ePortfolio introduction: Designing a Support Process

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Abstract. As a result of innovations within the computer field, educational content changes continuously. The constant change can make it challenging for some students to understand what competencies they have gained. Relevant literature indicates that ePortfolios can help students gain awareness of competencies if given technological - and pedagogical support. The potential benefits of ePortfolios are the motivation behind the research questions: What types of support do students need when developing an ePortfolio for the first time, and how should the support be designed to make students independent when developing ePortfolios? Data is collected by observation and analysis of four student assistants' reflection notes on the experience of developing ePortfolios for the first time. The finding shows that the identified support process was appropriate but needs some adjustments to make students able to develop ePortfolios without further support from teachers or others. The support process identified and explored in this study will be customized based on the findings. Subsequent studies will try out the customized support among a larger group of students.

Keywords: ePortfolio, Competence, Implementation, Promotion, Support.

1 Introduction

ePortfolios provides students with a place to collect examples of work experiences and reflecting on those examples and what they represent. The content in ePortfolios may include text, images, video, and sound. The artifacts and the associated reflections are evidence of achievement and demonstrate skills, competencies, or learning acquired from education, training, or work experience [1]. Moreover, the opportunity to present this information in digital format makes the previously unseen visible to students and employers alike [2].

Several authors indicate that ePortfolios can be used as a tool to make competencies more visible for students because ePortfolios creates self-awareness [3, 4, 5], and demonstrate student development over time [6, 7]. However, ePortfolio implementation takes time and increases teachers' workload due to the support students need when first introduced to the tool. Most teachers do not have time to put in the necessary effort, and it is recommend that further empirical research on this topic incorporate approaches that do not require as much time and effort from the teachers [8]. Lack of time to implement ePortfolios is one of the most significant barriers to the use of ePortfolios in

classes [4]. Further, Pool et al. [9] point out that challenges to ePortfolio implementation need to be explored and addressed before effective integration can take place [9].

In this paper, we will explain and examines types of support students need when developing ePortfolios for the first time. The purpose is to identify what kind of support students need and develop a support process that may save teachers and university time when implementing ePortfolios. The methodology chosen for this research is an exploratory case study and is the first cycle in a broader action research. As this is an exploratory case study, a small group of students has participated in this study. Based on the study's findings described in this paper, the support will be customized and lanced in a whole class in proper courses in subsequent studies. Therefore, this research is in line with what is recommended by Poole et al. [9] - addressing challenges before the integration of ePortfolio.

2　Review of literature

2.1　Technological considerations

A survey conducted by Blevins and Brill [4] revealed that the ePortfolio technology system's design was the top barrier to ePortfolio use, and that that the students wanted more flexibility in the design of their ePortfolio then ePortfolios in Learning management systems (LMS) provides. The survey showed that students prefer to use tools such as Google and iWeb. Therefore, the university decided to use Google Apps in addition to LMS. All the students were given a Gmail account and had access to Google Docs. Besides, the university implemented a zero-credit class where students watched two video modules. The videos helped them create their Google Sites page and practice adding artifacts. In this class, they also tried to help students reflect on their experiences [4]. Class sessions seem to be a method often used when implementing ePortfolios for providing students technological instructions and training [1, 5, 8, 9].

A study done by Tosh et al. [10] on ePortfolio and challenges from the students' perspective reveals that the biggest technology-related problems for students included lack of control, lack of features, and lack of access or permission. In turn, such shortcomings can lead to students becoming less motivated to develop ePortfolios [10]. Shroff et al. [11] find that students get motivated when they perceive the ePortfolio system easy to use and nearly free of mental effort, which may also create a favorable attitude towards its usefulness. Whether the students perceive the ePortfolio as easy to use and nearly free of mental effort will depend a lot on how the support is designed and whether it is adequately addressed to the students' needs [11].

2.2　Pedagogical considerations

The Learning outcomes and Competence. Most ePortfolios are developed with a focus on learning outcomes and are described as developmental portfolios [1]. To address the intended learning outcomes teaching and learning activities and assessment tasks and criteria should be aligned to the learning outcomes [12]. The alignment is the fundamental idea of constructive alignment. Constructive alignment is a principle devised

by Professor John Biggs [12] and used for devising teaching and learning activities and assessment tasks that directly address the intended learning outcomes. Higher education institutions in Europe develop lists with statements of intended learning outcomes for each course and program. The list is based on the quality of higher-education agreement called the Bologna Process. The agreement ensures comparability in the standards and quality of higher-education qualifications. Learning outcomes are statements of what a learner knows, understands, and is able to do on completion of a learning process, defined in terms of knowledge, skills, and competence [13].

Unfortunately, the term 'competence' is often used interchangeably with terms like skills and abilities, causing quite some confusion, according to Westera [14]. Kennedy et al. [15] point out that there is a need to avoid confusion when using the term competence by defining it for the context in which it is being used [15].

Frezza et al. [16], defines competence as an integrative function consisting of knowledge elements, a set of skill elements, and asset of disposition element. Disposition is described as the abilities to turn learning into action [16]. Cedefop [17] defines competence as "actually achieved learning outcomes, validated through the ability of the learner autonomously to apply knowledge and skills in practice, in society, and at work" [17, p. 30]. The definitions show that skills and abilities are part of the concept of competence for educational purpose together with knowledge. While knowledge represents facts, procedures, principles, and theories, skills are associated with the mental operations that process this knowledge. When considering abilities, we are somewhat in the sphere of intelligence [15]. Competence related to education is thus understood as applied skills and knowledge, and ePortfolios may make competencies achieved through learning more visible for the students.

Artifacts and reflection. Reflections are central to raise awareness around what is learned [18]. One way of conceptually link reflection and learning is proposed in Kolb's [18] experimental learning theory. In the first stage, the students got a concrete experience which they reflect on in the second stage. The third stage is where experience and reflection are transformed, and the students build or modify their abstract conceptualizations. In other words, they learn from their experience. In the last stage, students use and apply these concepts in other situations and gain new experiences that starts the next learning cycle [18]. Reflection is the "heart" of ePortfolios [8], and according to Kolb [18], reflection is essential for learning. Further, Alexiou et al. [2] describe the process of reflection on artifacts involved in the development of ePortfolios as one that makes invisible learning visible.

In a study by Ring et al. [8], one of the findings is that students participating in ePortfolio instruction sessions with training and support are more capable of articulate what they know and how they know. In one-on-one sessions, students received instructions on ePortfolio technology and asked to complete a draft of their portfolios before participating in these sessions. For the draft, the students used their resumes, academic records, and extracurricular activities as a starting point, and wrote reflections on the potential artifacts to place in their ePortfolio.

Table 1. What, So What, Now What with Guiding Questions [8]

Reflective category	Guiding questions
What?	What did I do? What was the assigned task?
So What?	What did I learn from this experience? What was the importance and/or significance of my discovered learning?
Now What?	How can I use the learning in the future? What am I prepared and equipped to do as a result of this learning experience?

For the reflection, Ring et al. [8] used a What? So what? Now what? model as instructions designed with guiding questions (see Table 1) to help the students to connect past experiences with present understanding and future use or action [8].The instruction was modeled after Kolb's [18] experiential learning theory. The questions cause the students to reflect on what they did and act in a cyclic process in response to the learning situation and what they learned.

Roberts and Maor [19] added the theoretical principle of the model in a gateway as an area of the ePortfolio [19]. The gateway may lead to less work for teachers than the method used by Ring et al. [8], but the results from the research show that the student did not engage in the gateway's content [19].

The What? So What? Now What? model is also very similar to a method used by Janosik and Frank [1]. In sessions, the students received copies of the program's learning outcomes and encouraged to reflect on experience and link the experiences to the learning outcomes. The students were encouraged to reflect on what they had learned and what they could do as a result of the learning. The students also got to see examples of evidence, based on expected achievements listed in the learning outcome [1].

Several authors also recommend providing students with ePortfolio examples [19, 20, 21, 22]. ePortfolio examples enable students to identify the areas they want to highlight in their ePortfolio [20, 22] and may motivate the students because they can explore the possibilities. Motivation is essential when implementing ePortfolios [10, 11, 23]. Lack of motivation may cause the students not to upload their learning material in the ePortfolio. These students often need to be forced through the course content to uploading the learning material because they do not feel that the ePortfolio has any value [23]. Together with motivation, promoting the ePortfolio to students is essential to succeed with ePortfolios. It is through the promotion that students' basic understanding of the value is created [19]. According to Tosh et al. [10], the effect of promoting the e-portfolio to students when introducing ePortfolio cannot be underestimated. Students need to know what an ePortfolio is, how to use one, and, most important, how it may benefit them [24].

3   Research method

The methodology chosen for this research is an exploratory case study and is the first cycle in a broader action research. The principle in action research involves steps in an iterative, cyclical process of reflecting on practice, taking action, reflecting, and taking further action [25].

Four student assistants from the second year of an IT education at the Norwegian University of Science and Technology participated. Four students are a small group, but the study identifies only a first draft of necessary support. The goal was to identify what types of support students need when developing ePortfolios for the first time, and how the support should be designed to make students independent when developing ePortfolios.

Data were collected by observation and reflection notes written by the students after developing ePortfolios for the first time. The observation data were collected in a session that lasted for three hours, where four student assistants were to set up their ePortfolio. The observer took notes to identify challenges and had a participant role [26] where the students were free to ask questions and discuss with each other. In the following three weeks, the students continued working on their ePortfolio. After the three weeks, each student wrote a reflection on their experiences of developing ePortfolio using the support material described in the next chapter. The observation and students 'reflections sought to find answers to what worked and what did not work when it comes to the support that was developed and presented to the students and the students' overall impression of ePortfolios. Portfolios.

The qualitative data, observation notes, and students' reflections were imported into NVivo for coding and thematic analysis, observation notes, and interview transcripts are easily coded in NVivo. The identification of differences and similarities in the collected data, themes, and categories was completed using NVivo constant comparative. Observation notes and reflection notes were compared before clarifying the meaning of what worked and what did not work in relation to the support the students received, as well as links between the challenges and the support material.

3.1   Case

At universities, the students attend, the learning platform (LMS) Blackboard is used, which also offers an integrated ePortfolio. When the students graduate, however, they no longer have access to Blackboard and their ePortfolio. In this study, we have selected Google Sites ePortfolio solution to allow students to continue developing and using their ePortfolio after graduation.

Google Sites offer 10 GB of storage for free, and this is far more than other solutions. The one closest to Google Sites is WordPress, which provides 3GB for free. Google Sites has strong integration with Google Docs and YouTube and allows students to add all kinds of formats as artifacts that do not contribute to the storage limit. This possibility lacks for MyPortfolio, WordPress and FolioSpace. When it comes to ownership and lifelong access, Google Sites is the winner. The ePortfolio is owned by the learner indefinitely, thus encouraging lifelong learning and reflective practice. Google Sites is also easier to learn and use than WordPress. MyPortfolio and Foliospace. Ease of use

is a favorable towards the usefulness of the system and, positively affects the acceptance of Google Sites [22]. Based on the benefits Google Sites holds as described above and the usability and ease of use [11], the ePortfolio solution offered through Google Sites is selected for this research.

The support processes. The session started with introducing the ePortfolio, focusing on promoting the ePortfolio and motivating the students to develop ePortfolio [19, 23, 24]. The students were informed what an ePortfolio is and why the ePortfolio could be of value for them [2, 6, 7, 10]. After the introduction, carried out by the researcher, the students were given a combination of three different types of support material. Figure 1 illustrates the support process and the combination of support material. The students had access to the support material throughout the session and the following three weeks. The introduction was followed up with a tutorial video that explained step-by-step how to set up an ePortfolio with Google Sites. Next, the students were given links to ePortfolio examples, which included one made for this purpose. The ePortfolio made for this purpose was created with Google Sites and contained artifacts and content relevant to IT-education. The ePortfolio consisted of two pages, were the first one introduced the owner, and the second one had a selection of artifacts with associated reflections. The other ePortfolio examples had the same setup but consisted of more than two pages and more detailed information as they were developed throughout a study program.
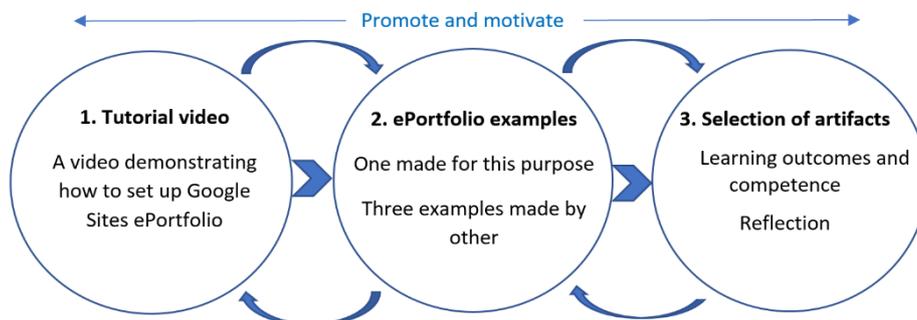

Fig. 1. Support process

Then the students started to build their ePortfolio, and for this, they watched the tutorial video and the ePortfolio examples. The students could design the page the way they wanted. However, a minimum requirement was that it should contain two pages. The first one should consist of a presentation of themselves, and on the second, the artifacts and the associated reflections.

For the selection of artifacts, the document explained how competence listed in the learning outcomes can be linked to the courses and how they can link the work they have done to the competence. This part of the document included three examples with different competencies from the learning outcomes in a course. The document also included the What? So What? Now What? model, described by Ring et al. [8], and an example of an artifact with a reflection.

4 Results

4.1 The introduction

According to the students' reflection notes and the observation, the students were motivated to start developing ePortfolios for the first time. They actively participated with questions during the promotion and was eager to get started. One student asked an open question during the promotion, where the student wondered why they were not informed about ePortfolios in their study program.

However, in one of the students' reflections, it appears that it is uncertain whether the student will continue to develop the ePortfolio:

"*There are very few in the computer industry that uses e-portfolio today. If there is nothing a future employer is interested in, I am unsure if I will continue working on my ePortfolio.*" The other students, on the other hand, perceived the ePortfolio more useful to themselves and pointed out that they would continue develop their ePortfolio after this project. Some comments from the students' reflection notes:

"This is something that all students should be familiar with from the beginning of the education so that it is possible to collect experiences and competencies acquired during the study period continuously."

"This was an amazing experience, the ePortfolio forced me to reflect on what I have done. I have not thought that is useful, but it is and especially when I look for a job after graduation."

ePortfolio technology. The observation revealed that the students actively used the tutorial video and the ePortfolio examples while setting up their ePortfolios. They went back to the tutorial video several times and the ePortfolio examples while setting up their ePortfolios. The usefulness of the tutorial video and the ePortfolio examples and the fact that they had access to this simultaneously as they developed the ePortfolios were also mentioned in one of the students' reflections:

" The tutorial video and the examples helped me a lot at the beginning, and it was useful to have it available so that I could go back and look when I needed to. All in all, I think it is an ingenious and easy-to-manage tool for creating an ePortfolio. The layout is excellent, and it was easy to add new elements to the page."

One challenge occurred when students were to add artifacts. They managed to organize them in a folder in Google Docs, but the artifacts were not visible in the ePortfolio when they signed out of Google. Those who visit the ePortfolio will thus not be able to see the artifacts. No support material addressed this challenge, but the students managed to solve the problem together by discussing and trying out different ways. The observation shows that although the students eventually solved the challenge, it required time and effort. The students' time and effort to solve this challenge were also mentioned in their reflection, and one of the students wrote:

"When we managed to solve it, we found out that it was easy, but it would have saved us time if this was explained in the video or in any of the other supporting material we received in the session."

Competence and artifacts. The students find the document *Selection of artifact*s to be useful when it comes to writing a reflection. Still, the students found it challenging to find work done throughout the education linked to competencies without further support. The students 'reflections and the observation show that it is challenging for them to select appropriate artifacts. In particular, it was challenging without an understanding of the meaning of the term competence. One student pointed out in the reflection that they have many theoretical subjects and that theoretical subjects do not result in any competencies. The observation revealed that the students spent much time discussing what was meant by competence when trying to select artifacts evidencing achieved competencies. Eventually there was a need to explain what was meant by competence so that they would not spend more time of the session to understand the concept of competence. When they finally understood what was meant with competence, the process of selecting artifacts became somewhat easier. All the students argued in the reflections why it was difficult for them to select artifacts. Example from one of the students' reflection:

"*I did not understand what was meant by competence, and therefore it became difficult for me to select work that proved my competencies. It became easier when explained what was meant by competence. Without having it explained, I think it would have been challenging for us.*"

The students did not face any challenges when writing reflections based on the guidance in the document. On the other hand, it is evident from the observation that the students initially did not understand the reflection's purpose. After they had written it, they understood the purpose, and at this point, the student also started to see the value of developing an ePortfolio. As one of the students said*: "I don't think the reflection would have had the same effect if I were to reflect on previous work without putting it together as we did in the ePortfolio.*"

5 Discussion and implications

This study investigates types of support students need when developing ePortfolios for the first time and how the support should be designed to make students independent when developing ePortfolios. The challenge the students faced, the shortcomings of the support the students received and how this may be addressed are discussed in this chapter.

5.1 The promotion

In our study, the students' reflection revealed that ePortfolio promotion has an essential role when it comes to the students' decisions whether to continue developing their ePortfolio through their education. The observation revealed that almost all the students who participated in this research were motivated to start developing their ePortfolio. Only one student was not motivated and this student evaluated the ePortfolio against potential employers' interest, and not one's own value, hence the lack of motivation. There may be several reasons why employers do not ask to see a job seeker's ePortfolio,

such as not knowing this opportunity for students to show what they can. ePortfolio can be shown to a potential employer without being asked for, for example when those who apply for a job are asked about competence or how they have solved challenges. As Alexiou et al. [2] point out, an ePortfolio can make the previously unseen visible to employers. It might be that the explanation in the introduction was too general, and that there was an indistinct distinction between own value and the ePortfolio as a showcase. This may indicate that there should be a clear distinction between students own value of developing an ePortfolio and ePortfolio as a showcase, and that own value should be given more focus. Through the promotion, students' basic understanding of value can be created according to Roberts and Maor [19]. In this paper's research, we found that motivation arises when the students understand the value. Motivation and value are thus two factors that depend on each other, and it will be essential that all the students understand the value when implementing ePortfolio.

5.2   Technological and pedagogical challenges

The students frequently looked at the tutorial video and the ePortfolio examples while setting up their ePorfolios and managed to set them up without further support. Compared to the sessions used by, e.g., Ring et al. [8] with the same goal, the tutorial video, and the ePortfolio examples may lead to less workload for teachers when introducing ePortfolios. The students found the ePortfolio examples useful, and mostly they looked at the one developed for this purpose. When it comes to the tutorial video, the students also found this very useful when setting up the ePortfolio. However, the video did not provide any support when it comes to making artifacts in the ePortfolio visible to visitors. It may be appropriate to add a document in the supporting material that considers the technological challenge. Alexiou et al. [2] recommend that support is guided by both technological and pedagogical considerations. The document *Selection of artifacts* is more of a pedagogical nature. Providing students with two documents, one with pedagogical support and the other with technological support, may create a clear and positive distance between those two. Maybe it can also be an advantage considering the length of the document if operating with one document. Not all students may experience the same challenges. Suppose some students do not meet any technological challenges but find it challenging to select artifacts. In that case, they will not have to read a document that also supports technological challenges and vice versa.

One challenge of a more pedagogical nature occurred when it was time for the students to select artifacts that demonstrated their competencies. Both the observation and the students' reflection revealed that the students did not understand what was meant by the term competence. There may be several reasons for this (e.g., different terms are used in their everyday language), but it became essential to explain for the students the definition of competence. Findings in the study described in this paper demonstrate the importance of defining competence for the context in which it is used, as recommended by Kennedy et al. [15]. The students need to understand what is meant by competence, especially against the student's expectations related to the learning outcome. When they understood what was meant by competencies, it became less challenging for them to select artifacts among their previous work assignments.

The document *Selection of artifacts* support the students well with the writing of reflections. It can be argued that reflection alone with the use of the What? So what? Now what? model towards work carried out in education will lead to the same result as ePortfolios. Our study, however, points to the combination of selecting artifacts, reflecting on them, and putting them together in an ePortfolio as essential. The students who participated in this research point out that this process was what made the invisible visible. This may indicate that the ePortfolios itself supports Kolb's experiential learning theory [18] and takes the theory a step further because of the ability to put experiences and reflections together in a more practical direction.

However, different results may be obtained by a different sample from another field. The students in this research have high experience using computers and using different kinds of digital technology, systems, and applications. This may be a limitation in the research. Students who lack this experience possibly face other challenges than the students in our research. Another limitation may be that the students in this research are student assistants. They are interested in this kind of work and are getting paid for it. One can assume that the enthusiasm these students show is higher than for students who do not receive such incentives. On the other hand, this research is mainly about identifying appropriate support for beginners, and none of the student assistants have previous ePortfolio experience. Finally, a small group of students participated. Therefore, it is essential not to make strong conclusions, whether the results are positive or not. Instead, data from this research should be used to design more extensive confirmatory studies.

6   Conclusion

The goal of this research was to identify what types of support students need when developing ePortfolio for the first time, and how to design the support to make students independent when developing ePortfolios.

Three types of support material were identified through relevant literature as essential: tutorial videos, ePortfolio examples and descriptive documents. Even though the student received such support material, they still encountered some challenges. Three main challenges were identified as not adequately addressed: students' own value of developing ePortfolio, an explanation of what is meant by competence in an educational context, and how to make artifacts visible.

In addition, the support was identified as a process where the promotion is a part of the whole process. In this research, it became clear that promotion is complex and requires the presence of a teacher or others engaged in ePortfolios. Even if the research indicates that students may be capable of developing ePortfolio by using customized support material, motivation is crucial and should not be left to the support material. Another conclusion drawn from this research is that challenges may vary from challenges identified in other similar studies, as this study shows when it comes to students' understanding of competence. The conclusions driven from this research are not strong conclusions, but rather a way of identifying what kind of support students need as a starting point before trying out the support among a larger group of students.

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