

Student Teachers' Perceptions About an E-portfolio Enriched with Learning Analytics

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Abstract. In recent years the use of e-portfolios has increased in teacher education. Moreover, another rapidly evolving area in teacher education is learning analytics (LA). This paper reports the experiences of 13 student teachers in the implementation of an e-portfolio that is enriched with LA in a teacher education programme. Thirteen student teachers of primary school teacher curriculum received feedback and were assessed by their supervisors in their internship via an e-portfolio with LA. Questionnaire and a focus group interview were administered among the participants to identify how the student teachers perceive the job-fit and the effort expectancy of the e-portfolio with the LA application and to indicate the challenges encountered. The study revealed several positive evidences: the student teachers were on agreement that e-portfolio with LA is time-economising and easy to use. The student teachers appreciated that they received a good overview about their professional development. As a challenge, many student teachers questioned whether the use of e-portfolio can increase the quality of their professional activities (e.g. planning lessons, carrying out teaching activities and evaluating pupils' learning). Future research should focus on how to support the student teachers so that they would comprehend the benefits of the e-portfolio with LA on their professional activities and how to integrate human expertise in a more dynamic way.

Keywords: E-portfolio · Learning analytics · Teacher education

1 Introduction

1.1 Background

Feedback on and assessment of professional activities (e.g. planning and carrying out the learning activities, choosing and designing the appropriate learning materials, evaluating the pupils, etc.) in the workplace are critical in becoming a teacher [1, 2]. In teacher education often electronic portfolios (e-portfolios) are used to support workplace-based learning and assessment [3, 4]. Existing research shows several potential benefits of the use of e-portfolios in teacher education. Aligning the e-portfolio with teaching education programmes and the professional activities to be assessed gives the student teachers a possibility to reflect on their development and work and to improve their effectiveness as a teacher [5]. However, research also shows that the implementation of e-portfolios in

teacher education may be a complex process [6]. Firstly, the use of e-portfolios requires a wide range of digital technology skills and proficiencies among the student teachers and their supervisors [7, 8]. In order to overcome this challenge, students need to be instructed and supported in the development of the necessary technology skills and understandings that guidance in terms of clearer expectations and requirements, more directions and modelling through examples, would make the e-portfolio more meaningful for them [9]. Secondly, one major challenge is the time and attention needed for working with the e-portfolio [10].

Furthermore, potential data in an e-portfolio assessment are underused. Therefore, in this article we will study the usefulness of a teacher e-portfolio that is enriched with Learning Analytics (LA). Learning analytics applications can be defined as the measurement, collection, analyses and reporting of data about learners and their contexts, for the purpose of understanding and optimising learning and the utilising of environments in which it occurs [11]. E-portfolios combined with LA can deal with the complexities of the workplace-based environment and can provide just-in-time high quality feedback to and assessment of student teachers.

In the implementation of new technology, it is important to study and understand the perceptions of the people using the technology. We use the Unified Theory of Acceptance and Use of Technology (UTAUT) which describes the significant determinants of user acceptance and usage behaviour [12]. More specifically we focus on two constructs: performance expectancy and effort expectancy. Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance [12]. Only the job-fit root construct about the extent to which an individual believes that using a technology can enhance the performance of his or her job [13] from this construct will be used. Effort expectancy is defined as the degree of ease associated with the use of the system. Two scales from this construct, complexity [13] and ease of use [14], will be used. Complexity describes the degree to which an innovation is perceived as relatively difficult to understand and use [13] and ease of use describes the degree to which an innovation is perceived as being difficult to use [14].

The aim of this study is to explore the perceptions of student teachers who used an e-portfolio that is enriched with LA during their internship. The specific research questions were the following:

1. How did the student teachers perceive the job-fit of the e-portfolio with the LA application?
2. How did the student teachers perceive the effort expectancy of the e-portfolio with the LA application?

1.2 Context of the Study: The E-portfolio and the LA Application

At first the most crucial activities that student teachers need to develop during their teacher education studies were developed [15]. The assessment rubric used in the current study targeted five professional roles and 12 professional activities teachers need to carry



Fig. 1. The just-in-time feedback box on the dashboard of the e-portfolio.

out in their everyday work. Each activity was further specified in five performance levels (for further information about the assessment rubric see [16]).

While there was not a very clear system or protocol for providing feedback in the internship, there was a necessity for the implementation of a new system or protocol for formative assessment. Furthermore, there was a need for increasing student teachers' ownership for their learning and development as well. For these reasons, the above mentioned assessment rubric was implemented in an e-portfolio

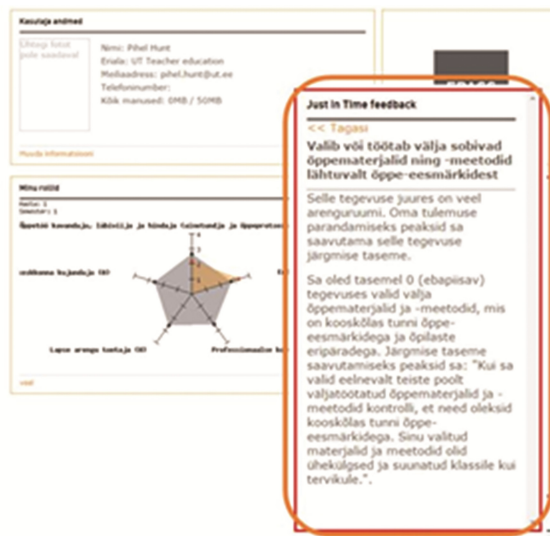


Fig. 2. Improvement feedback (automated feedback) in the just-in-time feedback box

environment. The rationale behind the e-portfolio was that student teachers should gradually submit their assessment data instead of submitting the data at the end of their internship. The student teachers filled in the electronic assessment forms (context info) in the e-portfolio and requested their supervisors to validate the forms. The supervisors marked the performance levels and provided further feedback. After the form was validated the student teachers received automated feedback in the automated feedback module. This appears on the e-portfolio dashboard in the Just-In-Time feedback box (see Fig. 1).

There are two kinds of feedback visible in the just-in-time feedback box - improvement feedback and supervisor feedback. This paper focuses on the improvement feedback, which is automated feedback based on the received rubric score given by the supervisor (Fig. 2).

In the following sections, we present our exploration of the perceptions of the student teachers in terms of the job-fit and effort expectancy of learning analytics enriched e-portfolio.

2 Method

2.1 Sample of the Participants

Data was collected from thirteen students of the final (fifth) year of the primary school teacher curriculum who used the assessment e-portfolio for six weeks during their internship. Nevertheless, using the e-portfolio was voluntary for them. This was agreed beforehand with the coordinator of the internship. All the student teachers were female and their age varied between 22 and 34 years. Mean age of the student teachers was 24.6 years ($SD = 3.3$). Most of the student teachers reported prior use of e-learning systems, mostly Moodle and eKool. No one had had any prior experiences with e-portfolios.

2.2 Procedure

Before student teachers started using the e-portfolio, the coordinator of the internship gave them an overview of the requirements of the internship. The student teachers were provided with manuals and videos on how to use the e-portfolio. Moreover, constant support was provided via Moodle environment (on the internship's page). Frequent reminders to use the e-portfolio were sent to the users via email and Moodle. Over the internship period of six weeks, the student teachers were asked to request assessment via the e-portfolio from their supervisors for eight lessons.

2.3 Instrumentation

The questionnaire was administered among the participants at the end of the internship. Based on the Unified Theory of Acceptance and Use of Technology [12] mentioned in

the introduction section, the questions focused on the constructs of job-fit and performance expectancy. The specific questions that were used are presented in Table 1.

Table 1. Constructs, items and cronbach's alphas

Construct	Items ^a	Cronbach's alpha (e-portfolio; automated feedback module)
Job-fit [13]	Use of the system increases the quality of the professional activities I need to carry out during my internship Use of the system results in higher performance in the professional activities I have to carry out during my internship Use of the system supports the development of my professional activities during my internship In conclusion, the system helps to do my professional activities better	.94; .81
Effort expectancy ([12] adapted from [13, 14])	Use of the system means I have to do too much tedious work (e.g., data input, data retrieval) It takes a long time to learn how to use the system Using the system takes much of the time meant for carrying out my professional activities The system is easy to use	.70; .82

^aThe formulations of the items were adapted regarding the topic (e-portfolio, automated feedback module)

All questions were rated on a 5-point Likert scale (1-fully disagree; 5-fully agree). There was an option to answer "not applicable" (NA) if there was a possibility that the respondent had not used some parts of the system. Also, student teachers had the opportunity (open-end question) to add additional comments about the e-portfolio and the automated feedback module.

In addition to the questionnaires a focus group interview was conducted with three student teachers to get more information in order to explain more the results from the questionnaire and find the issues that may not have revealed from the questionnaire. The student teachers gave their permission to use their data from the e-portfolio, the questionnaire and the interview. They were granted confidentiality.

2.4 Data Analysis

The data was analysed in two steps. Firstly, descriptive statistics were used to describe the mean scores and the standard deviations (SD) of the constructs. The reliability analysis (Cronbach alphas and Spearman correlation coefficients) was carried out to analyse the

questions that were answered on Likert scale. Also, Wilcoxon signed ranks test was used to evaluate significant differences between constructs. Secondly, a qualitative analysis of the open-ended responses and of the interviews was conducted. The qualitative analysis followed the thematic analysis procedure [17] in which the researcher looks for themes and sub-themes underlying the qualitative data.

3 Results

3.1 Student Teachers' Job-Fit of the E-portfolio and Automated Feedback Module

The mean score of the job-fit of the e-portfolio was 2.7 (SD = .83; N = 13). This result indicates that few student teachers agreed that the use of the e-portfolio resulted in increased quality of their professional activities, in higher performance in the professional activities or supported their development in their professional activities. Only two student teachers agreed that using the e-portfolio helped to do their professional activities better during the internship.

The mean score of the job-fit of the automated feedback module was 3.0 (SD = .92; N = 10). This score is a bit higher than the mean score for the e-portfolio although, there is no significant difference between these scores. There is a strong significant positive correlation ($\rho = .81$) between the job-fit of the e-portfolio and the automated feedback module. However, it must be also noted, that only 10 respondents out of 13 answered these questions. This may refer to the fact, that some of the respondents did not use the automated feedback module.

The student teachers were more positive in the interview. From the interview and open-ended responses it can be included that overall, student teachers were satisfied with their experiences in using the e-portfolio in their internship. They expressed that although they were a little sceptical before using it, they liked the idea that their professional development was easily observable.

3.2 Student Teachers' Effort Expectancy of the E-portfolio and the Automated Feedback Module

The mean score of the effort expectancy of the e-portfolio was 3.4 (SD = .74, N = 13). The opinions about whether using the e-portfolio means too much tedious work or not were divided into two: seven people agreed that it does and six disagreed. Most of the student teachers agreed that the e-portfolio was easy to use and did not take too much of their time meant for professional activities. A common view among the participants was that the positive side of the implementation of the e-portfolio would be the decrease in the use of paper. Some of the student teachers indicated that they experienced some technical problems with the system. These problems were mostly connected with logging in to the system or sending the feedback protocol to the supervisor.

The mean score of the effort expectancy of the automated feedback module was 3.4 (SD = .85; N = 10). The Spearman correlation analysis shows a significant positive correlation ($\rho = .76$) between the effort expectancy of the e-portfolio and effort

expectancy of the automated feedback module and there is no significant difference between the scores. Similarly to the job-fit construct, three participants did not answer to the questions about the automated feedback module, which may suggest the fact that the student teachers did not use this module.

The most interesting topic that emerged from the open-ended questions and from the interview was the perception that the automated feedback was not personalised because it was created based on the rubric and on the supervisor's score, so every student teacher could receive the same feedback. The student teachers pointed out that they value more the oral feedback or the written comments they received from their supervisors rather than the automated feedback generated by the computer.

4 Main Conclusions and Implications

The aim of this study was to explore the job-fit and the effort expectancy of an e-portfolio with the LA application which was used by thirteen student teachers during their internship. This study provided useful insights into benefits and challenges of implementing e-portfolio and LA in educational contexts and therefore provides a valuable base for implementations and further developments.

The study revealed several positive evidences regarding the effort expectancy of the e-portfolio and automated feedback. Student teachers were on agreement that e-portfolio with LA is time-economising and easy to use. This finding is contrary to previous studies [7, 8, 10] which have suggested that working with e-portfolios requires too many technical skills, and too much time and attention. The student teachers expressed that although they were a little sceptical before using the e-portfolio, they liked the idea that their professional development was easily observable. A common view among the participants was that the positive side of the implementation of the e-portfolio would be the decrease in the use of paper.

However, the study also revealed that student teachers only modestly value the e-portfolio and automated feedback as a beneficial tool for their professional development. Many student teachers questioned whether the use of e-portfolio can increase the quality of their professional activities (e.g. planning lessons, carrying out teaching activities and evaluating pupils' learning). A possible explanation for this might be that for gaining more from the e-portfolio, student teachers should reflect on their development and work. However, the e-portfolio does not automatically lead to reflection; it only works when it is well embedded in the educational environment and the e-portfolio is aligned with learning goals of the teacher education programme, assignments, assessment of the internship and instruction. Moreover, in the era of complex ICT-enriched environments, participants seem to value expert insights and communication of humans over mere computer-based automatic output.

The major limitation of this study is the small sample size, making it difficult to generalize the results to a larger population. Future research should focus on how to support the student teachers so that they would comprehend the benefits of the e-portfolio with LA on their professional activities and how to integrate human expertise in a more dynamic way.

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