How formative assessment using ePortfolio can add value to computer students

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Abstract

This submission is a poster submission that describes an ongoing study. In the study, we examine how formative feedback with ePortfolio can provide value to computer students. The background for the study is related to the pandemic that led higher education institutions to face challenges conducting assessments, the need for more flexible courses in the future to meet the diversity of the student population, and computer education's crucial role in realizing sustainable development.

For computing students, it can be challenging to recognize competencies acquired through the education. The content of higher computing education are constantly changing because of digitalization and the emerging of new technologies (Velden, 2018; European Commission, 2016). The ePortfolio enables students to digitally collect examples of their work, so-called artifacts, reflect on what they represent, and share the ePortfolio with others (Farrell, 2020) . The opportunity to present this information in digital format makes the previously unseen visible to students themselves, teachers and to external audiences (Kuh, O'Donnell, & Schneider, 2017). As the artifacts and the associated reflections are evidence of achievement and demonstrate skills, competencies, or learning acquired from education, training, or work, target audiences such as teachers or employers can assess the student's capacity for graduate study or employment (Janosik & Frank, 2013).

It is challenging to get a full overview of ePortfolio usage at universities in Norway as the term is not consistently used in the literature, and often, the term is used in a broader sense than we do in this study. However, there are several examples of learning management system (LMS) folders. Typically, the course will be in a folder and the course material organized in several sub and sub-sub folders. In this study, we introduce computer science students to the ePortfolio in the LMS Blackboard. Blackboard is the primary LMS used for online, blended and web assisted course at the Norwegian university of science and technology (NTNU). Two undergraduate courses in Collaboration Technology are the source of data for our study. The students in the courses had no previous experience with ePortfolios. The purpose of this study is to examine how formative assessment using ePortfolio can add value to computer science students by exploring (1) How students experience formative assessment with ePortfolio, and (2) what influence their preference with respect to formative assessment method.

The formative assessment provided in this study is based on findings in relevant literature. Formative assessment is about monitoring student progress and providing feedback in the learning process without grading to facilitate students' needs during the task or activity (Black & William, 1998). A primary component in formative assessment is feedback (Gallagher, 2017; Rushton, 2005; Sadler, 2010). Feedback given by teachers should be iterative and with a constructivism approach to ePortfolio in that it affords students with opportunities to demonstrate learning from feedback (Peacock et al., 2011) . The formative assessment process is responsive in the sense that the teacher responds to the assessment of students' prior knowledge by setting intermediate goals, making instructional decisions, and providing feedback and relevant instruction (Sadler, 1989).

The focus in constructivist approaches to ePortfolio is on the developmental process of learning and the act of reflection on learning through the ePortfolio development (Yancey, 2009). In many ePortfolio studies reflection has been given a lot of attention, and there are also examples of reflection models linked to ePortfolios. Ring et al. (Ring, Waugaman, & Brackett, 2017) developed a pedagogical instruction model named the "What, So what, Now what" model, which includes guiding questions intended to make the students think about what they have done, what they learned and

what they are capable of as a result of what they have learned in a professional setting. In a study implementing the model in teaching, the students were asked to write reflections related to the assignments that were given and that addressed the intended learning outcomes (i.e., constructive alignment) (Ring, Waugaman, & Brackett, 2017). Similar reflection models are used by Roberts and Maor, and Janosik and Frank (Roberts & Maor, 2012; Janosik & Frank, 2013).

The view at the constructivism approach takes us to the collaborative nature of learning and group work. *Vygotsky who emphasized the collaborative nature of learning by the construction of knowledge through social negotiation argue that people learn by making meaning through their social dialogue and interactions with their environment* (Vygotsky, 1978).

A qualitative case-study

Two undergraduate courses in Collaboration Technology are the source of data for our study. The courses have a 4-week module on CSCW and digitalization, followed by an 8-week module on user centred design. There are altogether five mandatory assignments. The students work in teams of 3-4 on the assignments, which are handed in and assessed for the group as a whole. Each assignment included an individual reflection part, which was to be entered into an e-portfolio. The e-portfolios would then be the basis of individual assessment (pass/fail) in the course. The students' reflections will be visible to fellow students in the same group. The individual reflection is based on an established approach to reflection (the what- now what- so what model), relating explicitly to achieved competencies and learning outcomes.

After the five assignments, there would be a final, individual exam assignment (pass/fail) for the students with a summative reflect on learning, the reflection activities and use of e-portfolio and other aspects of the course as a whole. The exam was conducted in the digital exam system Inspera Assessment. Due to the COVID pandemic, both courses were conducted completely digitally, which means lectures/teaching sessions (in the campus version of the course) as well as group work took place by the use of digital tools.

In total, 84 students participated in the two courses in Collaboration Technology, and 67 of the students gave informed consent to participate in the study. Three (3) researchers were involved in the project. Two of them were teaching (different modules) in both of the courses. The third researcher, who is the first author, was involved in parts of the courses related to reflection and the use of ePortfolios in assignments and the final exam. The data used in this study were the students' final, individual exam and observation of the students' development of the ePortfolios. The purpose was to follow the students' progression in the development of ePortfolios. The students' individual exam was downloaded from Inspera as PDF and anonymized before being imported into NVivo for thematic analysis and coding by the first author. The data analysis was performed in sequential steps with several levels of analysis (Creswell & Creswell, 2018). To avoid unstructured codes without context, themes were initially identified through a text search query in NVivo. Then the first eight reflections were analysed against the identified themes and used to group associated related codes.

Findings

This study indicates that there are several aspects of formative assessment using ePortfolios that creates value for computer students. The first is that the ePortfolio facilitates self-assessment. The second is that formative assessment with ePortfolio creates a holistic picture of what has been learned and thus makes students aware of achievements.

Four aspects linked to ePortfolio development served as tools for self-assessment: the intended learning outcomes, the formative feedback provided by the teachers, access to fellow students 'reflections and fellow students' feedback from the teachers. The judgments students made concerning their performances were thus augmented with assessments collected from others.

Because the ePortfolio allows content to be visible to fellow students, it opens for two-step self-assessment. Figure 1 shows how the students initially evaluate their achievements against the intended learning outcomes. Then they assessed their work against feedback from the teachers and then evaluated their work against fellow students 'reflections and fellow students' feedback from the teachers.

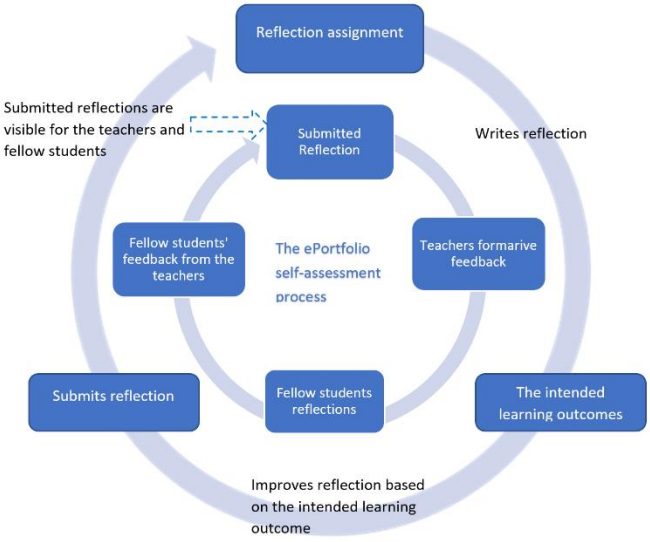

Figure 1 The ePortfolio self-assessment process

Furthermore, the study indicates that the same process helps to develop students' metacognitive skills. By examining their knowledge against the learning outcomes, fellow students' reflections, and feedback, the students became able to reflect on the guidance questions and plan how to approach the following work requirements. The development of the metacognition skill is further confirmed through students' descriptions of how the reflections helped them put into words what they have learned, something they saw as relevant training for job interviews.

All the aspects of the ePortfolio as implemented in these courses can be completed without an ePortfolio. On the other hand, implementing all the aspects mentioned above without an ePortfolio can be very confusing. According to the students, one essential value of the ePortfolio is that it provides a comprehensive overview. While the traditional LMS folder method requires students to navigate in and out of different files to get an overview, the ePortfolio everything gathered all assessments and reflections in one place.

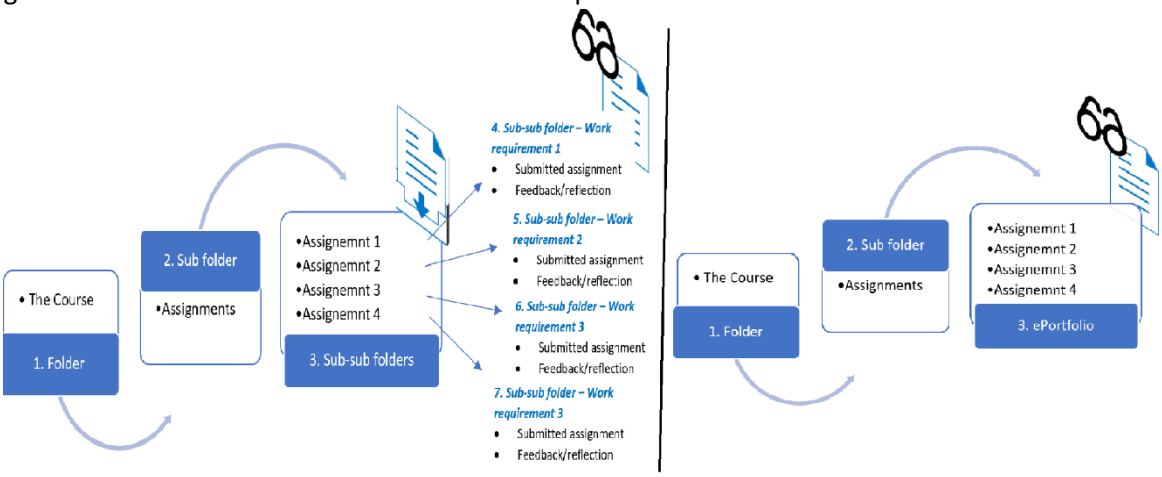

Figure 2 The traditional method in the LMS vs the ePortfolio

Figure 2 illustrates how the traditional method requires students to go in and out of folders, sub folders and sub-sub folders to get an overview, while the ePortfolio has everything gathered in one area.

Conclusion

Several aspects related to the development process of the ePortfolio and the ePortfolio as a product may add value to computer science students. The development process facilitates self-assessment and help students in the development of transferable metacognition skills. As a product the ePortfolio provided students with a comprehensive overview of achievements. The comprehensive overview of achievements is so valuable for the students that they would select the ePortfolio over the traditional LMS folder method even though the ePortfolio increases their workload.

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Abstract

Computer education is crucial for realizing sustainable development. However, many students do not consider their competencies through education which makes it challenging for them to recognize, develop, and evidence their employability.

The ePortfolio enables students to digitally collect examples of their work, so-called artifacts, reflect on what they represent, and share the ePortfolio with others. The opportunity to present this information in digital format makes the previously unseen visible to students themselves, teachers and to external audiences.

This study was designed to examine how formative assessment using ePortfolio can add value to computer science students by exploring (1) How students experience formative assessment with ePortfolio, and (2) what influence their preference with respect to formative assessment method.

Findings in this study show that there are several aspects of formative assessment using ePortfolios creating value for computer students. The first is that the ePortfolio facilitates self -assessment. The second is that formative assessment with ePortfolio creates a holistic picture of what has been learned and thus makes students aware of achievements.

Theoretical background

- Formative assessment: *Black & William, 1998; Cowie & Bell, 1999*
- Formative feedback: *Rushton, 2005; Salder,2010; Gallagher, 2017; shute, 2008;*
  - Self –assessment: *Vygotsky, 1978; Hemdry, Frommer, &Waler, 1999 ; McMillian & Hearn, 2008; Scott, 2017*
- Constructivism approach to ePortfolio: *Paulson & Paulson, 199; Yancey, 2009 Constructive alignment: Biggs, 1996; Adam, 2007; Gallagher, 2017; European Commission/EACEA/Eurydice, 2018*
- Reflection: *Roberts & Maor, 2012; Janosik & Frank, 2013; Ring et al., 2017*

Methods

Two undergraduate courses in Collaboration Technology are the source of data for our study. The courses have a 4-week module on CSCW and digitalization, followed by an 8 -week module on user centred design.
In total, 84 students participated in the two courses in Collaboration Technology, and 67 of the students gave informed consent to participate in the study. The data used in this study were the students' final, individual exam, which was a summative reflection, and observation of the students' development of the ePortfolios.
The purpose of the observations was to follow the students' progression in the development of the ePortfolios. The students' individual exam was downloaded from Inspera as PDF and anonymized before being imported into NVivo for thematic analysis and coding The data analysis was performed in sequential steps in NVivo with several levels of analysis (Creswell & Creswell, 2018).

Findings

Figure 1 The ePortfolio self-assessment process

Figure 2 The traditional method in the LMS vs the ePortfolio

"The ePortfolio provided us with training in how to present what we can to an employer. It will be necessary to communicate to an employer what competencies we have acquired. You also have to get used to talking about yourself in interviews, and I think that students often find it difficult, because we do not normally get training in that through education."

Conclusion

Several aspects related to the development process of the ePortfolio and the ePortfolio as a product adds value for computer science students. The development process facilitates self-assessment and help students in the development of transferable metacognition skills. As a product the ePortfolio provided students with a comprehensive overview of achievements. The comprehensive overview of achievements is so valuable for the students that they would select the ePortfolio over the traditional method even though the ePortfolio increases their workload.