



**Karolinska
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Informatics, Management and Ethics
(LIME)**

Master of Medical Education
Degree Project, 15 HEC
Spring term 2015

Do learning portfolios facilitate lifelong learning in students?

- A review of the literature

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Abstract

Do learning portfolios facilitate lifelong learning in students?

-A review of the literature.

Background: The context of academic learning is changing, providing challenges to support student learning and to strengthen regulatory skills. Previous research on portfolios indicates promising findings for student learning. However, due to the rapid development in this field, with no systematic reviews performed since 2009, this review was considered important. The review is a starting point for a scholarly work aiming to improve student learning in a master's program. The aim of this study was to explore the role of learning portfolios on students' professional development and lifelong learning. **Method:** This literature review used a qualitative explorative approach using narrative overview and content analysis methodology. **Results:** The overall result showed that E-learning portfolios can be effective in supporting students learning and professional development. However, effectiveness relies on: careful implementation, that portfolios are embedded in the curriculum, ongoing support and training to students. Portfolios need to be well-motivated and easy to use; Perceived educational value, technological issues and problems related to portfolios inhibit motivation and use of portfolios. However, more research of higher quality addressing portfolios actual effect on learning outcomes is needed since the knowledge base is still inadequate e.g. so far focusing more on perceptions and experiences of using portfolios.

Key words: learning portfolio, students, lifelong learning, professional development

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Introduction

The labor market for health professionals within the occupational health services (OHS) has grown increasingly more complex and challenging in the last decades. Organizational changes and changing working conditions have given rise to new and different health concerns for OHS professionals (WHO, 2001). Moreover, the rapid development of technology and increased demands to stay abreast with new knowledge provides challenges for health professionals. Yet, the educational system has not kept pace with this development and a redesign of professional health education is urgently needed as called for by Frenk et al (Frenk et al., 2010). There is a great need to produce well-equipped graduates and a first step in doing so may be to develop a systematic scholarship approach to learning and educational development.

The background of this project is based on the Master's program "Work and Health" at the Karolinska Institutet, educating health professionals for the occupational health services. The program was established following an initiative by the Government in 2011 to supply skills for the OHS. The program biannually enrolls 90 students and runs part-time mainly on distance. Students' backgrounds are increasingly diverse with new groups enrolling, choice of orientation and with varying time since graduation. The differences between students levels of work experience, pre understanding and knowledge of the field leads to challenges in how to meet the students' different needs satisfactory along with facilitation of their professional development and lifelong learning to match the OHS expectations and needs. Thus within the scope for the programme the time for work-based practice and reflections on experiences is limited.

The OHS in Sweden is an independent expert resource in the field of occupational health and rehabilitation responsible for preventing and eliminating health hazards in the workplace. Staff involved in occupational health should have the competence to identify and describe the relationship between work environment, organization, productivity and health (Josefsson & Kindenberg, 2004). WHO has stated that "OHS staff should be competent for their particular job e.g. have sufficient knowledge, experience, skills, both individually and collectively and appropriate attitude to perform the tasks belonging to their unique profession and necessary for the customers they are working for". Further, "each professional has the duty to keep their competencies on an appropriate level during their professional life both clinical and non-

clinical, this is particularly important in a continually changing world to ensure that competences are still relevant and sufficient for the service” (Europe, 2002).

Professional competence was earlier defined by the academia in isolation from the services. This is no longer functional. There is a need to define these competences in collaboration between the academia and the OHS services to facilitate for health professionals possibilities to meet the challenges of the twenty-first century. The Swedish National Association of nurses and researchers have emphasized the need to develop a range of other competencies and generic skills beyond the direct skills related to their clinical work, such as lifelong learning skills to keep up and maintain knowledge and skills (Företagssköterskor, 2010; O’Sullivan, van Mook, Fewtrell, & Wass, 2012).

Understanding how people develop and become ‘who they are’ professionally, and the factors influencing and facilitating this development, is more relevant than ever. Thus the program “work and health” need to address these challenges by systematically assess needs, develop and implement new activities and evaluate both the processes and outcome. This degree project will be based on scholarly work on how the program can improve and support student learning (Bolander laksov, McGrath, & Silén). For this thesis, portfolios possibilities to support students’ professional development and lifelong learning skills will be studied. The degree project will be part of a larger project and will start with exploring existing knowledge and experiences for learning portfolios.

The main parts of the project are to:

- conduct a review of the literature to explore existing knowledge
- design, test, implement and evaluate a pilot study among students
- Communicate, review and share the findings with colleagues
- Make the findings public

The main part of this degree project is the review and analysis of the literature. In the following developing phase, a learning portfolio will be designed and developed based on the findings from the literature study, if supported by evidence. The result will be documented in a report and peer-reviewed by students, teachers as well as by colleagues.

Background

The goal of higher education is to offer education based on an academic or artistic footing and proven experience. It is also to provide for students ability to independently identify, formulate and solve problems to meet changes in working life and to keep up to date with the development of knowledge ((Högskoleverket), 2011). To meet these goals, the scientific knowledge base supports the need for higher education to find ways of stimulating the development of generic competences, learning outcomes or non-discipline-specific outcomes (Faulkner, Mahfuzul Aziz, Wayne, & Smith, 2013). Research suggests that portfolios is one tool that might facilitate and evaluate this process: “tools such as portfolios indicate that they can promote more profound forms of learning” (O’Keeffe & Donnelly, 2013). However, there are still issues such as the evidence to enhanced learning that needs to be defined for the method to be effective and how to engage students in this process (Faulkner, et al., 2013).

Portfolios

Portfolios have traditionally been used in paper format. Recently, E-portfolios have become available freely on the internet. Specific for E-portfolios is the multimedia environment that enable students’ ownership over the portfolio for as long as desired and the creative use of a wide range of tools for both learning and interaction. It is a powerful tool to get an overview of, and monitor, personal growth over time. Thus, the creation of portfolios is a useful skill for today’s job market (MacDonald, Liu, Lowell, Tsai, & Lohr, 2004). Portfolios have been defined in a number of ways, however for this project two definitions describing portfolios as a learning tool have been chosen, firstly portfolios as; “a collection of papers and other forms of evidence that learning has taken place” (Davis et al., 2001) and secondly, “a collection of student work that exhibit the students’ efforts, progress and achievements in one or more areas” (Martin-Kniep, 2000). Several studies have shown that portfolios can be used in numerous ways, in all stages of education and for more than one goal. For example, the following six formats have been defined and used in education; assessment, presentation, learning, personal development, multiple-owner and working portfolios (Inc, 2005).

Although portfolios for assessment and working portfolios have been the most used forms of portfolios, learning portfolios have developed rapidly in recent years. Hence, there are different opinions on the evidence for portfolio effectiveness on learning and whether the same portfolio can and/or should be used for multiple reasons such as both assessment and reflection (Snyder, Lippincott, & Bower, 1998) (Driessen, Van Tartwijk, Van Der Vleuten, & Wass, 2007; Tigelaar, Dolmans, Wolfhagen, & van der Vleuten, 2004).

However, some studies have shown that portfolios can be effective for professional learning and lead to greater self-awareness, engagement, increased student responsibility for learning and reflective practice if they are well implemented (Tochel et al., 2009) (Andre, 2010). Moreover, other studies have found that portfolios and portfolio assessment can support students ability to measure outcomes, e.g. professional development and making the learning process visible to the learner (Friedman Ben David et al., 2001; Van Tartwijk & Driessen, 2009). The evidence is stronger if the process is combined with feedback (Colthart et al., 2008).

Even though portfolios have shown great potential in some fields, there are also some known challenges, in particular for learning portfolios which is the focus for this project. Studies have shown that the introduction of learning portfolios can lead to disappointment from both teachers and students, because they require a new perspective on education from mentors and learners and great investment of time and effort. Furthermore, many studies have so far been of weaker study designs and the effectiveness of learning portfolios is not evident (Van Tartwijk & Driessen, 2009).

Perspectives on learning

Perspectives on learning will be described in relation to the portfolio method e.g. type of learning connected to portfolios, factors that are involved and that seem to be important to consider when implementing learning portfolios.

Lifelong learning

Lifelong learning is a multifaceted concept comprising many aspects and skills of learning, such as; learning to learn, transmission of theory into practice, questioning and reasoning, managing information, communication, oneself and others (Dornan, 2011). It has been defined as “a set of self-initiated activities and information-seeking skills with sustained motivation to learn and the ability to recognize one’s own learning needs” (Hojat et al., 2003). Furthermore, Hojat et al developed a scale to measure lifelong learning and they came up with five factors that are consistent with those described by others and these are; ‘need recognition’ (cognitive aspect), ‘research endeavor’ (capabilities), ‘self-initiation/self-directed learning’ (behavioral aspect), ‘technical skills’ and ‘personal motivation’

(predisposition) (Hojat, et al., 2003). McKenzie (2001) has described what this mean in practice for a professional saying that “every professional should be actively encouraged, motivated and able to learn throughout his or her life (McKenzie, 2001)

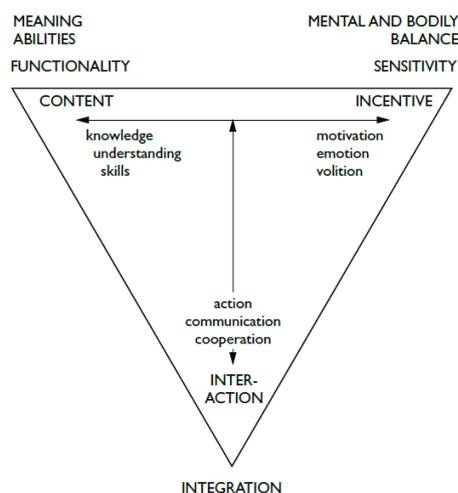
Learning

Learning is a complex process comprising both cognitive processes and contextual factors and a broad definition of learning is; “any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or aging”(Illeris, 2009). Illeris means that several conditions are involved that actively influence the learning process. These conditions are; External and internal conditions, application, basis and learning itself (Illeris, 2009). Illeris concept of learning is constructivist in nature, i.e. it is assumed that the learner actively builds up or constructs learning as mental structures (Illeris, 2003).

Constructivism can be regarded as a philosophical view of learning that underpins most contemporary perspectives on learning (Dornan, 2011). Knowledge is something that is constructed in dynamic interaction with the physical as well as the social learning environment, that is, not something objective that can be transmitted from teacher to student (Schunk, 2012) (Stalheim-Smith, 1998). Constructivism originates from classical theorists such as Piaget, Vygotsky and Dewey (Phillips, 2009). Piaget emphasized the cognitive processes and argued that learning is a dynamic process comprising of two processes; assimilation (new experiences are added into existing cognitive structures) and accommodation (cognitive structures are changed/modified by reflection integration) (Phillips, 2009). Vygotsky, on the other hand, focused on the social constructs of learning and that most of what we learn we learn from others. One of his key aspects was children’s ability to learn by imitation and the potential of further development in students by proper guidance and support. Even though these two perspectives emphasize different aspects of learning and ontological views, there are also important similarities, e.g. that learning is an active and reconstructive process requiring motivation and effort by the learner. Dewey argued that the key process to support motivation and learning in students was by using purposeful activities and meaningful learning set in proper social settings (Phillips, 2009).

From the work of Piaget and Vygotsky, the dualistic individual view of learning and the nondualistic sociocultural view of learning developed. The individual learning theory focuses on how the individual constructs knowledge in interaction with the environment, in this view

Piaget employed dualist ontology of two realms: a subject and an independent world. In this view, it is not only knowledge that is constructed but the individual and the social world is constructions as well. In short, this means that learning is one part of a larger process of human change and transformation (Packer & Goicoechea, 2000). In the sociocultural theory, the focus is on the social interactions between individuals and or with cultural products (Leach & Scott, 2003). However, when learning processes are studied separately the whole field of learning cannot be covered. Illeris means that the fundamental process of learning will always include both the internal processes (cognitive and incentives) of the learner and the interaction with the ambient environment. In his model of the processes of learning he



illustrates learning as a combination of two simultaneous processes; acquisition and interaction, including the three dimensions; content, incentive and interaction. Content is essential as there can be no learning without it, incentive is necessary as a mental function requiring mental energy as motivation and interest for learning to take place, and lastly learning takes place in social interaction with the environment and society as the base (Illeris, 2009)

Furthermore, from a constructivist view new knowledge and understanding is constructed and organized based on previous knowledge, experience, values and beliefs together with perceptions of the world (Dornan, 2011). To facilitate the development of new understanding, the dialogue, interaction and shared experiences with other learners as well as teachers are stressed (Hrynchak & Batty, 2012). A way to provide students with new experiences and opportunities to collaborate with peers is for example to present students with meaningful problem solving activities as described by Dewey. Ideally, these activities are based on real life experiences and reflective practice.

Reflection

Reflection is a main activity in the use of learning portfolios and the key component in both reflective learning and reflective practice, the former aiming at enhancing learning and the latter when reflection takes place in the professional context (Sandars, 2009). Reflection “is a process by which we examine our experiences in order to learn from them” (Boud, Keogh, &

Walker, 2013) or “Reflection is a metacognitive process that occurs before, during and after situations with the purpose of developing greater understanding of both the self and the situation so that the future encounters with the situation are informed from previous encounters” (Sandars, 2009). Reflection predicts an active process and approach to learning and a metacognitive process leading to enhanced understanding of the self and situations (Sandars, 2009). Furthermore, the ability to reflect seems to develop over time with practice and certain forms of stimuli e.g. small groups, but also the learning environment, the behavior of mentors and supervisors seem to be essential (Mann, Gordon, & MacLeod, 2009).

Reflection and learning

In the constructivist philosophy of learning, Kolb’s experimental learning theory developed. In his theory, the learner move through a cycle, starting with concrete experience, reflecting on the experience, conceptualizing the experience and ending with action (Kolb, 1984). Understanding can be enhanced by repetition. The learning cycle has been applied and used in various learning situation and is particularly applicable in health education where the clinical or practical setting represents an important learning environment and practice for reflective learning. Despite the fact that the evidence of reflection on learning is limited, there are findings that suggests that reflective practice may result in “a deeper approach to learning thus leading to new learning to be integrated with existing knowledge and skills” (Mann, et al., 2009) (Sandars, 2009). In addition, many studies have shown potential in this area for further development and application to lifelong learning. In particular, the development of the self has shown to be essential for developing self-efficacy, which in turn contributes to the development of self-regulation and lifelong learning skills(Sandars, 2009). Known challenges with the use of reflection for learning is for example low engagement from students, hindering effective reflection and learning to take place. For effective reflection to take place there needs to be an alignment between self-regulated learning; the goal, the will (motivation) and the skills. If the goal is unclear to students, the motivation will be affected negatively and insufficient skills might lead to exercise drop-out, which in turn might lead to decreased self-efficacy (Sandars, 2009).

Self-efficacy

Self-efficacy is a key aspect of motivation and closely linked to the perception of mastery, it has been defined as ” a belief in one’s ability to perform effectively (Bandura, 1997). There are two dimensions of self-efficacy; the first concerns “efficacy expectations” and refers to the belief of one’s ability to perform an action, and the second “response-outcome

expectancy” refers to the belief that the action will be successful to achieve the desired outcome (Bandura, 1997). High self-efficacy in students lead to higher performance, higher effort and increased motivation, moreover, mastery and vicarious experiences, verbal persuasion and the affective state are positively linked to improved self-efficacy (Bandura, 1997). Implications for learning is how we best can support students’ perceptions of mastery since this aspect seem to be one of the key aspects of both students’ motivation and self-efficacy. A successful approach shown in studies is to focus on successes; more experiences of success have proven to lead to improved self-efficacy. Encouraging students to focus on frequent, short-term and explicit goals and to measure progress are important processes. Additionally, the quality of the teacher feedback is of paramount importance (Major & Palmer, 2001).

Metacognition

Metacognition is the process involving the ability to identify relevant learning needs, define achievable goals, work towards these and evaluate its process and outcome. This process is self-regulatory and an essential capacity for mastering lifelong learning. This level of thinking involves an active control over the process of thinking in learning situations, which in practice can mean that reflection as a process can be developed by different training strategies (Sandars, 2009). Metacognition is something that develops over time and needs continuous training, preferably from the start of the program. A promising method in this development is deliberate practice (DP) which can be viewed as a promising set of actions to aid students’ metacognitive development and professional development. The definition of deliberate practice is “strategic, focused, goal-oriented activities aimed at improving components of performance” (Ericsson, Krampe, & Tesch-römer, 1993). DP has commonly been used in sports, but has recently been proven effective also in medicine (Ericsson, 2008). The method builds on reliable, continued improvement in skills and performance by; 1) the learner is given a task exceeding his or her current skill level, 2) motivated to practice extensively and improve, 3) provided with comprehensive and effective feedback, and 4) prompted to reflect on the learning experience. Once a goal has been met, the learner advances to a more difficult task (Hastings & Rickard, 2015).

Motivation

“To be motivated means *to be moved* to do something i.e. being energized or activated towards an end” (Ryan & Deci, 2000). Motivational research within education has mainly focused on either a behavioral perspective emphasizing external rewards as the driving force or the social cognitive perspective stressing students’ beliefs about themselves and their learning environment (Pintrich & Schunk, 1996). For example, motivation is not only something that we perceive more or less of for different tasks, but there are also different types of motivation. A student, e.g., can be motivated to perform a task out of personal interests, or value-driven motives. In the self-determination theory these two views of motivation is described and named to intrinsic- and extrinsic motivation (Deci & Ryan, 1985). Intrinsic motivation is when doing something out of one’s own interest and or enjoyment and extrinsic motivation as something you do because it leads to a certain outcome (Ryan & Deci, 2000). The effectiveness of these two different types of motivation for learning has been studied intensively in the last decades. A meta-analysis showed that external rewards known to the learner on beforehand had strong negative influence on motivation (Deci, Koestner, & Ryan, 2001). On the other hand, other studies have found that other strategies of intrinsic approaches targeting the learning environment can lead to increased motivation, e.g. how tasks are presented to students if they challenge curiosity, fantasy and sense of control among the students. The sense of control, particularly, have shown to be important for students feelings of self-determination, degree of motivation and autonomy, but only as long as intrinsic values works as the driving force and not by external rewards (Ryan & Deci, 2000).

Two aspect of motivation that is of great interest for learning are the expectancy–value theory and achievement theory. In the first theory, “expectancies and values are assumed to influence directly on achievement choices, performance, effort and persistence. Expectancies and values are assumed to be influenced by ability beliefs, the perceived difficulty of different tasks and individuals goals, self-schema and affective memories (Eccles, 1983). The latter theory refers to the different types of academic goals students can have, for example personal, social, mastering or performance goals. Studies have shown that it is possible for students’ to have multiple goals and that both learning goals and performance goals are intimately linked to learning. However, mastery goals or learning goals that focus on content rather than the outcome have been shown in studies to lead to deeper learning and higher achievements than performance goals that are focused on external rewards and competition

with peers (Ryan & Deci, 2000). In addition, students who identify and set high performance and learning goals have also shown in studies to perceive higher self-efficacy and beliefs of their abilities (Valle et al., 2003). Implications for practice of motivational studies for portfolio use lie in how to support students' development of metacognitive functions i.e. the ability to identify and define meaningful individual learning or mastering goals to experience what mobilized effort can lead to, in form of successes, improved self-efficacy and motivation for continuing learning.

Problem statement

There is an increased demand for health professionals to be self-regulated lifelong learners in order to be able to keep up and maintain their competencies on an appropriate level during their professional life both clinical and non-clinical. Thus there is a great need to start the process of fostering these skills in students early and throughout programs.

Aim

The general aim of this literature review was to explore the role of learning portfolios for improved student learning. The specific aims were to explore learning portfolios in relation to lifelong learning in students, and to explore facilitators and barriers in using learning portfolios from both a facilitator and user perspective.

Research questions (RQ)

1. What is known of learning portfolios and their role for lifelong learning and professional competence development for students in higher education?
2. What are the facilitators and barriers for the use of learning portfolios?
3. How are learning portfolios perceived by students and facilitators?

Methodology

This literature review employed a qualitative explorative approach adopting narrative overview and content analysis methodology. A qualitative approach was decided as the most suitable method to explore the phenomenon “learning portfolios” since it supports “the study of selected issues in both depth and detail” (Patton, 1990). Significant to qualitative research is the use of constructivist inquiry for the focus on “understanding of the human experience through an inductive process to integrate information to develop a theory or description” (Polit & Beck, 2012). The aim for this study was on developing in-depth understanding as well as description of the phenomenon and the reasons for how and why it is so. This project originates from the constructivism, qualitative paradigm where for this study the reality is viewed in the form “of multiple, mental constructions, socially and experientially based, local and specific in nature” and where the investigator is closely linked to the findings (Guba, 1994).

Data collection procedure

An initial literature search was conducted to enhance the understanding of the research topic and to explore the knowledge base (Polit & Beck, 2012) (Green, Johnson, & Adams, 2006). This search resulted in refined key words for the search strategy. The initial search revealed a large amount of research published on this topic which called for a narrow search strategy to be able to capture the research aim and research questions as well as avoiding too many hits. The following key words were identified for the final search; professional development, professional competence, learning portfolio, portfolio and lifelong learning. Furthermore, no limits for quality, country of origin or study design was set except for other reviews that were excluded.

Search strategy

Relevant databases to health professions and education were selected for the search and included; Cinahl, Pub Med, Eric, Web of Science and Scopus. Google scholar generated many hits on this topic but was excluded for this search due to too many hits and unclear information of sources. Limitations used were; age (adults), higher education, publication date; 2005-2015 - after the initial search changed to; 2009-2015 since there were published systematic reviews from 2009, original research, peer reviewed and language (English). Further, the boolean operator “AND” was used to delimit the search result and truncation of ‘portfol’ was used to capture all sorts of variations of portfolios, see table 1 for detailed

description. New data was searched for until no redundant information to answer the research aim was found (Polit & Beck, 2012).

Table1. Search description

Database	Search words	Hits	Abstracts	Included articles
Scopus	1.(professional competence AND lifelong learn* AND portfol*)	16	12	1
	2.(Portfol*AND lifelong learn*)	51	21	4
Pub Med	1.(professional competence AND lifelong learn* AND portfolio)	20	12	2
	2.(Portfol*AND lifelong learn*)	11	4	2
Web Of Science	(professional competence AND lifelong learn*AND portfol*)	20	4	1
Cinahl	1.(professional competence AND lifelong learn* AND portfol*)	3	0	0
	2.(portfolio AND lifelong learning)	15	1	0
	3.(Metacognitive skills AND portfolio)	27	6	2
ERIC	(professional competence AND lifelong learn* AND portfol*)	15	9	3
From references				8

Selection of articles

First titles and abstracts were screened for its relevance and those selected were then read in full, the selected articles were eligible to include the following key words; portfolio, learning and or professional competence or development. Further, studies with all types of students in higher education were included and not only healthcare professionals, this decision was made because type of students was not the focus of the study and not considered relevant for the outcome. Studies with all sorts of study designs were included that were primary source material published in peer-reviewed scientific journals. Lastly, relevant studies were also identified and selected through reference lists from retrieved materials.

Selection of portfolio

The type of portfolio relevant for this project was learning portfolios and limited to include those that were related to; student learning, student engagement, goal setting, professional competence, self-management, lifelong learning and professional/personal development. However, a precise definition was not set in the search process as it was considered to limit the sample size and thereby increasing the risk for missing relevant articles. For example, there are both paper- and E-portfolios for learning and some portfolios are used both for assessment and as a learning tool and might be published in different “areas” of research with different keywords.

Ethical consideration

Degree projects on master level do not generally require an ethical approval, and this degree project was not considered to be of a sensitive nature nor was the method since it builds on secondary data that has already been published in peer-reviewed papers.

Analysis

This literature review used a narrative overview approach which is also known as an unsystematic narrative review. The purpose is to describe and synthesize available literature on the topic you have chosen using the following three main steps; developing a preliminary synthesis of the findings of included studies, exploring relationships in the findings and assessing the robustness of the synthesis produced. Further, focus in this process lie in; organization, description, exploration and interpretation of the study findings (Green, et al., 2006). The included material in this narrative review was read, critiqued and evaluated according to the keywords; portfolio, learning, lifelong learning, students, higher education, professional competence, competence, self-directed learning and professional development. Of these keywords, the first two were decisive for inclusion. In the next step, coding of the studies were performed to organize the information and to facilitate the analysis (Polit & Beck, 2012). Data/information was organized by making a summary of the included articles and synthesized into a table (see appendix 1).

In the second step of the analysis the research questions were used to guide the extraction of the data that was relevant for the aim of this study e.g. all data from the selected studies that answered the research questions were selected, sorted and organized to each RG. The UoM that were sorted are summarized in a table (see appendix 2). In the final phase of the analysis, a content analysis was performed on the data that was extracted from the second step of the analysis following the steps described by (Graneheim & Lundman, 2004). First the UoM from step 2 were used to create new categories, these were organized into a table (see appendix 3). Categories answer the question “What” and function as a descriptive level of content or the manifest content of the text (Graneheim & Lundman, 2004). In the next step each category was divided into subcategories, these were then in the final step abstracted, interpreted and formulated into themes. “Themes can have multiple meanings and the creation of themes is a way of linking the underlying meanings together”, hence themes answer the question “How” (Graneheim & Lundman, 2004). From the themes an overarching theme then emerged and the themes were then sorted into sub-themes. To increase credibility,

categories and themes were discussed with a colleague who had read the material and made an individual analysis of data.

Results

This literature search yielded 178 potentially relevant studies and the manual search of the reference lists of studies included in the review another eight studies. Of the 178 studies 69 abstracts were read and assessed against inclusion criteria (learning portfolio, lifelong learning, professional development and students in higher education), of the 69 abstracts that were assessed 23 were selected for inclusion. The most common reasons for exclusion were other reviews or that they did not meet the definition of portfolio or the type of student. Type of portfolio best suitable and most used to support lifelong learning turned out to be the E-portfolio and was therefore the format of portfolio selected and analyzed for this paper. Of the 23 studies included, 5 used qualitative design with interviews, 7 mixed-methods design with both questionnaires and interviews, 6 survey methods with questionnaires, 4 case study designs and 1 RCT. Among the included studies 7 were published in the UK, 7 in the US, 3 from Australia, 3 from Asia, and 1 respectively from Sweden, Greece and Turkey. Of the included studies all but one were published in the last five years and the reason for only including studies from the last five years was because there are several systematic reviews that are six years or older.

The results will be presented and later discussed according to the findings from the content analysis, thus the research questions that the author used were only defined and used to retrieve relevant data from the included papers and is not part of the final results. The results of the content analysis of the included papers in this literature review will be presented here by describing the theme, sub-themes, description of underlying categories and illustrated with quotes.

The analysis resulted in one overarching theme; “Supporting students learning by being structured and systematic” and in the five sub-themes; to develop expertise, to be meaningful, to develop skills, the changes of roles and strategy of learning. Between the sub-themes there is a hierarchy where the sub-theme “to develop expertise” (illustrated in green in table 2) is an outcome of the other sub-themes (illustrated in pink in table 2) and as such dependent on these whether they are facilitating or hindering the process. Examples of UoM units, categories and subcategories underpinning the theme and sub-themes are presented in table 2.

Table. 2 Summary of; Theme, sub-themes, categories and UOM

UoM	Category	Subcategories	Sub-themes	Theme
<i>“the ePortfolio facilitated reflection on professional practice in relation to the competencies that had been developed” - 16</i>	Reflection and feedback facilitate continuous growth and learning in students	Give structure and content to students – to see the work as a whole Develop skills both for own understanding but also to support peers	To develop expertise	Supporting students learning by being prepared, structured and systematic
<i>“the purpose of ePortfolios was not clear to all participants and inconsistent messages from lectures” -8</i>	A clear purpose and acceptance of the use of ePortfolios are essential for success	Educational value must be clarified. Careful and structured implementation for both tutors and students	To be meaningful	
<i>“did not know how to use the ePortfolio, too little guidance and support” – 2</i>	Explicit instructions and guidance for how build technology and metacognitive skills	Technology as both a barrier and facilitator Reflection skills requires facilitation and training	To develop skills	
<i>“The relationship between tutor and student become more equal e.g. feedback is not a gift but rather a “dialogue” between the two” - 18</i>	Learning new ways to teach and communicate between tutor – student and how to collect evidence of learning	From collection of artifacts to evidence of learning From the expert to the facilitator/tutor	The changes of roles	
<i>“If embedded from the start in the curriculum the E-Portfolio facilitates lifelong learning” - 6</i>	To start early in the program and teach students how to use it	Hands on training with explicit guidelines to students Changes in curriculum - to be student centered	Strategy of learning	

Theme

Supporting students learning by being prepared, structured and systematic

The overarching theme from the analysis *“Supporting students learning by being prepared, structured and systematic”* comprises the following findings from this analysis; portfolios are effective for student learning if the implementation is well prepared, structured and systematic. Relating to everything from how the portfolio is anchored and accepted by facilitators and students, the quality of and how the support and guidance for students’ development of skills is given, how the purpose and content with the portfolio is motivated, and how the process is organized within the curriculum. If the process is not well prepared for, well performed or implemented in a systematic and structured way the outcome for lifelong learning and professional development will not be as successful as it could be, on the contrary the whole project might fail its purpose.

“Careful implementation process (training & acceptance) essential for successful result -4, 6, 8, 11, 15, 16, 23”

Sub-themes

To develop expertise

The first sub-theme, “to develop expertise”, represent the effectiveness of portfolios for learning; comprising the notion of students learning in form of improved metacognitive control strategies, higher order cognitive skills and collaborative skills for learning as well as professional development and becoming a self-directed lifelong learner. In this process, reflection and feedback emerged to be the key ingredients and the e-Portfolio the means facilitating this process.

“the E-portfolio was instrumental in promoting the development of self-assessment and reflection in learning and fostering positive motivational beliefs and self-esteem...it also facilitated the delivery of high-quality feedback that enabled students to monitor and assess goal process ”-10

The studies investigating students’ perceptions of using e-Portfolios found that when students are given explicit instructions and training on how to use reflection and when, this process was both valued by students and found to facilitate the learning process.

“I’ve never written reflective pieces before, but can see their value, as it helps me to clarify my position on things, or look at it from a different point of view; definitely a good thing, a good way to see progress” – 9

Further, several studies reported the importance of extensive and guided expert feedback from teachers for the process of developing reflective skills, in addition, students demonstrated more high-level reflective indicators over time in studies where evaluations of type of and level of reflection was performed. It was shown, e.g., that students showed a deeper level of understanding about discrepancies among goals, experiences and observations. On the other hand, when the implementation process had not been as clear, explicit, timely and as supportive as needed, the outcome was frustration, lack of value and negative attitudes among students and lack of value of the use of e-Portfolios. Some negative reflections are as follows;

“The timing of the training was hopeless, it was too far before we went into practice” - 4

“The value was dependent on the instructors’ skills, they all seemed to do it differently and some didn’t even bother” - 4

Moreover, students that improved skills for learning and development also improved their ability to give better feedback to peers and thereby learn by and from each other. Training

students in giving and receiving feedback as well as keeping a dialogue on what and how feedback is wanted was emphasized in several studies to be crucial. The feedback process in the included studies was linked to both students' motivation and self-regulation.

“I'm more willing and motivated to learn than I have ever been in my life. I know where my learning needs to go now and I am much more positive and willing to preserve learning”

Some data indicated that high achievement students, e.g. students who use metacognitive strategies to a higher degree than other students, showed better academic performance and used peer learning strategies such as involving learning with or through friends or study groups more often and to a higher degree than low achievement students.

“the constructions of portfolios with an explicit focus on learning brings about important changes for course-participants as they become more aware of their own learning through a process of meta-learning, they are able to support others' learning” – 18

Finally, the use of e-portfolios *per se* were found to facilitate this learning process and making it possible to achieve all the complex processes, not the least by enabling the students the ownership of their own learning. The portfolio was described by students as *“the mirror of their learning”* and *“the format that gave them the possibility structure the content and show and illustrate what they had learned”*

To be meaningful

The sub-theme “To be meaningful” describes the key to success or failure of learning portfolios. It comprises the notion of the purpose and value with portfolios and whether this is clearly clarified or not. All studies included in this review reported how crucial it is to clearly define, explain and anchor goal as well as educational value for the portfolio, hence, it must be discussed and accepted by both students and teachers involved. Failing in motivating the use of portfolio and inconsistent messages from teachers were reported to lead to lack of motivation and students viewing the value of portfolios largely negative.

“The perception that professors do not value the program contributes to the lack of value that students see in the e-portfolio activity”-11

All studies stressed the importance of structured and careful implementation with explicit guidance and ongoing support to ensure meaningfulness. This alone seems to be the difference between whether portfolios are valued or not by students and “worth the effort”. In

this guidance, clearly defined goals and evidence to learning is necessary to stay motivated to use the portfolio.

“The intended value is not being recognized by many trainees and identifies a need to promote engagement with the e-portfolio as a learning tool, rather than simply as a bureaucratic exercise”-2

To develop skills

The sub- theme “to develop skills” was identified as essential for students to be able to both manage the technological part of the activity as well as the learning part, thus not spending too much energy on solving technological issues or how to work with the content.

Developing metacognitive skills need practice and this was evident in several of the papers that were analyzed.

“Essential to teach students how to select artifacts and reflect on learning - 9, 11, 13, 14, 16”

In several studies, technology was regarded as a barrier as well as a facilitator to usage and learning in students. In this process, the quality of the implementation as well as the access to ongoing support was identified as being the difference between the two.

“The implementation of the new technological platform went relatively smoothly due to careful planning and iterative development” - 4

Developing technological skills was also associated with building and strengthening self-efficacy in students. However, several studies reported that to facilitate this process, teachers need to be familiar with the technologies.

“Students responded well to in-class training which lessen anxiety caused by learning a new tool... the workshops helped the students to build technology confidence” - 16

The changes of roles

In this sub-theme, the changes of different roles were identified as a key function and driver for change, not only as a tool for behavior change for tutors and students, but also in terms of contextual changes. The implementation of portfolios for learning requires not only a change in power between the expert and the student but also the sense of ownership by the students. First of all, the way communication strategies are used shifts from being a one-way

communication from the expert to the students to being a dialogue between teacher and student. This is illustrated by the following quote.

“The relationship between tutor and student become more equal e.g. feedback is not a gift but rather a “dialogue” between the two” – 18

Moreover, there seem to be a common understanding that portfolios should be learner driven and as such the power lies with the student to choose what artifacts to collect, reflect upon, show and discuss with teachers. However, this change in power forms new types of relationships between teachers and students and issues like trust, honesty, engagement, sufficient feedback and security were identified as important for this relationship. Clear instructions of purpose and assessment criteria were reported to be essential for students to be able to choose sufficient artifacts.

“The purpose was not clear to all participants, they would have liked more detail and examples of what the final product would look like to guide their reflections and inconsistent messages from different lectures made the students wonder – what’s the real purpose of the e-portfolio?”

The second subcategory was the change of type of artifacts and evidence of learning to collect in the portfolio e.g. from collecting as much content as possible to collect evidence of learning that the learners have constructed themselves. This shift is significant for and the major difference from traditional portfolios to these more recent types of learning or professional development portfolios. This shift demands new roles from both the tutors and students e.g. requiring a more active role of the student and a more supportive of the tutor to embrace a constructivist approach. Moreover it puts more focus on the learning environment and context in which the student is active within and how this is arranged by tutors. This is illustrated by the quote below.

“It emerged that the construction of learning is more effective when learners participate socially, engage with ideas in the group context and construct their own meaning and understanding through dialogue” - 18

Strategy of learning

This sub-theme identified how learning portfolios function as a tool and as a strategy to enhance learning. Several studies reported the need for changes in the curriculum, meaning that the portfolio must be embedded in the curriculum from the start to guide teaching activities and focus on the learning. Since learning is an ongoing process and reflective

practice develops over time and therefore takes time to master, the level of success of these will be dependent on whether the portfolio is introduced early in the program or not.

“If embedded from the start in the curriculum the e-Portfolio facilitates lifelong learning” – 6

The second category in this theme is the way this learning best takes place, analysis showed that the portfolio in itself is an instrument to learning and explicit guidance and hands on training is needed with the purpose of training students to use this instrument in the best way so it facilitates learning. Resources should be put on learning processes and not only the outcome. In other words, the development of reflective- and feedback skills is as important as the focus on the production or end result itself. This shift of focus puts new demands on the teachers and stresses the construction and perception of knowledge among students.

Discussion

Results

This study found that there are some challenges for an effective use of E-learning portfolios but when they are well implemented they can be an effective instrument in facilitating student learning e.g. lifelong learning and professional development. The overarching theme from the analysis in this study *“supporting students learning by being prepared, structured and systematic”* comprises the notion that the effectiveness of E-learning portfolios lie solely on thorough implementation strategies; that E- learning portfolios are embedded in the curriculum, anchored and accepted among both staff and students and that ongoing support, feedback and training is given to students throughout the program. In addition, E-learning portfolios must be motivated and easy to use since perceived educational value, technological issues and perceived problems related to the portfolios seem to inhibit motivation and use. These results is also line with other reviews and studies published on E-portfolios with the aim to facilitate student learning (Butler, 2007) (Moore & Parks, 2010) (Buckley et al., 2009) (Van Tartwijk & Driessen, 2009) (Tochel, et al., 2009).

The sub-theme “*to develop expertise*” comprised the effectiveness of portfolio use. Twelve out of the 23 included studies in this review reported that students using portfolios developed higher order cognitive skills such as elaboration, organization, critical thinking and metacognitive control strategies, self-regulation skills and collaborative learning strategies such as peer learning to a higher degree compared to students who did not use portfolios. Moreover, these results show that students who used learning portfolios were more likely to use structured self-assessment tools to identify their strengths and areas of improvement compared to controls. These results are also in agreement with results from a previous review from 2009 that found some but mixed evidence for the effectiveness of E- portfolios on learning and whether portfolios aid or hinder reflection (Tochel, et al., 2009). Thus there are other studies supporting E-portfolios effectiveness for metacognitive development and self-regulation that also stress the importance for supervisors to have sufficient confidence in students capacity for self-direction since students apply metacognitive knowledge only when they are given autonomy to do so (Meeus, Van Petegem, & Meijer, 2008). In addition, Meeus et al showed how the increased capacity for autonomous learning bridges the gap between higher education and the job market for students.

The sub-themes “*to be meaningful*” and the “*changes of roles*” can be viewed as a key factors to whether the E-learning portfolio will be used or not in such a way that it improves students learning, thus meaningfulness is directly linked to students’ mental constructions e.g. the level of motivation and the effort they will put into using the portfolio. The findings from this review showed that students reported negative perceptions for the use of portfolios when uncertain, unclear and inconsistent messages were communicated from staff to students, when the purpose of the learning portfolio was unclear or when the link to learning was missing. Moreover, most of the studies that explored students’ perceptions of using E-learning portfolios reported lack of motivation, lack of meaning or purpose with the portfolio, time-consuming and interference with clinical practice and a need for more effective guidance and support in relation to unclear communication. These issues have also been discussed earlier by researchers who have stressed the importance of communicating a clear purpose of learning portfolios, thorough training and high quality of support to students (Shepherd & Bolliger, 2011) (Tochel, et al., 2009) (Mok, 2012). Furthermore, several other studies also supports the need for; clear content and structure of the portfolio, practical skills training for both technical issues as well as for reflective writing, feedback, and peer-review, together with ongoing support from teachers to maintain students motivation for the use of

portfolios (Butler, 2007) (Moore & Parks, 2010) (Buckley, et al., 2009) (Van Tartwijk & Driessen, 2009) (Tochel, et al., 2009).

However, as Illeris has shown in his model of “processes of learning” not only content and incentives are enough when we view the complexity of learning but also the notion of interaction in the social environment. Challenges for implementation of E-learning portfolios lie in creating a context where the portfolio is seen as meaningful by both teachers and students when the roles are changing. For example, it has been shown in studies that teachers are important change agents in this interaction, not only by providing, high quality sufficient support and feedback but also in the way they facilitate students to take responsibility, control and action over their own learning. Moreover, the quality of the process of guiding both students and teachers in finding their new roles in the transfer from teacher-directed to student-directed education have shown to be of great importance (Butler, 2007; Tochel, et al., 2009; Van Tartwijk & Driessen, 2009).

Furthermore, the move and behavior change from extrinsic to intrinsic motivation e.g. portfolios for assessment to portfolios for learning is not evident in students and has shown to require change of strategies by teachers. For example the context e.g. the way new activities are presented and communicated to students has shown to be crucial for students’ sense of control. Specifically, studies have found that students find the transition to student-directed education problematic (Van Tartwijk & Driessen, 2009), and it is therefore necessary with hands on training e.g. skills training to help students to enhance their sense self-control with new activities. Sense of self-control has been shown by Deci et al. (2001) to be vital for motivation and students perception of meaningfulness. Moreover, this perception is closely linked to self-regulation and students beliefs about their academic capabilities such as; attaining designated goals (Deci, et al., 2001), in addition, the quality of goal-setting strategies has been shown to facilitate self-regulation skills better (Chang, Tseng, Liang, & Liao, 2013). Hence, a key role for lifelong learning is self-regulation skills and strong beliefs about ones achievements which can also be viewed as the degree of self-efficacy.

Furthermore, self-efficacy has been shown to be a strong predictor of students’ motivation and learning even stronger than outcome expectancies. Self-efficacious students have been shown to participate more readily, work harder, persist longer and have fewer adverse emotional reactions when they encounter difficulties” (Zimmerman, 2000). This is a key

issue for academic achievement e.g. professional development and the development of metacognitive skills which is in turn is vital for being a self-regulated lifelong learner. Moreover, evidence has shown that students who judge themselves as more capable also set more challenging goals for themselves (Zimmerman, 2000).

To sum up “*to be meaningful*” and “*the changes of roles*” the purpose of the learning portfolio e.g. how well the portfolio is motivated to improve student learning was found both in this study but also in other studies to be essential to motivate not only students to accept and use portfolios but also teachers (Heinrich, Bhattacharya, & Rayudu, 2007; Van Tartwijk & Driessen, 2009). The use of learning portfolios demands not only a great deal of extra time and effort from the students but also a move from extrinsic to intrinsic motivation. Other studies have shown that students’ motivation decreases if their effort is not rewarded, by for example assessment or grades. On the contrary, some studies have shown the opposite e.g. when the portfolio was assessed and mandatory students considered the activity tiresome and wanted it only to be encouraged for personal use to support lifelong learning (McAllister, Hallam, & Harper, 2008). All together this shows the complexity of this issue and calls for a comprehensive view of learning as for example Illeris model when preparing implementation of learning portfolios but also how teachers best can support this process e.g. what new skills do teachers need to develop to manage student-centered learning. Furthermore students’ self-efficacy and sense of control seem to be crucial aspects as well as the quality of goal-setting. To facilitate students skills for goal-setting deliberate practice has shown good evidence as a strategic method not only to facilitate professional development and improved achievements but also in how challenging goals students set for themselves (Ericsson, 2008).

“*To develop skills*” comprised both the acquisition of skills for learning and technology skills for managing the E-portfolio format. Skills is one of the key components for effective reflection and insufficient skills has been shown to lead to exercise drop-out and decreased self-efficacy (Sandars, 2009). The results from this study support the need for skills training in students in form of; active teacher feedback and support on learning activities, development of self-assessment skills on artifacts and skills for writing reflections preferably guided by teachers. These were also shown to be vital facilitators for students’ abilities for knowledge sharing, innovation, acquisition, application and accumulation. Furthermore, these processes have also been reported in studies to need deliberate, consistent training, support and feedback in order to promote lifelong learning and the maintenance of the portfolio.

Parallel to learning strategies the technology skills were reported as either the main barrier for maintenance of the E-learning portfolio or as a strategy to strengthen self-efficacy in students. The Use of E-learning portfolios compared to paper portfolios differ in the perspective that they are student owned and demands technological skills to manage. The results from this review showed that students in general need comprehensive technological support in the startup process of the E-learning portfolio but also ongoing support throughout the process. Technological problems were reported in several of the studies to inhibit motivation and to reduce the use of the portfolio, thus in the studies where effective support were given to students increased self-efficacy and greater motivation and value of the portfolio was reported among students. Even though E-learning portfolios require more resources in terms of staff support they have many advantages over paper portfolios. E-portfolios facilitate not only students' lifelong ownership, learning and management of the portfolio but also interactions between students, sharing, connection, feedback and possibilities to bridge the gap between theory and practice.

Lastly, the sub-theme "*strategy of learning*" revealed that there is a need for learning portfolios to be embedded in the curriculum to support professional development and lifelong learning. This is also consistent with other studies that have found that lifelong learning is supported if the portfolio is incorporated in the curriculum together with good planning (Cambridge, 2008) (Turhan & Demirli, 2010). However, embedding the portfolio is not enough to ensure that graduates are able to articulate what they have learnt or to form professional development. For this to happen as stated by Faulkner et al (2013) "challenging reflective activities are needed with formative feedback from staff, peers or professional mentors who can encourage and support the development process needed" (Faulkner, et al., 2013). However, the role of feedback for transfer of learning must be taken into consideration. Not all feedback has proven successful e.g. motivation will only increase and support transfer of training if students perceive the feedback as helpful and appropriate (Van den Bossche, Segers, & Jansen, 2010).

Hence, introducing E-portfolios for learning is not only about implementing a new tool, but also a new way of thinking and teaching e.g. a transfer from teacher-directed to student-directed education requiring an educational change and an individual change. A theory that has been widely used within implementation science and highly applicable for learning is Social cognitive theory (SCT). In this theory the interaction between; self-efficacy,

motivation and environmental factors affect behavior changes (Nilsen, 2014). The use of the SCT for implementation of portfolios fits well with the identified facilitators, barriers and mediators for change that were found in this literature review. First of all the role of self-efficacy that seem to be vital for students' academic achievements and its link to motivation to engage in the effort needed and lastly the need of supportive learning environments. In particular the notion that teachers should facilitate learning environments has been in focus lately for students' perception of sense of control and value of tasks. A recent paper by Artino et al (2012) discusses that when students feel that learning activities are out of their control and or is not perceived as valuable to them, it leads to emotions such as boredom. Hence, boredom is related negatively to intrinsic motivation, effort, academic performance and self-regulation to learning (Artino Jr, Holmboe, & Durning, 2012). In addition, a recent study found that motivation to transfer was the linking mechanism for transfer of theory into practice, calling for the need to address motivation in learners (Grohmann, Beller, & Kauffeld, 2014).

Implications for implementing E-learning portfolios are many; hence learning portfolios seem to be a promising way to support not only students' self-assessment abilities e.g. lifelong learning skills but also their ownership of the portfolio by using the E-portfolio format. Thus the use of learning theories such as Illeris comprehensive view of constructivism and theories of change such as the social cognitive theory can aid us in adopting a scholarly approach in guiding us on what to do, why we should do it and why it works.

Methodology

The scientific rigor and trustworthiness of the findings will be discussed in relation to the four dimensions of assessment criteria: credibility, dependability, confirmability and transferability (Miles & Huberman, 1994).

Credibility

Credibility is related to validity – used in quantitative research to estimate and value whether the tool measures what it claims to measure- and refers to queries made to establish the truth-value of the findings. A credible research study should demonstrate that appropriate questions were used and critically reflect on both content and the role of the researcher. For a qualitative study question of credibility will address “how well data and processes of analysis

address the intended focus” (Graneheim & Lundman, 2004). For this study the following strong and weak points have been identified in terms of credibility:

- + Findings linked to theory and prior research in peer-reviewed articles
- + Method section clearly outlined the analysis process
- + An extensive analysis process was used
- + Triangulation of analysis
- Study did not explore possible sources of publication bias
- the search process was not systematic and therefore the selection of publications may be biased
- A single author performing the analysis is a weaker design compared to a research team in the analysis process

Dependability

Dependability refers to the adaptations and new inputs obtained during the analysis and that the research process was consistent. Dependability of a study depends on factors such as saturation of content, whether data was collected from an appropriate setting and whether there were clear research questions (Miles & Huberman, 1994). The following strong and weak points in relation to dependability were identified:

- + On-going analysis and interpretation of findings throughout the study
- + Study used an appropriate theoretical framework as guidance
- + The process of analysis was clearly described
- Study based on literature review; in-depth qualitative interviews might give a more thorough understanding of the phenomena

Confirmability

Confirmability refers to the neutrality of the study. The essence of confirmability is that the author should outline the content analysis in a clear and comprehensive way in order for the reader to be able to interpret the results in a reasonable similar way (Miles & Huberman, 1994). In other words, is it possible to conduct a similar study and arrive at similar results? The following strong and weak points in terms of confirmability were identified for this study:

- + All included studies are described in detail (in appendix 1)
- + The search strategy and keywords are outlined in detail in the methods section
- + Use of method to show that the results come from data and not from personal opinions or preconceptions
- The pre-understanding and pre-knowledge of the author are likely to influence the result

Transferability

Transferability is about applicability and relevance of the research findings, and hence has many similarities to generalizations often used in quantitative research. Transferability involves describing the setting of the study and communicating the essence to the reader. If

the findings are logical and conceivable to others, then they will be able to decide whether the findings are relevant in other settings and contexts (Miles & Huberman, 1994). The following strong and weak points were identified:

- + Findings in the study are linked to previous findings and knowledge base.
- Included studies were not rated or assessed according to study quality (which is paramount in systematic reviews).
- An overwhelming majority of selected studies are from the Western, English-speaking world. The transferability of the findings to a Swedish or non-english context is uncertain.
- The type of students in the selected studies varied in terms of education, age and country of origin and might not be fully transferable to other context, especially outside the student context.

Summary of strengths

The strengths of this study are that the results build on, and are in line with, previous research; that the search strategy is clearly outlined; and that the selected articles are well described. Another strength is the use of a method for content analysis.

Summary of limitations - bias of the study

The strongest limitations in this study are; firstly, the study was based on a thorough but unsystematic review. An unsystematic literature review does not meet the rigor of a systematic review and therefore the results can only be said to give a snapshot of the topic under investigation. Secondly, a single author conducted the analysis and the quality of the included studies was not assessed. This provides a weaker design than if it had been conducted by a whole team. The whole team approach is less biased because they can evaluate the analysis and conclusions of each other (Polit & Beck, 2012). Moreover, in terms of robustness as described for the process of the narrative review approach, the strength of the evidence should be assessed i.e. the relationship of synthesis to research questions. In this perspective, the main limitations are: studies with the strongest designs were not given higher importance; the evidence was not weighed; primary authors were not involved or contacted and critical tools were not used to value the studies.

Conclusions

The findings from this literature review showed that learning portfolios in E-portfolio format are promising and can be effective in supporting and improving student learning e.g. lifelong learning and professional development if they are thoroughly implemented, supported with high quality feedback and training to students, well anchored e.g. motivated among both staff and students. However, there is still a need of more studies in this area exploring the effectiveness of E-portfolios on student learning, hence students and teachers' perceptions of portfolios have been extensively researched so far while less is known on the actual effectiveness of learning portfolios. Moreover, the implementation of E-portfolios for learning is complex and comprehensive requiring not only dedicated teachers but also an educational change comprising both contextual and individual changes; hence this process should preferably be underpinned by theories for learning, change and implementation. Finally, E-technology cannot be ignored as an essential tool for student learning, nor the notion that student learning takes place in various contexts whereof formal settings are no longer the only or main context. For higher education to stay abreast with the rapid technological development, the implementation and use of e-learning tools such as E-portfolios for student learning is of utmost importance.

Acknowledgements

I would like to thank the faculty of the masters' programme in medical education at Karolinska Institutet for a great programme, your dedication and support, in particular programme director Charlotte Silén. I would also like to thank Teresia Nyman who is the programme director of the master's programme "Work and Health at Karolinska Institutet" who made it possible for me to carry through this project and my supervisor Juha Nieminen. Thank you.

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Appendix 1.

Nr	Author, Year, title, land of origin, journal	Aim	Method	Sample	Results
1	Van Schaik, S. Plant, J. O'Sullivan, P. <i>Promoting self-directed learning through portfolios in undergraduate medical education: The mentors' perspective.</i> (USA)Medical Teacher (2013).	To examine how portfolio mentors perceive and approach self-directed learning	Semi structured interviews	Faculty (n=8)	1. The portfolio brings structure to students SDL activities and to the mentor-student relationship, it helps with; self-assessment, reflection and skills to become lifelong learners. Should be learner driven 2. Students level of engagement is variable, some don't value the portfolio- sees it as something to get over with, lack of fit to education.
2	Vance, G et al. <i>Evaluation of an established learning portfolio.</i> (UK) ClinTeach (2013).	To establish how current trainees evaluate portfolio-based learning and ARCP (annual review of competence progression) and how these attitudes may have changed since the programme was introduced	Electronic questionnaire, baseline 2005 follow up 2009.	Students 111 of 372 (30%)	Many students view the e-portfolio largely negative and are not convinced about the educational value. They understand how to use the portfolio but not how much or what to collect; they also perceived too little guidance from supervisors. The portfolio was not seen as supporting learning or identifying strengths and weaknesses.
3	Chang, C et al. <i>Using e-portfolios to facilitate university students' knowledge management performance: E-portfolio vs. non-portfolio.</i> (Taiwan) Computers and Education (2013).	To investigate whether e-portfolios enhance university students knowledge management performance (KM)	Quasi-experimental design. One experimental group and one control group. Both quantitative and qualitative data were analyzed.	Students (88)	Overall the experimental group outperformed the control group on all the measured aspects; knowledge, sharing, innovation, acquisition, application and accumulation. E-portfolios had the greatest effect on knowledge innovation and the most important aspect were teacher feedback and self-assessment on artifacts. Also writing reflections showed to be a great facilitator for KM performance
4	Garret et al. <i>Evaluation of an eportfolio for the assessment of clinical competence in a baccalaureate nursing program.</i> (Canada) Nurse Education Today (2012)	To capture student and instructor experiences in using an eportfolio for the assessment of clinical practice and explore their perceptions of the value of this tool and it's potential to enhance learning.	Survey; Mixed-method Survey and focus group interviews (FGI)	Students (n=36), clinical instructors (n=18), Students (n=10), CI (n=8)	Instructors were of high agreement that the eportfolio was an effective way to assess clinical performance and to monitor progression and achievement (only 5.6% disagreed) and students were of lower agreement (28% disagreed) and more divided in their opinions. The findings indicated that for eportfolios to enhance learning there is a need for careful and structured implementation, standardization and acceptance of approach by both the faculty and students. T
5	Wheeler, A., & Yeats, R.M. <i>Embedding ePortfolios for effective lifelong learning: a case study.</i> European e-learning conference,	To investigate whether user engagement will be enhanced by embedding e-portfolio use into the curriculum.	Case study; 3 groups; 1= lowest (12) 2= full access and training, formative assessed (21)	Students (n=48)	Group 2 was significantly more engaged in all activities compared to group 1 and 3, findings suggests that eportfolios must be made meaningful to learners with clear links to learning and they need to be encouraged to use it particularly in the initial stage of its

	(UK) October (2009)		3= like groupe2 but summative assessed.		introduction. The study indicates that if the e-portfolio is incorporated into the curriculum it can directly promote autonomous learning which can increase lifelong learning.
6	Dopp, A. L. et al. A five-state continuing professional development pilot program for practicing pharmacists(US) American Journal of Pharmaceutical Education,2010	To determine whether a structured educational intervention would support pharmacists' utilization of a continuing professional development model compared to control subjects.	Prospective randomized observational case-control study	Students (n=57(28 study, 29 control))	The results show that the study group were more likely to use structured self-assessment tools to identify their strengths and areas of improvement compared to controls, also more deliberate appraisal of their professional practice, and study group were more prone to use and develop learning objectives (SMART) to develop learning plans and identify activities that would help them achieve goals and how to evaluate these. Overall the study showed that deliberate, consistent training, support and feedback can promote lifelong learning and maintenance of a personal portfolio.
7	Davis, M. H. Ponnampereuma, G. G.Ker, J. S. Student perceptions of a portfolio assessment process. (UK) Medical Education (2009).	To identify and analyze students' attitudes to the portfolio assessment process over time.	Survey, questionnaires from 4 sampling periods (1999, 2000, 2002, 2003)	Students (141)	The students perceived that the portfolio supported their learning and heightened their understanding ILO and, enabled reflection. Negative findings were; too little guidance and support for reflective writings, not standardized, time-consuming
8	Oakley, G. Pegrum, M. Johnston, S. Introducing e-portfolios to pre-service teachers as tools for reflection and growth: lessons learnt. (Australia) Asia-Pacific Journal of Teacher Education, (2013)	How pre-service teachers viewed and used their developmental e-portfolios as platforms for reflection and the collection of supporting artifacts included in the portfolio.	Mixed methods; survey and focus group interviews	Students Survey (n= 23) (88%), Focus groups (n= 11)	The purpose of e-portfolios was not clear to all participants, inconsistent messages from lectures of how to use the portfolio and why, the wiki platform was challenging to use for some students e.g. a barrier to success but the workshops on how to use the platform was reported to be useful. The students would have preferred open not private settings for the portfolio. Some students perceived lack of engagement and focus among lectures and insufficient feedback. The guiding structure for reflection was seen as valuable by most student and others saw it as time consuming and tedious.
9	Donnelly, R. O'Keeffe, M. Exploration of eportfolios for Adding value and deepening student learning in contemporary higher education (Ireland) International Journal of ePortfolio (2013)	To explore the holistic and meaningful aspects of using e-portfolios for students learning.	Case study	Master students (n=14)	Data indicate that the e-portfolio as a tool facilitates continuous growth and learning in students and that awareness and understanding of creativity is necessary to nurture creative and critical thinking abilities. Further, students need active support and guidance in the implementation of e-portfolios.
10	Welsh, M. Student perceptions of using the PebblePad e-portfolio system to support self- and peer-based formative assessment.	To monitor the implementation of an innovative course redesign in which the PebblePad e-portfolio system was used as the	Action research; descriptive analysis of questionnaires with both statements and	Students (n=115 (72%))	The pebblePad (e-portfolio system) played a crucial role in supporting the process of self- and peer based formative assessment. Half of the students reported that the goals were clear to them with the system, 72%

	(UK) Technology, Pedagogy and Education (2012).	medium to support the introduction of self- and peer-based formative assessment.	open ended questions		reported that group tasks supported their learning and 76% that the individual task did so, 76% were happy to share the portfolio with other students and 43 % did not want it open for staff. Both spoken and written feedback from both peers and staff were regarded helpful from most students but expressed a need to discuss written feedback. 76% found the PebblePad easy to use but 69% did not enjoy it
11	Ring, G. Ramirez, B. <i>Implementing E-portfolios for the assessment of general education competencies.</i> (USA)International Journal of e-portfolio (2012)	To examine the implementation process of the e-portfolio program by taking a detailed look at the rationale behind implementation.	Descriptive paper; by using informal discussions between students and faculty on implementation, feedback, mentoring, assessment and support on the e-portfolio	Students and faculty	The e-portfolio is an active part of student learning, changes in the curriculum based on the portfolio program, faculty members have revised syllabus and course assignments based on portfolio experience to better support students. Challenges to solve are; clarity of purpose, motivation and use of technology, how to satisfy needs of all stakeholders better, how to get professors to value the program and thereby getting more students to value it better
12	Wolffe, R et al. <i>Portfolio As A Teaching Method: A Capstone Project To Promote Recognition Of Professional Growth.</i> (USA) Journal of College Teaching & Learning (TLC). (2013)	To promote recognition by teachers completing the program about their professional and personal changes experienced and to provide program evaluators additional qualitative data regarding program goals.	Qualitative; analysis of students narratives	Students (n=20)	5 overarching themes; 1. Strategies to improve learning, 2. Importance of reflective practice, 3. Role as a leader, 4. Dedication to lifelong learning, 5. Confidence in being an effective professional educator. The process of developing a portfolio gave rich data for the educators about the students' personal growth, reflective process and changes in professional disposition.
13	Cheng, G, Chau, J. <i>Exploring the relationship between students' self-regulated learning ability and their e-portfolio achievement.</i> (Hong Kong)The Internet and Higher Education (2013).	To evaluate student's use of learning strategies and their scores in e-portfolio activity.	Survey, questionnaires	Students (n=26)	Higher order cognitive skills; elaboration, organization, critical thinking and metacognitive control strategies; self-regulation and collaborative learning strategies; peer learning were positively correlated with e-portfolio achievement of participants; moreover students should be equipped with SRL strategies to successfully benefit from e-portfolio activities.
14	Pincombe et al. <i>portfolio in midwifery practice: "the way of the future".</i> (Australia) Women and Birth (2010).	To develop, implement and evaluate an e-portfolio for the Bachelor of Midwifery at UniSA.	Action research; observations, questionnaires and face-to face interviews	Students (n=39)	Overall findings is that the students considered the portfolio a valuable record of their experience, it provides students with an authentic record of achievement, proof of their competency and final summary of their learning journey, it also enhanced the ability to reflect and consolidate their understanding. Suggested improvements; a need for a means of validating the practice experiences and the ability to enter details for each

					practice experience.
15	Woodley, Carolyn Sims, Rob. <i>E-portfolios, professional development and employability: some student perceptions.</i> (Australia) International Journal of Information and Learning Technology (2011).	To explore students views about using e-portfolios and to what extent students present e-portfolios to prospective employers in applying for jobs	Survey; online questionnaire mixed with closed and open-ended questions	Students (n=60 (10%))	Polarized views on the importance of having an e-portfolio to showcase employability and 56% reported that they would not show their portfolio. 60 % of the students reported the Pebblepad as a useful tool but 40% did not. Only 37% were positive of the use and relevance of the e-portfolio for assessment.
16	Wakimoto, Diana K Lewis, Rolla E. <i>Graduate student perceptions of e-portfolios: Uses for reflection, development, and assessment.</i> (USA) The Internet and Higher Education (2014).	To explore graduate students perceptions of the value of creating e-portfolios and ways of improving the e-portfolio process.	Survey with both quantitative and qualitative questionnaires	Students (n=70)	Overall the students found e-portfolios to be useful in reflecting on their competencies e.g. becoming reflective practitioners by seeing their work as a whole enabled students to see their growth, moreover, students can gain confidence in using technology if implemented carefully with hands-on training. The following improvements should be made; more explicit instructions for reflection, introducing e-portfolios early with students
17	Alexiou, A, Paraskeva, F. <i>Enhancing self-regulated learning skills through the implementation of an e-portfolio tool.</i> (Greece) Procedia - Social and Behavioral Sciences (2010).	To explore the potential of e-portfolio to support self-regulated learning e.g. examining the process, the content and the tool.	Survey; evaluation using data from several questionnaires.	Students (n=41)	39 of the 41 students successfully completed all activities, overall the feedback from the students were positive. Data indicated that higher levels of cognitive factors are associated with higher levels of motivational and affective factors across all phases of self-regulated learning and e-portfolio implementation.
18	Klenowski, V, Askew, S, Carnell, E. <i>Portfolios for learning, assessment and professional development in higher education.</i> (UK). Assessment & Evaluation in Higher Education (2006)	To gain insights into how a portfolio for learning can be used in higher education to develop understanding into one's own learning, assessment and professional practices.	Case-study using data from; participant observation, documents (portfolios) course evaluations, questionnaires and interviews.	Students Interviews (n=16)	A learning portfolio needs to have an internal coherence, providing evidence of learning, something that the learner constructs rather than is dictated externally. It also needs to be seen as a generative process extending students learning rather than being a collection of unconnected thoughts. Students became more aware of the learning process, felt more creative, empowered and confident of their understanding, moved from being intuitive to being more explicit and felt more able to support others learning and therefore portfolios is an effective form of professional development.
19	Oner, D, Adadan, E. <i>Use of Web-Based Portfolios as Tools for Reflection in Preservice Teacher Education.</i> (Turkey). Journal of Teacher Education (2011).	To examine the use of web-based portfolios for developing reflective skills among science teachers and whether high-level reflective indicators	Exploratory mixed-method design	Students (n=19)	The findings suggested that the students demonstrated high- and low-level reflective skills and there was a significant improvement in high-level reflective skills between the first and second round. The students perceived the web-based platform as medium

		increased over time.			
20	Haffling, A, et.al. <i>Students' reflections in a portfolio pilot: Highlighting professional issues.</i> (Sweden). Medical Teacher (2010)	To investigate whether students' reflections include sufficient dimensions of professional competence, notwithstanding a standardized portfolio format and to evaluate students' satisfaction with the portfolio.	Qualitative	Students (n=35)	The study showed good evidence of the students learning process and a wide variety of dimensions of professional competence through the nature of the reflections. The findings also suggested integration of the cognitive, affective and practical dimensions of professional competence.
21	Altahawi, F et.al. <i>Student perspectives on assessment: Experience in a competency-based portfolio system.</i> (USA). Medical Teacher (2012).	To gain insight into the strengths and weaknesses of a competency-based assessment system	Qualitative	Students (n=4)	Continuous feedback allows students to monitor their performance, writing portfolios based on feedback engaged the students in assessing their own performance.
22	Chang, C. C. Tseng, K. H. Liang, C. Chen, T. Y. <i>Using e-portfolios to facilitate university students' knowledge management performance: E-portfolio vs. non-portfolio.</i> (Taiwan). Computers and Education (2013).	To use e-portfolios to enhance students' knowledge management (KM) performance.	RCT	Students (n=88)	The experimental group outperformed the control group in the performances of overall KM and five KM aspects(knowledge sharing, innovation, acquisition, application, and accumulation)
23	Boulton, H. <i>ePortfolios beyond pre.service teacher education: anew dawn?</i> (UK). European Journal of Teacher Education (2014).	To demonstrate the efficacy of using e-portfolios to engage career skills for newly qualified teachers.	Case study	Students (8)	The e-portfolio supported self-regulation skills in terms of goal-setting, self-evaluation and self-efficacy. E-portfolios need to be embedded in the curriculum in order to support professional development and lifelong learning.

Appendix 2.

Research questions (RQ)	Explore the role of learning portfolios for lifelong learning and professional competence development.	Explore facilitators' perceptions of learning portfolios and its barriers and facilitating factors.	Explore students' perceptions of learning portfolios and its barriers and facilitating factors
	<p>Portfolios facilitates the development of skills to be self-life-long learners (1, 9, 18, 20, 23)</p> <p>Give structure and content to student –tutor meetings (1,7, 9)</p> <p>Useful to understand professional strengths and weaknesses and reflect on competencies (16, 18, 20)</p> <p>Supports self-assessment & reflection in learning and understanding of learning processes (7, 10, 12, 14, 18, 20, 23)</p> <p>Limited effect on SDL (10)</p> <p>A format to place, store, structure and show what you have learned (1, 7, 9, 11, 14, 15, 16, 18, 19)</p> <p>Portfolio users performed significantly better than control group regarding knowledge management (3, 19)</p> <p>Feedback, reflection and self-assessment great effect on student performance (3, 10, 19)</p> <p>Facilitates lifelong learning if embedded in the curriculum & introduced early in a programme (6, 11, 15, 23)</p> <p>Using e-portfolio as a learning strategy develops reflective learning cognitive strategies and self-regulation (7, 13, 14, 17, 20, 23)</p> <p>Facilitates professional competence (20, 23)</p> <p>e-portfolio use lead to changes in the curriculum and student centered learning(11, 18)</p> <p>Increased self-efficacy (9, 12, 18)</p> <p>Higher-order cognitive skills linked to level of achievement (9, 13)</p> <p>Activated creativity, energy and motivation to learning(9, 18)</p> <p>Facilitate students ability to support peers and learn from peers(18, 19,20, 23)</p> <p>Facilitated deep learning(20, 23)</p> <p>High achievement students use Peer learning strategies more (13)</p>	<p>Essential to get familiar themselves before introducing to students(16)</p> <p>Shift from being the expert to a guide and facilitator (18)</p> <p>Dialogue between tutor and learner is the key to success(18)</p> <p>Extensive expert feedback needed in the process of developing reflective disposition(19)</p> <p>Careful implementation process (training & acceptance) essential for s successful the result (4, 6, 8, 11, 15, 16, 23)</p> <p>feedback, reflection & discussion - explicit guidance needed (2, 7, 8, 10, 16, 18, 19)</p> <p>should be learner driven (1, 6, 9, 18, 23)</p> <p>Essential to teach students how to select artifacts and reflect on learning (9, 11, 13, 14, 16)</p> <p>Reflection requires facilitation and training to be successful (1,7, 8, 18, 19)</p> <p>Shift from transmission of content to constructivist approach(18)</p> <p>A model for reflective practice is needed(19)</p>	<p>Time-consuming (negative motivation), (1, 2, 4, 7)</p> <p>Uncertainty of how much and what to include (2, 7, 8, 10)</p> <p>Better training needed(4)</p> <p>Valuable to see the work as a whole(16, 23)</p> <p>Must be made meaningful with clear purpose and links to learning (2, 5, 11, 18,23)</p> <p>Portfolio interfere with clinical practice (7)</p> <p>Technology a challenge (8, 23)</p> <p>Give confidence in using technology(16, 18)</p> <p>Unclear assessment criteria (3, 10)</p> <p>Flexibility in the design increases usage and ownership of the portfolio after graduation(11, 14, 16)</p> <p>Shifts focus from right and wrong thinking to process thinking(18, 20)</p> <p>Evidence of learning constructed by the learner with internal coherence(18)</p> <p>Valued the e-portfolio (9, 14, 19)</p> <p>Equivocal view if all work should be available (10)</p> <p>Confidentiality and privacy important (18)</p> <p>Negative or uncertain view of the value of portfolios (2, 3,14, 15)</p>

Appendix 3. (UoM in red are barriers)

To be meaningful	To develop skills	To develop expertise	The changes of roles	Strategy to learning
<i>"the purpose of e-portfolios was not clear to all participants and inconsistent messages from lectures" -8</i>	<i>"did not know how to use the e-Portfolio, too little guidance and support" - 2</i>	<i>"the e-portfolio facilitated reflection on professional practice in relation to the competencies that had been developed" - 16</i>	<i>"The relationship between tutor and student become more equal e.g. feedback is not a gift but rather a "dialogue" between the two" - 18</i>	<i>"If embedded from the start in the curriculum the e-portfolio facilitates lifelong learning" - 6</i>
<p><i>Time-consuming (negative motivation), (1, 2, 4, 7)</i></p> <p><i>Portfolio interfere with clinical practice (7)</i></p> <p><i>Unclear assessment criteria (3, 10)</i></p> <p><i>Must be made meaningful with clear purpose and links to learning (2, 5, 11, 18,23)</i></p> <p><i>Careful implementation process (training & acceptance) essential for a successful result (4, 6, 8, 11, 15, 16, 23)</i></p> <p><i>Useful to understand professional strengths and weaknesses and reflect on competencies (16, 18, 20)</i></p> <p><i>Valued the eportfolio (9, 14, 19)</i></p> <p><i>Negative or uncertain view of the value of portfolios (2, 3, 14, 15)</i></p> <p><i>A great format to place, store, structure and show what you have learned (1, 7, 9, 11, 14, 15, 16, 18, 19)</i></p>	<p><i>Technology a challenge & barrier (8, 23)</i></p> <p>Gives confidence in using technology (16, 18)</p> <p>feedback, reflection & discussion - explicit guidance needed (2, 7, 8, 10, 16, 18, 19)</p> <p>Extensive expert feedback needed in the process of developing reflective disposition(19)</p> <p>facilitators must get familiar themselves before introducing to students(16)</p> <p>Essential to teach students how to select artifacts and reflect on learning (9, 11, 13, 14, 16)</p> <p>Reflection requires facilitation and training to be successful (1,7, 8, 18, 19)</p> <p>A model for reflective practice is needed(19)</p> <p><i>Uncertainty of how much and what to include (2, 7, 8, 10)</i></p> <p>Better training needed(4)</p>	<p>Increased self-efficacy (9, 12, 18)</p> <p>Higher-order cognitive skills linked to level of achievement (9, 13)</p> <p>Activated creativity, energy and motivation to learning(9, 18)</p> <p>Facilitate students ability to support peers and learn from peers(18, 19,20, 23)</p> <p>Facilitated deep learning(20, 23)</p> <p>High achievement students use Peer learning strategies more (13)</p> <p>Portfolio users performed significantly better than control group regarding knowledge management (3, 19)</p> <p>Feedback, reflection and self-assessment great effect on student performance (3, 10, 19)</p> <p>Facilitates professional competence (20, 23)</p> <p>Portfolios facilitates the development of skills to be self-life-long learners (1, 9, 18, 20, 23)</p> <p>Supports self-assessment & reflection in learning and understanding of learning processes (7, 10, 12, 14, 18, 20, 23)</p> <p><i>Limited effect on SDL (10)</i></p>	<p>Shift from transmission of content to constructivist approach(18)</p> <p>Dialogue between tutor and learner is the key to success(18)</p> <p>Shift from being the expert to a guide and facilitator (18)</p> <p>Give structure and content to student –tutor meetings (1,7, 9)</p> <p>should be learner driven (1, 6, 9, 18, 23)</p>	<p>Flexibility in the design increases usage and ownership of the portfolio after graduation(11, 14, 16)</p> <p>Using e-portfolio as a learning strategy develops reflective learning cognitive strategies and self-regulation (7, 13, 14, 17, 20, 23)</p> <p>Evidence of learning constructed by the learner with internal coherence (18)</p> <p>Valuable to see the work as a whole(16, 23)</p> <p>e-portfolio use lead to changes in the curriculum and student centered learning(11, 18)</p> <p>Shifts focus from right and wrong thinking to process thinking (18, 20)</p> <p>Facilitates lifelong learning if embedded in the curriculum & introduced early in a programme (6, 11, 15, 23)</p>