

Evaluation of a learning portfolio: how to stimulate self-directed learning among employees in health care



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Master thesis

Educational Science and Technology

Human Resource Development

Supervision

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20/10/2012

Abstract

Self-directed learning becomes more and more important in health care and could be supported by the implementation of a (digital) learning portfolio. This article describes an evaluation study about the effect of a digital learning portfolio on self-directed learning among employees in health care. This effect is investigated in a Dutch company in health care, named Dichterbij, by making a comparison between users and non-users of a learning portfolio. Also the effect of the variables 'age', 'educational degree', 'work experience in health care', 'proactive personality', 'self-directed learning orientation', and 'job characteristics' will be taken into account as literature claims a direct effect of these variables on self-directed learning. In addition to the direct effects, also the indirect effects of the mentioned variables with the use of a learning portfolio are investigated. Until now, research focused on the effect of a learning portfolio on self-directed learning *or* on the effect of personality traits and environmental conditions on self-directed learning, but the combination of these two is new. Besides, employees in health care are asked to the positive and negative factors of the learning portfolio and how self-directed learning can be stimulated. The experiences of the employees with the learning portfolio are taken into account as this can have an influence on the use of the learning portfolio and the degree of self-directed learning. Qualitative and quantitative data is gathered by a digital questionnaire with open and closed questions, which was filled out by 228 non-users and 267 users of the learning portfolio at Dichterbij. The results from a multiple regression analysis showed that the self-directed learning process can be predicted for 69.9% by self-directed learning orientation, a proactive personality, educational degree and the interaction between age and activities in the learning portfolio. Open coding showed that employees were mainly positive about the gathered insight in their own learning and development and employees were mainly negative about the information provided in the learning portfolio. Self-directed learning could be stimulated by paying more attention to the importance of and possibilities in learning and development in all layers of the organization, according to the employees.

Acknowledgement

Executing my final project and writing my thesis would not have been possible without the guidance and help of several individuals. So I would like to express my gratitude for their meaningful and useful contributions. Thanks to Maaïke Endedijk and Maria Hendriks from the University of Twente for their guidance and help in conducting a correct academic research and writing my thesis clearly. My sincere thanks also go to Nel Basten and Jessica Slungers from Dichterbij, for giving me the chance to perform my research at Dichterbij and providing guidance to make my theoretical ideas and knowledge work in everyday practices of a company in health care. I would also like to thank all employees at Dichterbij who filled out the questionnaire, told me about their job and working in health care, shared their experiences with learning and development at Dichterbij and/or guided me on their workplace. Last but not least, my sincere thanks go to my parents, brother and friends for their moral support and for all the fun I had during my study.

Enschede, 20-10-2012

Linda Cornelissen

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Introduction

In Dutch health care, the focus of education for health professionals changed by the manifestation of several trends. Firstly, as a result of graying and hazing in the Netherlands (Rijksoverheid, n.d.-a), a deficit in personnel is expected (Nationale Atlas Volksgezondheid, n.d.), as more individuals depend on health care and less individuals are available to work in this sector. The outflow of the vocational educational training might be insufficient to fill all vacancies and training and retraining of employees in health care becomes more important. Secondly, to protect clients against incompetence and carelessness of caregivers, the Dutch government had implemented the law BIG (BIG stands for jobs in individual health care). Because of this law, caregivers have to prove their knowledge and skills every 5 years to stay registered (Rijksoverheid, n.d.-b), so retraining becomes more important. Thus, to avoid an increase of the deficit in personnel and to guarantee the qualifications of caregivers, it is important that employees keep developing themselves. Hereby the focus of education in health care changed from providing initial education to providing education for lifelong learning (also called continuing medical education). This latter kind of learning refers to activities people perform throughout their lives to improve competences, skills and knowledge in a particular field, because of societal, employment or personal motives (J. Field, 2001).

Continuing medical education should be highly self-directed (Bennett et al., 2000; Mamary & Charles, 2003) because research has shown that the adult learner wants to direct his own learning (Knowles, 1975; Merriam, 2001) and people who take initiative in learning, learn more, better, permanently, more purposefully and with greater motivation (Knowles, 1975). Self-directed education will lead to improved performances in health care (Mamary & Charles, 2003), namely compassionate, high-quality and cost-sensitive care and improved outcomes for patients (Bennett et al., 2000). Self-directed learning means that learners take responsibility for their own learning (Garrison, 1997), and have control over both the objectives and the means of their learning (Mocker & Spear, 1982). This might lead to the development of skills which are necessary for lifelong learning (O'Shea, 2002; Patterson & Lunyk-Child, 2002; Slotnick, 1999; Williams, 2001).

To help updating self-directed learning, (digital) learning portfolio's are promising tools (Kicken, Brand-Gruwel, van Merriënboer, & Slot, 2008), also for health professionals (Kalet & Sanger, 2007; Parboosingh, 1996; K. Smith & Tillema, 2001). Learning portfolios, development portfolios or personal development plans are purposeful collections of evidence of learning and development that students can help to showcase their achievement and personal growth (Austin, Marini, & Desroches, 2005; Heinrich, Bhattacharya, & Rayudu, 2007; Kalet & Sanger, 2007; Parboosingh, 1996; K. Smith & Tillema, 2001; Snadden & Thomas, 1998).

While the effect of learning portfolios on self-directed learning has been investigated and a positive effect is shown for students (Heinrich et al., 2007; Kicken, Brand-Gruwel, van Merriënboer, et al., 2008; Kicken, Brand-Gruwel, & Van Merriënboer, 2008; Kicken, Brand-Gruwel, Van Merriënboer, & Slot, 2009), medical students (Kalet & Sanger, 2007), adult learners in general (Brown, 2002; K. Smith & Tillema, 2001) and in other sectors such as teaching (Jones, 2010), their potential to support learning of health care employees is less explored. As the implementation of a learning portfolio costs a great amount of money and effort, research is necessary to see if the investment is worth it and the intended results will be achieved. The goal of this research is to evaluate the influence of a learning portfolio on self-directed learning of employees in a health care organization. This evaluation will also be used to give an advice for the increase of self-directed learning in organizations for health care.

Theoretical Framework

Self-Directed Learning

Adults prefer to learn in a self-directed way (Merriam, 2001), and people who take initiative in learning, learn more, better, permanently, more purposefully and with greater motivation (Knowles, 1975). Shifting to self-directed learning is also beneficial for companies who want to be learning organizations, as existence of learning capacity on an individual level is a prerequisite for group-level and organizational-level learning (Ellinger, 2004). Thereby, learners with high self-directed readiness scores, score higher on job performance (Ellinger, 2004), which can generate more earnings. Besides, there are increased options for self-directed training programs instead of classic, group trainings. Thence a new learning infrastructure can be build, which can be time providing and costs saving (Ellinger, 2004; Guglielmino, Guglielmino, & Long, 1987). So self-directed learning can have fundamental and financial benefits.

Self-directed learning can be seen as a personal characteristic, in which self-directedness points to individual's beliefs, intentions, attitudes and behavior that stimulate one to influence learning situations (Raemdonck, 2006). However, the concept of self-directed learning is more often seen as a process oriented approach, in which self-directedness is an instructional process where people take the initiative to influence learning situations (Raemdonck, 2006). For example Knowles states:

Self-directed learning is a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes (Knowles, 1975, p. 18).

In this research, the model of self-directedness of Raemdonck (2006) (see figure 1) will be used to conceptualize self-directed learning as a process oriented approach. The inner circle reflects a set of beliefs, attitudes, intentions and behavior that stimulate one to influence the personal learning process. This learning process, in the outer circle, exists of making goals and plans, choosing and executing a strategy, and using rational reflection. The personality traits and physical and social environment (outside the circle) shape the cluster of patterns (inner circle), which in turn regulates the self-directed learning behavior (outer circle). Thereby Raemdonck (2006) emphasizes that "Self-directedness (1) is changeable, (2) is domain specific, (3) is an active approach, (4) centers on the individual's perspective and his/her ability to cope for oneself on the labor market, (5) has a long term focus, and (6) is dynamic". This dynamic process is indicated by the arrows in the circle.

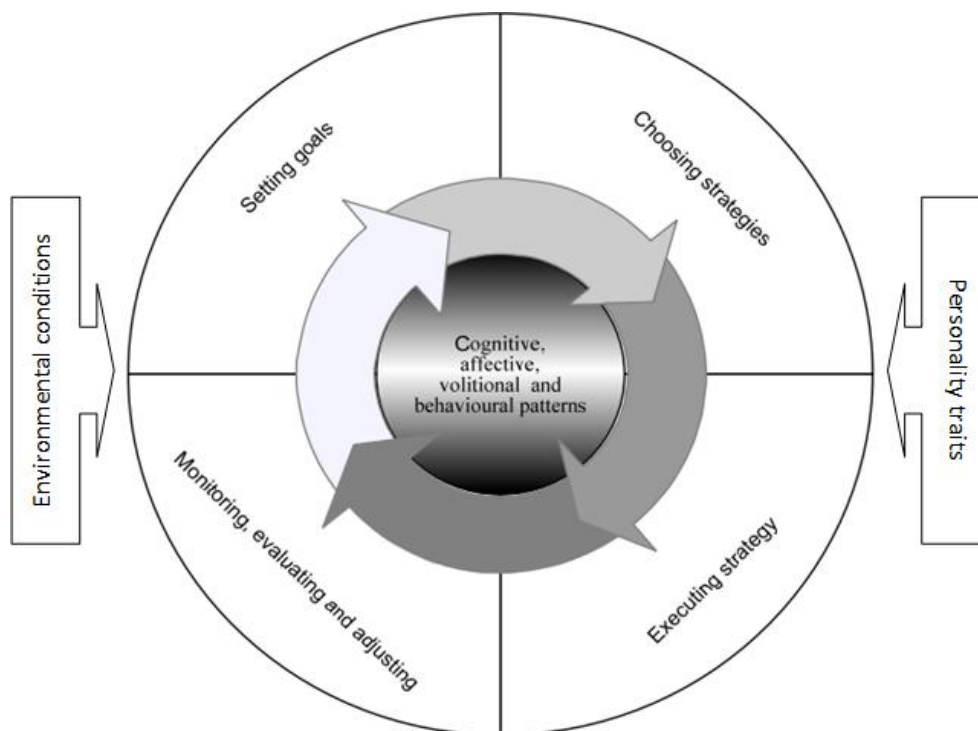


Figure 1. Model of self-directedness.

Learning Portfolios

Self-directed learning (Kalet & Sanger, 2007; Kicken, Brand-Gruwel, van Merriënboer, et al., 2008; Parboosingh, 1996; K. Smith & Tillema, 2001) and lifelong learning (Heinrich et al., 2007; Parboosingh, 1996) can be stimulated by learning portfolios. Derived from arts, a learning portfolio is a collection of evidence of a student to showcase achievement. This evidence is composed from documentation of learning and reflection on it (Challis, 1999; Heinrich et al., 2007; Snadden & Thomas, 1998). The goal of such a portfolio is that students learn to reflect on strengths and weaknesses and direct their own learning process by setting up personal learning goals (Reyneart, 2006, as cited by Mittendorf, 2008).

A learning portfolio is a personal creation (Parboosingh, 1996), which frequently exists in health professions of a series of documents (e.g. articles and references), records (e.g. certificates and course materials), logs (e.g. video recordings of consultations, critical incidents or events with patients), and reflections (analysis of how the documents, records and logs have lead to new ways of practicing) (Austin et al., 2005; Snadden & Thomas, 1998). To facilitate the demonstration of development of the learner, a learning portfolio should have the following basic structure: learning needs or objectives should be identified, resources used to address this needs and learning that took place should be listed, and the outcome of learning on practice should be displayed with evidence (Austin et al., 2005; Parboosingh, 1996; Snadden & Thomas, 1998). However, as the range of purposes of learning portfolios is large, there is an equally large range of structures and complexity of portfolios in use, even within medical education (Challis, 1999). Portfolios range from simple diaries to larger A4 folders and computer-held files (Snadden & Thomas, 1998).

The Relation between Learning Portfolios and Self-Directed learning

Different authors (for example Kicken, et al. (2008), K. Smith & Tillema (2001), Kalet & Sanger (2007), Parboosingh(1996)) claim a positive effect of the use of a learning portfolio on self-directed learning, but how does this relationship work? A learning portfolio might help to develop the *skills* to asses performance (Jones, 2010; Kalet & Sanger, 2007; Kicken, Brand-Gruwel, van Merriënboer, et al., 2008), to monitor growth and recognize learning gaps (K. Smith & Tillema, 2001), to formulate learning needs (Austin et al., 2005; Kalet & Sanger, 2007; Kicken, Brand-Gruwel, van Merriënboer, et al., 2008), to select learning tasks (Kicken, Brand-Gruwel, van Merriënboer, et al., 2008) and to reflect on learning (Jones, 2010; Kalet & Sanger, 2007; Kicken, Brand-Gruwel, van Merriënboer, et al., 2008; Parboosingh, 1996). In general, a learning portfolio makes learners develop communication and organization skills (Brown, 2002).

Also, a learning portfolio has an influence on *attitude* towards the self-directed learning process, as it points at the importance of learning and reflection (Brown, 2002; Jones, 2010), it enhances self-knowledge (Brown, 2002; Mathers, Howe, & Field, 1999; K. Smith & Tillema, 2001), self-responsibility (K. Smith & Tillema, 2001) and self-confidence (Mathers et al., 1999), and a learning portfolio stimulates proactive behavior (Mathers et al., 1999) and autonomy in learning (Jones, 2010; Parboosingh, 1996). Thereby, a learning portfolio has a positive influence on *support* or help from others as it structures mentorship (Kalet & Sanger, 2007). So, a learning portfolio has a positive effect on self-directed learning as it stimulates the development of skills, attitude and support which are necessary for self-directed learning.

However, the use of a learning portfolio also has disadvantages, as it is time-consuming, it focuses on individual development instead of organizational development, and professionals do not think the learning portfolio is helpful in short-term professional development (K. Smith & Tillema, 2001). Besides, resistance to the implementation of a learning portfolio is expected, as it might conflict with learners past educational experiences (Akerlind & Trevitt, 1999). Positive first experiences with the learning portfolio are important, as a negative first experience discourage learners to make use of a technology (Ash, 1985) and on that account the learning portfolio will less stimulate self-directed learning.

Factors Influencing Self-Directed Learning

Self-directed learning might be influenced by the use of a learning portfolio, but research demonstrates that self-directed learning can also be influenced by other variables. Some other variables are discussed in the categories “personality traits” and “environmental conditions” (see figure 2), as these two categories have an influence on the self-directed learning process according to Raemdonck (2006) (see figure 1).

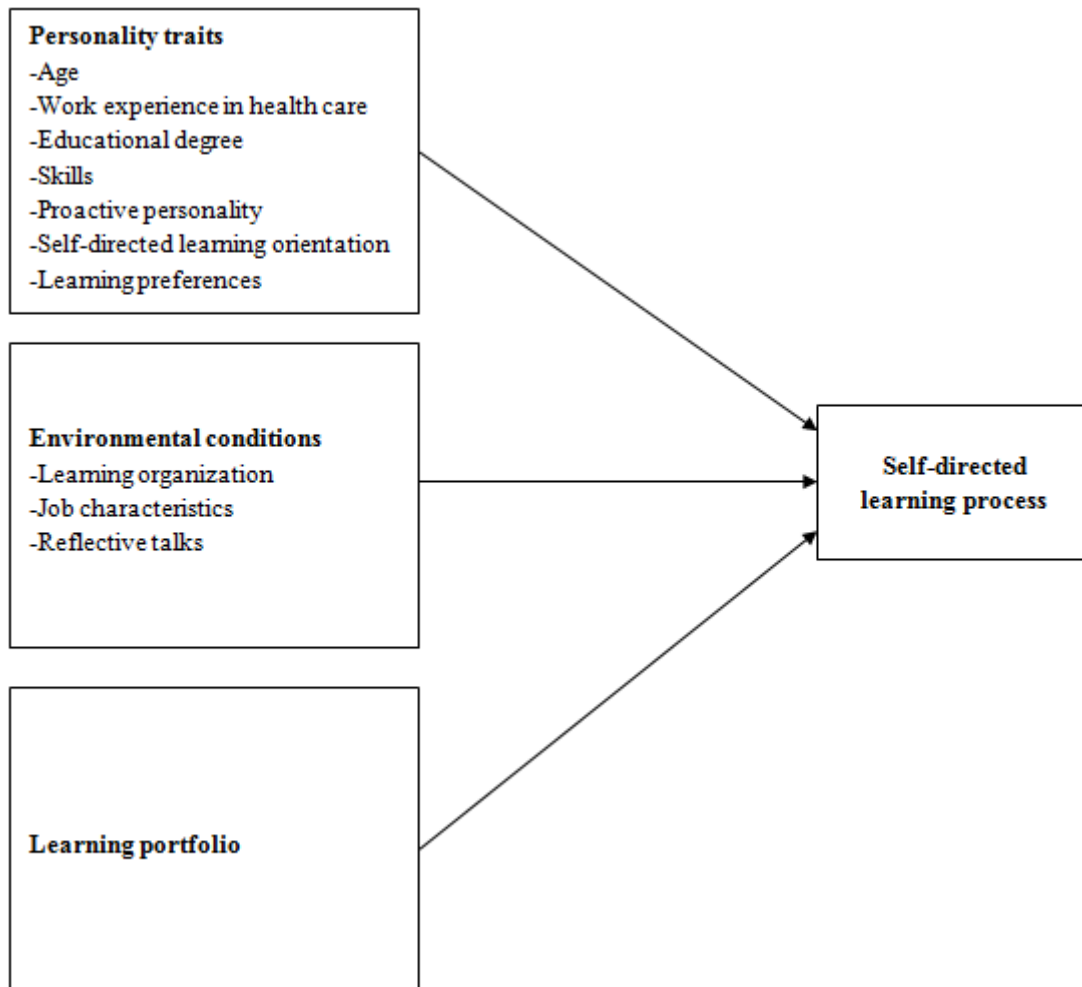


Figure 2. Factors influencing the self-directed learning process.

Personality traits.

The amount of self-directed learning can be influenced by the *age* of the employee, as self-directed learning assumes that the human being grows in need and capacity to be self-directed as an essential component of maturing (Knowles, 1975). So, a learner will be more self-directed when he is older (Merriam, 2001; Raemdonck, 2006). However, employees who learned in a problem-based way, which was implemented in medical education during the late nineties, are likely to have better developed self-directed learning skills (Barrows, 1986; Loyens, Magda, & Rikers, 2008; O'Shea, 2002; Williams, 2001). Still, older people have more *work experience in health care*, which can lead to more self-directed learning. A condition to be self-directed in a specific content area is to possess a certain level of knowledge in that area (Fisher, King, & Tague, 2001). An increase of work experience in health care can lead to more knowledge and more domain specific self-directedness.

According to Guglielmino et al. (1987), a learner who has completed a higher *educational degree* will be more likely to have a higher self-directed learning readiness score, which is about the amount of control a learner takes of his own learning (Fisher et al., 2001). This might be the result of developing more *skills*, during formal education, which are necessary for self-directed learning. A learner should have (1) evaluation skills to make an objective evaluation of self and others; (2) the skills to reflect on what happened and how this influence future action; (3) information management skills to search and file information; (4) critical thinking skills for purposeful and goal-directed thinking; and (5) skills for critical appraisal to identify relevant data to solve problems and select the best evidence (Patterson & Lunyk-Child, 2002). Also, a learner should have a concept of himself as being a self-directing, non-dependent person (Knowles, 1975), so he should be convinced of his own skills.

Raemdonck (2006) claims a positive relation between a *proactive personality* and self-directedness in learning processes exists, in which a proactive personality is someone who identifies opportunities and acts on them, shows initiative, takes action and preserves until meaningful changes occurs (Bateman & Crant, 1993). A proactive personality has a significant direct effect on motivation to learn (Major, Turner, & Fletcher, 2006), while this motivation is an important dimension in the model of self-directed learning (Garrison, 1997). It is also claimed that people with a high *self-directed learning orientation* are more self-directed in learning (Raemdonck, Tillema, de Grip, Valcke, & Segers, In press), in which self-directed learning orientation is a tendency to take an active and self-starting approach to work-related learning activities and situations and to persist in overcoming barriers and setbacks to learning (Raemdonck et al., In press). This fits to *learning preferences* as learners who indicate preference for high levels of structure are less positive about self-directed learning (Fisher et al., 2001), as there is less structure given by others.

Environmental conditions.

The environment that self-directed learners prefer is very similar to a *learning organization*, which is characterized by the ability of its members to find opportunities to learn and to add value to the organization by converting individual information into organizational knowledge (Confessore & Kops, 1998). According to self-directed learners, there should be an environment in which there is

(1) tolerance for errors, support of experimentation and risk taking, and an emphasis on creativity and innovation; (2) the use of a participative leadership style and delegation of responsibility to organizational members; (3) support for learning initiatives that are linked to the organization's goals and values; (4) encouragement of open communication and of information systems that provide for collaboration and teamwork and that use both internal and external learning resources; and (5) provision of opportunities and situations for individual learning (Confessore & Kops, 1998, p. 371).

Next to characteristics of the organization, *characteristics of the job* influence self-directed learning. Employees who perceive more task variety, growth potential and stimulation from the staff will be more self-directed in learning (Raemdonck, 2006). At first, task variety (as it is called by Raemdonck (2006)) or skill variety (as it is called by Hackman and Oldham (1976)) is the degree to which a job requires a variety of different activities in carrying out the work and is one of the core job dimensions in the job characteristics model of work motivation of Hackman and Oldham (1976). As motivated employees are more likely to be self-directed in learning (Garrison, 1997), task variety can indirectly influence the amount of self-directed learning. In health care, especially older employees are more motivated when work is interesting, which can be ensured by providing task variety (Amsterdam center for career research, 2011). At second, growth potential is the combination of learning opportunities and mobility opportunities (Raemdonck, 2006). When a job provides more mobility, there should be more learning opportunities, which leads to more self-directed learning (Raemdonck, 2006). Learning opportunities appear in a supportive learning environment. Third, self-directed learning does not mean that decisions are made in isolation by learners. Facilitators should provide support, standards and direction which are necessary for a successful outcome (Garrison, 1997; Timmins, 2008). This means that stimulation by the staff has a positive relation with self-directed learning. Amsterdam center for career research (2011) emphasizes that the manager is crucial in development of employees in health care.

Support by managers can be given in *reflective talks*, as the best way for learners to be facilitated and motivated towards self-directed learning is to achieve individual guidance (Regan, 2003; Timmins, 2008). In reflexive dialogues, advice is more useful than only feedback, as learners which received advice formulated better learning needs, selected more suitable learning tasks, completed more practical assignments and acquired more certificates than learners who received only feedback (Kicken et al., 2009). Also a learning portfolio is only useful when used in a dialogical context. If used without reflexive dialogues between teachers and student, students perceived the instruments as not useful and showed coping behavior (Mittendorff, 2008).

The Present Study

In this study, the effect of a learning portfolio on self-directed learning is investigated in a Dutch company in health care, by making a comparison between users and non-users of a learning portfolio. Also the effect of the variables ‘age’, ‘educational degree’, ‘work experience in health care’, ‘proactive personality’, ‘self-directed learning orientation’, and ‘job characteristics’ will be taken into account as literature claims a direct effect of these variables on self-directed learning. However, not all variables that may have an effect on self-directed learning according to literature are included in this research. For example ‘reflective talks’ can also have an effect on self-directed learning, but is not measured as it probably will not be different between users and non-users because of policies at Dichterbij. In addition to the direct effects, also the indirect effects of the mentioned variables with the use of a learning portfolio are investigated (see figure 3). Until now, research focused on the effect of a learning portfolio on self-directed learning *or* on the effect of personality traits and environmental conditions on self-directed learning, but the combination of these two is new. Besides, employees in health care are asked to the positive and negative factors of the learning portfolio and how self-directed learning can be stimulated. These experiences are taken into account as this can have an influence on the use of the learning portfolio and the degree of self-directed learning.

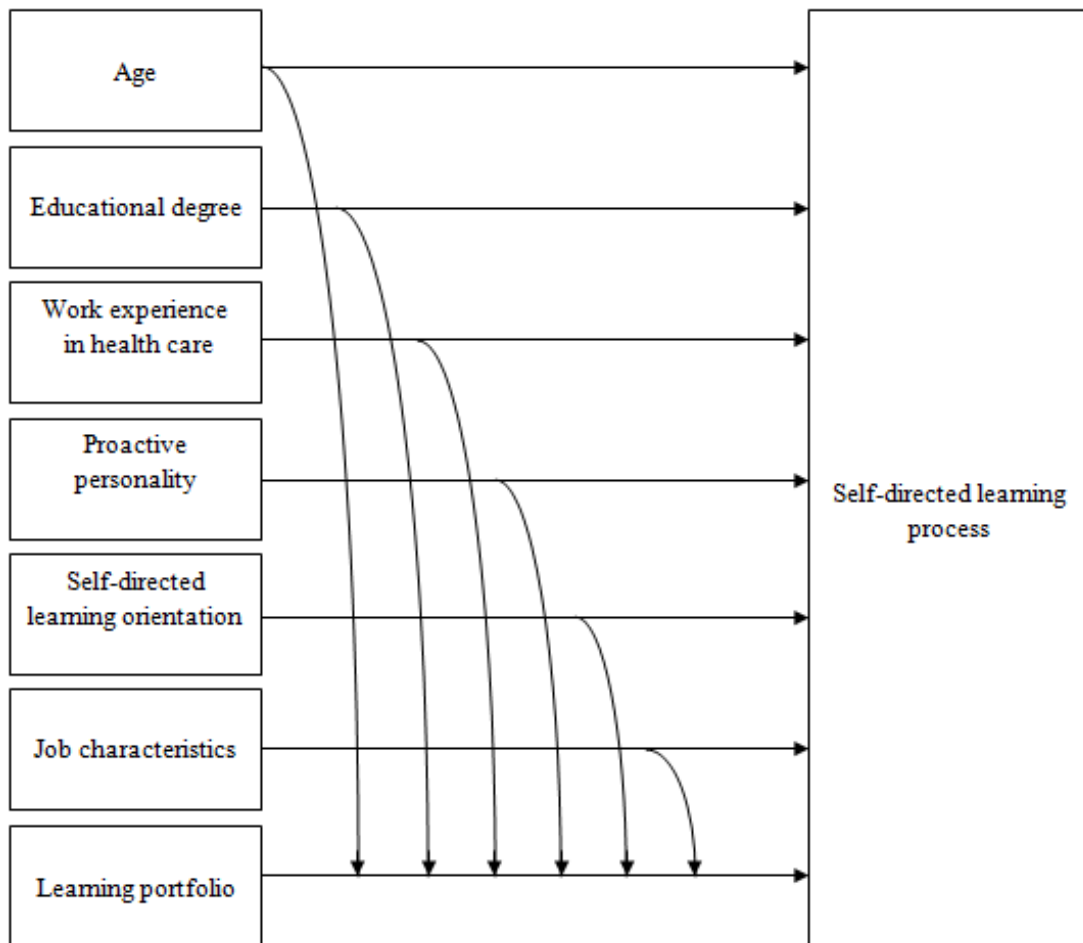


Figure 3. Research model.

The following research questions and corresponding hypothesis are central in this research:

1. *Which influence has a learning portfolio on self-directed learning among employees in health care, and what is the influence of age, educational degree, work experience in health care, proactive personality, self-directed learning orientation and job characteristics on self-directed learning?*
 - Hypothesis 1a: An increase in the use of a learning portfolio will lead to an increase in self-directed learning.
 - Hypothesis 1b: An increase in age of an employee in health care will lead to an increase in self-directed learning.
 - Hypothesis 1c: An increase in educational degree of an employee in health care will lead to an increase in self-directed learning.
 - Hypothesis 1d: An increase in work experience in health care by an employee in health care will lead to an increase in self-directed learning.
 - Hypothesis 1e: An employee in health care with a more proactive personality will be more self-directed in learning in comparison to an employee in health care with a less proactive personality.
 - Hypothesis 1f: An employee in health care with a higher self-directed learning orientation will be more self-directed in learning in comparison to an employee in health care with a lower self-directed learning orientation.
 - Hypothesis 1g: Employees in health care who perceive more task variety, growth potential and stimulation from the staff will be more self-directed in learning than employees in health care with less stimulating and supporting job characteristics.
2. *What are positive and negative factors of the learning portfolio and how can self-directed learning be stimulated according to employees in health care?*

Method

Design

This research is an evaluation research, as it investigates the situation after an intervention (Verschuren & Doorewaard, 2007), in this case the self-directed learning process after the implementation of a learning portfolio. To find a proper answer on the research questions, mixed methods are used. This is a research design for collecting, analyzing and mixing both qualitative and quantitative data to better understand a research problem (Creswell & Creswell, 2005). The first question ‘*Which influence has a learning portfolio on self-directed learning among employees in health care, and what is the influence of age, educational degree, work experience in health care, proactive personality, self-directed learning orientation and job characteristics on self-directed learning?*’ will be answered with quantitative data, while the second question ‘*What are positive and negative factors of the learning portfolio and how can self-directed learning be stimulated according to employees in health care?*’ will be answered with qualitative data.

Context

To investigate the influence of a learning portfolio on the self-directed learning process, a study is executed at Dichterbij, who supports mentally disabled people and their family by providing health care. This Dutch company is implementing a digital ‘personal learning portal’, which is comparable to a learning portfolio. Just like learning portfolios, the personal learning portal of Dichterbij:

- helps with the formulation of learning needs, by showing qualifications that are going to be expired and in the future by showing learning gaps.
- lists the resources/learning activities which are used to address the learning needs, by giving an overview of the learning history of the learner.
- displays the outcomes of learning, by showing which learning activities in history are completed successfully.

In contrast to learning portfolios, the personal learning portal of Dichterbij:

- is no personal creation, as all data is imported by the back office.
- does not exist of evidence of learning, as there is no room to import documents, logs, reports and reflection.

So, the personal learning portal of Dichterbij is a learning portfolio with regard to documentation of learning needs, resources and outcomes, but is no learning portfolio with regard to reflection of learning.

Respondents

Around 5000 people of different ages, with different occupations in different regions, work at Dichterbij with clients or behind the scenes. In February 2012, the learning portfolio was implemented for a pilot group, compiled of 500 employees of different units and regions at Dichterbij. The other 4500 employees at Dichterbij were not familiar with the learning portfolio, which means that they didn’t hear much about it and had never seen or used it. To see if the use of the learning portfolio has an influence on the degree of the self-directed learning process, a comparison was made between users and non-users of the learning portfolio. In both groups, attention was paid to the employees, so not taken into account were the managers who look into the portfolio of his subordinates and the back-office. “Users” are employees who were in the pilot group, regardless of the actual use of the learning portfolio. “Non-users” are employees who were not in the pilot group and consequently did not receive information about the learning portfolio and did not have the choice to use the system. For a reliable result, the minimum number of respondents in both groups was calculated by a power analysis. An effect size of 0.3 was chosen as large effects are almost never exposed in social sciences and around 0.3 is a small effect, around 0.5 is a medium-sized effect and around 0.8 is an large effect (Cohen, 1977). So, there should be a minimum of 176 respondents in the user-group and 176 respondents in the non-user-group (power = 0.8).

At first, managers were asked for permission for approaching their subordinates. All managers of the units in the pilot group were approached and a selection of the managers of the non-users. A selection was made of units which are similar to the units in the pilot group to eliminate harassing factors. With permission of managers 843 employees were approached for participation in this research, whereof 373 non-users and 470 users. This was done by an initial email and two repeating emails from the learning portfolio with the request to fill in a digital questionnaire. In all emails the importance of the study and the permission of the manager was emphasized, as well the chance to win one of the 10 vouchers of €7.50 which were distributed as a reward. In the end, 281 non-users and 267 users (total 604 respondents) started with the questionnaire, which made a response rate of 71.6%. 228 non-users and 267 users (total 495 respondents) filled in the questionnaire completely. So the sample has met the requirements of the power analysis as with this sample the chance to accept the right hypothesis is big (power = 0.8), even when there is only a small effect (effect size = 0.3).

The average age of the respondents was 40.2 years. 81% of the respondents were female and 19% male. Secondary vocational education was the average educational degree, and accompanist was the average function. The respondents had on average 18.4 years work experience in total and 15.1 years work experience in health care.

Instruments

An anonymous, digital questionnaire was spread to gather data. In this questionnaire demographic data (gender, work experience total and function) was collected, as well as data about the self-directed learning process, age, educational degree, work experience in health care, proactive personality, self-directed learning orientation, job characteristics, the use of the learning portfolio (entries and activities) and experiences with the learning portfolio. In Appendix A are the question or an example question and the answer range per variable displayed.

To measure *the self-directed learning process*, a research of Raemdonck (2006) was used. She developed a valid instrument to measure self-directedness in learning processes for both low qualified and high qualified employees (Raemdonck, 2006). There was made use of 14 items with a 5 point Likert-scale, in which 1 = totally disagree, 2 = partly disagree, 3 = nor agree, nor disagree, 4 = partly agree, 5 = totally agree. Besides, an open question was asked, at which respondents could tell how they thought the self-directed learning process could be stimulated. To investigate *age*, an open question about the year of birth was included. A multiple choice question was included to investigate the highest finished *educational degree* and an open question was included to investigate the years of *work experience in health care*. Raemdonck (2006) also developed a scale (10 items, 5 point Likert-scale) to measure *proactive personality*, based on the proactive personality scale of Seibert, Kramer and Crant (1999). Raemdonck, Tillema et al. (In press) developed a an instrument to measures a *self-directed learning orientation*. This scale is a uni-dimensional construct (Gijbels, Reamdonck, & Vervecken, 2010) an exists of 13 items with a 5 point Likert-scale. To measure the *job characteristics*, a scale (15 items, 5 point Likert-scale) of Raemdonck (2006) was used, which was based on on the job diagnostic survey of Hackman and Oldham (1975). The above mentioned variables were measured for both the users and non-users.

To measure the use of the learning portfolio, there is looked beyond the use or non-use of the learning portfolio. Instead, the extent to and the manner in which the learning portfolio is used is taken into account, by asking the amount of *entries in the learning portfolio* and the performed *activities in the learning portfolio*. An open question about how many times they entered their learning portfolio during 3 months and a multiple choice question about which activities they carried out during 3 months were included in the questionnaire. The entries and activities in the learning portfolio were investigated for 3 months (February, May and April 2012), as the learning portfolio was implemented for the pilot group in February 2012 and the questionnaire was spread in May 2012. To investigate the *experiences with the learning portfolio*, two open questions were included: a question about the strong points and positive experiences, and a question about the weak points and negative experiences. Users who were in the pilot group but never made use of the learning portfolio in the 3 months were asked by an open question why they didn't made use of the learning portfolio. The above mentioned variables were only measured at the users.

Data-Analysis

Before analyzing the data to answer the research questions, some other analyses were performed. The cronbach alphas for self-directed learning process, proactive personality, self-directed learning orientation and job characteristics were calculated to measure the reliability of the scales. Further, a chisquare test (nominal variables: sex), a Mann-Whitney test (ordinal variables: educational degree, function) and independent samples T-test (continuous variables: age, work experience in total, work experience in health care) were performed to investigate if the users and non-users of the learning portfolio differ significantly. Complementing, the effect sizes were calculated to measure the magnitude of differences between the user and non-users. Finally, the correlations between all variables are calculated for a first indication in the strength of association between variables.

To answer the first research question, the quantitative data was analyzed with a backward, multiple regression analysis in SPSS20, to investigate to which degree the self-directed learning process is predicted by the entries in the learning portfolio, the activities in the learning portfolio, age, educational degree, work experience in health care, proactive personality, self-directed learning orientation and job characteristics. The direct effects of the mentioned variables on the self-directed learning process were tested, and also the indirect effect of all variables with the activities in the learning portfolio and the indirect effect of all variables with the entries in the learning portfolio on the self-directed learning process were tested.

All variables were standardized before entering and were entered as ordinal variables. Missing values were excluded pair wise. For the self-directed learning process, proactive personality, self-directed learning orientation and job characteristics the scale scores were used. To simplify the analysis, the activities in the learning portfolio were categorized in three categories: (0) Nothing: not one activity is performed in the learning portfolio; (1) Looking: the learning portfolio is used to draw information out of it; (2) Looking and doing; the learning portfolio is used both for gathering information and taking action. See table 1 for the activities per category.

Table 1
Activities in Learning Portfolio Categorized

Category	Activities
Nothing	None of the options beneath.
Looking	Looking at present and future learning activities, learning activities that are expired or are going to be expired within 3 months, and e-learning modules. Looking at the history of learning activities and canceled learning activities. Looking at the offer of schooling. Looking who are the participants and/or the teacher in a training. Looking at the permissions. Using the planning per period. Looking at personal messages and general information. Looking at personal messages and general information. Searching the contact details of the learning center of Dichterbij. Making use of the search engine. Option only for managers: Looking at the data of my subordinates.
Looking and doing	Booking a retraining, on account of a qualification that will expire. Booking a training. Taking an option on a training. Canceling participation in a training.

To answer the second research question, the qualitative data were coded by hand to investigate the positive and negative factors of the learning portfolio. There was made use of open coding (Boeije, 2005). First, all answers were read per respondent, to see if the answers were really about the learning portfolio, instead of e.g. e-learning, and to see if the answer was filled out to the right question. Second, per question every answer was read and eventually divided into different arguments. Third, every argument was coded and the similar arguments received the same code to indicate the answer belongs to the same category. Fourth, similar small categories were combined into bigger, meaningful categories.

Results

For illustrative purposes and as a first indication some descriptive statistics are explored. Information is provided on the actual entries and activities in the learning portfolio, on the cronbach's alpha, mean, standard deviation and range of the self-directed learning process, age, work experience in health care, proactive personality, self-directed learning orientation, job characteristics and entries in learning portfolio (the continuous variables) and on the frequencies and percentages of educational degree and activities in the learning portfolio (the ordinal variables). Then, a comparison is made between the users and non-users of the learning portfolio, and the correlations between the variables are explored. After these descriptive statistics, the results of the first research question, *Which influence has a learning portfolio on self-directed learning among employees in health care, and what is the influence of age, educational degree, work experience in health care, proactive personality, self-directed learning orientation and job characteristics on self-directed learning?*, and the second research question, *What are positive and negative factors of the learning portfolio and how can self-directed learning be stimulated according to employees in health care?* are described.

Descriptives

The learning portfolio is not used in the same manner and to the same extent by the respondents from the user group. The *entries in the learning portfolio* in the last 3 months differed among the 307 respondents from the user group who filled out this question in the questionnaire. 158 respondents (51.5%) entered the portfolio 1, 2, 3, 4 or 5 times. 35 respondents (11.4%) entered their learning portfolio 6, 7, 8, 9 or 10 times. 7 respondents (2.3%) logged in 11, 12, 13, 14 or 15 times. 107 respondents (33.1%) have never been in their learning portfolio. Detailed information is shown in table 2.

Table 2
Entries in Learning Portfolio

Entries	Number of respondents
0	107
1	39
2	33
3	37
4	23
5	26
6	9
7	3
8	7
10	16
12	1
15	6
Total	307

Also the performed *activities in the learning portfolio* differed among the 304 respondents who filled out this question in the questionnaire. 103 respondents (33.9%) didn't do anything in their learning portfolio (category: nothing). 129 respondents (42.4%) used the learning portfolio to draw information out of it. For example, they looked at the offer of education or their history of learning (category: looking). 72 respondents (23.9%) did go a step further, as they used the portfolio both for gathering information and taking action. For example, booking a training after looking at the offer of education (category: doing). Detailed information about the performed activities is shown in table 3.

Table 3
Performed Activities in Learning Portfolio

Category	Activities	Number of respondents
Nothing	None of the options beneath.	103
Looking	Looking at present and future learning activities, learning activities that are expired or are going to be expired within 3 months, and e-learning modules.	166
	Looking at the history of learning activities and canceled learning activities.	41
	Looking at the offer of schooling.	96
	Looking who are the participants and/or the teacher in a training.	26
	Looking at the permissions.	8
	Using the planning per period.	4
	Looking at personal messages and general information.	35
	Searching the contact details of the learning center of Dichterbij.	16
	Making use of the search engine.	17
	Option only for managers: Looking at the data of my subordinates.	3
Looking and doing	Booking a retraining, on account of a qualification that will expire.	36
	Booking a training.	37
	Taking an option on a training.	34
	Canceling participation in a training.	6
Total		622

Table 4 and 5 provide an overview of the descriptive statistics. As cronbachs alpha is above or close to 0.80, the scales to measure the self-directed learning process, proactive personality, self-directed learning orientation and job characteristics are internally consistent and therewith reliable (A. Field, 2009). On average, respondents are 41 years old, have 15 years work experience in health care and finished secondary vocational education. Meanly, they entered the learning portfolio 1 or 2 times and did nothing or only looked in the learning portfolio. The means for the self-directed learning process, proactive personality, self-directed learning orientation and job characteristics are on the positive site of the Likert-scale, above 3.0. There is high variation in age and work experience in health care.

Table 4
Cronbach's Alpha, Mean, Standard Deviation and Range of Continuous Variables

Variable	Cronbachs alpha	Mean	Standard deviation	Range
Self-directed learning process	0.906	3.81	0.53	1.57-5.00*
Age		41.15	13.26	17-64 years
Work experience in health care		15.14	11.48	0-45 years
Proactive personality	0.851	3.60	0.48	1.90-5.00*
Self-directed learning orientation	0.898	3.38	0.41	1.54-4.54*
Job characteristics	0.792	3.02	0.27	1.93-4.07*
Entries in learning portfolio		1.41	2.72	0-15 times

*1 = totally disagree, 2 = partly disagree, 3 = nor agree, nor disagree, 4 = partly agree, 5 = totally agree

Table 5
Frequencies and Percentages of Ordinal Variables

Variable	Categories	Frequency	Percentage (%)
Educational degree	Primary school	10	1.7
	Preparatory secondary vocational education	104	17.7
	Senior general secondary school	23	3.9
	Pre-university college	2	0.3
	Secondary vocational education	277	47.2
	Professional university	153	26.0
	Academic university	18	3.0
	Totals	587	100
Activities in learning portfolio	Nothing	381	65.5
	Looking	129	22.2
	Looking and doing	72	12.4
	Totals	582	100

To measure the influence of a learning portfolio on the self-directed learning process, a comparison is made between users and non-users of a learning portfolio. Other variables, such as demographic variables, should be as equal possible between the two groups to foil bias.

Work experience in total and work experience in health care do not significantly differ between users and non-users (see table 6). Though, in the sample appeared a significant difference between users and non-users concerning age, but the effect size is small (Cohen, 1977). There was a significant association between sex and whether respondents are user or non-user of the learning portfolio ($\chi^2(1) = 18.14, p = .000$), as 64.3% of the male is user and 35.7% of the male is non-user. Also the educational degree did differ significantly ($p = .000$) between non-users ($Mdn = 6$) and users ($Mdn = 5$), $U = 29199.50, z = -7.111$, but the effect size is small ($r = -0.29$) (Cohen, 1977). Non-users ($Mdn = 4$) have also a significant ($p = .001$) higher function than users ($Mdn = 4$), $U = 35386.00, z = -3.176$, but here is the effect size also small ($r = -0.13$) (Cohen, 1977). So, despite randomization, there are some differences between the two groups. However, the variables which are used for calculations have small effect sizes concerning the difference (age, educational degree) or no difference at all (work experience in health care).

Table 6
Comparison of Users and Non-Users of the Learning Portfolio

	Users		Non-users		<i>t</i>	<i>df</i>	<i>p</i>	<i>r</i>
	Mean	<i>SE</i>	Mean	<i>SE</i>				
Age	39.98	0.767	40.34	0.777	-0.321	586	.033	.01
Work experience in total	18.94	0.74	17.89	0.72	-1.009	536	.051	.04
Work experience in health care	15.50	0.66	14.74	0.69	-0.788	571	.454	.03

To investigate the relationships and coherence between the variables, a correlation matrix is made (see Table 7). There is a significant positive relationship between the entries in the learning portfolio and the activities in the learning portfolio ($r = .70, p < .001$). A significant, negative relationship exists between age and the activities in the learning portfolio ($r = -.10, p < .05$) and between educational degree and the entries ($r = -0.16, p < .001$) and activities ($r = -0.17, p < .001$) in the portfolio, which means that younger employees and less educated employees take more action in the learning portfolio. Also a significant, positive relationship exists between work experience in health care and the entries ($r = .08, p < .05$) and activities ($r = .10, p < .05$) in the learning portfolio.

However, there are no significant relationships between the entries and activities in the learning portfolio and the self-directed learning process. But significant positive relationships exist between the self-directed learning process and educational degree, self-directed learning orientation and characteristics of the job, and the self-directed learning process and a proactive personality. So, an employee might be more self-directed in learning when he or she is highly educated, has a high self-directed learning orientation and a high proactive personality, when the right job characteristics are present.

Table 7
Correlations

	1	2	3	4	5	6	7	8	9
1. Self-directed learning process		.03	.21**	-.08	.74**	0.81**	0.28**	.04	.03
2. Age			.08	.47**	-.00	.04	.03	-.08	-.10*
3. Educational degree				.04	.13**	.11*	.02	-.16**	-.17**
4. Work experience in health care					-.02	-.08	-.07	.08*	.10*
5. Proactive personality						.77*	.28**	.05	.02
6. Self-directed learning orientation							.30**	.04	.05
7. Characteristics of the job								-.02	-.03
8. Entries in learning portfolio									.70**
9. Activities in learning portfolio									

Note. * $p < .05$, ** $p < .001$, (both two-tailed)

Influence of a Learning Portfolio on the Self-Directed Learning Process

To answer the first research question, which was aimed at determining the influence of a learning portfolio, age, educational degree, work experience in health care, proactive personality, self-directed learning orientation and job characteristics on self-directed learning among employees in health care, the results of the backward multiple regression analysis will be described. An overview is displayed in table 8, as it shows the model of the multiple regression analysis in which *all* variables are included. This model explains a large amount of variance ($R^2 = 0.707$) but is not significant.

Table 8

Coefficients of a Multiple Regression Analysis with All Variables

	β	<i>SE B</i>	<i>t</i>	<i>p</i>
Entries in learning portfolio	.004	.043	0.102	.919
Activities in learning portfolio	.015	.040	0.377	.706
Age	-.008	.033	-0.246	.806
Educational degree	.114	.027	4.203	.000
Work experience in health care	-.029	.032	-0.900	.369
Self-directed learning orientation	.575	.042	13.755	.000
Proactive personality	.263	.042	6.341	.000
Job characteristics	.033	.028	1.181	.238
Entries in learning portfolio X age	.011	.059	0.191	.849
Entries in learning portfolio X educational degree	-.025	.041	-0.622	.534
Entries in learning portfolio X work experience in health care	.077	.058	1.333	.183
Entries in learning portfolio X proactive personality	-.043	.072	-0.603	.547
Entries in learning portfolio X self-directed learning orientation	.093	.075	1.238	.216
Entries in learning portfolio X job characteristics	.055	.044	1.257	.209
Activities in learning portfolio X age	.064	.051	1.256	.210
Activities in learning portfolio X educational degree	-.003	.039	-0.086	.931
Activities in learning portfolio X work experience in health care	-.050	.055	-0.912	.362
Activities in learning portfolio X proactive personality	.074	.068	1.088	.277
Activities in learning portfolio X self-directed learning orientation	-0.115	.067	-1.708	.088
Activities in learning portfolio X job characteristics	-0.49	.038	-1.305	.193

The backward multiple regression analysis led to a significant model, which explains 69.9% of variance in self-directed learning ($R^2 = 0.699$). The model consists of three direct variables and one interaction variable, which are shown in table 9. So, employees with a more proactive personality, a higher self-directed learning orientation and a higher educational degree will learn in a more self-directed way. When an employee is older and performs more activities in his learning portfolio, this will also lead to more self-directed learning.

Table 9

Coefficients of Multiple Regression Analysis with Significant Variables

	β	<i>SE B</i>	<i>t</i>	<i>P</i>
Self-directed learning orientation	.582	.041	14.296	.000
Proactive personality	.269	.041	6.606	.000
Educational degree	.110	.026	4.198	.000
Activities in learning portfolio X age	.066	.026	2.525	.012

Positive and Negative Factors of the Learning Portfolio

To answer the second research question, regarding to the positive and negative factors of the learning portfolio and how self-directed learning can be stimulated according to employees in health care, the results of open coding will be described. 107 respondents from the user group did never enter the learning portfolio and 89 respondents gave a reason for this. Four different categories were identified, which are displayed in table 10. Most respondents ($n = 39$) indicated that priority goes to clients and they had not enough time left during working hours to make use of the learning portfolio. A lot of respondents ($n = 29$) indicated that they don't use the learning portfolio because of the unclear relevance. "I don't know what a learning portfolio is and what I have to do with it" is said by a respondent. Further, some respondents ($n = 18$) pointed out that the learning portfolio didn't fit to the career phase they are in. For example, a respondent said "I will leave Dichterbij within 1 month, so I don't want to put effort in the learning portfolio". Also some respondents ($n = 17$) did not make use of the learning portfolio as a result of problems to login, such as passwords which are never received or lost and problems with computers. A respondent said "I never received an invitation or credentials of my learning portfolio". A few respondents ($n = 2$) gave reasons which did not fit to identified categories.

Table 10

Reasons for Not Making Use of the Learning Portfolio

Category	Category description	Typical example from data	Non-typical example from data	n^*
Not enough time	There is no time / no time can be made for working with the learning portfolio.	For me, there is not enough time to do everything, so priority goes to the clients and other tasks.	I did not get to this yet.	39
Unclear relevance	The relevance of the learning portfolio is not clear as employees do not know what the learning portfolio is and why they should use it.	I do not know what I can do with my learning portfolio, so I do not use it.	I did not know that I have a learning portfolio.	29
Career phases	There are phases in the life or career of employees in which (they experience) the learning portfolio is not a priority.	I just signed my contract at Dichterbij and do not have access to my learning portfolio yet.	I missed information about the learning portfolio because of illness.	18
Problems to login	There are problems to login, as not all employees received credentials or enough information, have difficulties with computers or lost their credentials.	I do not know how I enter the learning portfolio as I never received credentials.	I think I never had an invitation.	17
Remainder	Learning is not rewarded and no permission for learning will be given.	-	-	2

* n = number of respondents that gave an answer belonging to this category.

Of the 200 respondents in the user group that really entered the learning portfolio 1 or more times, 139 respondents indicated positive and negative experiences with the portfolio. However, the answers of 60 respondents (43.2%) are not taken into account as they mixed up the learning portfolio with e-learning, which is also a new development in the ICT domain at Dichterbij.

Three categories of positive factors of the learning portfolio were identified (table 11), based on the answers of the respondents. By far the most respondents ($n = 67$) pointed out that the gained insight in their own learning and development is useful. “I quickly got an overview of the education I followed and when I have to follow education again”, said a respondent. Far less respondents ($n = 13$) pointed to self-management, which means that they liked that learning and development is placed in their hands. For example a respondent explained: “I could directly sign in for training”. A few respondents ($n = 5$) pointed out that the system was user-friendly. Some respondents ($n = 3$) pointed at remainder reasons.

Table 11

Positive Factors of and Aspects of Positive Experiences with the Learning Portfolio

Category	Category description	Typical example from data	Non-typical example from data	n^*
Insight in learning and development	It gives an overview of employees own learning, the gaining's of learning and possibilities of development.	It is easy to see what I have learned and what I could learn in the future.	I can use the clear overview for my curriculum vitae.	67
Self-management	Learning and development of employees is placed in the hands of the employees themselves.	I can take initiative in shaping my career.	I can book trainings by myself.	13
User-friendly system	The program 'Edumanager' / the site www.dichterbij.nl/mijnleerportaal is easy to use.	I found it easy and clear in use.	If you once know how the system works, it is clear.	5
Remainder	There is enough offer in trainings, the pilot group meeting was informative and the learning portfolio reminds of learning.	-	-	3

* n = number of respondents that gave an answer belonging to this category.

Four categories of negative experiences of respondents with the learning portfolio are identified (see table 12). Many respondents ($n = 29$) were negative about the wrong content of the learning portfolio, as information is not correct, vague or not up to date. “Some trainings are not mentioned in the offer of education and not all trainings I have followed are registered in my learning history”, was pointed out by a respondent. Also many respondents ($n = 25$) pointed to the deficient system, as the program is difficult to use and has shortcomings. A respondent said “As I'm not used to working with computers, I found it difficult to enter the portfolio”. Another respondent said “It is disappointing that I can't fill in my own learning portfolio as it is done by the back office”. Far less respondents ($n = 8$) pointed out that there is no time for making use of the learning portfolio. And some respondents ($n = 6$) pointed to a poor implementation, as they did not receive enough information.

Table 12

Negative Factors of and Aspects of Negative Experiences with the Learning Portfolio

Category	Category description	Typical example from data	Non-typical example from data	<i>n</i> *
Wrong content	The information in the learning portfolio is not up to date, wrong or vague.	Not all trainings I have done are mentioned in my learning portfolio.	I booked a training, but I never received information about it.	29
Deficient system	The program 'Edumanager' / the site www.dichterbij.nl/mijnleerportaal has deficient's and is not easy to use.	As I am not well up to date in the digital things, the learning portal is difficult in use.	Unfortunately, I can't fill the learning portal by myself (including evidence).	25
No time	Using the learning portfolio costs time, while there is no time for it.	I have so much to do that learning via the learning portfolio has a low priority.	Now I have to think by myself if qualifications will expire.	8
Poor implementation	The implementation of the learning portfolio was deficient, as information was scarce.	The implementation of the learning portfolio could have been better.	I do not feel that the learning portfolio is alive among colleges.	6

**n*= number of respondents that gave an answer belonging to this category.

154 users and 156 non-users made suggestions about how to increase the self-directed learning process at Dichterbij and five categories were identified (see table 13). Many respondents ($n = 120$) think more attention should be paid to learning and development, in policy, by managers and between colleagues. A respondent had the following idea: "A manger should pay attention to learning in the job evaluation conversation and learning should be a subject in the digital newsletter". Respondents ($n = 60$) also indicate that the self-directed learning process could be stimulated when the learning portfolio is improved and better implemented. In addition, respondents point out ($n = 37$) that learning and development should be better facilitated. "There should be time for learning during working hours", was said by a respondent. The need for means and support is also pointed out. Further, respondents ($n = 32$) indicate that self-directed learning could be stimulated when there is interesting content of trainings which fits to the demand of employees. A respondent indicated "Some trainings are very cumbersome. Education in daily actions should be very short". Finally, some respondents ($n = 24$) point out that the self-directed learning process will be stimulated when there are more possibilities in self-management. So employees have to manage learning themselves, instead of the manager doing it for them. "The employee should be responsible for subscribing for a training", declared a non-user. Some remainder reasons are mentioned by respondents ($n = 14$).

Table 13
Ideas for Stimulating the Self-Directed Learning Process

Category	Category description	Typical example from data	Non-typical example from data	<i>n</i> *
More attention to learning and development	More attention should be paid to learning and development at Dichterbij in all layers of the organization, so in policy, by managers and between colleagues.	The development of an employee should be a topic during meetings with the manager.	It should be made clear why learning is so important.	120
Improvement of learning portfolio	The learning portfolio should be improved and better implemented.	There should be more explanation about how to use the learning portfolio.	The offer of trainings should focus on the job of every single employee.	60
Better facilitation	Learning and development of employees should be facilitated by time, means and support.	There should be time available for learning, you cannot do everything in the time that is reserved for clients.	There should be dispersion in trainings, as employees should learn a lot in a small amount of time which results in a high workload.	37
Interesting content of trainings	The supply of trainings should fit better to the demand of the employees.	Learning will be more attractive when it is connected to the workplace.	Organize meetings to share knowledge, per subject or per group of clients.	32
More self-management	Learning and development of employees should be placed more in the hands of the employees themselves.	Employees should take the initiative in learning.	Every employee should have their own budget for learning and development.	24
Remainder	Learning should be obligatory, not obligatory, measurable, straightforward and the responsibility of the organization. There should be a database with theses of students, a training with examples of learning, more training officers and an overview of trainings beyond Dichterbij. The feeling of connectedness should be given by Dichterbij.	-	-	14

**n*= number of respondents that gave an answer belonging to this category.

Conclusion and Discussion

In this research were two questions posed about learning portfolios and self-directed learning for employees in health care. Below, the results on these questions will be summarized and discussed.

First, the influence of a learning portfolio on the self-directed learning process among employees in health care is discussed, together with the influence of age, educational degree, work experience in health care, proactive personality, self-directed learning orientation and job characteristics on the self-directed learning process. 69.9% of the variance in the self-directed learning process is explained by self-directed learning orientation, a proactive personality, educational degree and the interaction effect between age and activities in the learning portfolio. So, employees with a more proactive personality, a higher self-directed learning orientation and a higher educational degree will learn in a more self-directed way. These relationships are consistent with expectations raised from literature, and herewith are hypotheses 1c, 1e and 1f confirmed. Contrary to the expectations resulting from literature, the entries and activities in the learning portfolio, age, work experience in health care and job characteristics have no direct influence on the self-directed learning process. So hypotheses 1a, 1b, 1d and 1g are not confirmed.

Raemdonck (2006) already claimed that a positive relation between a *proactive personality* and self-directedness in learning processes exists, in which a proactive personality is someone who identifies opportunities and act on them, shows initiative, takes action and preserves until meaningful changes occurs (Bateman & Crant, 1993). It is also claimed that people with a high *self-directed learning orientation* are more self-directed in learning (Raemdonck et al., In press). Self-directed learning orientation is a tendency to take an active and self-starting approach to work-related learning activities and situations and to persist in overcoming barriers and setbacks to learning (Raemdonck et al., In press). When an employee is older and performs more activities in his learning portfolio, this will also lead to more self-directed learning. This relationship is not consistent with literature but could be inferred, as a higher age (Knowles, 1975; Merriam, 2001; Raemdonck, 2006) and use of a learning portfolio (Kalet & Sanger, 2007; Kicken, Brand-Gruwel, van Merriënboer, et al., 2008; Parboosingh, 1996; K. Smith & Tillema, 2001) separately will lead to more self-directed learning.

A possible reason for the absence of the direct positive relationship between *age* and the self-directed learning process is the implementation of a new educational method in medical education, during the late nineties. This new method is problem-based learning, which stimulates the development of self-directed learning skills (Barrows, 1986; Loyens et al., 2008; O'Shea, 2002; Williams, 2001). As older employees might learn self-directed by maturing (Knowles, 1975) and younger employees by problem-based learning, no significant, direct relationship exists between age and the self-directed learning process. This is confirmed by the indirect, positive relationship between age and activities in the learning portfolio, as these activities might stimulate the development of self-directed learning skills especially for older employees.

There are different explanations for the contrast between literature that claims a relationship between the use of a *learning portfolio* and the self-directed learning process, and this research in which this relationship is missing. First, research that claims an increase of the self-directed learning process as a result of using a learning portfolio is not performed with employees in health care but in other contexts, for example in sectors such as teaching (Jones, 2010), by students (Heinrich et al., 2007; Kicken, Brand-Gruwel, van Merriënboer, et al., 2008; Kicken, Brand-Gruwel, & Van Merriënboer, 2008; Kicken et al., 2009), medical students (Kalet & Sanger, 2007) or adult learners in general (Brown, 2002; K. Smith & Tillema, 2001). Maybe there is an effect in these contexts as students and teachers reflect more on learning, are more used to working with computers, and might have put more time in working with the learning portfolio than the employees in health care. Second, a learning portfolio is a collection of evidence of students' learning and development, and is composed from documentation of learning and reflection on it (Challis, 1999; Heinrich et al., 2007; Snadden & Thomas, 1998). However, the learning portfolio in this research did empower employees in documentation, but not in reflection. On that account, this learning portfolio might have less stimulated the skills, attitude and support which are necessary for learning according to Parboosingh (1996) and Kicken, Brand-Gruwel, van Merriënboer, et al. (2008). Third, at the moment of data gathering, this learning portfolio had just been implemented for 3 months. It is possible that the relationship between the learning portfolio and the self-directed learning process changes when more time passes and employees are used to the learning portfolio.

It was expected that more *work experience in health care* would lead to more self-directed learning, as a condition to be self-directed in a specific content area is to possess a certain level of knowledge and an increase in work experience can lead to more knowledge and self-directedness. The absence of this relationship might be explained by the fact that also employees with low work experience have a lot of knowledge as they just finished school. Besides, during the late nineties, problem-based learning is implemented in medical education and employees who learned in this way are likely to have better developed self-directed learning skills (Barrows, 1986; Loyens et al., 2008; O'Shea, 2002; Williams, 2001). So also younger employees with less work experience in health care, could be more self-directed in learning.

The absence of a positive relationship between *job characteristics* and the self-directed learning process might be declared by the high consensus between users and non-users about the job characteristics. As the standard deviation was 0.27, there was less variance in job characteristics which can declare variance in the self-directed learning process.

Second, the positive and negative factors of the learning portfolio according to the employees in health care were investigated. This might give an insight in the absence of a positive, significant relationship between the use of a learning portfolio and the self-directed learning process. Many respondents were *positive* about the insight in their own learning and development they gained by using the learning portfolio. This is caused by the documentation of learning, which is one of the two important aspects of learning portfolios (Challis, 1999; Heinrich et al., 2007; Snadden & Thomas, 1998). Respondents were also positive about the chance to manage their own learning. This is also claimed by Knowles (1975) and Merriam (2001) who indicate that adult learners want to direct their own learning. Some respondents pointed out that the learning portfolio was a user-friendly system.

Negative factors of the learning portfolio, according to the respondents, were the content, the system and the implementation. This could result in a negative first experience which discourage learners to use a new technology (Ash, 1985). Respondents also pointed out that they did not have enough time to work with the learning portfolio. However, time must be claimed in policies, as policies should underpin the development and encouragement of self-directed learning at employees (P. Smith, Sadler-Smith, Robertson, & Wakefield, 2007). According to the respondents, the self-directed learning process should be stimulated by paying more attention to learning and development in all layers of the organization. This is also claimed by literature (P. Smith et al., 2007).

Strong points of this research are the use of qualitative data next to quantitative data and the investigation of the entries and activities in the learning portfolio instead of only looking to the differences between users and non-users. However, there are some limitations. In this research is only one specific learning portfolio evaluated, namely the personal learning portal of Dichterbij, which did not have all the characteristics of a learning portfolio: it is a learning portfolio with regard to documentation of learning needs, resources and outcomes, but not with regard to reflection. As this particular learning portfolio does not stimulate the self-directed learning process among employees in health care, it does not mean that learning portfolios in general do not stimulate the self-directed learning process among health professionals. Further there are, despite randomization, some significant differences between users and non-users concerning demographic variables. This could have influenced the results, as the difference in scores should reflect *only* the effect of the implementation of the learning portfolio. However, the effect sizes are small, which reduced the bias resulted from the differences between users and non-users concerning demographic variables.

Further research could be done about which factors determine how often and in which way employees make use of a learning portfolio, as it is not self-evident that employees start and stay working with a learning portfolio when a company decides to implement it. Also a longitudinal research could be done to investigate after what amount of time a learning portfolio makes a difference in the degree of self-directed learning. This research shows there is no influence after 3 months, but there might be an influence after a longer period of time. Finally, the self-directed learning process is not influenced by this particular learning portfolio, but other studies do show an influence of learning portfolios on the self-directed learning process. This might be explained by the fact that there are so many different versions of learning portfolios (Challis, 1999). So, it would be interesting to find out what particular elements of a learning portfolio cause the stimulation of the self-directed learning process.

Considering the conclusions of this evaluation of the influence of a learning portfolio on self-directed learning of employees in health care, advices for practice could be given. Users of a learning portfolio prefer a learning portfolio that gives insight in the learning and development of employees and places responsibility in the hands of the learner. In addition, this could be facilitated with a good implementation that points to the relevance of a learning portfolio, enough time to work with it, a user-friendly system with correct content, and eventually support to develop the necessary computer skills. It is also important that much attention is paid to learning and development by the organization, managers and between colleagues. P. Smith et al. (2007) advocates that a view in the broader management and culture of an organization that learning and development is an important part of the organizations health and competitiveness and that self-directed learning is an important strategy in this. HRD personnel, supervisors and workplace experts could develop the skills needed to encourage, value and support the self-directed learning process among employees. Also structures, policies, practices and motivators have to underpin the development and encouragement of the self-directed learning process at employees (P. Smith et al., 2007). Managers have to recognize their important role in motivating and inspiring employees to become independent and self-directed learners (Regan, 2003). To motivate employees, managers could give guidance and clear direction about the self-directed learning process, use their knowledge about intrinsic and extrinsic motivators, and provide learning activities matching with different preferred learning styles (Regan, 2003). Also, making reflection an important part in the learning portfolio and taking care of the conditions for reflection could help to pay more attention to learning and development. According to Driessen, van Tartwijk, Overeem, Vermunt & van der Vleuten (2005), learners could be coached in what questions to ask when reflecting on performance, how to identify learning needs and to shape a learning plan, and motivation to work with a learning portfolio. Next, guidelines might tell learners what is expected of them and what are suitable subjects to reflect on. Also a learning portfolio could be used for summative assessment.

Dichterbij might stimulate self-directed learning by achieving three goals. At first, it is important that employees gain deeper understanding in the importance of and possibilities to learn and develop themselves. For example, more attention to learning and development could be paid on intranet, in newsletters etc, and managers should have the skills to simulate and support self-directed learning among employees. Second, Dichterbij could support their employees more in self-directed learning, as the personal learning portal only helps with choosing a learning strategy and not with setting goals, executing the learning strategy and monitoring, evaluating and adjusting. For instance managers could pay attention to all elements of self-directed learning in formal and informal conversations with their subordinates. Third, the personal learning portal could be improved, so employees will have more positive experiences with the learning portal. For example, all start up problems should be tackled, profiles could be made to represent the offer of schooling per function or client group, and the learning portal could be changed in a personal creation.

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Appendix A. Questionnaire

Variable	Question	Range
Sex*	What is your sex?	<input type="radio"/> Male <input type="radio"/> Female
Age	What is your year of birth?	n.a.
Educational degree	What is your highest educational degree?	<input type="radio"/> Primary education <input type="radio"/> Preparatory secondary vocational education <input type="radio"/> Senior general secondary school <input type="radio"/> Pre-university college <input type="radio"/> Secondary vocational education <input type="radio"/> Professional university <input type="radio"/> Academic university
Function*	What is your function at Dichterbij?	<input type="radio"/> Household employee <input type="radio"/> Student/Intern <input type="radio"/> Supportive accompanist <input type="radio"/> Accompanist <input type="radio"/> Service coordinator <input type="radio"/> Therapist <input type="radio"/> Manager <input type="radio"/> Remainder
Work experience in total*	How many years of work experience do you have?	n.a.
Work experience in health care	How many years of work experience in health care do you have?	n.a.
Job characteristics	15 items, for example: My job gives opportunities for promotion	<input type="radio"/> Totally disagree <input type="radio"/> Partly disagree <input type="radio"/> Nor agree, nor disagree <input type="radio"/> Partly agree <input type="radio"/> Totally agree
Self-directed learning	14 items, for example: During last year, I learned a lot for my job on my own initiative	<input type="radio"/> Totally disagree <input type="radio"/> Partly disagree <input type="radio"/> Nor agree, nor disagree <input type="radio"/> Partly agree <input type="radio"/> Totally agree
Proactive personality	10 items, for example: Regardless of the chances, if I believe in something I make it happen	<input type="radio"/> Totally disagree <input type="radio"/> Partly disagree <input type="radio"/> Nor agree, nor disagree <input type="radio"/> Partly agree <input type="radio"/> Totally agree
Self-directed learning orientation	13 items, for example: If I want to learn more for my job, I can always find a way to do this	<input type="radio"/> Totally disagree <input type="radio"/> Partly disagree <input type="radio"/> Nor agree, nor disagree <input type="radio"/> Partly agree <input type="radio"/> Totally agree
Entries in learning portfolio**	How many times did you enter the learning portfolio in February, March and April?	n.a.
Activities in learning portfolio**	Which activities did you carry out during February, March and April in you learning portfolio?	Multiple answers possible. <input type="radio"/> Take a look at current, former and expired learning activities and e-

		learning	
		<ul style="list-style-type: none"> ○ Book a repeat training, on the occasion of a (nearly) expired qualification ○ Take a look at the history of learning activities and canceled learning activities ○ Take a look at the offer of education ○ Book a training ○ Take an option on a training ○ Canceled a training ○ Take a look at the participants and teacher of a training ○ Take a look at the permissions of the manager ○ Make use of the planning per period ○ Take a look at the personal messages and general information ○ Seek for the contact information of the service point 'learning and development' ○ Make use of the search option ○ Only for managers: Take a look at the information of my subordinates ○ None of options above. 	
Non use of the learning portfolio**	Why don't you ever made use of the learning portfolio?	n.a.	
Positive factors of the learning portfolio**	What do you consider as strong points of the learning portfolio? Describe here positive things and experiences.	n.a.	
Negative factors of the learning portfolio**	What do you consider as weak points of the learning portfolio? Describe here negative things and experiences.	n.a.	
Stimulating self-directed learning	In your opinion, what can Dichterbij do to stimulate employees to take more responsibility about their own learning and development? You can think about suggestions to improve the learning portfolio or about different options for stimulation	n.a.	

*Background variable

** Variable only measured at users