

Research Article

E-Portfolio Implementation Experiences of Prospective Primary School Teachers

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Abstract

In the information society, as in all other institutions the functions of educational institutions have changed by the phenomenon of globalization, the rapid spread of knowledge and reaching broad masses, the necessity of co-existence of differentiated cultures, and the development of science and technology. Portfolios help students to assess themselves and improve their ability to express themselves and allow observation of the development that takes place over a specified period due to the collection of work during a specified period, taking these characteristics into account, the use of portfolios in the assessment and evaluation process is suggested. Considering the progress in educational technology, it can be said that e-portfolio implementations, which can provide the products of teachers or prospective teachers to move on to the next teaching process and other teachers and prospective teachers, will become more prevalent. When these developments and changes are taken into consideration, it is expected that the evaluation of the e-portfolio implementation of the prospective primary school teachers enrolled in Science and Technology Instruction II and their related gains in the process will contribute to the field. In the research aimed to reveal the evaluations of primary school prospective teachers about their e-portfolio implementation, the approach of phenomenology was used which is one of the qualitative research designs. In this research, it was aimed to reveal the evaluations of e-portfolio contents and the outcomes related to themselves in the course of Science and Technology Education II of the prospective primary school teachers. In the research, the result that e-portfolio creation process is contributed to the prospective primary school teachers in the sub-headings of "Pedagogical Knowledge", "Field Information", "Technology Use Skill" and "Thinking Skill" was obtained.

Anahtar Sözcükler: *Prospective primar school teacher, e-portfolio, science education.*

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Sınıf Öğretmeni Adaylarının E-Portfolyo Uygulaması Deneyimleri

Öz

Bilgi toplumunda, küreselleşme olgusu, bilginin hızla yayılması ve geniş kitlelere ulaşması, farklı özellikteki kültürlerin birlikte yaşama zorunluluğu, bilim ve teknolojideki gelişmeler tüm kurumların olduğu gibi eğitim kurumlarının da işlevlerini değişime uğratmıştır. Öğrencilere kendi kendilerini değerlendirmede ve kendilerini ifade etme becerilerini geliştirmede yardımcı olması, çalışmaların belirli bir süreç boyunca toplanması nedeniyle belirli bir zaman diliminde gerçekleşen gelişimi gösterme olanağı tanınması gibi özellikleri dikkate alınarak portfolyoların ölçme değerlendirme sürecinde kullanımı öngörülmüştür. Eğitim teknolojisindeki ilerlemeler düşünüldüğünde öğretmenlerin ya da öğretmen adaylarının ürünlerinin bir sonraki eğitim sürecine ve diğer öğretmenlere ve adaylara taşınmasını sağlayabilecek olan e-portfolyo uygulamalarının yaygınlık kazanacağı söylenebilir. Bu gelişim ve değişimler dikkate alındığında sınıf öğretmeni adaylarının Fen ve Teknoloji Öğretimi II dersinde e-portfolyo uygulamasına yönelik değerlendirmelerinin ve süreçte kendilerine ilişkin kazanımlarının belirlenmesinin alana katkı sağlayacağı ön görülmektedir. Sınıf öğretmeni adaylarının e-portfolyo uygulamasına ilişkin kendilerine yönelik değerlendirmelerinin ortaya konulması amaçlandığı araştırmada, nitel araştırma desenlerinden fenomenoloji (olgubilim) yaklaşımından yararlanılmıştır. Bu araştırmada, sınıf öğretmeni adaylarının Fen ve Teknoloji Öğretimi II dersinde e-portfolyo uygulamasına yönelik değerlendirmelerinin ve süreçte kendilerine ilişkin kazanımlarının ortaya çıkarılması amaçlanmıştır. Araştırmada e-portfolyo oluşturma sürecinin “Pedagojik Bilgi”, “Alan Bilgisi”, “Teknoloji Kullanım Becerisi” ve “Düşünme Becerisi” alt başlıklarında sınıf öğretmeni adaylarına katkı sağladığı sonucuna ulaşılmıştır.

Anahtar Sözcükler: Sınıf öğretmeni adayı, e-portfolyo, fen öğretimi dersi.

Introduction

In the information society, as in all other institutions the functions of educational institutions have changed by the phenomenon of globalization, the rapid spread of knowledge and reaching broad masses, the necessity of co-existence of differentiated cultures, and the development of science and technology. In this context, learners are expected to be individuals who can construct, internalize and use knowledge. They are also expected to have the ability to problem-solving, researching, questioning, reasoning, and critical thinking skills. In the information society, curriculums are also changing to train individuals with these qualities. Within this framework, education and training programs in social and numerical fields have been renewed in many countries including the United States, Australia, Finland and New Zealand (Yaşar, 2005). In Turkey, the necessity of the use of portfolio is included in the primary education program developed in 2004. In the training curricula, it was discussed by constructivist understanding as part of the assessment and evaluation teaching process (Gelbal & Kelecioğlu 2007). In this context, the use of portfolios in the assessment and evaluation process is envisaged, taking into account features such as helping students to assess themselves and improving their ability to express themselves, and the ability to show progress over a certain period due to the collection of work during a particular period. In this context, the use of portfolios in the measurement and evaluation process is suggested, taking into consideration the features of helping students to assess themselves and improving their ability to express themselves, and the ability to demonstrate progress over a certain period of time, as the work is collected over a specified period. The use of portfolio in everyday life is not a new phenomenon. For example, portfolios are used to help assess financial services industry investments. Portfolios are also used in areas such as fine arts, marketing or architecture (Briscoe & Wells, 2002; Lawrenz, Huffman, & Welch, 2000). In the 1990s, Pearl and Leon Paulson (1991) developed a metaphor for the portfolio. According to this metaphor, portfolios are expressed as laboratories where students configure their own experiences and meanings related themselves. According to them, each portfolio is a story of what students know and why they do not. Students demonstrate what they know and can do with examples of their work (Paulson, Paulson, & Meyer, 1991; cited by Kan, 2007). In simple terms, a portfolio is a collection of gathered evidence to show an individual's learning journey and talent over time.

Portfolios are a purposive collection of work (Jorgensen, 1994) that demonstrates the effort, progress, and success of learners at one or more fields; (Rhodes & Shanklin, 1993, p.3), a file consisting of contents reflecting and proving the work of the student (Paulson and Paulson, 1991), a collection of written material and products exhibited by the student (Brandut, 1989; Wolf, 1989; cited by Long, 2006). Portfolios can be used as educational materials and assessment tools in the educational setting and are intended to monitor the development of each student's own potential and characteristics, rather than comparing or racing them against each other. Such an understanding allows assessment criteria to be determined not only by the teacher but also with the students and other stakeholders. It allows observation of development based on individual differences (Anagün, 2016).

Recent developments in computer technology have contributed to the traditional pen and paper portfolio by enabling the portability of the portfolio to the electronic environment; In addition to having all the advantages of traditional portfolios, e-portfolios offer a more productive and more comprehensive view of learning improvement (Demirli & Gürel, 2007). At the same time, an advantage of e-portfolios in contrast to the traditional format is that they also contain digital files such as simulations and videos (Butler, 2006). E-portfolio can be contain materials accordance to course contents and learning outcomes such as puzzles, concept map, worksheets, research report, documentary, article, observation report, brochure, video recording, blog page, website, poster, story, animation, educational software, presentation, newspaper, voice recordings, exam questions, webquest, interview, drawing, poetry, self evaluation report and products (Gülbahar, 2009a). Although the content has the same properties as other portfolios, it is different from others in that it is created and stored in the electronic environment. The use of e-portfolios with teacher education focuses on the learning process and knowledge production of prospective teachers.

The development of teacher candidates can be documented, explained and reflected in the e-portfolio process (Granberg, 2010). It reflects the academic development of the students and contains important evidence and products for the teacher and the student to follow their development (Kutlu, Doğan, & Karakaya 2009). The conceptual interpretations of E-portfolios are very diverse (Shroff, Trent, & Ng, 2013), but are based on the learning portfolio (Zubizarreta, 2009), although the portfolio design is made electronically. According to Zubizarreta (2009), the learning portfolio is a flexible, evidence-based tool that directs students to an ongoing learning and collaborative analysis process.

In the context of teacher education, portfolios have some purposes: teaching prospective teachers how to be reflective, assessing their readiness to graduate, and providing accreditation as part of the teacher training program (Zeichner, & Wray, 2001). E-portfolios are one of the critical tool currently used by prospective teachers to support and document personal, professional and intellectual development as self-directed learners (Vam Wyk, 2017). In the use of e-portfolio, materials and product types to be included in the content should be determined, and guidelines which are also the basis for evaluation should be prepared. Also, proper planning should be done by deciding on the usage rules for the content production and use process and how to evaluate them. The general objectives for using the E-portfolio can be summarized as providing better learning, helping the student to take own learning responsibility, and ensuring that the student presents their development over time (Gülbahar & Köse, 2006).

E-portfolios can be used for different purposes, such as assessing the level of students' attainment of achievements, giving feedback and directing students in their future work. Generally, it is developed for three different purposes:

1. Learning Portfolio (for development purposes): It is used for evaluation of shaping, used to support professional development.
2. Assesment Portfolio (for evaluation purposes): It is used for performance-based level determining evaluation.
3. Working Portfolios (for presentation purposes): It is used for supporting the search for a career by presenting of electronic files and projects (Carliner, 2005; Irby & Brown, 2000; Lynch and Purnawarman, 2004; Mason, Pegler & Weller, 2004; cited by Gülbahar & Köse, 2006).

E-portfolios provides a safe, reflective, interactive, and individual-enhancing environment for the student (Chang, 2001). The use of e-portfolios has increased in teacher education programs in European countries and elsewhere. In addition to pedagogical goals, the driving forces behind the ongoing use of ePortfolios are generally defined as the need to meet national standards, address accreditation issues, or improve quality (Butler 2006; Dysthe & Engelsen 2008; Strudler & Wetzel 2005; Woodward & Nanlohy 2004). Butler (2006) describes the success criteria of e-portfolios as a planning process in which various "what, why and how"

questions need to be answered. A common understanding of the purpose and design of e-portfolios is needed. The creation process is important to the E-portfolio rather than the implementation (Granberg, 2010). The e-portfolio should be used within software and students must take responsibility as active participants in the creation of the file. The products should be taken into account when providing feedback to the students and giving information about their progress (Gülbahar, 2009b). Academicians argue that e-portfolios are being applied gradually in teacher training programs, especially in most higher education institutions (Granberg, 2010, Hoekstra & Crocker, 2015). The main reason for this practice is to promote a learner-centered approach and more active learning experiences and pedagogical changes in higher education (Joyes, Gray & Hartnell-Young, 2010). In teacher training programs, e-portfolios are formed as "living-learning experiences" by prospective teachers as an evidence-based approach (Wang, 2009).

Studies have shown that the development of e-portfolios can improve the way prospective teachers reflect their professional learning processes and skills in their work. In the same researches, it has been suggested that prospective teachers should receive training and support in order to be successful in their work. In the learning process, the importance of teacher presence and supporting feedback is emphasized (Beck & Bear 2009; Hauge 2006; Mansvelder-Longayroux, Beijaard, & Verloop 2007; Pelliccione & Raisen 2009; cited by Granberg, 2010). In this context, with the training of prospective teachers with knowledge on using technology will contribute to the formation of teacher profiles which can combine the technology with teaching skills in their professional lives. These teachers will also meet the expectations of the learners who have already got the consciousness about using technology and 21st-century learner characteristics (Önal & Çakır, 2015). Teachers and prospective teachers should be informed about useful technological tools and be encouraged to create and use their own materials that are produced by combining field knowledge with technology in their education process (Tatlı, Akbulut, & Altınışik, 2016). It can be said that, considering the development in educational technology, e-portfolio implementations, which can enable teachers or prospective teachers to carry their products to the next teaching and learning process, other teachers and prospective teachers, will become more prevalent. When these developments and changes are taken into account, it is predicted that the evaluation of the prospective primary school teachers about e-portfolio implementation in the Science and

Technology Instruction II course and the achievements related to them will contribute to the field.

Method

This study uses a qualitative phenomenological approach which is one of the qualitative research design to investigate the evaluations of prospective primary school teachers about their e-portfolio implementation. Phenomenology design focuses on phenomena that we are aware of but do not have an in-depth and detailed understanding. These phenomena can be events, experiences, perceptions, orientations, concepts, and situations in the world we live in (Yıldırım & Şimşek, 2011: 72). In this research, the phenomenon is "e-portfolio implementation". In the research, Phenomenology approach was used as a qualitative research approach because of the third-grade students' self-evaluations reports of e-portfolio creation process were gathered in written form within the electronic environment and analyzed in depth at the end of the process. In this research, it is aimed to reveal the evaluations of the e-portfolio implementation and the achievements related to themselves in the course of Science and Technology Education II of the prospective primary school teachers. In this context, for the following questions the answers were searched:

- What are the acquisitions of prospective primary teachers regarding their e-portfolio implementation process?
- What are the general evaluations of prospective primary teachers regarding e-portfolio implementation?

Participants

In qualitative research, the number of samples depends on what the researcher wants to know, what is the researcher's purpose, what is reliable and useful, and what can be done at the available resource and time (Patton, 2002). Criterion sampling was used for purposeful sampling methods in this study. Purposeful sampling allows for in-depth study of situations that are thought to have rich knowledge. In the studies in which the criterion sampling is used, the units of observation can be formed by persons, events or situations with certain qualities.

In this case, units that meet the criterion (primary qualifications) set for the sample are selected (Büyüköztürk et al., 2009; Patton, 2002). In this study, three key criteria were taken into consideration: participants should be willing to investigate, should be the third-grade students at the primary school teacher program, and have taken the Science and Technology Instruction I course. 35 class teacher candidates participated in the research.

Implementation and Data Collection Tool

Prospective primary school teachers implemented the e-portfolios in fourteen weeks according to the Science and Technology Instruction II course curriculum. The researchers were configured The Canvas Learning Management System (LMS) to allow the prospective primary school teachers to prepare e-portfolios. Canvas is a learning management system built on a modern web framework. The Canvas user-interface is well-designed for both teaching staff and students. Canvas LMS has many options for interoperability with other systems and services through its open-source application programming interface (API). For example, teaching staff can assign collaborative projects through google docs and completed google docs can be submitted to instructors for review. Teaching staff and students can link not only google documents but can register for their Canvas account other social networking services and curricular content provided by publishers (Kandemir, 2013). Figure 1 shows the main student page of the Canvas LMS and the course instructions.

Fen ve Teknoloji Öğretimi II Dersi için öğrenme yönetim sistemi giriş sayfası. Bu bölümde öğrencilere derse ait izlençe, etkinlik ve değerlendirme bilgileri verilmektedir.

Öğrenme yönetim sistemi üzerinde yer alan "Tartışmalar" bağlantısı ile erişim sağlanan sayfada 3 farklı tartışma konusu görülmektedir. Oynatma listesine <https://qoo.gl/xNccw1> bağlantısından erişim

Figure 1. Canvas LMS main student page and the course instructions

The researchers shared the lesson plans of the entire semester in the first week both through the Canvas learning management system and face to face lecture session. Evaluation methods are introduced and necessary information about how the e-portfolio method is implemented is explained to the students. The students weekly formed materials related to the topics that were followed and uploaded them to the learning management system. The implementation schedule is shown in Table 1 below.

Table 1
Implementation Schedule

Week	Date	Weekly Portfolio Scope
1	17 February 2017	Course overview
2	24 February 2017	1. Examination of learning outcomes and distribution of <i>topaç</i> within the science curriculum.
3	3 March 2017	2. Overview and examples of 5E model 1. Prospective teachers' course plans
4	10 March 2017	2. Moon observation 1. Prospective teachers' course plans
5	17 March 2017	2. Overview and examples of Socio-scientific topics 3. Moon observation 1. Prospective teachers' course plans
6	24 March 2017	2. Introduction of technology-assisted applications 3. Moon observation 1. Prospective teachers' course plans
7	31 March 2017	2. Comic book creation steps with ComicLife application 3. Moon observation 4. Argumentation-based socio-scientific topic teaching (Use of animals in experimental research) 1. Prospective teachers' presentations
8	21 April 2017	2. Moon observation 1. Prospective teachers' presentations
9	28 April 2017	3. Argumentation-based socio-scientific topic teaching (Antibiotic usage) 4. Guidance for prospective primary school teachers on portfolio assignments 1. Prospective teachers' course plans
10	05 May 2017	2. Moon observation 3. Guidance for prospective primary school teachers on portfolio assignments 1. Prospective teachers' course plans
11	12 May 2017	2. Moon observation 3. Guidance for prospective primary school teachers on portfolio assignments 1. Prospective teachers' course plans
13	26 May 2017	3. Argumentation-based socio-scientific topic teaching (Genetically Modified Organisms) 4. Guidance for prospective primary school teachers on portfolio assignments 1. Prospective teachers' course plans, Science Center Trip
14	27-31 May 2017	2. Guidance for prospective primary school teachers on portfolio assignments 1. Portfolio delivery and self-evaluation

Lessons were theoretically carried out weekly and the products created each week are uploaded to the LMS. In this process, prospective teachers have created two lesson plans based on learning through research and in the form of a 5E learning cycle. Three different observations were made on one of the selected observation days and a detailed drawing of the Moon was performed for each observation. Prospective primary school teachers observed the Moon for at least three nights during a week at the same clock. There are two days between the two observations. In addition, in one of these days, three observations were made, which would be

at least an hour between the two observations. This observation process continued for nine weeks. The e-portfolio assignments and student uploads of the lunar observations are shown in Figure 2.

Ay Gözlem Günlüğü - Hafta 01

Yayımlanmış Düzenle

Yarıyılız, Proje ve Pazır günleri yapabarak günlemler ile ilgili gözlemler haftalık tek bir belge olarak yükleyeceksiniz.

1. Ay Gözlemi Günlüğü (30)

Ay gözlemi günlüğünü uzun süreli bir çalışma ile oluşturacağız. Bu ödevi Ay'ı gözlemleyerek ve veri toplayarak başlayacağız. Ardından bazı sorular soracak ve sorduğunuz soruları cevaplamak üzere veri toplamak için bir yöntem geliştireceksiniz.

1. Aşama (Bu aşama verileri online olarak toplanacaktır):

Çalışmaya başlamak için her defasında aynı noktadan olmak üzere gözlem yapmanız gerekecek. Gözlemlerinizi sırasında şu işlem sırasını izlemeniz içinizi kolaylaştıracağız:

*** Veri toplamak için aşağıdaki tabloyu kullanın

Puanlar 0

Gönderiliyor bir dosya yükleme

Dosya Tipleri docveyadocx

Bitiş	Kim için	Kullanılabilir	Şu zamana kadar
Mar 10, 2017	Herkes	Mar 3, 2017 12am	Mar 10, 2017 11:59pm

Öğrenciler planlamada yer alan haftalık ödevleri, "Kullanılabilir" olduğu tarihten itibaren "Bitiş" tarihine kadar öğrenme yönetim sistemine yükleyebilmektedirler.

Ay Gözlem Günlüğü - Hafta 02

Yayımlanmış Düzenle

Yarıyılız, Proje ve Pazır günleri yapabarak günlemler ile ilgili gözlemler haftalık tek bir belge olarak yükleyeceksiniz.

1. Ay Gözlemi Günlüğü (30)

Ay gözlemi günlüğünü uzun süreli bir çalışma ile oluşturacağız. Bu ödevi Ay'ı gözlemleyerek ve veri toplayarak başlayacağız. Ardından bazı sorular soracak ve sorduğunuz soruları cevaplamak üzere veri toplamak için bir yöntem geliştireceksiniz.

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Puanlar 0

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Dosya Tipleri docveyadocx

Bitiş	Kim için	Kullanılabilir	Şu zamana kadar
Mar 17, 2017	Herkes	Mar 10, 2017 12am	Mar 17, 2017 11:59pm

İlgili Öğeler

SpeedGrader™

Gönderileri İndir

Gönderileri Yeniden Yükle

33 öğrencinin 0'i notlandırıldı

Figure 2. Student Moon Observation assignment and log reports

The researchers have created a discussion environment based on Toulmin's argumentation that includes "data, claim, warrant, backings, qualifier, rebuttal" on the learning management system. Also, various issues related to the argument-oriented teaching of socio-scientific subjects were assigned to prospective teachers. The students were provided with information about ComicLife software to create comic books on science subjects. Screen captures of the ComicLife learning modules are given in Figure 3.

171416115-A - Sayfalar - Resim ekleme ve hazır filtre kullanımı

Ana Sayfa
Ödevler
Tartışmalar
Notlar
Kaldırımlar
Sayfalar
Dersler
Ders Programı
Çizimler
Kısmi İncelemeler
Modüller
Çevre Dersleri
Ayarlar

Tüm Sayfaları Göster

Yayımla

Düzenle

Resim ekleme ve hazır filtre kullanımı

ComicLife kullanımı hakkındaki yönlendirici bilgi de içeren öğretici videolar modül içinde hazırlanan sayfada görüntülenebilmektedir.

171416115-A - Ödevler - Fen ve Teknoloji Eğitiminde Çizgi Roman - Comic Life 3

Ana Sayfa
Ödevler
Tartışmalar
Notlar
Kaldırımlar
Sayfalar
Dersler
Ders Programı
Çizimler
Kısmi İncelemeler
Modüller
Çevre Dersleri
Ayarlar

Fen ve Teknoloji Eğitiminde Çizgi Roman - Comic Life 3

Yayımla

Düzenle

Temanya bölümünde yer alan ve aşağıda linkli olan başlıklardan birini seçerek tartışılan konular bağlamında bir eğitimci çizgi roman oluşturup sisteme 9 Haziran 2017 saat 17:00'a yükleyiniz.

- Hayranların deneyimlerini paylaşmalarını kullanın: https://canvas.egu.edu.tr/courses/427/discussions_topica/1415
- Artık yayımla kullanın: https://canvas.egu.edu.tr/courses/427/discussions_topica/1415
- Geneliği değiştirilmez organizmatör: https://canvas.egu.edu.tr/courses/427/discussions_topica/1417

Publiler 0

Gönderiliyor Bir araya yüklemeye

Bitiş	Kim için	Kullanılabilir	Şu zamana kadar
Haz 9, 2017 13pm	Herkes	May 5, 2017 12pm	Haz 9, 2017 11 51pm

İlgili Öğeler

- SpeedGrader™
- Gönderileri İncele
- Gönderileri Yeniden Yükle

29 gönderiye 0% notlandırıldı

Figure 3. *ComicLife learning modül on Canvas LMS*

In relation to science education in the out-of-school environment, prospective primary school teachers prepared a report related to the trip to the Science Center. The evaluation of the e-portfolios was made during the last week of the work. At the end of the process, open-ended questions were asked, and answers given by teacher candidates to these questions via the learning management system were gathered in written form as research data.

Data Analysis

Descriptive analysis based on qualitative research method was used in analyzing the data gathered in the research, and data were examined in depth on the basis of the themes determined based on the theoretical framework of the research (Yıldırım & Şimşek, 2006). The analysis of research data, in the context of the research questions and conceptual framework of the research, has been conducted out in three stages. In the first stage, the evaluations of the students related to the process were analyzed with the open-ended questions. In the second

stage, students' opinions were analyzed on the basis of the themes determined in the context of the theoretical framework of the research. In the third stage, the findings were interpreted after analysis.

Findings

In the findings section of the study, the results related to each sub-objective are interpreted and given respectively below.

Skill Acquisition of The Prospective Primary School Teachers During The E-Portfolio Implementation Process

Figure 4 shows the data obtained from the opinions of the prospective primary school teachers regarding skill acquisitions in the e-portfolio implementation process. Numbers in the figure indicate frequencies.

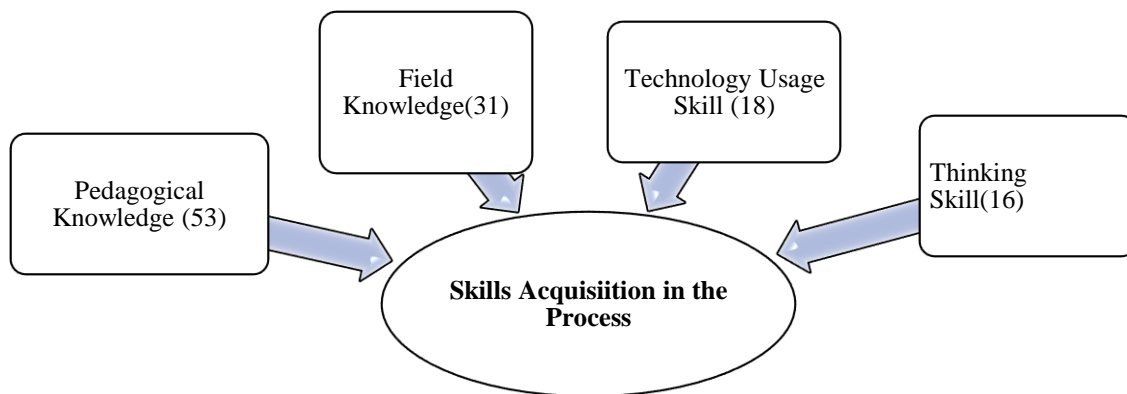


Figure 4. Skill acquisition of the prospective primary school teachers during the e-portfolio implementation process

Prospective primary school teachers stated that e-portfolio implementation process contributes significantly in the sub-headings of "Pedagogical Knowledge", "Field Knowledge", "Technology Usage Skill" and "Thinking Skill". Classifications and opinions of the prospective

primary teachers regarding subheadings are presented in tabular form. Prospective teachers expressed their views on pedagogical information acquisition in the process of e-portfolio implementation in three sub-dimensions.

Prospective teachers have indicated that the e-portfolio implementation process contributes to the pedagogical knowledge acquisition in sub-dimensions such as "providing experience in preparing and implementing lesson plans (31)", "providing awareness (6)", and "personal and professional development (16)". The sample statements of the prospective teachers for facilitating the preparation and implementation of the lesson plan are given below. Prospective teachers were coded as PT1, PT2, PT3, ... etc. in the statements.

PT1 "How to prepare a lesson plan according to 5E model? I learned what to watch out for when preparing the lesson plan, and what kind of activities might be for the stages of the 5E model. I have acquired experience in implementing the lesson plans for the class."

PT2 "We had the opportunity to work on many subjects, not just on one subject. When I am a teacher in the future, I will apply my learning to my students."

PT4 "I learned everything about how to teach a science course to 3rd and 4th-grade students."

PT5 "It contributed to the preparation of lesson plans, both for learning the 5E model and for different methods and techniques that are interesting for teaching and learning."

The majority of the participants agreed with the statement that e-portfolio implementation process has contributed to the process of preparing the lesson plans, creating content and implementing them. The opinions of prospective teachers who indicate that the process of creating e-portfolios is giving them awareness are presented below.

PT4 "I understood what I should pay attention to in my presentation, that I should give tangible examples to the students for science lessons."

PT8 "In this study I learned how to teach according to the 5E model and why I can not always see the Moon in the sky."

PT10 "When we were observing the moon, I realized that we could not perceive what we actually saw. In other words, I understood that to look and to see are two different things."

Prospective teachers have indicated that their awareness was raised about the planning of the learning process, reasons and solutions to the problems they have faced. The opinions of the

prospective teachers that the process contributes to their personal and professional development in the context of acquiring pedagogical knowledge are summarized below.

PT1 “I think that I developed myself in the course.”

PT5 “Now, I see myself as a prospective teacher who is more qualified and self-confident for professional competence and science teaching.”

Prospective teachers stated their opinions on the field knowledge acquisition in the e-portfolio application process in three sub-dimensions. Some of the prospective teachers have stated that the e-portfolio implementation process has contributed to them in the context of "learning through experience (5)", "new knowledge acquisition(17)" and "research (9)". Prospective teachers stated the contribution of e-portfolio implementation process on learning by experience as follows:

PT7 “The trips to the Science Center, Underwater World, Space House or Zoo are also very useful. Because seeing and trying everything on the spot where they belong is a convenient way to learn by doing/living. The moon observation is the same. Instead of memorizing the phases of the Moon, Earth rotation and its influence on the Moon, we learn by observing the Moon”

PT16 “I would like to take my students to science centers in the future. I want children to learn by seeing and living. I'm sure there will be a trip that students can not forget.”

PT20 “. A student learns better by doing and living. Researching, developing and implementing these programs also provided the permanence of learning.”

Prospective teachers stated the following opinions on their acquisition of new knowledge and techniques in the context of field knowledge.

PT2 “We observed the Moon on specific days and hours every week. I never saw the Moon, but I learned why I can not always see the Moon.”

PT3 “I learned that the moon will not always be visible. I learned to do argumentation based teaching of socio-scientific issues.”

PT5 “I got the information about GMO foods, animals used in experimentation and antibiotics usage. Both topics are current, and I did not have sufficient information before.”

In the e-portfolio creation phase, participants reported that they have been doing research in many stages, such as participating in discussion environments or updating their uploads. The following sample statements can be given in this context.

PT1 "In order to be able to participate in these discussions; first, we had to have the knowledge about the socio-scientific issue. For this reason, first of all, I have done research on the subject and read the article. So I had an idea for the discussion."

PT18 "I learned to do academic research."

PT21 "It was beneficial to regularly investigate things and constantly obtain new information."

Eighteen of the participants expressed their view that developed the skill of using technology in the process of e-portfolio creation in the context of "learning by using different software". Sample statements are given below.

PT1 "On Comiclif assignment, we had the opportunity to use the technology in the class and implement with the student. We started to use the ComicLife software in the homework of our other courses."

PT5 "I also learned ComicLife software which is a different and beautiful software that can be used for making cartoons and banners."

PT12 "I learned that I could discuss any scientific topic on the internet."

PT23 "When we do assignments we have also learned technological software that we can use in education."

Sixteen of the participants stated that e-portfolio implementation process making contributed to their thinking skills in the context of "making use of thinking skills" and "a different perspective acquisition". Sample statements are:

PT3 "I have learned a lot of ideas about how to teach different subjects with the help of the presentations made by my classmates."

PT4 "I shared my opinions on the discussion platform and learned to read people's different views. I also learned how I could defend my own opinions."

PT22 "I think that all the assignments given in the course are beneficial and that I have improved my creativity."

PT35 "During the moon observation assignment, I have learned to dream more, and ask more questions to myself about the universe and the creation of the universe."

General Evaluations of The Prospective Primary School Teachers About The E-Portfolio Implementation Process

Figure 5 shows the data obtained from the opinions of the prospective primary school teachers regarding general evaluations in the e-portfolio implementation process. Numbers in the figure indicate frequencies.

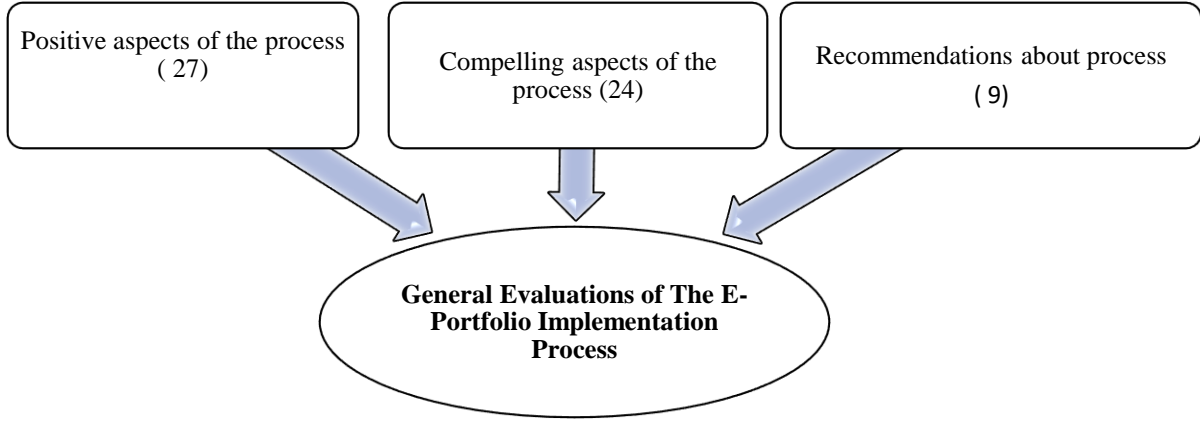


Figure 5. *General evaluations of the prospective primary school teachers about the e-portfolio implementation process*

Implementation process sample statements of the participants regarding the positive aspects of the implementation process are given below.

PT15 “The activities we did made the lesson more enjoyable. At first, I thought it was tough, but when I started to do it, I saw that it was enjoyable and effortless.”

PT16 “After the Science Center, my favorite task was to share my thoughts with my friends on the discussion board..”

PT17 “Overall, from a curriculum point of view, we have completed a course that was both fun and educational.”

PT22 “I believe that all the assignments given will be very beneficial to me in the context of science education.”

PT24 “The trip to the science center has destroyed my prejudice against some courses since I was early age.”

Prospective teachers stated that the e-portfolio implementation process is pleasurable, fun and useful, eliminating their prejudices against the lesson. Also, they expressed that this kind of implementation has a lot of positive aspects in different dimensions. Prospective teachers have

indicated that they are the processes they are challenged to implement e-portfolio. Sample statements on this issue are as follows:

PT3 "I noticed that I did not do sufficient study in the research sections during discussion sessions. My classmates have done more research on this subject and - had more knowledge."

PT11 "I can say that our moon observation exercise is a little tough. Because we had to look at the moon at the same time every week and shoot the photo, and regularly observing the moon and logged was a challenging task for me."

PT12 "There were moments when I was having difficulty preparing a lesson plan according to Model 5E. Especially in the step of exploration and deepening."

PT15 "Mostly I have difficulty in observing the moon. I saw the moon very rarely. And I had trouble researching about antibiotics usage."

PT33 "I had trouble with moon observation assignment. Because I have had difficulty in taking pictures on specific days, hours and locations."

As stated in the above opinions, the majority of the participants stated that they have difficulties in the research and observations to be done within the course. Prospective primary school teachers expressed their suggestions for the implementation of such activities in other courses. They also recommend that the activities which are implemented within the scope of e-portfolio implementation process be carried out in the primary schools. Sample recommendations for the e-portfolio implementation process are given below.

PT7 "Although it seems difficult, lessons should be taught like this."

PT24 "I think that the science center trip will make a positive contribution to the primary school children's love of lessons. In this way, interests can also be attracted to science courses."

PT32 "I think children will be very interested in science centers. So, I think that primary school teachers should go to similar places."

Results, Discussion and Recommendations

When the opinions of the prospective teachers participating in the research are examined, it is concluded that the process of e-portfolio creation contributed to them in the sub-headings which are "Pedagogical Knowledge", "Field Knowledge", "Technology Usage Skill", and "Thinking Skill". They stated that the process contributed in the sub-dimensions of "providing

experience in the preparation of lesson plan and providing practical experience", "awareness-raising" and "personal and professional development". Many researchers have also show that e-portfolios help students learn to manage their own professional development. This contributes to lifelong learning as well (Barrett, 2000; Love and Cooper, 2004). Gömleksiz and Koç (2010) stated that the process of e-portfolio creation has positive aspects in taking responsibility for learning to prospective teachers, taking an active role in their own work and monitoring and contributing to their development. Similar results with this research were achieved in the study performed by Gömleksiz and Koç (2010). Furthermore, Lyons, Hyland, and Ryan (2002) stated that the aim of using e-portfolio as an alternative assessment tool is to improve the pedagogical knowledge content of prospective teachers and provide a reflective practice. Similarly, Belgard (2013) and Garrett (2011) have emphasized the positive effects of pedagogical and technical content knowledge of prospective teachers.

Participants expressed that the e-portfolio implementation process contributed to them in the sub-dimensions of the field knowledge acquisition such as "learning through experience", "new knowledge acquisition" and "research". In similar research, Gömleksiz and Koç (2010) found that the process of e-portfolio creation leads students to research, to add individuality to their work and to share with their friends. Participants indicate that they have developed the skills of using technology in the e-portfolio creation process in the context of "learning using different softwares". Heath (2005) stated that e-portfolio is a way to demonstrate technology skills. It has been determined that the process of portfolio creation contributes to the thinking skills of prospective teachers in the context of "using their thinking skills" and " a different perspective acquisition". Wade and Yarbrough (1996) stated that portfolio provides students with a focus on their thinking. The results of the research show that the e-portfolio creation process is enjoyable, funny, beneficial, and eliminates prejudices towards the lesson. In the e-portfolio creation process, it was determined that participants had difficulties in the research and the observations to be made within the course. Participants have made recommendations for the implementation of such activities in the other courses as well as for the activities they have carried out in the process in primary school.

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