learning Result	School Validated Peer Feedback Quality
Number of uploaded products (VLI5)	0.44				
Voting on statements and giving arguments (VLI6)	0.67				
Nominated products in Best Practising (VLI7)	0.89				
Given peer feedback (GAF1)		0.88			
Appreciated peer feedback (GAF2)		0.68			
More freedom to decide how I learn (FI01FREEHOW)			0.66		
More freedom to decide what I learn (FI02FREEWHAT)			0.69		
Take more initiative (FI06MOINITIA)			0.72		
Focused more intensively (FI12MOFOCUS)			0.70		
More interested in topic concerning the course (FI07MOINTERS)				1.00	
School Validated Peer Feedback Quality					1.00
Only loadings above .40 are shown					

Within the construct Virtual Learning Interaction, two items have sufficient validity: VLI6 (AVE =0.67) and VLI7 (AVE =0.89). Only item VLI5 is not valid (AVE =0.44). Within the construct Given and Appreciated Peer Feedback, both items GAF1 (AVE =0.87) and GAF2 (AVE =0.68) are valid. Within the construct Student Perceived Way of Learning, four items have sufficient validity: FI01FREEHOW (AVE =0.66), FI02FREEWHAT (AVE =0.69), FI06MOINITIA (AVE =0.72) and FI12MOFOCUS (AVE =0.70). Within the construct Student Perceived Learning Result, the only item with sufficient validity proved to be FI07MOINITIA (AVE= 1.00). Within the construct School Validated Peer Feedback Quality, the only item to have sufficient validity was FI07MOINITIA (AVE= 1.00). We chose to retain item VLI5 in our further analysis with the aim to reduce respondent bias.

Second, we examined the Composite Reliability and Convergent Validity within the Path model as displayed in Table 4.8 (Chapter 4). We considered the constructs after removing the 10 invalid items, as shown in Table 5.6.

Table 5.6 Composite Reliability and Convergent Validity (N = 148)

	Composite Reliability	Convergent Validity
Virtual Learning Interaction	0.72	0.48
Given and Appreciated Peer Feedback	0.76	0.62
Student Perceived Way of Learning	0.79	0.48
Student Perceived Learning Result	1.00	1.00
School Validated Peer Feedback Quality	1.00	1.00

Composite Reliability for all five constructs is acceptable and appeared to be reliable with a Reliability score (α) of at least 0.7 (Nunnally, 1978): Virtual Learning Interaction (α=0.73), Given and Appreciated Peer Feedback (α=0.76), Student Perceived Way of Learning (α=0.79), Student Perceived Learning Result (α=1.00) and School Validated Peer Feedback Quality (α=1.00).

In the check on Convergent Validity, we used Fornell and Larcker's criterion of an Average Variance Extracted (AVE) for each construct above the 0.5 benchmark (Fornell and Larcker, 1981). The model demonstrated acceptable Convergent Validity with Virtual Learning Interaction (AVE=0.48), Given and Appreciated Peer Feedback (AVE=0.62), Student Perceived Way of Learning (AVE=0.48), Student Perceived Learning Result (AVE=1.00) and School Validated Peer Feedback Quality (AVE=1.00).

Third, we checked for Discriminant Validity, comparing the AVEs of the constructs with the inter-construct correlations determining whether each latent variable shared greater variance with its own measurement variables or with other constructs (Fornell and Larcker, 1981). We compared the square root of the AVE for each construct with the correlations with all other constructs in the model (Table 5.7). A correlation between constructs exceeding the square roots of their AVE indicates that they may not be sufficiently discriminable.

Table 5.7 Discriminant Validity

Items	Given and Appreciated Peer Feedback	School Validated Peer Feedback Quality	Student Perceived Learning Result	Student Perceived Way of Learning	Virtual Learning Inter-action
Virtual Learning Interaction	0.34	0.30	0.25	0.10	0.69
Given and Appreciated Peer Feedback	0.79				
Student Perceived Way of Learning	0.22	0.03	0.60	0.69	
Student Perceived Learning Result	0.33	0.16	1.00		
School Validated Peer Feedback Quality	0.36	1.00			

For each construct, we found that the absolute correlations did not exceed the square roots of the AVE. Hence, we may conclude that all constructs show sufficient Discriminant Validity and that the results of the characteristics of this Path model are reliable and valid.

The testing of the research model

Regarding the research model (the inner model), we analysed the path coefficients by using bootstrap t-statistics for their significance (Anderson and Gerbing, 1988). For this bootstrapping, we used 5,000 subsamples, with a bias-corrected bootstrap, testing for a two-tailed significance of 95%. The model showed sufficient model fit: the Standardized Root Mean Square Residual (SRMR) was 0.045, which is in line with Hu and Bentler's criterion (1998). Our check on the estimations of the research model considered the significant paths in the inner model as shown in Table 5.8 and the path coefficients and significations as shown in Table 5.9 by means of the results of the PLS/SEM-model.

Table 5.8 The PLS/SEM-model testing the research model
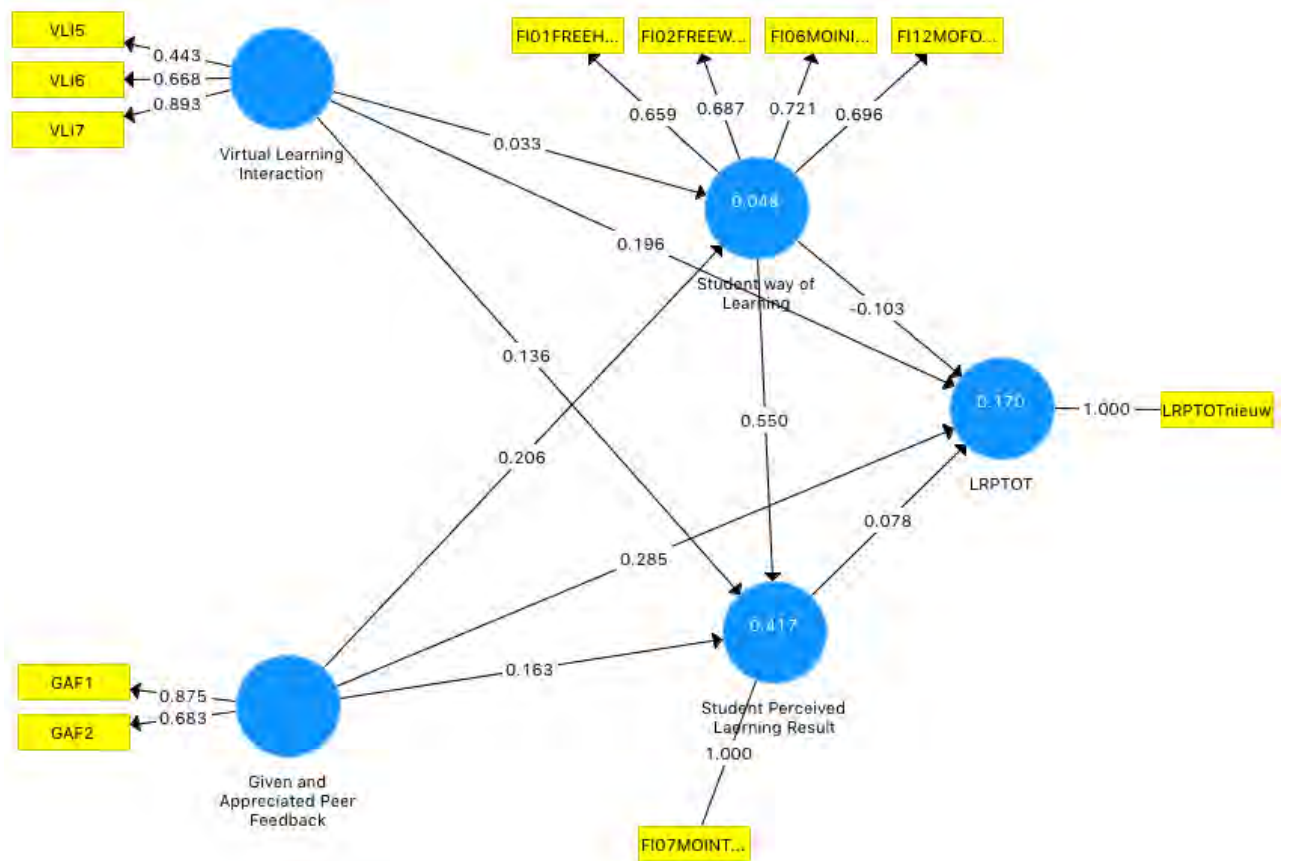
Tabel 5.9 Path coefficients and significances within the research model (N = 148)

Items	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Virtual Learning Interaction -> School Validated Peer Feedback Quality	0.20	0.21	0.11	1.76	0.080
Virtual Learning Interaction -> Student Perceived Learning Result	0.14	0.13	0.08	1.70	0.089
Virtual Learning Interaction -> Student way of Learning	0.03	0.04	0.08	0.43	0.669
Given and Appreciated Peer Feedback -> School Validated Peer Feedback Quality	0.29	0.31	0.12	2.41	*0.016*
Given and Appreciated Peer Feedback -> Student Perceived Learning Result	0.16	0.17	0.07	2.29	*0.023*
Given and Appreciated Peer Feedback -> Student way of Learning	0.21	0.21	0.09	2.26	*0.024*
Student way of Learning -> School Validated Peer Feedback Quality	-0.10	-0.10	0.08	1.31	0.193
Student way of Learning -> Student Perceived Learning Result	0.55	0.55	0.06	9.68	*0.000*
Student Perceived Learning Result -> School Validated Peer Feedback Quality	0.08	0.07	0.10	0.77	0.440

	Explained Variances R^2	Adjusted Explained Variances R^2
Student Perceived Way of Learning	0.05	0.04
Student Perceived Learning Result	0.42	0.41
School Validated Peer Feedback Quality	0.17	0.15

First, we analysed the relationship of the constructs Virtual Learning Interaction and Given and Appreciated Peer Feedback with the three other constructs: Student Perceived Way of Learning, Student Perceived Learning Result and School Validated Peer Feedback Quality. Most of the explained variance in the model concerns Student Perceived Learning Result (42%), followed by School Validated Peer Feedback Quality (17%) and Student Perceived Way of Learning (5%). Given and Appreciated Peer Feedback has a significant (p=0.02) effect of .29 on School Validated Peer Feedback Quality. Given and Appreciated Peer Feedback also has a significant (p=0.02) effect of .16 on Student Perceived Learning Result and a significant (p=0.02) effect of .21 on Student Perceived Way of Learning. Finally, Student Perceived Way of Learning has a significant (p=0.00) effect of .55 on Student Perceived Learning Result.

5.4.3 Evaluating the statements

Next, we reconsidered our initial research statements and determined for each of these to what extent the statement could be confirmed by the relationships demonstrated in the model. This is elaborated below.

Statement 1

Giving and appreciating peer feedback to fellow students is the driving force in students' learning processes in VAL; as such, it is the main determinant of the other constructs in our research model. The two constructs that concern virtual learning activities in the Learning process of students within VAL are Virtual Learning Interaction and Given and Appreciated Peer Feedback. Given and Appreciated Peer Feedback was found to have significant effects on three other constructs: 0.21 on Student Perceived Way of Learning, 0.16 on Student Perceived Learning Result and 0.29 on School Validated Peer Feedback Quality. Virtual Learning Interaction was shown to have certain effects on these three constructs, but these effects did not prove to be significant (p=0.08, p=0.09 and p=0.67). The effects we found between the constructs support our statement that Given and Appreciated Peer Feedback to fellow students is the driving force in students' Learning process within VAL and this is confirmed by school in terms of their Validated Quality of Peer Feedback.

Statement 2
The amount of given peer feedback by students determines the quality of feedback as validated by the school. We judged this statement via the relationship between Given and Appreciated Peer Feedback and School Validated Peer Feedback Quality. The former concerns the amount of given and appreciated peer feedback and the latter is related to the quality of given peer feedback as validated by the school. Given and Appreciated Peer Feedback was found to have a significant (p=0.02) effect of .29 on School Validated Peer Feedback Quality. This result supports Statement 2 that the amount of given peer feedback by students determines the quality of their feedback as validated by the school.

Statement 3
Students who participate more actively in Virtual learning than their fellow students experience a more intensive learning process, within as well as outside the virtual learning environment, and hold the opinion that they have learned more as a result of this engagement. This statement about Virtual learning concerns the effect of two constructs in the Learning process of students within VAL: Virtual Learning Interaction and Given and Appreciated Peer Feedback on Student Perceived Way of Learning and Student Perceived Learning Result. Given and Appreciated Peer Feedback was found to have a significant (P= 0.02) effect of 0.16 on Student Perceived Learning Result and a significant (P= 0.02) effect of 0.20 on Student Perceived Way of Learning. The Adjusted Explained Variance of Student Perceived Learning Result by the three other constructs is 41%. In addition, Virtual Learning Interaction was found to have an effect of 0.14 on Student Perceived Learning Result, but this is not sufficiently significant (P= 0.08). Both relationships support, regardless whether or not they are added together, the statement that students who participate more actively in Virtual learning experience a more intensive learning process, within as well as outside the virtual learning environment, and hold the opinion that they have learned more as a result of this engagement.

Statement 4
Students who participate more actively in virtual learning interaction than their fellow students are able to provide higher-level and better-quality feedback to their fellow students. This statement is expressed in the relationship between Virtual Learning Interaction and School Validated Peer Feedback Quality. Virtual Learning Interaction had an effect of 0.20 on School

Validated Peer Feedback Quality, but this effect is insufficiently significant (p=0.08). Statement 4 therefore is not supported by the results.

Statement 5

The quality levels of feedback given by students to fellow students during the virtual learning process, as validated by the school, improve as the learning process progresses - even without any intervention from teachers. Our fifth statement, which considered the improvement of peer feedback quality during the course, was tested with the same dataset but with a specific analysis. We split each variable with respect to Virtual Learning Interaction, Given and Appreciated Peer Feedback and School Validated Peer Feedback Quality into two separate variables corresponding to the two 10-week periods of the courses which took 20 weeks. Validation of peer feedback was done by the head teacher several months after course completion (see Section 5.2.3.5). Thus, we were able to split the validated peer feedback quality into two periods (P1 and P2). It is important to bear in mind here that validation after the course had no effect on giving peer feedback during the course. The number of students for whom the feedback in the two periods had been validated decreased from N=148 to N=59. Only these students are involved in this analysis (Figure 5.9).
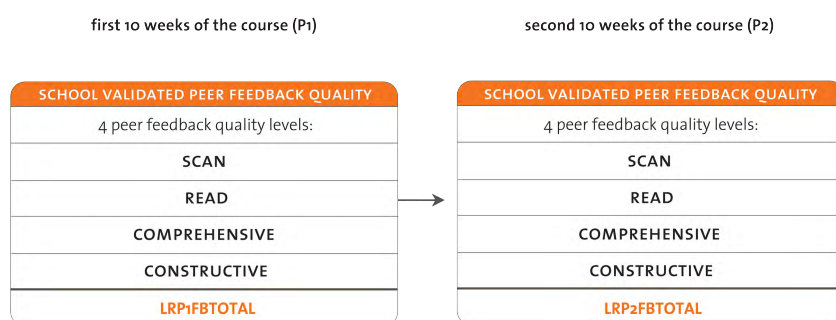
Figure 5.9   Analysis of improving peer feedback (Statement 5)

Our next table, table 5.10, shows the differences in the Anova-analysis between the mean use of the four feedback quality levels (scanning, reading, comprehensive and constructive) at P1 and P2.

Table 5.10. Increase in the amount of feedback per feedback quality level (N=59)

Feedback levels	F	P	*df*	P1 Mean (SD)	P2 Mean (SD)
Scan	11.72	.00	1	2.02(3.70)	3.55(6.22)
Read	57.74	.00	1	1.77(1.79)	4.55(4.78)
Comprehensive	62.51	.00	1	1.13(1.38)	3.02(3.04)
Constructive	18.21	.00	1	0.55(1.52)	1.71(3.60)

As the table shows, each level of feedback is used significantly more often in P2 than in P1. There is a significant multivariate effect on each of the four levels of feedback scores in P1 and P2 (Wilks' lambda=.889, F=1.63, p<.05). Thus, feedback of lower quality levels (scan and read) as well as feedback of higher quality levels (comprehensive and constructive) increased over time. No effect was found of the validation of peer feedback quality on the quality of the given peer feedback by students during the course, as validation by the head teacher took place after course completion.

These results support Statement 5 that says that the quality levels of feedback given by students to fellow students during the virtual learning process, as validated by the school, improves as the learning process progresses - even without any intervention from teachers.

Summarised, our results mean that the relations between the five constructs in the research model show that the overall progress and results of the learning process - physically at school and virtually on the Internet, and as demonstrated by Student Perceived Way of Learning, Student Perceived Learning Result and School Validated Peer Feedback Quality - have a strong relationship with the virtual part of the learning process within VAL: Virtual Learning Interaction and Given and Appreciated Peer Feedback. Students who participate more actively in Virtual Learning Interaction and - definitely - who give and appreciate more peer feedback on learning products to and from their fellow students not only experience a better way of learning and better learning results, but they also provide higher levels of peer feedback as validated by the school.

5.5 Discussion

We have developed a research model based on two new reliable and valid instruments with five components. The overall research model was tested and found reliable and valid, allowing us to evaluate our five statements concerning the progress and results of the learning process within VAL. The methods used, the data gathering process and the subsequent analyses are detailed in this chapter. The results are clear: four of the five statements are supported by the results. This is an important outcome of the development of an educational concept and a research model with two instruments, a development that took place over time in successive projects and in a process of co-creation involving teachers as well as students. It enabled us to measure the specific nature of the learning process within VAL.

Limitations
Some limitations to our study need to be noted. First, considering the methods, we must mention that only students who took and completed a course in VAL were examined. No student control group was used. A second limitation concerns the student population. The number of students involved in our research did not allow us to generalise results to all students. Third, it would have been possible to keep the research project outside the scope of the development of VAL and to develop a completely separate instrument. However, we chose to evaluate each application of VAL with the help of a questionnaire, the quality of which improved over time with the successive components as described earlier in this chapter. It would, in theory, also have been possible to perform our measurements with existing instruments, but these proved to be insufficiently valid for measuring the progress of the learning process within VAL, which is regrettable because a comparison with other research and concepts would have been preferred. Another limitation is the fact that today's students are more used to working and learning on the Internet than was the case in 2007/08, so there would probably be other forms of progress and results within the learning process of VAL if data on younger populations were to be considered. In scientific terms, the instrument has its limitations. The model fits, but it has only one to four valid and reliable items per construct. In particular, this means that statements about the construct Student Perceived Learning Result remain limited at most to a student's growing interest in topics concerning the content of his or her education within VAL. In order to make this construct more representative the name (label) should be changed into Student Perceived Content Interest.

Practical implications and suggestions for further research

The impact of learning interventions in terms of learning outcomes of the implementation of a new educational concept, regardless whether these are established by the student or the school, is near-impossible to prove scientifically: too many variables, interactions and time factors are involved. Apparently, students are better able to indicate whether or how they have learned differently than what they have learned in comparison to other courses they have attended. This is probably because most of what they learn is new to them, as was the case in our study. Therefore, future research on the impact of learning interventions could be even more focused on whether and how students are learning and how this can be measured with a newly developed three-dimensional scale. If it can be shown that the result of a particular learning intervention has led to increased focus on the learning objectives, an increased motivation and more time spent on learning, there will be sufficient scientific evidence that the learning intervention has indeed led to the learning result concerned.

With the help of our results and the new knowledge thus obtained, educational institutions and teachers may use the VAL educational concept to expand and enrich both their own educational work and student training programmes with the introduction of a learning process that takes place in schools as well as on the Internet. Our message for all of them, and our own 'lesson learned', would be that participation alone (Virtual Learning Interaction) is not sufficiently effective to achieve better learning results among students, but that giving, receiving and appreciating feedback on learning products to and from fellow students is the true driving force to achieve improved progress and learning results, from the perspective of the student as well as the perspective of the teacher.

5.6 Final remarks

Now that we have tested our statements, discussed our findings and considered their implications, the time has come to return to the very first question that lit the spark and fuelled of our scientific endeavours: is learning via the Internet definitely worthwhile? This question will be addressed in the next and final chapter of this dissertation.

5.7   References

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To conclude our investigations and this dissertation, we need to go back to the very beginning and recall our initial research question. We asked ourselves whether the use of the Internet in any way contributes to a student's learning process, and if yes, precisely what added value this would represent. The answer to this question is given in our sixth and final chapter.

6.1 Introduction: is learning via the Internet definitely worthwhile?

The central problem of this research study concerned the need to investigate the possibility of designing an educational concept to be introduced in schools that incorporates the various opportunities offered by the Internet in such a way that students experience how they may learn in a different way, with better results, and that schools will be able to determine that the intended virtual learning results have indeed been achieved. Our research question was rephrased into five statements that were tested within the theoretical framework of the VAL concept. In order to derive scientific proof in support of these statements, two valid and reliable instruments were developed and data were collected with the help of specific tools used in three student cases. The first section of this chapter offers an overall conclusion followed by an indication of how the results can be interpreted. The second section describes the relationship between this study's findings and existing theories and research. Naturally, this study has its limitations and serves as a starting point for further research (cf. Sections 6.3 and 6.4). It does, however, offer a number of practical implications for the further application of VAL in educational practice, with the introduction of the Meaningful Dialogue as the quality standard of good education emerging as the most important (Section 6.5).

6.2 Conclusions

To prepare for our next sections, we shall first re-mention our statements and then summarise our findings as described in the previous chapter:

Statement 1
Giving and appreciating peer feedback to fellow students is the driving force in students' learning processes in VAL; as such, it is the main determinant of the other constructs in our research model.

Statement 2
The amount of given peer feedback by students determines the quality of feedback as validated by the school.

Statement 3
Students who participate more actively in Virtual learning than their fellow students experience a more intensive learning process, within as well as outside the virtual learning environment, and hold the opinion that they have learned more as a result of this engagement.

Statement 4
Students *who participate more actively in virtual learning interaction than their fellow students are able to provide higher-level and better-quality feedback to their fellow students.*

Statement 5
The quality levels of feedback given by students to fellow students during the virtual learning process, as validated by the school, improve as the learning process progresses - even without any intervention from teachers.

Statement 1 was supported; giving and appreciating peer feedback to fellow students is indeed the driving force in students' Learning processes in VAL and the main determinant of the other constructs in our research model. Statement 2 was found to be justified with the reservation that only Given Peer Feedback (and not Appreciated Feedback) is validated: the Quality of Peer Feedback is determined by the amount of Given Peer Feedback by students (as validated by the school). Statement 3 was also supported: students who participate more actively in Virtual learning than their fellow students experience a more intensive Learning process, not only inside but also outside the virtual learning environment. In addition, students feel that they have learned more as a result of this engagement. This concerns two constructs in the Learning process of students within VAL: Virtual Learning Interaction and Given and Appreciated Peer Feedback and their relationship with Student Perceived Learning Result. Both relationships confirmed our statement, irrespective of whether they were added together. We found no significant evidence for Statement 4, which said that students who participate more actively in virtual learning interaction than their fellow students are able to provide higher-level and better-quality feedback. Our fifth and final statement was accepted; this statement concerned the quality levels of feedback given by students to fellow students during the virtual learning process, as validated by the school, and said that this improves as the Learning process progresses (regardless of teacher intervention).

In sum, we found that the overall progress and results of the learning process have a strong relationship with the virtual part of the learning process within VAL: Virtual Learning Interaction and Given and Appreciated Peer Feedback. Students who participate more actively in Virtual Learning Interaction and - definitely - who give and appreciate more peer feedback on learning products to and from their fellow students not only experience a better way of learning and better learning results, but they also provide higher levels of peer feedback as validated by the school.

Collaborative Creation as the Learning process within VAL

At the individual level, our findings show that students who give and appreciate more peer feedback in the virtual learning environment learn better and are most likely to achieve better learning outcomes as a result. These students learn how to give better feedback by doing it, by reading feedback from other students and by appreciating the feedback of fellow students. Even without the interim validation of feedback from teachers, these students improve the quality of their feedback over time. It seems that the more students take responsibility for their Learning process from the outset via more virtual interaction and feedback provision, the more they learn to change their way of learning and achieve better learning results (see Statements 1, 2, 3 and 5). Giving peer feedback seems to be the accelerator of this Learning process that is only possible if supported by ICT (i.e. the VLC), which allows students to see online all the products of fellow students and to provide and receive feedback at any time of the day.

The confirmation of four of our statements support the idea that learning via the Internet definitely is worthwhile, especially when learning takes place in a Learning process of Collaborative Creation.

Taken together, we may suggest that our results confirm the influence of at least four specific features of the VAL concept: Collaborative Creation as the Learning process, the Feedback and Reflection Cycle, the essential support of a virtual learning environment and the Design principles with their learning outcomes (see Chapter 2.1.6). These research findings are interesting, but they need to be interpreted with some caution for a number of reasons. First of all, we need to consider the quality of the research instruments and the data collected: these only justify statements regarding the virtual learning process and its learning outcomes and not the VAL educational concept as a whole. Secondly, the design principles of the VAL concept have not been fully implemented and it is unclear what the results would have been if they had been implemented. The absence of interim validation by the teacher with respect to peer feedback from students is the clearest example. It is also possible that the introduction of VAL, because of its repeated application in a course, leads to other and as yet unknown effects; a first application of the concept could be distortive but at the same time also stimulating.

6.3 Relationship with existing theories and research

The new insights provided by the current research study concern many different elements: the VAL educational concept and particularly the learning process, giving peer feedback by students, improving peer feedback without the intervention of the teacher and finally the use of the Feedback and Reflection Cycle. However, it offers no insight into the value of receiving peer feedback, the specific influence of the educational process during the course and the assessment process on students' learning behaviour or the role of the teacher and the staff.

An important confirmation is found in the statement made by Brown (2004, p 84) concerning the relationship between learning and assessing: "If assessment is to be integral to learning, feedback must be at the heart of the process". The student learns from other students by receiving feedback with which he or she can improve the quality of his or her own learning product; the student also learns from the appreciation of his or her own feedback to other students. But there is more: the student who gives peer feedback learns in a different way and learns *more* (see Statements 1, 3 and 5). He or she has to read and analyse the products of fellow students, carry out complementary research and then give feedback to the best of his or her ability. This also confirms the theory that feedback, and in particular peer feedback, enhances learning (see Statements 1 and 3), something which also holds true for progress feedback, which helps students to improve or enrich their learning products (see also Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008; Schunk & Swartz, 1993).

The results found after testing our first, second and fifth statements indicate that the concept of providing feedback helps both the provider and the receiver of feedback to learn (Li, Liu, & Steckelberg, 2010; Nicol, 2010; Ertmer et al., 2007; Hattie & Timperley, 2007; Lin, Liu, Chiu, & Yuan, 2001; Boud, Cohen, & Sampson 1999). Our results are also in line with the theory proposed by Ertmer et al. (2007) which states that feedback is an essential requirement for social-constructivist learning because each student learns in a different way and feedback is necessary to compare the knowledge of one student with that of another. In addition, the result found after testing the fifth statement strengthens the perceptions of Chang (2005) with respect to self-regulated learning stating that the more responsible students are for their own learning, the more oriented they are towards the intrinsic rewards and challenges of learning. The results after testing the first, second,

third and fifth statement concerning students giving, receiving and appreciating peer feedback, as embedded in the Virtual Learning Interaction in the VLC, support the concept described by Nicol (2010), who argues that the nature and quality of feedback will be enhanced when students receive feedback on their products in the form of a dialogue with fellow students and teachers. The traditional way in which students receive feedback from their teachers tends to have the character of a monologue: teachers have little time to give appropriate feedback to large numbers of students, and teacher feedback is often insufficiently detailed.

From the data, it is clear that the Virtual Learning Interaction including giving, appreciating and receiving feedback on students' learning products forms part of discussions rounds taking place in an online learning environment and in agreement with social-constructivist learning perspectives such as Vygotsky's zone of proximal development (1978), which states that students can learn by observing the behaviour of others who are just that little bit ahead of them in their learning process. Furthermore, the results (see Chapter 2.1.3) lend support to the five essential and structured elements of the cooperative learning concept (Johnson & Johnson, 2002). Responsibility and self-regulation in the Learning process of VAL and the execution of the Feedback and Reflection Cycle within VAL are in line with positive interdependence and with individual and group accountability. Moreover, virtual learning interaction and the meetings at school promote interaction, the appropriate use of social skills and group processing with two additions: virtual learning interaction is an effective alternative for promotive interaction within cooperative learning and learning is Collaborative Creation, while goal achievement is quite an individual effort within cooperative learning.

Within General learning theories, VAL can best be placed in the social-constructivism domain, within the theory of self-regulated learning. It also has characteristics of the connectivist viewpoint. However, when it comes to the role and impact of ICT, no matching theoretical explanations are found. Within educational psychology theories, VAL is more closely associated with the cognitive flexibility theory of Spiro (1991). The Feedback and Reflection Cycle stimulates and ICT enables students to mirror the cognitive representations of learning products and offer peer feedback to each other and to their teacher.

Within the Process theory of learning, Collaborative Creation as the Learning process within VAL comes into its own more strongly. When placed in Engeström and Sannino's (2012) model for determining whether a theory is a well-developed process theory of learning, we can conclude that it meets all of their criteria. There is a clear sequence of events or actions and a rationale of the sequence as well as a transparent mechanism of transition in combination with a dialectic relationship between learning and instruction. The strength is the plurality of learning based on a cultural and historical background and – of course – in the rejection of universalism. The power of Collaborative Creation is that it also attempts to bring learning and instruction into a dialectical relationship, focusing on the analysis of the gap and interplay between the three processes.

The VAL educational concept (Baeten, 2009, 2011) is very much part of, and can be seen as a continuation of, the theory of learning activity (Davydov, 1990, 2008) and the theory of expansive learning (Engeström, 1987). These theories consider a stepwise evolution of contradictions inherent to the learning object to be the mechanism by which learners transition from one learning

action to the next. Such contradictions may appear in different parts of the Learning process; examples include dilemmas, conflicts and contradictory messages (Engeström & Sannino, 2012). Learning and instruction are intimately related and this relationship is dialectical in nature. As shown in this research, the Meaningful Dialogue bridges the gap between learning, teaching and assessment. This is why we rephrase the statement formulated by Brown (2004) here: if peer feedback is to be integral in the learning, educational and assessment process, the Meaningful Dialogue must be at the heart of these processes.

6.4 Limitations and suggestions for further research

Although this research study employed valid and reliable instruments and although significant relationships were found with results that are at least partially generalisable to other student populations, the observed effects were modest. One important limitation of the present study is that no causal inferences were possible due to the absence of a control group and the difficulty of controlling circumstances. In addition, the quality of the construct Student Perceived Learning Result (Chapter 4) should be improved, and a greater focus needs to be placed on the experiences of teachers.

This study clearly demonstrated the difficulties involved in studying an educational intervention. The large variety of student characteristics and the difficulty of imposing a tightly controlled educational intervention on different educational institutions are just two of the significant factors that make large-scale controlled studies difficult. It is also not easy to determine whether the answers to the research questions can be considered to be generalisable to other educational environments. Our study was about education in specific disciplines and about specific students and teachers who have learned in this way for the very first time. Furthermore, we do not know yet what the learning behaviour of students participating in this study will be *after* the course. So far, little has become known about how the learning behaviour of students changes in the long run when they learn on the Internet and in virtual learning environments. Nevertheless, our research has provided some initial understanding in this regard.

The amount of validated feedback scores is a methodological limitation that affected the results of the analyses, which often showed trends towards statistical significance. Repeating our research with a larger amount of validated feedback will likely shed more light on this issue and may reveal the effects of giving and appreciating feedback on learning outcomes. This study shows that the VAL concept may work (a proof of concept), but we need to provide more insight into the critical success and failure factors of the application of VAL within schools or universities. Related to this, future research may focus on determining which aspects of the VAL educational system contribute most to the Collaborative Creation and the Feedback and Reflection Cycle. Is it giving feedback, receiving feedback, appreciating feedback, adding a statement with arguments, reading learning products in the digital portfolios of fellow students, improving learning products, best practising, teacher validation of feedback, the assessment or evaluation and reflection? Or can these aspects only contribute to a Meaningful Dialogue as a coherent whole? Despite these challenges, the results provide a good first insight into meaningful learning and the individual learning process of students that take place intensively in a virtual learning environment.

The results of this study are modest, as stated above, which is partly due to the research approach and the time it took to collect the data. Nevertheless, in all three courses, the results show that there is a relationship between the main features of the VAL concept and the way students learn, perceive their learning result and provide peer feedback – as validated by the school. If the VAL concept had been applied fully, the students' results would have been of a higher quality for a number of reasons:

1 Students are more deeply involved with the content of the course thanks to the reciprocity of the Learning process and the publication of their (validated) best learning products;

2 Course content can be better connected to professions, because companies and institutions can submit questions to students online in the virtual learning environment;

3 There is more autonomy for the teacher in the student's learning process through the ability to i) advise on self-learning objectives and topics, ii) design learning arrangements and iii) determine that meetings and virtual sessions take place when the teacher and students want them;

4 The teacher's expertise becomes broader because his or her role becomes more educational and aimed at a wider field with associated competencies.

The free time created for the teacher comes from the considerable reduction in educational activities in VAL such as i) setting and checking exams, ii) supervision, iii) re-examinations, iv) timetables and v) the fact that the teacher does not even have to read all students' assignments or essays. In addition, the teacher will need less educational and staff support. VAL is a social-constructivist educational concept supported by a virtual learning environment and therefore suitable for any kind of education where the student is able to take responsibility for his or her learning. This may be gradual and, therefore, can be applied to pupils from about eight years of age. VAL is best suited to disciplines where there may be inter-subjectivity, which means that the Feedback and Reflection Cycle can be best used to address teaching issues with multiple solutions. Behavioural sciences, economics, management, care and medical sciences lend themselves better for this than arithmetic and mathematics.

The results of this study are partly dependent on the context of the learning process within the educational institute: first and foremost to the educational process and the evaluation process and subsequently to the support and management processes. It is recommended to investigate whether this context determines the progress and results of the learning process of students as intended within the VAL educational concept.

If students follow the VAL learning concept for a number of years, it will ultimately affect the way in which they experience success and function in their work. Currently, VAL is more focused on the way in which people work together and on bridging the gap between learning and working. It therefore also fits well within the training departments of larger companies and institutions, as they have a stronger coupling of learning and work, and this can improve workplace performance more quickly. In addition, employees are more accustomed to working in teams to deliver certain products or services that are aligned with organisational goals and strategy. VAL in this variant is called "workplace learning" (in Dutch: "Werkplekleren met leertechnologie"). The main reason why companies introduce workplace learning is that they want to enhance the adaptive capacity of their organisation by strengthening the role and responsibility of the teams in the workplace.

Since 2012, the VAL concept has been increasingly used companies to encourage the learning development of their employees and teams in the workplace. An interesting question related to workplace learning concerns the extent to which the VAL concept is suitable as a model of Workplace Learning with Learning Technology for employees who want to learn about the activities they execute in their workplace.

6.5 Practical implications

This study has shown that the VAL concept works, but we also wish to provide more insight into the critical success factors of its application in a school or university. Educational reinforcements include greater variety in the methods used during the meetings at school and in the virtual learning environment (especially best practising), allowing students to moderate, to enhance the learning challenge online and carry out teaching assignments and to interact with companies and institutions, as well as giving more autonomy to the teacher. The critical success factors lie more on the side of the organisation. The decision to utilise VAL is better - and better founded - when it is part of a vision of learning and organisation rather than a mere desire to innovate in the form of experiments or pilots. The second success factor is the quality of the educational leadership in a school. This relates not only to the decision to enter VAL but also to embrace its follow-up, as profound innovation barriers need to be cleared in the areas of regulation and organisation and in terms of removing old behaviours, which is a responsibility for management. Support among teachers is the third critical success factor, where the rule of thumb is that 30% of this group will be motivated by innovation and want to become more professional in the required new expertise and that another 40% will be willing to be subsequently trained by them. This way of learning suits students, but, because of the transparency of their learning and social control within the community, they may still feel that they have to work harder. Additionally, this can create a feeling of instructive teaching where the teacher provides the necessary information and knowledge in an attractive and orderly manner.
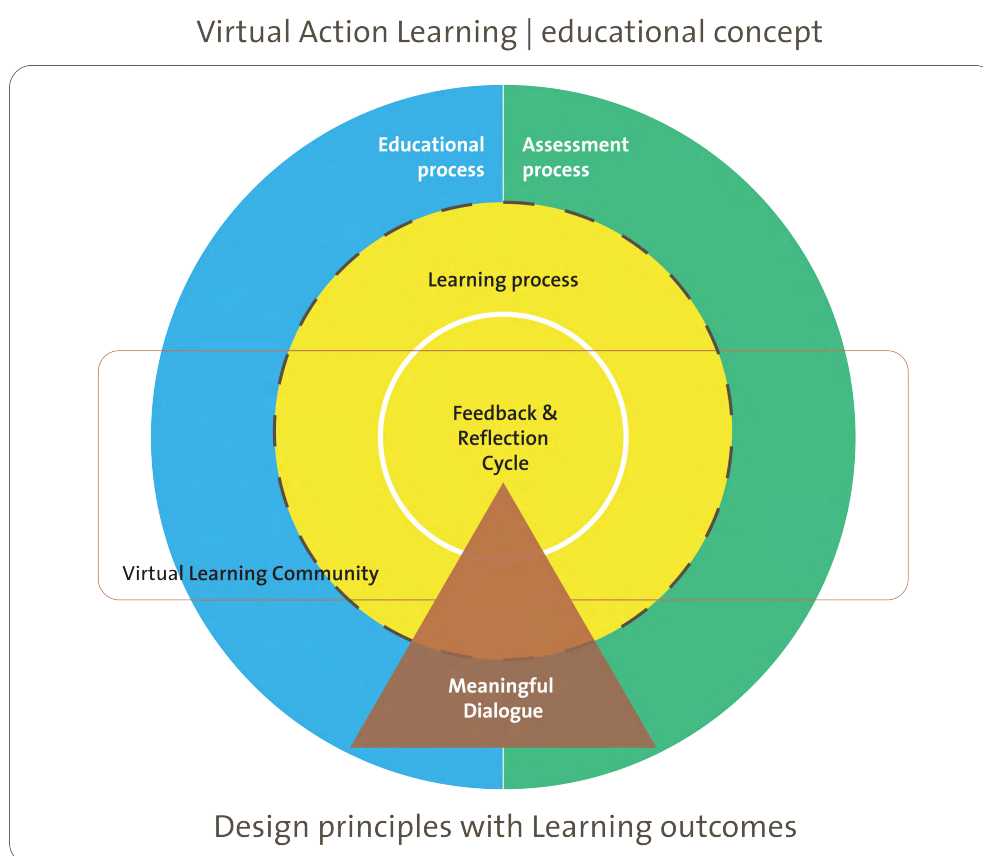
Figure 6.1 *The researched specific features of the VAL concept*

The availability of ever larger quantities and greater variation of information means that every learner uses his or her own personal learning interface and that only the learner knows what he or she knows. The variety of knowledge and ways of processing information will continue to increase. VAL is an educational concept where the three processes of learning, education and assessment are described as a coherent whole, with clearly defined roles and responsibilities for students and teachers. A virtual learning environment makes it possible for information to be used such that learning is efficient and effective and taps optimally into students' talents.

The Meaningful Dialogue as a quality instrument

The Meaningful Dialogue is the most important specific feature of the VAL concept (see Chapter 2) A true Meaningful Dialogue means that the VAL concept is applied fully within a transformation of the existing processes and goals; this clarifies the role of the teacher and the staff within an educational institute or training department. Furthermore, the Meaningful Dialogue is a reliable criterion for educational quality. The Collaborative Creation of knowledge that takes place, i.e. the Learning process in VAL based on social-constructivist learning, matches the variation in information processing and the use of ICT. Social-constructivist education, supported by ICT, matches this Learning process well because through it, learners can mirror their representations to those of others before the teacher validates them. Learning activities become more fragmented and more spread out, meaning that education should be aimed towards learning preferences that are independent of time and place, instead of learning styles. Formative assessment by receiving and providing peer feedback may lead to better learning results than summative assessments

(during or after the educational period). The quality of any educational programme can be best determined through the extent to which a student acquires knowledge during his or her education. For this reason, the Meaningful Dialogue is a better criterion for educational quality than are learning results (i.e. grades), which are predetermined by the educational institution.

To elaborate on the above-mentioned points even further: a learning result says more about the qualities of the student, and the Meaningful Dialogue says more about the quality of education. It is commonly accepted that high-quality education starts with teachers, but these should be a new type with expertise that is broader and based on professional practice as well as theory. Teachers must also be media literate and able to work well in teams. The impact of learning technologies on information processing and the Learning process, together with open access to virtually all information sources, will eventually lead to an educational transformation that includes the disappearance of the fixed curriculum. The implementation and application of the VAL concept within a course is an intense transformation process for the teacher, for the staff and for the regulating institutions. An increasing autonomy on the part of teachers and their new roles require a re-evaluation of the teacher function and demand a new kind of teacher with a broader expertise base, increased responsibility, empowerment and also new twenty-first century teaching skills. Students generally have less trouble with the transformation to VAL; it appears that this new way of learning is better suited to their way of working and information processing.

To conclude, if the educational system wishes to connect with developments in the personal environment and the working environments of people, a redesign is required of all of the processes in an educational institution. The application of the VAL concept is an example of such a transformation and starts with the primary three processes: learning, teaching (educational) and assessing. When learning on the Internet is the starting point, a Learning process such as Collaborative Creation with a Feedback and Reflection Cycle is needed in order to connect the three processes. A Meaningful Dialogue, as described in this thesis, could be a proper approach and instrument to provide quality in (transformed) education. Learning via the Internet is definitely worthwhile.

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List of Figures

List of Tables

Nr	Title
2.1	The extent to which the VAL Learning process meets the requirements of process theories of learning
4.1	Overview of the VAL implementation projects and the instruments used 2000-2008
4.2	The construct of Student Perceived Way of Learning
4.3	The construct of Student-perceived learning result
4.4	The construct of Virtual Learning Interaction
4.5	The construct of Given and Appreciated Peer Feedback
4.6	Effect of implementation of VAL on students
4.7	The path model of the first instrument
4.8	The factor loadings of the path model
4.9	Composite Reliability and Convergent Validity
4.10	The Discriminant Validity of the four constructs
4.11	Check on significant paths
5.1	Characteristics of the three cases
5.2	Responses per case
5.3	Time spent on Virtual Learning Interaction including feedback (N=276)
5.4	Types of Virtual Learning Interaction per week per course
5.5	Factor structure and loadings within the outer research model
5.6	Composite Reliability and Convergent Validity
5.7	Discriminant Validity
5.8	The PLS/SEM-model testing the research model
5.9	Path coefficients and significances within the research model
5.10	Increase in the amount of feedback per feedback quality level (N=59)

Appendices

Appendix A. Pre- and Post-course Questionnaires

A1. Pre-course Questionnaire

This questionnaire has been made by Citowoz with regards to the theme Strategy & Communication that you will follow in the coming period (Virtual Action Learning)
The findings will not be used by the NHTV, only by Citowoz for scientific research in cooperation with the University of Utrecht and might be published anonymously in the future.
Filling out this questionnaire will take no more than 10 to 15 minutes.

			SPSS codes
Name			SC
Age	…… year		ST01
	O Male O Female		ST02
Education	O Facility management	O Hotel management	ST03
Highest previous education	O HAVO O MBO O VWO O Other, …….		ST04

	< 2 hours	2-5 hours	6-9 hours	10-13 hours	14-17 hours	> 17 hours …	
1. How many hours per week (on average) have you spent the last year (outside your summer holidays) on paid or voluntary jobs.							ST05
2. How many hours per week (on average) do you expect to spend the coming theme (Strategy & Communication) on paid or voluntary jobs?							ST06

The questions on the following pages are in random order.

		Partially or completely disagree	Partially agree	(Almost) completely agree	
3	In general, I have a positive study attitude (during my NHTV education)				ST07
4	I strongly value and am sensitive to formal rewards/grades (achieve high marks, finish the education in the set period)				ST08
5	I strongly value and am sensitive to informal rewards (receive compliments from fellow students or lecturers)				ST09
6	I am goal-oriented				ST10
7	I am mainly a team player				ST11
8	I enjoy learning and rely on active fellow students				ST12
9	I am eager to learn				ST13
10	During my study, I am used to taking decisions autonomously about how and when I learn				ST14
11	When I study (self-study, homework), I always strictly follow the guidelines set by the education (the lecturer)				ST15
12	When I study (self-study, homework), I start by checking what the objective / required end result is and then design my own learning path				ST16
13	When I study, I always check with my fellow students before I choose my own learning path				ST17
14	I am prepared to study extra in the evening hours if I find the subject interesting				ST18
15	I am very flexible				ST19
16	I have a great feeling of responsibility				ST20
17	My attitude towards working in a project team is very positive				ST21
18	I believe the coming theme (Strategy & Communication) is more important than previous themes				ST22
19	A deal is a deal				ST23
20	If required, I can write a short memo quickly (within 1 hour) and in correct English				ST24
21	I am in the possession of sufficient social and personal skills to provide other students with feedback				ST25
22	I can handle and deal with feedback from fellow students				ST26
23	I can answer learning questions from fellow students				ST27
24	In the coming months, I have sufficient time to completely finish this theme				ST28
25	I have access to a workplace with a PC connected to the Internet				ST29
26	Studying with the help of the Internet is obvious to me				ST30

27	I reply to my emails within 48 hours				ST31
28	I enjoy communicating via mobile phone (GSM)				ST32
29	If someone asks me to return their call (via voicemail), I do so within 24 hours				ST33
30	If I am busy, I do not answer my mobile.				ST34

With the following questions, you compare yourself to other students that follow this education. It is about your experiences in (among others) group work and you do not have to be able to substantiate your opinion.

If you compare yourself to your fellow students, how do you rate yourself on the following topics:	No opinion	Less than others	Compar able / average	Better than them	
a	My motivation for the education (HHO /FM)					ST36
b	Independence					ST37
c	Study attitude					ST38
d	Achieved grades / results					ST39
e	Learning result (what you have learned)					ST40
f	Functioning in a group (team player)					ST41
g	Having faith in the effort of your group members					ST42
h	Having faith that your group members meet deadlines					ST43
i	My Internet skills					ST44
j	Chatting (MSN, ICQ)					ST45
k	Making phone calls via Internet (Skyping)					ST46
l	Use / knowledge of SMS					ST47
m	Use / knowledge of mobile phones (GSM)					ST48
n	Use / knowledge of Hyves or other virtual communities					ST49
o	Use / knowledge of search engines					ST50
p	Use / knowledge of PowerPoint					ST51

A2. Post-course questionnaire

Evaluation Virtual Action Learning Students	**Name:**

The focus of this evaluation is on the educational concept of Virtual Action Learning (VAL) as it was implemented during the course <Name course> from <date> up to <date>. This questionnaire contains questions in two different categories: Virtual Action Learning and the Virtual Learning Community.

The goal is to evaluate your attitude and opinion towards VAL and the VLC. We ask you to answer these questions as honestly as possible and fill in a score for each question

We ask you to compare VAL with more traditional education that you have experienced

When we speak of VAL, we refer to a specific way of learned-centred education in which students essentially learn from each other in both a virtual and a physical learning environment. When we speak of traditional education, we refer to teacher-centred education in which students essentially learn from a teacher in class.

Please tick the boxes of your choice	I largely disagree	I partly disagree	Neutral	I partly agree	I largely agree
1. With VAL, I have more freedom to decide for myself **how** I learn					
2. With VAL, I have more freedom to decide for myself **what** I learn					
3. Because of VAL, I have taken more responsibility for my own learning process					
4. Because of VAL, I have needed less time to learn					
5. Because of VAL, I have spent more time studying					
6. Because of VAL, I have taken more initiative during this module					
7. Because of VAL, I have become more interested in topics concerning <Name of course>					
8. VAL has stimulated me to learn more from my fellow students					
9. VAL has made me more dependent on my teachers					
10. With VAL, I have experienced more knowledge construction and less knowledge transfer					
11. Because of VAL, I have been able to construct more knowledge					
12. VAL has stimulated me to focus more intensively on the content of the course					
13. VAL has increased my motivation to learn/study					
14. Because of my specific way of studying during the module I have reached a higher level					
15. Would you like to take other VAL courses?	0 Yes		0 No		

Evaluation Virtual Learning Community

Questions 17 to 30 are about the Virtual Learning Community (VLC)

17. To what extent have the following VLC components supported your learning activities

	Strongly negative influence	Negative influence	Neutral	Positive influence	Strongly positive influence
Platform/home					
Portfolio					
Giving constructive feedback					
Receiving constructive feedback					
Rating constructive feedback					
Learning arrangements					
Statements					
Learning questions					
Self-testing					
Best practising					
Learning Development Report					
Learning Activities Report					
Other components					
The entire VLC					

18. To what extent has the atmosphere on the VLC influenced your behaviour as a student

19. Would you like keep participating on this VLC even after graduation?

0 Yes   0 No

20. What aspects or parts of the VLC could be improved according to your opinion?

Please tick the boxes of your choice	I largely disagree	I partly disagree	Neutral	I partly agree	I largely agree
21. I feel comfortable in this group (in the VLC and outside)					
22. Working in the VLC with this group of students was pleasant					
23. In the VLC was a atmosphere of trust with fellow students					
24. In the VLC was a atmosphere of trust with teachers					
25. The interaction with fellow students was based on trust					
26. The interaction with the teacher(s) was based on trust					
27. The atmosphere in the VLC was pleasant					
28. I regularly felt the need to visit the VLC					
29. Once I was in the VLC, I often stayed longer than I had planned					
30. I believe that fellow students have given honest constructive feedback					
31. My fellow students took my constructive feedback seriously					
32. I have learned more in the VLC than I had expected					
33. In the VLC, I have mainly learned from fellow students' learning products					
34. In the VLC, I have mainly learned from fellow students' constructive feedback					
35. I have learned at least as much in the VLC as in meetings at school					

Do you give Citowoz permission for using your contribution in the VLC and other photo- and video recordings (if applicable) for education and research? Please tick the box of your choice.

0 No
0 Yes, the VLC contributions
0 Yes, the VLC contributions and other photo- and video recordings.

Appendix B. List of data (variables) used in analysis

Var number used in analysis	Variable code in SPSS	Variable name (SPSS label)
1	SC	Studentcode example SC001
4	LRP1FBSCAN	Given feedback validated as scan P1
5	LRP1FBREAD	Given feedback validated as read P1
6	LRP1FBCOMP	Given feedback validated as comprehensive P1
7	LRP1FBCONST	Given feedback validated as constructive P1 (Quality given feedback P1)
8	LRP1FBTOTAL	Total Validated given feedback P1 (scan+read+comprehensive+constructive)
9	LRP2FBSCAN	Given feedback validated as scan P2
10	LRP2FBREAD	Given feedback validated as read P2
11	LRP2FBCOMP	Given feedback validated as comprehensive P2
12	LRP2FBCONST	Given feedback validated as constructive P2 (Quality given feedback P2)
13	LRP2FBTOTAL	Total Validated given feedback P2 (scan+read+comprehensive+constructive)
14	LRAFTER	Learning result validated by school
16	VCCOMMUNITY	VLC (community) coursegroup
18	ST01AGE	Age
19	ST02GENDER	Gender
20	ST03COURSE	Course
21	ST04HPREVEDU	Highest previous education
24	ST07STUDYATT	In general I have a positive study attitude (during my .. education)
25	ST08FORMREW	I strongly value and am sensitive to formal rewards / grades (achieve high marks, finish the education in the set period)
26	ST09INFORMRW	I strongly value and am sensitive to informal rewards (receive compliments from fellow students or lecturers)
29	ST13EAGERTO	I am eager to learn
30	ST14LEARNDEC	During my study I am used to take decisions autonomously about how and when I learn
32	ST16OBJCTORI	When I study, I start with checking what the objective / required end result is and than design my own learning path
34	ST18INTRINORI	I am prepared to study extra in the evening hours if I find the subject interesting
36	ST20RESPONSBL	I have a great feeling of responsibility
41	ST25FBPRSKIL	I am in the possession of sufficient social and personal skills to provide other students with feedback
42	ST26FBRECSKL	I can handle and deal with feedback from fellow students
43	ST27ANSWERLQ	I can answer learning questions from fellow students
50	ST36RMOTIVA	My motivation for the education … in comparing to my fellow students is
51	ST37RINDEPN	My independence in comparing to my fellow students is
52	ST38RSTUATT	My study attitude in comparing to my fellow students is
53	ST39RGRADES	My achieved grades results in comparing to my fellow students are
54	ST40RRESULT	My learning result (what you have learned) in comparing to my fellow students is
56	ST42REFFORT	My having faith in the effort of your group members in comparing to my fellow students is
57	ST43RDEADLN	My having faith that my group members meet deadlines in comparing to my fellow students is
58	ST44RINTRNT	My internet skills in comparing to my fellow students are
59	ST45RCHAT	My chatting (MSN, ICQ) in comparing to my fellow students is
60	ST46RSKYPE	My phone calls via internet (skyping) in comparing to my fellow students are
61	ST47RSMS	My use / knowledge of sms in comparing to my fellow students is
62	ST48RGSM	My use / knowledge of mobile phone (GSM) in comparing to my fellow students is
63	ST49RHYVES	My use / knowledge of Hyves or other Virtual Communities in comparing to my fellow students is
64	ST50RSEARCH	My use / knowledge of search engines in comparing to my fellow students is
67	FI02FREEWHAT	With VAL I have more freedom to decide for myself what I learn
68	FI03RESPONSB	Because of VAL I have taken more responsibility for my own learning process
70	FI05MOSTUDYT	Because of VAL I have spent more time studying

71	FI06MOINITIA	Because of VAL I have taken more initiative during this module
72	FI07MOINTERS	Because of VAL I have become more interested in topics concerning the module
73	FI08MOCOLLL	VAL has stimulated me to learn more from my fellow students
76	FI11MOKNO	Because of VAL I have been able to construct more knowledge
77	FI12MOFOCUS	VAL has stimulated me to focus more intensively on the content of the course
78	FI13MOMOTIV	VAL has increased my motivation to learn/study
110	LA01P1WEEKS	Number of course weeks P1
111	LA02P1VISITS	Average weekly visits P1
112	LA03P1USE	Average weekly use of components P1
113	LA04P1MESS	Average number of Platform messages P1
115	LA06P1PROD	Average number of weekly products P1
117	LA08P1GIVFB	Average number of weekly given feedback P1
118	LA09P1APPRFB	Average number of weekly appreciated feedback P1
119	LA10P1RECIFB	Average number of weekly received feedback P1
120	LA11P1LQUEST	Average weekly added learning questions/answers P1
121	LA12P1STATEM	Average weekly voted on Statements P1
122	LA13P1NOMBP	Average weekly nominated products in Best Practising P1
123	LA14P1RATEDBP	Average weekly rated at Best Practising P1
124	LA15P1IMPROV	Average weekly improved product P1
125	LA16P2WEEKS	Number of course weeks P2
126	LA17P2VISITS	Average weekly visits P2
127	LA18P2USE	Average weekly use of components P2
128	LA19P2MESS	Average number of Platform messages P2
129	LA20P2PROD	Average number of weekly products P2
130	LA21P2GIVFB	Average number of weekly given feedback P2
131	LA22P2APPRFB	Average number of weekly appreciated feedback P2
132	LA23P2RECIFB	Average number of weekly received feedback P2
133	LA24P2LQUEST	Average weekly added learning questions/answers P2
134	LA25P2STATEM	Average weekly voted on Statements P2
135	LA26P2NOMBP	Average weekly nominated products in Best Practising P2
136	LA27P2RATEDBP	Average weekly rated at Best Practising P2
137	LA28P2IMPROV	Average weekly improved product P2
111a	LA02P1VISITSsec	Norm time to visit the VLC (P1 start of a virtual session)
112a	LA03P1USEsec	Norm time to use a component P1
113a	LA04P1MESSsec	Norm time to post am message on the Platform P1
115a	LA06P1PRODsec	Norm time to upload a product in Portfolio P1
117a	LA08P1GIVFBsec	Norm time to give one feedback P1
118a	LA09P1APPRFBsec	Norm time to appreciate one feedback P1
119a	LA10P1RECIFBsec	Norm time to read weekly received feedback P1
120a	LA11P1LQUESTsec	Norm time to add a learning question or answer P1
121a	LA12P1STATEMsec	Norm time to read and vote incl. argument on a Statement P1
122a	LA13P1NOMBPsec	Norm time to nominate a product in Best Practising P1
123a	LA14P1RATEDBPsec	Norm time to rate a product at Best Practising P1
124a	LA15P1IMPROVsec	Norm time to upload an improved product in Portfolio P1
126a	LA17P2VISITSsec	Norm time to visit the VLC (P2 start of a virtual session)
127a	LA18P2USEsec	Norm time to use a component P2
128a	LA19P2MESSsec	Norm time to post am message on the Platform P2
129a	LA20P2PRODsec	Norm time to upload a product in Portfolio P2
130a	LA21P2GIVFBsec	Norm time to give one feedback P2
131a	LA22P2APPRFBsec	Norm time to appreciate one feedback P2
132a	LA23P2RECIFBsec	Norm time to read weekly received feedback P2
133a	LA24P2LQUESTsec	Norm time to add a learning question or answer P2
134a	LA25P2STATEMsec	Norm time to read and vote incl. argument on a Statement P2
135a	LA26P2NOMBPsec	Norm time to nominate a product in Best Practising P2
136a	LA27P2RATEDBPsec	Norm time to rate a product at Best Practising P2
137a	LA28P2IMPROVsec	Norm time to upload an improved product in Portfolio P2

Appendix C. Check on SPSS data entry

Sample of SPSS data entry and check on deviations

nr	Respondent code	Course	number of input variables	Variable number	is	should be	deviations	Correct input	corrected?
1	SC001	FM	134				0	yes	
2	SC011	FM	134				0	yes	
3	SC021	FM	134				0	yes	
4	SC055	FM	134	F143 STA	3	99	1	no	yes
5	SC088	FM	134				0	yes	
6	SC122	HM	134				0	yes	
7	SC163	HM	134				0	yes	
8	SC181	HM	134	LRP2FB	9	10		no	yes
				LRP2Total	33	34	2		
9	SC193	HM	134				0	yes	
10	SC132	HM	134	not started, no input			0	no	
11	SC205	NU	134	LRP2FBTotal	9	8	1	no	yes
12	SC216	NU	134	LRP1FBTotal	0	8	1	no	yes
13	SC230	NU	134				0	yes	
14	SC256	NU	134				0	yes	
15	SC256	NU	134				0	yes	
16	SC266	NU	134				0	yes	
17	SC279	NU	134				0	yes	
18	SC288	NU		LRP1FBCOMP	3	0		no	
			134	LRP1FBCONST	0	3	2		
19	SC301	NU	134				0	yes	
20	SC312	NU	134				0	yes	
21	SC027	FM	134				0	yes	
22	no input	FM	134	not started, no input			0	yes	
23	SC108	HM	134	LRP1FBScan	15	5		no	yes
				LRP1FBREAD	4	5			
				P1Total	19	10			
				LRRP2Scan	5	15			
				LRP2READ	5	4			
				LRP2TOTAl	10	19	6		
24	SC135	HM	134				0	yes	
25	SC114	HM	134	LRP2FBCOM	3	2		no	
				LRP2FBTotal	27	26	2		
26	SC275	NU	134				0	yes	
27	SC287	NU	134				0	yes	
28	SC291	NU	134				0	yes	
29	SC293	NU	134				0	yes	
30	SC035	FM	134				0	yes	
31	SC057	FM	134	LRP2FBTotal			4	no	yes
	Total input		**4.154**	**Number of deviations**			**19**		
				Percentage deviations of total input			**0,46%**		

Appendix D. Virtual Learning Interaction scale

Number[a]	Name in data file	Description of items
111	LA02P1VISITS	Average weekly visits P1
111a	LA02P1VISITSsec	Norm time to visit the VLC
112	LA03P1USE	Average weekly use of components in P1
112a	LA03P1USEsec	Norm time to use a component P1
113	LA04P1MESS	Average number of platform messages P1
113a	LA04P1MESSsec	Norm time to post a message on the platform P1
114	LA05P1FIRSTLP	Number of days before uploading the first learning product P1
115	LA06P1PROD	Average number of weekly products P1
115a	LA06P1PRODsec	Norm time to upload a product in the portfolio P1
116	LA07P1FIRSTFB	Number of days before giving the first feedback P1
117	LA08P1GIVFB	Average amount of weekly given feedback P1
117a	LA08P1GIVFBsec	Norm time to give one feedback P1
118	LA09P1APPRFB	Average amount of weekly appreciated feedback P1
118a	LA09P1APPRFBsec	Norm time to appreciate one feedback P1
119	LA10P1RECIFB	Average amount of weekly received feedback P1
119a	LA10P1RECIFBsec	Norm time to read weekly received feedback P1
120	LA11P1LQUEST	Average weekly added learning questions/answers P1
120a	LA11P1LQUESTsec	Norm time to add a learning question or answer P1
121	LA12P1STATEM	Average weekly voted on statements P1
121a	LA12P1STATEMsec	Norm time to read and vote incl. argument on a statement P1
122	LA13P1NOMBP	Average weekly nominated products in best practising P1
122a	LA13P1NOMBPsec	Norm time to nominate a product in best practising P1
123	LA14P1RATEDBP	Average weekly rated at best practising P1
123a	LA14P1RATEDBPsec	Norm time to rate a product at best practising P1
124	LA15P1IMPROV	Average weekly improved product P1
124a	LA15P1IMPROVsec	Norm time to upload an improved product in the portfolio P1
125	LA16P2WEEKS	Number of course weeks P2
126	LA17P2VISITS	Average weekly visits P2
126a	LA17P2VISITSsec	Norm time to visit the VLC (P2 start of a virtual session)
127	LA18P2USE	Average weekly use of components P2
127a	LA18P2USEsec	Norm time to use a component P2
128	LA19P2MESS	Average number of platform messages P2
128a	LA19P2MESSsec	Norm time to post a message on the platform P2
129	LA20P2PROD	Average number of weekly products P2
129a	LA20P2PRODsec	Norm time to upload a product in Portfolio P2
130	LA21P2GIVFB	Average amount of weekly given feedback P2
130a	LA21P2GIVFBsec	Norm time to give one feedback P2
131	LA22P2APPRFB	Average amount of weekly appreciated feedback P2
131a	LA22P2APPRFBsec	Norm time to appreciate one feedback P2
132	LA23P2RECIFB	Average amount of weekly received feedback P2
132a	LA23P2RECIFBsec	Norm time to read weekly received feedback P2
133	LA24P2LQUEST	Average weekly added learning questions/answers P2
133a	LA24P2LQUESTsec	Norm time to add a learning question or answer P2
134	LA25P2STATEM	Average weekly voted on statements P2
134a	LA25P2STATEMsec	Norm time to read and vote incl. argument on a statement P2
135	LA26P2NOMBP	Average weekly nominated products in best practising P2
135a	LA26P2NOMBPsec	Norm time to nominate a product in best practising P2
136	LA27P2RATEDBP	Average weekly rated at best practising P2
136a	LA27P2RATEDBPsec	Norm time to rate a product at best practising P2
137	LA28P2IMPROV	Average weekly improved product P2
137a	LA28P2IMPROVsec	Norm time to upload an improved product in the portfolio P2

Summary

The Power of Peer Feedback: Research on the Learning Process within Virtual Action Learning

Does the use of the Internet in any way contribute to a student's learning process, and if yes, precisely what added value does this represent? This question – and more specifically the attempt to answer it – is what lies at the heart of this dissertation, which considers the issue from a number of perspectives based on experiences, opinions and academic theories. This is done through the analysis of a new and innovative educational concept: Virtual Action Learning.

Virtual Action Learning (VAL) is an educational concept that was designed to connect with the personal learning environments of people who live in a world where technology and social media play a dominant role. In other words, a world in which information is processed in an interactive and visual manner within the context of ever-changing situations and processes that demand ever higher levels of individual responsibility. The application of VAL concerns a way of learning that is different from what is common: VAL is based on social-constructivist learning theory in combination with an intensive use of ICT in the student's learning process. This takes place in the Virtual Learning Community (VLC), an electronic learning environment developed to support the learning process.

In addition to the educational characteristics of the VAL concept, a managerial perspective can be distinguished that involves the way in which schools and universities organise their processes in order to facilitate learning. This process approach, born in the nineteen-nineties, is grounded in a number of business theories. The VAL concept distinguishes three primary processes: the learning process, for which the student carries responsibility, and the processes related to teaching and assessment, for which the instructor is held responsible. With the help of design principles that are firmly based on theory, we first describe the way in which the learning process evolves. The ensuing assessment process is closely linked with the educational process, but is first and foremost geared towards the learning process of individual students.

By connecting the above-mentioned process activities via a Feedback and Reflection Cycle, it becomes possible to establish a strong connection between a course's contents and its related competences. To achieve this, we need to ensure that - throughout the course - participants are continuously engaged in a Meaningful Dialogue: interaction and the mutual exchange of constructive feedback, not only among students themselves, but also among students and their teachers. This is partly done in the VLC and partly during meetings held at school, a process for which new (virtual) educational forms have been designed and which focuses on the power of feedback provided and received by students on their specific learning products in the VLC. Within the VAL concept, the Meaningful Dialogue is considered to be the measure of good quality education that is supported by ICT.

Our research was executed in two stages. The first involved Design Based Research that was carried out from 2000 until 2007 and that encompassed ten projects involving students and teachers from a number of Dutch universities of applied sciences. In close cooperation with these groups, the VAL educational concept and its accompanying measurement instruments were designed and developed. The second stage of our research took place from 2007 until 2008, when these validated instruments were used to perform quantitative measurements with the aim to investigate the learning processes of three groups of students (N=276) from a number of Dutch universities of applied sciences who had embarked on a six-month course in an environment

designed on the basis of the VAL concept. In the years that followed, findings were analysed, interpreted and embedded within a theoretical framework to form the basis of the current dissertation.

The outcome of our investigations can be formulated as follows:
- We now have a well-founded educational concept, VAL, with a learning process that is firmly embedded within theory;
- We now have a combination of two valid instruments with which we can measure the progress and the results of the learning process within VAL, from the perspective of the student as well as from the perspective of the school;
- Our findings support the statement that the virtual part of the learning process within VAL - and more specifically the role of peer feedback – has a positive relationship with the progress of the learning process and with the results as perceived by the students and the school.

From its inception, the current study was supervised by Prof. Dr. P.R.J. Simons (University of Utrecht) in his role as PhD supervisor; in 2015, he was joined by Prof. Dr. R. J. Blomme MLD CMC MSIM MSc BSc Euring (Nyenrode Business University, who was involved in the completing stages of our research.

One of the challenges to be dealt with in our study lay in the fact that VAL was designed and developed *in practice*; this was done in close concert with a great many students and teachers and on the basis of what worked for this group of users in their *practical* environments. As a result, and almost by definition, the theoretical foundation often took place *after* the event, which to some extent affected the relationship between the VAL concept and educational theory. This was solved in part by making VAL's design principles explicit and by connecting them to ideas and concepts that are central to a number of educational and learning theories. This theoretical framework shows not only that the learning process in VAL, in terms of its conceptual features, is connected to the social-constructivist approach to learning and the theory of learning through Collaborative Creation, but also that it is in fact an extension of Engeström's Theory of Expansive Learning. This is expressed by the very nature of the learning activities that are included in a student's individual learning process and that will be different for learners because of the role played by ICT.

Chapter 1 of the current work introduces our research question as expressed in five research statements. Chapter 2 presents VAL's theoretical framework with a special focus on six specific features of the educational concept. Chapter 3 presents a detailed description of the VAL concept as such. Chapter 4 describes the Design Based Research carried out between 2000 and 2007 as well as the two instruments with which the progress and the results of the learning process can be measured. With the help of a Partial Least Square Structured Equation Model (PLS/SEM model), we strengthened the instruments and formulated constructs with which valid and reliable measurements could be taken. This is elaborated in Chapter 5, which combines both instruments and their constructs to form a research model with which our five statements concerning the progress and the results of the learning process in VAL are evaluated from the perspective of the students as well as the perspective of the school.

Summarised, the results mean that the relations between the five constructs in the research model show that the overall progress and results of the learning process have a strong relationship with the virtual part of the learning process within VAL: Virtual Learning Interaction and Given and Appreciated Peer Feedback. Students who participate more actively in Virtual Learning Interaction and especially those who give and appreciate more peer feedback on learning products not only

experience a better way of learning and better learning results, but they also provide higher levels of peer feedback, as validated by the school.

The results of our study are clear, and so are its limitations. An additional question presented itself in our analyses asking whether the measurement of learning outcomes can in fact be used as an effective indicator to determine the effect of learning interventions. Our final chapter, Chapter 6, presents our conclusions and final discussion. It also lists the limitations of our study, it critically examines our results, and it extends these to the specific characteristics of VAL – and especially to the Meaningful Dialogue that is needed in education in order to connect students' online behaviour with their offline behaviour and their teachers' activities in the education and assessment processes. Here, a decisive factor proves to be peer feedback on learning products - not only on the Internet, but also as part of a student's learning process as it evolves in other courses and programmes offered by the school. In sum, we may conclude that the Internet does indeed positively contribute to a student's learning process. Still, if we wish to build strong and lasting foundations to ensure the continued quality of education, a permanent connection appears to be required between the learning process, the educational process and the assessment process in the form of a Meaningful Dialogue among students and between students and their teachers. This connection is made possible by the Feedback and Reflection cycle within VAL.

August 2016

Jos J.M. Baeten

Samenvatting

The Power of Peer Feedback: onderzoek naar het leerproces binnen Virtual Action Learning

Levert de inzet van internet in het leerproces eigenlijk wel toegevoegde waarde voor de student op? Dat is in wezen de probleemstelling die in dit proefschrift vanuit allerlei ervaringen, opvattingen en wetenschappelijke theorieën bespiegeld wordt. Dit gebeurt via de analyse van een nieuwe opleidingsconcept: Virtual Action Learning.

Virtual Action Learning (VAL) is een opleidingsconcept dat beoogt aan te sluiten bij de persoonlijke leeromgeving van mensen die leven in een wereld met veel technologie en sociale media. Een wereld waarin informatie interactief en beeldend verwerkt wordt binnen snel veranderende situaties en binnen processen waar individuele verantwoordelijkheden steeds belangrijker worden. In VAL gaat het om een manier van leren die anders is dan gebruikelijk: VAL betreft een manier van leren die gebaseerd is op de sociaal-constructivistische leertheorie en waarbij in het leerproces van de student intensief gebruik wordt gemaakt van ICT. In dit geval gaat het om de Virtual Learning Community (VLC), een elektronische leeromgeving die speciaal is ontwikkeld voor de ondersteuning van de uitvoering van het opleidingsconcept.

Het VAL-concept heeft een bedrijfskundige invalshoek en gaat over de manier waarop de opleiding het leren faciliteert in haar processen. Deze procesbenadering is in de jaren negentig ontstaan vanuit theorieën binnen bedrijfsomgevingen. In het VAL-concept wordt onderscheid gemaakt tussen drie primaire processen: het leerproces met leeractiviteiten waarvoor de student verantwoordelijk is en daarnaast het onderwijsproces en het beoordelingsproces met activiteiten waarvoor de docent verantwoordelijk is. Op basis van een aantal theoretisch onderbouwde ontwerpprincipes is eerst het verloop van het leerproces beschreven. Het beoordelingsproces sluit aan op het onderwijsproces, maar is bovenal afgestemd op het leerproces van een individuele student.

Door de activiteiten in deze processen met een feedback- en reflectiecyclus onderling te verbinden, is het mogelijk om de competenties en de inhoud van de opleiding goed met elkaar te verbinden. Daarvoor is tijdens de opleiding een voortdurende Betekenisvolle dialoog nodig: constructieve feedback en interactie tussen studenten onderling en tussen de studenten en hun docenten. Dat gebeurt deels in de VLC en deels tijdens bijeenkomsten op school waarvoor nieuwe (virtuele) werkvormen zijn ontworpen en waarbij het accent ligt op de kracht van peer feedback die studenten op elkaars leerproducten in de VLC geven. De Betekenisvolle dialoog wordt in het VAL-concept gezien als een maatstaf voor de kwaliteit van goed onderwijs dat van ICT gebruikt maakt.

Het eerste deel van het onderzoek betreft Design Based Research dat in de periode 2000 tot 2007 plaatsvond en waar in tien projecten het VAL-opleidingsconcept en de bijbehorende meetinstrumenten zijn ontworpen en ontwikkeld, altijd in nauwe samenwerking met studenten en docenten van HBO-instellingen en opleidingsinstituten. In het tweede deel van het onderzoek werden in 2007-2008 met de gevalideerde meetinstrumenten op een kwantitatieve manier de voortgang en de resultaten onderzocht van de leerprocessen van drie groepen HBO-studenten (N=276) die een half jaar onderwijs volgden volgens het VAL-concept. De bevindingen zijn vervolgens uitgewerkt tot dit proefschrift, waarin ook een theoretisch kader geschetst wordt.

De opbrengst van onze onderzoeken kan als volgt geformuleerd worden:

- Er is een goed onderbouwd VAL-opleidingsconcept met een theoretisch verankerd leerproces;
- Er zijn twee valide instrumenten die samen de voortgang en het resultaat van het leerproces binnen VAL kunnen meten, zowel vanuit het perspectief van de student als vanuit het perspectief van de school;
- De onderzoeksgegevens ondersteunen de opvatting dat het virtuele deel van het leerproces binnen VAL - en daarbinnen vooral peer feedback - positief samenhangt met de voortgang van het leerproces en de resultaten zoals studenten en school die ervaren.

Het onderzoek is vanaf het begin begeleid door Prof. Dr. P.R.J. Simons (University of Utrecht) als promotor en vanaf 2015 tevens door Prof. Dr. R. J. Blomme MLD CMC MSIM MSc BSc Euring (Nyenrode Business Universiteit). Bij laatstgenoemde vond de afronding van het onderzoek plaats.

De uitdaging in het onderzoek lag in het feit dat VAL in de praktijk ontworpen en ontwikkeld is, in samenwerking met veel studenten en docenten, op basis van wat in hun praktijk goed werkt. Daardoor vond de theoretische verankering veelal achteraf plaats, hetgeen in zekere mate afbreuk deed aan de relatie van het VAL-concept met de theorie. Dat is gedeeltelijk opgelost door ontwerpprincipes achter het VAL-concept te expliciteren en die te verbinden met centrale uitgangspunten en concepten uit verschillende onderwijs- en leertheorieën. Dit theoretisch kader laat niet alleen zien dat het leerproces in VAL conceptueel aansluit bij een sociaal-constructivistische manier van leren en bij de theorie van zelfregulerend leren, maar ook dat het leerproces in VAL een verlengde is van de Theory of Expansive Learning zoals geformuleerd door Engeström. Dit ligt besloten in de aard van de leeractiviteiten binnen het individuele leerproces die voor de lerenden anders verlopen vanwege de rol van ICT.

Het proefschrift begint met het introduceren van de probleemstelling die uitgedrukt wordt in vijf beweringen. Hoofdstuk 2 schetst het theoretisch kader van VAL met het accent op zes specifieke kenmerken van het opleidingsconcept. In het daaropvolgende hoofdstuk wordt het gehele VAL-opleidingsconcept in detail beschreven. Hoofdstuk 4 betreft het Design Based Research dat is uitgevoerd tussen 2000 en 2007 naar het ontwerp en de ontwikkeling van het VAL-concept en de twee instrumenten waarmee de voortgang en het resultaat van het leerproces kunnen worden gemeten. Met behulp van een Partial Least Square Structured Equation Model (PLS/SEM-model) is het instrument aangescherpt tot constructen waarmee valide en betrouwbare metingen konden worden gedaan. Dit wordt behandeld in hoofdstuk 5, waar beide instrumenten en hun constructen zijn samengevoegd tot een onderzoeksmodel waarmee de vijf beweringen over de voortgang en resultaten van het leerproces in VAL worden gemeten vanuit het perspectief van de student en van de school.

Samengevat betekenen de resultaten dat de relaties tussen de vijf constructen in het onderzoeksmodel laten zien dat de voortgang en de resultaten van het leerproces een sterke relatie hebben met het virtuele deel van het leerproces binnen VAL, bestaande uit de virtuele leerinteractie en de gegeven en gewaardeerde peer feedback. Studenten die meer actief deelnemen aan virtuele leerinteractie en vooral zij die meer peer feedback geven op leerproducten van hun medestudenten ervaren niet alleen een betere manier van leren en betere resultaten, maar ze leveren daadwerkelijk ook feedback op een hoger niveau, hetgeen door de school wordt vastgesteld.

De resultaten van het onderzoek zijn duidelijk, en de beperkingen zijn dat ook. In de beschouwing van de resultaten komt ook de vraag naar voren of het meten van leerresultaten een zinvolle indicator is om het effect van n de toepassing van een heel nieuw opleidingsconcept te meten.

Het laatste hoofdstuk met de Conclusie en Discussie geeft de beperkingen van het onderzoek aan, zet de resultaten kritisch op een rijtje en verbreedt ze naar de specifieke kenmerken van VAL - en dan vooral naar de Betekenisvolle dialoog die in het onderwijs nodig is om het online gedrag van studenten te verbinden met hun offline gedrag en de activiteiten van de docenten in het onderwijs- en beoordelingsproces. Peer feedback op leerproducten van medestudenten blijkt de bepalende factor te zijn, niet alleen op het internet, maar ook binnen het leerproces van studenten dat zich verder op school afspeelt. We kunnen dus constateren dat internet loont voor het leerproces van de student; echter, wil de kwaliteit van het onderwijs geborgd worden, dan lijkt een permanente verbinding met het onderwijsproces en het beoordelingsproces in de vorm van een Betekenisvolle dialoog tussen studenten onderling en studenten met hun docenten nodig te zijn. De feedback en reflectiecyclus binnen VAL zorgt voor deze verbinding.

Augustus 2016

Jos J.M. Baeten