The Functions and Benefits of the ePortfolio in Craft Education at the Primary Level

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Abstract
The authors investigated primary school pupils' experiences using an electronic portfolio in their craft education for a three year period, from the 3rd grade until the end of the 5th grade. This article emphasizes the functions and the benefits of the ePortfolio method and outlines general user experiences based on pupil interviews (N=38), which recounted user experiences from the start of subject teaching in the 3rd grade. Data-driven content analysis with a summative approach was used to analyse these interviews. The results indicate that an ePortfolio (realized through the iPad application, Book Creator) is a workable method in craft education. When the use begins during the early school years, it is experienced as a natural part of the work process. The identified key functions were collection and management of information, communication and verification of development. The experienced benefits were related to supporting the working process; activities documented by the ePortfolio appeared to operate as stimuli to memory and elicited rehearsing of concepts in a way that deepened understanding of the past experiences. The ePortfolio method offers a balancing opportunity to regard design and making process in assessment. Despite being based on the pupils' experiences, the results are relevant and useful for teachers when improving their pedagogical practices.

Key words
ePortfolio, primary school, craft education, user experience, Design and Technology, D&T

Introduction

The aim of the present study was to examine pupil's experiences using an electronic portfolio in craft education and to identify what they took to be the main functions and benefits of this method. Portfolios, from paper to electronic versions, are well known and implemented in academia around the world as well as more widely in the educational field (Stevenson, 2006; Tosh et al, 2006; Walz, 2006). However, most of recently published research has focused mainly on the development of teaching pupils how to create an ePortfolio rather than investigating how the young students use portfolios in classroom. According to Barrett (2003), portfolios should be studied as a means to increase pupils' own understanding of their learning; more importantly, it is to be expected that the portfolios would demonstrate a deeper level of pupils' personal growth over a long time period. In the setting of the present study, we have taken into account Barrett's recommendations and focused our study on the long-term use of an electronic portfolio during the primary school pupils' craft education from grade 3 onward. This kind of research setting is rare internationally as well as nationally. Moreover, this study aims at cultivating knowledge and competence needed for supporting the future digitally mediated curriculum reforms.

Basic education in Finland encompasses nine years (called Comprehensive school) and provides education for all children between 7 to16 years. Primary school entails grade 1 to 6 (7-12 years old pupils) and Secondary school involves grade 7 to grade 9 (13-16 years old). Craft education – previously textile and technical work - has a 150-year long history in the Finnish school system as an independent and obligatory school subject (Seitamaa-Hakkarainen 2010; Syrjäläinen and Seitamaa-Hakkarainen, 2014). The National Core Curriculum reform in 2016 is bringing changes to craft teaching arrangements as well as to assessment (FNBE 2014). The recently launched curriculum emphasizes, among other things, seven transverse (cross-subject) competences as generic learning goals. Implementation of technology (ICT) and multiliteracy are the two competences which touch most closely the focus of this study. The reform focuses also on students' active role, starting from the very early school years, in their exploratory and creative work processes. The new Core Curriculum for Basic Education underlines the implementation of the digital technology by encouraging pupils to use portfolios to document their working processes. All these changes in pupils' roles can be observed when the ePortfolio method is implemented.

Usage of ePortfolios

The ePortfolio provides a method with a combination of functionality and technology. It is a personalised tracking of learning with authentic evidence (e.g., Barrett, 2010; Carmen and Christie, 2006; Lorenzo and Ittelson, 2005). Artists in various fields (i.e., visual arts, sculpture, fashion etc.), have a long tradition of using the portfolio as a collection to present their work for various purposes (Barrett and Carney, 2005; Greenberg, 2004). An innovation of the early 1990s was an electronic version of the portfolio; a document (file) created, published and presented with help of computer and selected programs.

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The digital format offers a variety of options including those related to presentation and content (multimedia text, audio, video etc.). Further, an electronic portfolio often manages to capture better the dynamic and complex process of teaching than on-paper documentation (Avraamidou and Zembal-Saul, 2006). Moreover, the cost and storage advantages of electronic portfolios were also noted. Portfolios as such can have multiple purposes, and one's usage contributes to its definition, for example working portfolio, reflective portfolio or presentation portfolio, each emphasizing a slightly different purpose. Sherman (2006) has argued that too often the general instructional role of ePortfolios as a means of assessing performances or as a showcase for outstanding work has been exclusively focused upon. He points out eleven different roles through which ePortfolios can contribute to the teaching and learning process, such as artefact creation, context, intentional learning and goal-setting, reflection, communication and examples of unacceptable/ best work associated with specific assignments.

Besides looking at multiple purposes, one may categorize ePortfolios in various ways. Kimbell's (2012) division to three potential forms of a portfolio in D&T (Design and Technology) express the developmental dimensions of the ePortfolios: the simplest one is like a container of experiences, the second dimension is more a learner's report and a story of personal development and the richest dimension of ePortfolio represent more a dialoge; providing external support for the learners' internal conversation across their working process. Barrett and Carney (2005) have crystallized three ways of using portfolios: as assessment tools (accountability), as stories of deep learning (learning purpose), and as resumés to highlight competencies (marketing purpose) (see also Stevenson, 2006; Greenberg, 2004). These authors continued by outlining a vision for today's and future needs: they proposed a balanced electronic portfolio system. The system includes flexible transformation of evidence from an external to internal locus and takes into account both management systems and individual growth (see also Jafari, 2004).

EPortfolios have been studied in numerous perspectives; however, at the moment, the technical and system-focused research is dominating the field, and most of the empirical investigations have focused mainly on secondary and higher educational levels. According to Nicolaidou (2013), the empirical research on using ePortfolios in primary education level is limited (see also Kuan-Cheng et al, 2006; Kettunen et al, 2013). In general, pupils of primary school level are considered less competent with computer skills, although on average today's students become familiar with ICT at quite an early age. A few empirical investigations of young pupils' ePortfolios have confirmed the supportive role of the ePortfolio method, for example a year-long study of 4th grade pupils' improvement of writing performance and peer feedback (Nicolaidou, 2013) who conducted the pre- and post-test on writing performance, qualitative content analysis of pupils' weblog comments as well as interviewing the pupils and teachers. Kuan-Cheng et al (2006) conducted a three months web based ePortfolio experiment focusing on appreciation and peer-assessment for visual art education in Taiwan. They analysed the qualitative content of the texts with a summative approach and they used questionnaires in order to reveal pupils' opinions about ePortfolio usage. In Finland, a study in upper secondary school has reported students' experiences using tablets (information retrieval and ePortfolio). Data were collected from two short courses (about 36 hours total) with pre and post inquiry. According to Kettunen et. Al. (2013) the use of the device was experienced positively and supported teaching.

Further, undergraduate students' overview of ePortfolio's basic functions (Walz, 2006) was the target of a research in the University of California. The most basic identified functions were: (1) storage (a repository for documents), (2) information management (collection, selection and reflection of documents), (3) connection (web-based linkage to resources of services), (4) communication (sharing and receiving feedback) and (5) development (a trajectory of educational experiences). In the conclusion of the study, Walz (2006) recommended that educators use the full potential of ePortfolio; placing the student at the centre of their learning and drawing connections across subject matters to realms of students' lives.

To conclude this brief review, the present study focuses on the user experiences of the functions and the benefits of using ePortfolio in craft education in the primary level. The main research questions are the following:

1. What were pupils' experiences of the functions of ePortfolio as a method in craft education?
2. What were pupils' experiences of the educational benefit of using ePortfolio in craft education?

Method

Participants and the setting of the study

The present research on ePortfolios in craft education started as a part of the Helsinki Media Centre development project, which encouraged comprehensive school teachers to develop pedagogical solutions for e-work (technology assistance in education). The first author participated in the project with a focus to develop useful pupil ePortfolios in her teaching. The present study took place in in a

comprehensive school located in a suburb in the north part of Helsinki. The school offers basic education for grades one to nine. Craft education is a common subject for boys and girls and is started in the third grade and is finished in the ninth grade.

An Apple iPad application called *Book Creator* was chosen to be a base of the ePortfolio. It is a non-web-based application. Cloud services were used only to store ePortfolios. All pupils in the school worked with their own ePortfolio, starting from the third grade. In total, there were 41 pupils that used ePortfolios for three years, 31 pupils for two years and one newcomer in subject teaching, third grade with 52 pupils for one year. This study focused on the group with three years' experience. The interviewed participants were in the fifth grade (ages 10-11 years) and consisted of 25 girls and 16 boys.

EPortfolios consisted of photos and text, which were chosen and produced independently by the pupils. The teacher gave feedback related to a pupil's ePortfolio once or twice a month. The length of an ePortfolio ranged from three pages to fifty pages per year. At the present the ePortfolio is used in this particular school as a support and assessment tool. At the end of every school term the teacher and every pupil individually assess the school year in the assessment session. The ePortfolio plays an important role in this evaluation process. It offers samples of the working processes and advancement of the pupil's understanding but reveals also the weaknesses and limitations. It was decided that a pupil's grades are not lowered because of a poor ePortfolio; high quality ePortfolio may, however, improve the pupil's grading.

In general, the text in pupils' ePortfolio mainly consisted of explaining their artefact and describing the look of it, their progress and the pupil's feelings during the working process. Figure 1 presents an example of one page of the pupil's ePortfolio. The pupil has designed an own soft buddy called Couch Potato. This artefact is his first product produced with the sewing machine.

I'm making patterns. That type should have a tongue, as you can see, but it doesn't have. I didn't feel like doing it, because I thought I get my work home faster

Figure 1. Excerpt 3rd grade pupil´s text in black and teacher comment in blue.

My work is nearly ready. It looks scary. I think it's boring to put pins!

Unfortunately you left the tongue!!! You have plenty of time to do and fasten it. You also learned my important rule: all the pieces stay at school for a week for exhibition - to admire and...

Figure 2. provides an example of one 5th grade pupil's ePortfolio. The pupil has designed a bag for her mother and was preparing lining of the bag.

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Figure 2. Excerpt 2. 5th grade pupil´s text in green and teacher comment in blue.

The present article reports from the first phase of a longitudinal development research project, *The ePortfolio in Craft Education*. Each research cycle corresponded to one school year (two semesters), and for this study we chose three cycles, which were carried out in the years 2012-2015. The research object (the ePortfolio) was developed across three cycles: the minimum list of documentation was defined (first cycle), starting guidance was offered (second cycle), and peer-assessment was added (third cycle).

The present study covered the pupils' experiences of using ePortfolios during the first three years. A semi-structured stimulated recall interview was applied to collect the data (Fox-Turnbull, 2011). Typically, the stimulated-recall method is based on the video recordings of participants' working process and the researcher selects either a whole video or some clips of video sequences that are shown to the participant in the interview (Lyle 2003). Stimulated recall (SR) is an introspective research procedure for analysing cognitive processes by inviting a participant to recall their activity as seen on a videotape. The video recording is used as a prompt to help the participant reflect on what they were thinking about during that particular situation. In Schepens et. al., (2007) study, the video recordings of a student teacher's lesson of teaching practice that were immediately played after the lesson with the video used to stimulate the revival of thoughts the student teacher had while teaching. Our application of the stimulated-recall interview (Fox-Turnbull, 2011) was based on the idea that pupils' own ePortfolios could facilitate the interview situation and will provide the external support to recall their memories and feelings of working with the ePortfolio. In the interviews, carried out December 2014 to January 2015, the pupils' ePortfolios were used as a stimulus of their working and, hence, pupils did not need to rely on memory alone. The interviews were conducted individually with each pupil. In the interview situation the pupils opened the device (i.e., iPad) and their own ePortfolio; they answered questions that were presented either by pointing out items displayed on the ePortfolio device (Q2, 3, 4, 5; see the appendix) or by using ePortfolio pages to

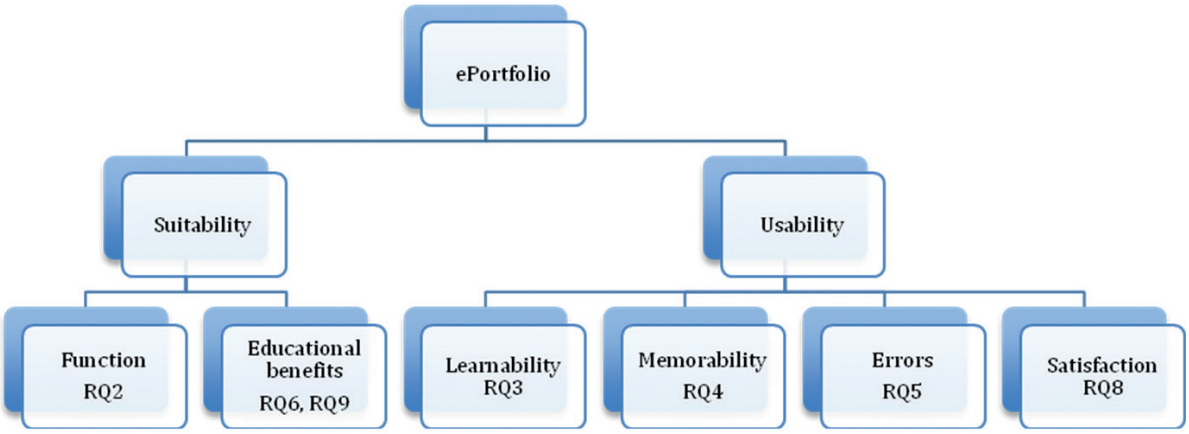

Table 1. Hierarchy of the frame concepts and distribution of the research questions.

recall their memories of events that sometimes happened of years ago (Q2,8). Questions were presented in the course of the discussion, and the order of questions varied.

The frame for the interviews was partly outlined from Nilsson's theory (1993) of usability (learnability, memorability, errors and satisfaction) and partly developed for this case based on the researcher's own interests in user experiences of ePortfolios in craft education and on users' opinions of its suitability to craft education (see Table 1.) The analysis of the study focused on users' opinions of the suitability and the benefits, but also revealed general user experiences.

The question of use frequency and used devices (RQ1, warm-up question) started the interview. The theme was chosen to relax the atypical atmosphere and was found to be successful. The presentation of one's own ePortfolio (RQ2) and early experiences (RQ3, 4, 5) formed the central portion of the interview, and the pupil's own opinions (RQ 6, 7, 8, 9) concluded the discussion. The purpose of the stimulated interview was to engage the pupil in a free discussion, taking into account the interviewee's young age and the occasional need for assisting questions. The sequence of the questions as well as the transition from one question to another varied between the interviews. Pupils had their devices on the table, and they used them as stimulus for the answers. Some explained all the stages very carefully, especially those in the beginning of the ePortfolio creation process; others mainly refreshed their memories by scrolling the pages and showing the content to the interviewer.

The interviews were videotaped; total 6 hours 16 minutes. There were 38 interviews that lasted 10 minutes, on average. The length varied from 8 to 14 minutes. In the videos only pupils' hands and the devices were visible. It was decided to capture the pages pupils were showing to enable us later to connect the incomplete accounts with the content and thus validate our understanding. The interviews were transcribed verbatim.

Method of Data Analysis

Interviews were analysed by data-driven qualitative, content analysis using a summative approach (Hsieh and Shannon, 2005). The process of analysis was divided into three phases. During the transcription process, data became familiar to researchers, and a rough word count and classification was created to identify the conceptual elements pupils used (target, positive/ negative tone). First, the answers were organized by questions (de-construct theconversation) and by participants (phase 1). Equally matched answers were grouped and named with shared categories (phase 2). In the third phase, some of the concepts were combined, and the analyses were conducted with two main categories: usability (including learnability, memorability, errors and satisfaction) and suitability (including opinions and justifications of the ePortfolio method and functions including content elements and benefits). An appendix shows hyponyms and data categories with excerpts.

For inter-rater reliability-analysis categories were tested by an external researcher. First researchers discussed the frame of the study (participants, questions, transcriptions), and then both categorized data from six pupils. Systematic sampling collected the crosschecked data. Inter-rater reliability of the first round was 79,8%, and it was taken to be adequate. Discussions afterwards revealed that all disputes (20,2%) were either ambiguous word interpretation or misunderstandings of speaker in transcription.

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Results

The goal of the present study was to examine pupils' experiences using ePortfolios in craft education for three years and identify the main functions and benefits of this method. Experiences of use in general were studied as background information and are presented first.

General user experiences

The general user experiences were described by the concepts of learnability, memorability, errors and (partly) satisfaction. The device (iPad) and the application (Book Creator) were mostly experienced as quite easy to learn to use and to use. Learnability was described positively (20/38), and though some pupils had difficulties in the beginning, everyone could, with time and the help of others, create his or her own ePortfolio. Most pupils (28/38) indicated that use of the application was very easy to remember, and only some (4/38) found it hard to keep in mind all the operations. A few pupils (6/38) needed some time to think and test a little to be able to remember operations.

Most respondents (31/38) had not faced insurmountable problems or they were confident they would able to solve one, if such occurred. A few (7/38) pupils thought that external help was needed. Nearly 87 % of pupils were satisfied with their own ePortfolios, but over half of them (55 %) wanted to make some improvements: quantitative (adding photos and text, changing focus) or qualitative (changing words, colours and better photos). Possible improvements were explained (motivated) verbally and pointed out from the ePortfolio.

Function of the ePortfolio

The relevance of the ePortfolio as a method of work in craft education was examined through what we called function experiences. Pupils were asked to imagine a situation where they have to describe to an unknown person (a reporter, a visitor in school) what ePortfolio work is and/or what an ePortfolio looks like. In analysis, the named elements (for example, text, photo and artefact) were listed, and their frequencies were calculated. The highest indexes of named elements were called essential elements (artefact f=29, photo f=25, text/writing f=21) and the lowest were called the uncommon elements (learning f=2, editing f=1 memory f=1). Some of pupils could name six elements, but an average of three was the most common. These named elements were interpreted as providing an overview of how pupils understood the ePortfolio as such and thus its availability.

The majority of pupils (29/38) described the ePortfolio as consisting of information regarding artefacts or products they are working with at the moment or had worked with during past years. None of the pupils used word artefact, but the focus of the portfolio according to research literature, is typically designated by that word. The pupils, therefore, talked about these artefacts using words such as "*taking/adding photos*" (25/38) and "*writing about*" or "*putting text about*" (21/38). Thus the ePortfolio was considered as a place to collect these documents, like a storage facility or a repository.

"Well it's like, that, it's where we put all the phases, when we're making the textiles. Then we put the images and text where we tell what is happening in the images and kind of update on the progress, and finally an image on how it turned out." (026)

One pupil clearly mentioned, also, the storage purpose combined with a time dimension. "*This is like...uhm...the product of this is like a book, where you see what you have done when you were a child...*" (001).

To be able to store information, a pupil needs to process it. Editing - like choosing, selecting, organizing and combining information - is a type of information management. A pupil needs to make decisions about documentation and approve or reject pieces of documentation of what was accomplished. One pupil mentioned editing in this research question, but in the other question (IQ9) another pupil described information management by telling about selecting the interesting part of the process to be documented.

(IQ9)"…Like that you teach for example, what you should tell during a work phase when everything isn't that interesting, like how to sew this one stitch."(026)

About 40% of pupils (15/38) described their ePortfolio as consisting of (representations of) of stages/steps of the work process. They mentioned either thinking about the process of one artefact (1/15) or about all their school years in total (14/15); thus one may interpret such talk as evidence that pupils saw ePortfolios potentiality as collecting data on their trajectory of educational experiences. None of them mentioned, word for word, the possibility of seeing one's own skill development, but one mentioned generally *"pupil's progress can be followed" and the other one "when you have reached something"*. Pupil's answers were largely concrete and tightly bound to concrete activities in the classroom and thus abstract concepts were not used.

"Well probably, so we'll make like a book, where it will detail all the work phases. How we did each task, what are plans

are for the work over the years. …Well, then there will be like your own picture and what phase we're on and what phases and work should have been done by now." (006)

Alongside telling about concrete activities in the classroom, a few pupils (f=7) mentioned communication to be part of the ePortfolio's function. Communication was described as comments, questions and assessment from teacher or peer-students (RQ2).

"*…So what we're doing in handicrafts, where we have done them, like all the work phases, the photos we've taken and written and then the teacher occasionally will have written some comments or questions..." (028)*

"That is a comparable, like that... one of our classmates, like evaluated me, like how well I had done or was there anything bad, like what I should practice, etc." (004)

Communication includes also an aspect of evidence; making a pupil's work visible. There are plenty of different things happening in the classroom, and it is impossible for a teacher to be aware of them. By sampling the information regarding one's own craft process, pupil has an opportunity to witness all accomplished stages, even the invisible ones.

"…This is that kind of portfolio, that you could write and add pictures, like what your doing or kind of like a diary, like now I'm working on so and so, which you can show to your teacher that this is what I've been working on and this is what my work looks like." (025)

Interviewees were also asked to try to find a synonym for the word *ePortfolio*. 'Book' and 'diary' were the most popular words, but also 'folder', 'place' and 'guidebook' were mentioned. Several had difficulties finding any synonym; some stayed silent or said that they couldn't find any expression.

Educational benefits of using an ePortfolio

There was total 100% agreement on the method's usefulness in craft education with several positive spontaneous comments; this was rather predictable. The ePortfolio was felt to provide support to memory; it was a nice break from making one's own artefact and providing samples of continued progress for the pupil herself and outsiders. Electronic devices were chosen by 37 of 38 pupils compared to traditional notebooks. The answers were based on (motivated by) timesaving, easiness and a learned habit. Negative aspects such as 'time-consuming' and 'difficulty with concepts' were also brought up.

The motivation for choosing an electronic device was in line with the previously mentioned educational benefits. Working with ePortfolios was experienced as helpful because of learning to use the devices in general (f=27). The answers that involved adding ICT skills were not just directed to the present moment and present device, but many mentioned future demands and assumed pupils would need all kind of skills to manage and to work later in life with ICT devices and with different applications.

"Well, mainly it begins this kind of machines, so that for example you had to make something like this in high school you'd be completely lost." (014)

A few pupils also mentioned that the school offers possibilities for everyone to learn to work with this kind of electronic tools and programs regardless of family background. Even though the use of ICT equipment was very versatile according to the first interview question, Apple iPads in particular, as a type of device, were mentioned only twice; such devices were reported to be only in parents' personal use. So previous access to iPads can be interpreted as very slight among these pupils.

Supporting the process and memory were stated 37 times and both aspects were often mentioned in the same sentence and therefore interpreted together. Pupils gave prominence to the benefit of adding clarity of terms/concepts and stages when documenting one's own work process. One's own process was estimated to benefit from repetition and splitting up.

"Remember the names correctly, like what is a hem and so forth"(029). "Probably there, so that you can differentiate all the different work phases, because you have to describe them separately.... It's then much clearer on what you've done, so for example you haven't done it all in a row, but they're actually separate work phases..." (016).

Supporting one's memory was experienced as an essential benefit as a location to collect information related to process or skills in general.

"…And for example, my "knot in yarn" things and then, you could write there everything so it's easy to recall, and if you include photos of the instructions and you misplace the instructions you can always look it up from there." (014)

Development of other skills, mainly photography and writing, was observed by 15 pupils. Some noticed that they learned to take better photos and to write longer and richer sentences as well. Producing documentation as collecting

pieces of sample was mentioned in eight interviews. Pieces were chosen according to one's own interest: *"It's pretty fun, like you see how it has improved over each phase or have you been careless." (004) or other purposes, demonstrating the process to outsiders: "… And then if you ever want to tell about it to others, then it's much easier to show the pictures, and if your doing the same work as someone else you can easily compare" (005) "And then the teacher can keep an eye on your progress much easier" (019).*

Four pupils also emphasized the benefit that one learns to produce one's own ePortfolio. They described how working has supported them, helped them to take photos, organize them in process order, and to work project-like manner.

Discussion

The aim of this article has been to examine fifth grade pupils' (N=38) experiences in using and identifying the functions and benefits of the ePortfolio method. In this research project, the sample of pupils was relatively small, but it was not selected, and the sample school represents a typical suburban Finnish school with not selected pupils. Empirical research in the use of ePortfolios at the primary school level over a long time period is limited though it is essential to investigate classroom activities using technology both for the introduction of the new Curriculum 2016 and for promoting pedagogically valid technology to schools. Moreover changes in emphasising learning processes (personal construction of knowledge and the focus on assessment) need to be reflected through everyday practices.

This study indicated that young pupils with three years' experiences in using an ePortfolio method were pleased with this method of collection of authentic evidence of their own learning process and were confident in their own abilities to work with ICT tools. They identified several educational values and key functions of the method (cf. Sherman, 2006; Kettunen, 2013; Kimbell, 2012). Pupils appeared to some extent to understand the logic of the ePortfolio as a supporting method of learning. Variations between young pupil's conceptions were significant, but when considering the pupils' age, development, and research context, the results were encouraging. The ePortfolio did not just have the role of storage of documentation (Sherman, 2006) but also an active conducive role in the learning process. It supported memory of the past activities; it reminded learners (and other involved persons) of development, as previous researchers have confirmed (cf. Nicolaidou, 2013; Kuan-Cheng et al, 2006).

Authentic sample plays a key role as well in the ePortfolio method as a research method in this study. Documented activities operated as stimuli to memory and thus helped pupils to return to past events. Repetition of concepts and combining single memory traces together strengthened and expanded pupils' understanding of the past activities. This is one of the focal points of the 2016 curriculum reform in Finland. The most significant focus is not on what is learned but how it is learned. Tracking learning activities reveals how the target has been reached and thus it can be analysed, supplemented, confirmed, and later on applied to another context.

The ePortfolio method is largely individual (cf. Walz, 2006). It activates students to concentrate on their own learning process, monitoring and documenting pieces of it, but it can also be flexibly exploited to wider audiences (cf. Barrett and Carney, 2005; Jafari, 2004) such as the teacher (for information/ assessment/ management), other students (peer-assessment) and parents (a showcase). The process was the primary topic in this research when students were interviewed about their work process. The collected data revealed individuality in raising the learner's active role and clarified the ownership of the learning process. This method with the personal story of the process, complemented with substance- specific knowledge, provides students' memory with a wider range of tools to recall and later on continue knowledge construction. Although the focus in this study was based on pupils' experiences of ePortfolio, the results are relevant and useful for teachers when improving their pedagogical practices, seeking support for assessment (i.e., developing methods of process assessment), and highlighting ownership of learning.

These results reveal that the ePortfolio is a workable method in craft education; when using it begins during the early school years, it is experienced to be a natural part of the schoolwork process. This setting with a non-web-based application simplified students' work, but did not prevent sharing of the ePortfolio. In spite of encouraging results, it has to be taken into consideration that the actual impact of ePortfolio for student learning was not analysed. We assessed benefits of ePortfolio by relying on the participants' retrospective self-assessment. In order to improve reliability and validity of self-reports, we applied the methods of stimulated-recall interview. The interviews were quite short and because their own teacher was the interviewer that might have affected the students' answers; on the other hand students were eager to participate and were familiar with the interviewer.

Future research could focus to analyse further ePortfolios various roles in comprehensive school level (all children between 7 to16 years) and research, with versatile methods, the effectiveness and functionality of an ePortfolio as a tool for helping pupils to develop their learning.

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References

Avraamidou, L. and Zembal-Saul, C., 2006. Exploring the influence of web-based portfolio development on learning to teach elementary science. *AACE Journal,* 14(2), pp.178-205.

Barrett, H., 2010. Balancing the two faces of ePortfolios. *Educação, Formação & Tecnologias-ISSN 1646-933X*, 3(1), pp. 6-14.

Barrett, H.C., 2003. The research on portfolios in education. Retrieved May 8, pp. 2009.

Barrett, H. and Carney, J., 2005. Conflicting paradigms and competing purposes in electronic portfolio development. *TaskStream* website.

Carmean, C. and Christie, A., 2006. EPortfolios: Constructing meaning across time, space, and curriculum. Handbook of research on ePortfolios, pp. 33-43.

Fox-Turnbull, W., 2011. Autophotography. A means of stimulated recall for investigating technology education. *International Handbook of Primary Technology Education*. Springer, pp. 195-209.

Greenberg, G., 2004. EXTENDING. *EDUCAUSE review*, 500.

Hsieh, H.F. and Shannon, S.E., 2005. Three approaches to qualitative content analysis. *Qualitative health research*, 15(9), pp. 1277-1288.

Jafari, A., 2004. The" Sticky" ePortfolio System. Tackling Challenges & Identifying Attributes. *Educause Review*, 39(4).

Kettunen, H., Kokko, S., Kröger, T. and Pöllänen, S., 2013. Taulutietokone tekstiilityönopetuksen työvälineenä. In: Opettaminen valinkauhassa. (eds) E. Yli-Panula, H. Silfverberg and E. Kouki.

Kimbell, R., 2012. The origins and underpinning principles of e-scape. *International Journal of Technology and Design Education*, 22(2), pp. 123-134.

Kuan-Cheng, L., Shu-Huey, Y., Hung, J.C. and Ding-Ming, W., 2006. Web-based appreciation and peer-assessment for visual-art education. *International Journal of Distance Education Technologies*, 4(4), pp. 5.

Lorenzo, G. and Ittelson, J., 2005. An overview of e-portfolios. Educause learning initiative, 1, pp. 1-27.

Lyle, J. (2002). Stimulated recall: a report on its use in naturalistic research. *British Educational Research Journal*, 29(6), 861-878.

Nicolaidou, I., 2013. E-portfolios supporting primary students' writing performance and peer feedback. *Computers & Education*, 68, pp. 404-415.

Schepens, A., Aelterman, A., & Van Keer, H. (2007). Studying learning processes of student teachers with stimulated recall interviews through changes in interactive cognitions. *Teacher and Teacher Education*, 23, 457-472.

Seitamaa-Hakkarainen, P., 2010. Searching new values for craft education: can design based learning be a solution. In: A. Rasinen & T.Rissanen (eds.) In the spirit of Uno Cygnaeus–Pedagogical questions of today and tomorrow. University of Jyväskylä.Deparment of Teacher Education, pp. 71-89.

Sherman, G., 2006. Instructional roles of electronic portfolios. *Handbook of research on ePortfolios*, pp. 1-14.

Stevenson, H.J., 2006. Using ePortfolios to foster peer assessment, critical thinking, and collaboration. *Handbook of Research on ePortfolios*, pp. 112-124.

Syrjäläinen, E. and Seitamaa-Hakkarainen, P., 2014. The Quality of Design in 9th Grade Pupils' Design-and-Make Assignments in Craft Education. *Design and Technology Education: an International Journal*, 19(2).

The Functions and Benefits of the ePortfolio in Craft Education at the Primary Level

Tosh, D., Werdmuller, B., Chen, H.L., Light, T.P. and Haywood, J., 2006. The learning landscape: A conceptual framework for ePortfolios. *Handbook of research on ePortfolios,* pp. 24-32.

Walz, P., 2006. An overview of student ePortfolio functions. *Handbook of research on ePortfolios*, pp. 194-205.

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APPENDIX 1.

Table 2. Divisions of analysis categories by hypernyms: usability, suitability and function.
1.) Usability (included all experiences of use)

Hyponyms (question)	Categories	Excerpt
Learnability (3a,b)	Positive	"It was fun/exciting to do…", " …I can learn something new…" "I got the challenge, because work was so easy…. "
	Uncertain	"In the beginning, I didn´t know how to use it…" " It was kind of strange/ challenging", "It was quite hard (in the beginning)."
	Negative	"…Don´t feel like, because writing is boring", " I was forced to just take photographs…."
	Neutral	"Nothing strange", "Nothing special", "...familiar feeling…"
Memorability (4a,b)	Positive	"Yes", " Always in my mind", "Yeah, really easily", " Yes, quickly", " It´s automatically in my mind", " I don´t need even to think about it", "Roughly I remember everything."
	Uncertain	"I have to think about a little bit…" , " When I get the Pad in my hand I start to remember…."
	Negative	"No, I can´t", "This is harder than I thought…", "I can´t remember", " I can´t remember all…"
Errors (5)	Positive	"Yes, I can", "Yes, it´s easy to use", "Pretty well", "There haven´t been any major things."
	Uncertain	"… Well, was it from there…" "I ´m not so sure…"
	Negative	"Well… exactly I don´t know how to correct… I have to ask help", "No, I don't."
Satisfaction (8a,b)	Positive	"Yeah, that way I´m nearly satisfied, because I´ve got quite a lot of photos, from all these stages and like that… and this is good, because I don´t have pointless photos there…." "So I´m quite pleased."
	Uncertain	No, not with all the photos, but… to some parts, yes", "I don´t know…."
	Negative	"No, I´m not super pleased", "No, I´m not."

2.) Suitability:

Hyponyms (question)	Categories	Excerpt
Arguments for eP (6a)	Recollection (Personal)	"It can be seen what has been done" "Helps you to remember those things", "When you are older you can look what…"
	Variation	"…and it´s a nice change", "…you don´t need to just wait…", " it´s done (conveniently) along the actual work…", "…it´s a suitable break…."
	Learning	"…and you can see how it has been done…", "You can see how working has progressed…", "…you can follow there, what has been done…" "…you learn to correct little mistakes."
	Evidence/ sample (Outsider)	"…also the teacher can see…", "The student has a possibility to show what kind of work has be done…"
	No argument	
Arguments for choosing eP (6b)	Time	"It´s so fast", "It won't take long" "It takes less time to…", " It would take more time to use other devices", "You have more time to do your work."
	Easiness	"It's easier", " It's simpler", " It´s handy."
	Habit	"I can use this", " I´m used to use this", "I´m closer to these computers than other devices."
	Usage	"Putting photos is easy", "Correcting is fast", " You can delete quickly", You can open and save easily", " You can give easily feedback", "The teacher can also easily and right away have a look", "The screen´s size is bigger than in a mobile."
	No argument	

Suitability: function and educational benefits.

Hyponyms (question)	Categories	Excerpt
Content elements (2)	Artefact	"…These things and these works.", "…what we do during these years", "what we have done here in handicraft."
	Photo	"It's such (a place) where to we take photos of things we are doing." "You put there photos and…", "… so there you can write and put photos."
	Text	"… and then we write there and then the teacher puts there also some comment"," There will be written something… like… what you have done…."
	Naming	"A Guidebook or something… like a… but not a memory book…", "It´s like a diary" "It's like a certain textile diary, where you can write what you´ve done and in what stage you are…." (020)
	Stages/phase	"Well, it´s kind of related to the craft thing, where you put different things, from different stages and like.." (018) "… work and all the phases you´ve had….(032)
	Feedback	" … and then there you write and then the teacher puts some comment there and…" (021) "… and then the teacher puts there some comments and questions and like that…."(028)
	Learning	"…it's like a update there what you´ve done and…"(026), and if you have " and if you´ve gained something you can take a photos…." (008)
	Editing	"It's like an electronic diary, which you can riffle and edit and the are all tools and you can with help of them draw, take photos and everything…."(013)
	Memory	"…it´s like a book, from where you can see when you´re adult, what you´ve done when you where a child…." (001)
Educational benefits (9a,b)	Usage	"Well, I learn to use these devices, because I´m not good with these, because we don´t have at home these…", " If I then we have an ICT lesson, so I can put photos and change colours and like that…"
	Support for process/ memory	"Well, sort off, yes… if someone doesn't remember something, so…can take a look to and see… how it had been done and to see which point to and look the text too… and like that."
	Evidence/ sample	"then, when you are working, so you don´t necessarily learn the name of those stages, but when you write it here, then you remember them better…." "If someone wants to tell to someone else, so it´s easier to show also all these photos and then if someone else is working with similar work than you, so you can peek a little and show what to do next…."
	Other skills	"…and you learn to take photos and then take better photos…", " Then you can learn to write entire long phrases and those are not just short ones."
	Producing eP	"… and anyway you learn to work like this project… like how to take photos, how to organize stages there…" "like it teaches which stages are worth telling something about, because all the stages are not so interesting…."