

Educational Potentials of ePortfolio Systems: Student Evaluations of Mahara and Elgg

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Abstract. *This paper provides an overview of the basic features of e-portfolio systems regarding their maturity level, purpose, typology, and potential for student reflection. It also presents the results of evaluation of e-portfolio systems based on a student survey. In order to choose the appropriate ePortfolio system for implementation, two systems (Mahara and Elgg) were tested in concrete setting of a hybrid university course. Both systems were positively evaluated but the Mahara system was better accepted in relation to most of the evaluated attributes.*

Keywords. E-portfolio, e-learning, evaluation, survey

1. Introduction

The teaching at modern universities has witnessed a growing interest in the use of *courseware*, i.e. course management systems (CMSs) or learning management systems (LMSs). According to the survey of the Campus Computing Project in the U.S.A., as many as 50-60% of courses at 4-year colleges or universities reported using a CMS/LMS system in the year 2009 [9]. However, a recent survey conducted in 2008 in Croatia revealed that at the University of Zagreb only 17,5% of the undergraduate courses used some form of a LMS and that at higher levels of education (graduate and doctoral studies) LMSs were used even less often [5]. The 2009 survey of the Campus Computing Project in the U.S.A. [9] has also revealed that *ePortfolio systems* have recently gained much popularity and that in 2009 as many as 45-55% of 4-year colleges or universities in the U.S.A. reported having an ePortfolio service on campus website. It must be noted that in 2009 in Croatia the Mahara ePortfolio system was made available on the website of the Center for e-Learning of the University of Zagreb and that a separate Mahara system was also introduced at the Faculty of Organization and Informatics in Varazdin.

The use of an ePortfolio at the academic level can enrich e-learning and therefore such systems "...are used in distributed, blended and totally

online learning programs and institutions" [19]. According to Lorenzo and Ittelson [13] electronic portfolios are the biggest innovation in educational technology since the introduction of course management systems and they show promise for use across disciplines, institutions, and applications. Moreover, they are contributing to the change in the perspective on learning, transferring it from the use of behaviorist principles towards the use of constructivist pedagogy. In the field of adult education, ePortfolios have the potential to support self-organized and autonomous learning of adults [3] and may contribute to the (re)presentation of the outcomes of their formal, non-formal and informal learning.

It must be noted that throughout the text of this paper the term „ePortfolio“ is used to indicate a web-based Portfolio.

2. Stages of ePortfolio maturity

According to Love et al. [14] ePortfolios "...promise a viable alternative to current, high-stakes testing, which focuses education on test-taking rather than teaching and learning". Many authors (for example: [1], [14], [19]) emphasize the importance of ePortfolios for education. Considering ePortfolio's physical and theoretical qualities, several levels of ePortfolio maturity have been identified. According to Love et al. [14] five levels of ePortfolio maturity in academic surroundings can be distinguished.

Level 1 & 2: Scrapbook & Curriculum Vitae

At level 1 it is not mandatory for students to have a personal portfolio and students are unaware of each other's activities. Students collect some of their assignments or awards (artifacts) that are stored on paper, CD-ROM, or on the web, preferably in chronological order. At the 2nd level students work on creating their portfolio can be guided by an educator, department or institution. Usually portfolios are created for employment purpose and, comparable to the collected artifacts, they can be in paper, CD-ROM, or webfolio format.

Level 3: Curriculum Collaboration

From this stage and above only web-based portfolios satisfy the requirements and are called „webfolios“. Educators can add syllabi or assignments for students to the webfolio system. Students can nominate who can view specific items (artifacts) that they have created and placed in their webfolio. Furthermore, it can be made possible to leave comments on someone's work. At this level educators and other students can provide feedback. Employers can view student's portfolio in the context of syllabi and assessment criteria.

Level 4: Mentoring

At this level the educators are very much engaged in providing guidance and feedback to students regarding their work samples. The portfolio system is advanced so that educators can "lock out" students from making further iterations on some of their work assignments. Portfolio is used both by students and educators. Educators can reproduce syllabi and assignments from previous semesters. All students have equal opportunity to access the portfolio system.

Level 5: Authentic Evidence for Assessment, Evaluation, and Reporting

At this highest stage students' portfolios are very structured and organized according to institutional standards. Students use the portfolio in their class assignments and receive feedback, while the educators and institution perform summative and formative assessments through the portfolio system, present syllabi, provide links to standards and educational goals. The institution can use the portfolio to assist in program assessment and revision.

A close observation of the previously presented ePortfolio maturity model developed by Love et al. [14] reveals that one of the key elements for the implementation of Level 5 of ePortfolio maturity at a specific institution from the ICT perspective is the system which (a) holds and helps organize the information, and (b) enables the interaction and information exchange between students, educators, representatives of the institution and employers. From the assessment perspective, only Levels 3 to 5 can fully and systematically support the evaluation of students' work. Finally, from the pedagogical perspective, only Levels 3 to 5 adequately support the novel concepts of collaborative and peer-to-peer learning. However, higher levels of ePortfolio maturity can not rely only on the technical features of the ePortfolio system, but must also be supported by organizational efforts, as well as by the needed pedagogical and technological competencies of educators.

It must be emphasized that there are comparable models of ePortfolio maturity (to the introduced by Love et al. [14]), for instance the model conceptualized by Rubens and Kemps [18]. Their analyses of ePortfolio implementation in higher education institutions in the Netherlands indicated that such systems were predominantly used for the support of the individual learning process, i.e. to coach students and enable them to reflect on their development, and not so much for peer feedback and collaborative learning.

3. ePortfolio in education

According to the Electronic Portfolio Consortium [7] there are numerous benefits of electronic portfolios for students, faculty, educational institutions and employers. For instance, they can aid students in the development of organizational skills, make them more aware of their abilities, support them in setting educational goals and assessing progress, facilitate their career decisions, and enable them to more effectively promote themselves as professionals to potential employers. Perhaps the most influential effect of the use of ePortfolio systems is the increase in the level of motivation and awareness related to self-assessment [6]. Students in a classroom with regular and appropriate use of ePortfolio may also manifest a greater degree of self-regulated learning and development of associated metacognitive skills [16].

However, to adequately support the learning process and the basic portfolio functionalities, an evaluation of ePortfolio systems must be performed as was recently done by Himpsl and Baumgartner [10] who have created a comprehensive taxonomy of ePortfolio functionalities regarding ePortfolio type, purpose, learning activities, source of feedback, and type of items. Furthermore, Sweat-Guy and Buzzeto Moore [20] have developed a list of features that may be used for comparison of ePortfolio systems which includes advisement, artifacts (multiple file types), assessment quizzes/exams, collaboration, communications, course management and delivery, learning outcomes/goals, reflections, reporting, surveys, etc. Many of such features are important for the pedagogical use of ePortfolios. For the purpose of this paper, only the most common features of ePortfolio systems will be outlined.

3.1. Types of ePortfolio systems

Even though different classifications of ePortfolios can be found in literature, the three

basic types of ePortfolios are (see: [15]; [11]; [1]):

1. *Assessment portfolio*. Their purpose is to demonstrate student competency and skills for well-defined areas and enable the evaluation of student competency as defined by program standards and/or outcomes. After the students publish their work, their educators, as well as peers, can provide comments and feedback.

2. *Development portfolio*. Their main idea is to facilitate setting of students' educational goals and provide evidence of the advancement of their knowledge and skills. The use of ePortfolio can provide support for personal development planning.

3. *Showcase portfolio*. Their use is to demonstrate exemplary results of classroom assignments and other work, as well as student skills. They are designed for potential employers or educators and can be used instead of one's CV.

In most cases ePortfolios are not used for one single purpose and are a combination 2-3 types of portfolios to create a *Hybrid* portfolio.

3.2. Pedagogical use of ePortfolio systems

The use of ePortfolios enables a change from traditional "one-dimensional" assessment to a more user-centered approach where students can better express the diverse knowledge and skills that they have acquired, as well as their learning experiences [7].

The constructivist approach to learning places an emphasis not on the teacher, but on the learner who becomes the "centre of learning". The content is no longer the main focus of teaching and the emphasis is put on learner who has to become autonomous and take initiative. The use of ePortfolio for setting career and educational goals motivates the students to seek for knowledge and skills according to their interests and abilities, and the educators to provide more personalized learning content and methods.

The ICT related aspects of the pedagogical use of ePortfolio are represented by three trends (adapted from: [2]):

– *The results of student work are mostly in electronic form* (digital artifacts are created even from printed material; experiments are videotaped and presented in electronic format, etc.).

– *The web is everywhere* (digital artifacts are placed on the web and accessible from anywhere and by anyone with permission).

– *Databases are available on the Internet* (large data volumes regarding the artifacts of student work can be placed on database services on the web, tagged, searched etc.).

3.3. Reflection in the use of ePortfolios

The constructivist approach to learning gives importance to learner's previous knowledge, his/her personal impressions of the learning content and individual fields of interest. The use of ePortfolios can support constructivist teaching and learning processes, facilitate the creation of personal experiences, their presentation and sharing with others, as well as critical thinking and learning by reflection [19]. The learners should have a chance for self-expression and they should be stimulated to connect pre-existing knowledge with new facts. Critical thinking about new things that are being learned is called reflection. According to Stefani [19] reflection is considered as a part of the learning process in which the learners try to relate the elements of the new learning situation and its content to what they already knew.

In ePortfolio context reflection means "contemplation on the meaning of artifacts, ideas, expressions, and the processes that supported their creation, including a consideration of intent" [6].

Reflective learners need certain skills like critical thinking. In critical thinking the individual thinks in a way that is purposeful, reasoned and goal directed or, in other words, "the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task" [6].

Because of its features, ePortfolio offers support for reflection and this is one of its main advantages over other systems. However, there are few issues that should be taken into consideration regarding the use of reflection [17]: (a) in academic institution there should be a unique definition of reflection along with instructions about what is expected from reflection process; (b) students should be thought on how to reflect in a purposeful way. Effective reflection will depend, according to Riedinger [17], "...on the willingness of all to take risks, think outside of their disciplines, and learn childhood curiosity – the art of asking why".

4. The case of ePortfolio implementation in a hybrid course

To chose the most suitable ePortfolio system and to evaluate the use of the selected system for assessment purpose we have conducted two studies. In our *first study*, during the first half of the academic year 2008/2009, we implement two parallel ePortfolio systems in a hybrid (blended learning) course entitled "Security of Information Systems" at the Faculty of

Organization and Informatics, University of Zagreb, Croatia. Fifty-four students, mostly at the third year of study, have attended this course which included conventional classes and practical sessions in a computer lab. Additional teaching materials, as well as discussion forums, were provided through a Moodle LMS. The students were given a quick tutorial on the use of two ePortfolio systems (Mahara and Elgg) at the beginning of the course. Moreover they had assignments which they had to complete at the end of each week simultaneously in both ePortfolio systems. At first they needed to create a *showcase* ePortfolio and after they got familiar with the systems they created an *assessment* ePortfolio by placing their working assignments and reflections for assessment on both of the ePortfolio systems.

The main goal of our parallel use of two systems was to choose the most suitable ePortfolio system and introduce it to the next generation of students. However, we had three other goals in this process:

1. To teach students how to reflect and to use ePortfolio capabilities for that purpose.
2. To teach students to create an assessment ePortfolio that included the results of work assignments and their reflections.
3. To explore the possibilities for assessment through an ePortfolio.

Considering the ePortfolio maturity model described in the second chapter of this paper (see: [14]), the use of student's ePortfolio reached Level 3 in our course at the end of the semester.

In our *second study* we used only the Mahara ePortfolio system predominantly for assessment purpose during the hybrid university course "Informatics 2" in the second half of the academic year 2008/2009 with 172 students of this course (mostly of the first and second year of undergraduate study) being included in the evaluation survey of the Mahara system.

A comprehensive questionnaire was developed that was based on an extensive overview of ePortfolio literature, as well as on a questionnaire developed for on-line course evaluation in our previous research. This ePortfolio evaluation questionnaire consisted of items that were designed to:

- a) find out more about ePortfolio possibilities in teaching and learning by its application in a specific hybrid course (this was related to previously mentioned goals 1-3);
- b) enable the evaluation and comparison of both ePortfolio systems (Mahara and Elgg) so that the most suitable system could be identified for the use at the institutional level (by Faculty of

Organization and Informatics as an educational organization).

For this reason, the questionnaire itself consisted of two parts. The first part contained statements of student impressions of the ePortfolio systems that they have used in the course and the second part contained statements related to ePortfolio application features. The students responded to survey questions on a Likert-type scale ranging from 1 – *totally true* to 5 – *totally untrue*.

4.1. Survey results regarding the general evaluation of two ePortfolio systems

To investigate the potential usefulness of both ePortfolio systems (Mahara, Elgg) the following statements (survey items) were included in our survey.

- *Item no. 1:* I find working with the system to be useful.

- *Item no. 2:* I find the possibility for comparing my results with those of other students to be a very useful feature of the system.

- *Item no. 3:* ePortfolio helps me to plan the content of my CV and to plan my further development.

- *Item no. 4:* I find that I can use the ePortfolio to present my own competencies.

- *Item no. 5:* ePortfolio is the ideal system for presenting skills acquired in non-formal education.

- *Item no. 6:* Using ePortfolio enables me to present myself to the possible employer in a much better way.

The results of the evaluation of both ePortfolio systems with the previously listed questionnaire items is presented in Fig. 1. As can be concluded from the data presented in Fig. 1, the Mahara ePortfolio system was rated slightly better than Elgg in relation to the elements associated with the usefulness of the system. Also, the Mahara ePortfolio system received on the average rather high ratings (in the range from 3,75 to 4,24) regarding the usefulness related items like comparing personal results with those of other students, planning the content of personal CV and personal development planning, presenting one's personal competencies, presenting skills acquired in non-formal education, and presenting oneself to possible employers.

With our survey we also wanted to investigate how difficult it was for the students of the Faculty of Organization and Informatics to learn how to use the ePortfolio systems. For this purpose the following survey items were used:

„No kind of extensive and special education is needed to build and maintain a personal ePortfolio“ and „I believe that anybody who can work with a computer can also learn to work with an ePortfolio“.

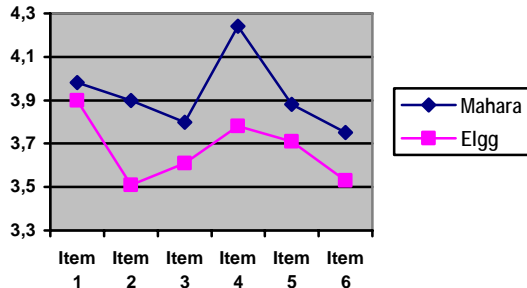


Figure 1. Average ratings of the survey items related to the usefulness of Mahara and Elgg ePortfolio systems (1-5 response scale; N=52; the items 1-6 are listed in the previous text of the paper).

The results of evaluation of both the Mahara and Elgg system are displayed in Fig. 2. These results indicate that the Mahara ePortfolio system was somewhat easier to learn and also that Mahara received very favorable evaluation regarding the low level of effort that was needed to learn how to use the system and create or maintain an ePortfolio. Even though the students that were included in the survey were highly computer literate, the results of our survey imply that it probably would not be too difficult even for students with average computer skills to use the Mahara system for creation and maintenance of their ePortfolios.

Both in the *first study* (N=52) and in the *second study* (N=172) we asked the students to evaluate if they intended to use the Mahara system in the future. They responded on a Likert-type scale ranging from 1 – *totally true* to 5 – *totally untrue* to statements “I intend to use the system in the future” and “I intend to use ePortfolio as a central system in lifelong learning.” The results of their evaluations are presented in Fig. 3. We can conclude that despite the overall high rating of the *development* and *showcase* features of the Mahara ePortfolio system the intention of the students to use the system in the future was only moderately present with average responses to the related survey questions in the range between 2,97 and 3,37 on a 1-5 Likert type scale.

Based on the results of the first and the second study regarding the opinion of the students about the Mahara ePortfolio system in general, we can say that they were satisfied with the use of this new tool. They found the ePortfolio very useful for creating their CVs and

presenting their work to potential employers, even though this was not the main reason for the use of the ePortfolio in the courses *Security of Information Systems* and *Informatics 2*. In their written comments to the survey they stated that the Mahara ePortfolio was “...one of the best systems for presenting oneself as a person, as well as of personal skills and abilities to other people”, that it was a “...quick, reliable and effective system for creating one’s CV and for comparing personal results with the results of others”, and that “...even though it is used as a ‘serious’ system, it has the potential for students to add friends, post photographs, etc.”.

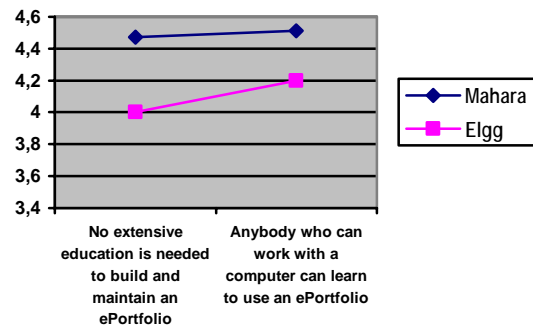


Figure 2. Average ratings of the survey items related to the effort that is needed to learn how to use Mahara and Elgg ePortfolio systems (1-5 response scale; N=52).

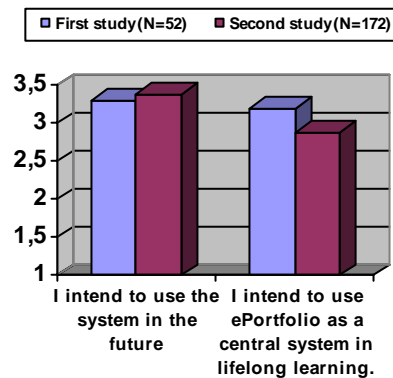


Figure 3. Average ratings of the survey items related to the intention to use the Mahara system in the future (1-5 response scale in the range from 1 – *totally true* to 5 – *totally untrue*).

5. Conclusion

In their study of ePortfolio and blog use Zhang et al. [21] have found that such systems facilitate interaction, idea exchange, and peer-to-peer feedback, and also that they are easy to use

and can enhance the learning experience of students. Furthermore, Lopez-Fernandez and Rodriguez-Illera [12] have found that students develop a positive opinion of the ePortfolio as a tool to manage their learning and assessment, and that they use it as a personal developmental and learning tool. These findings were confirmed in our two studies regarding the use of the Mahara ePortfolio system. Even though several evaluation studies of ePortfolio systems were performed (e.g.: [10], [20]), it is recommended to test 2-3 systems in actual educational settings (in one or more hybrid university courses) regarding student satisfaction and system usability before an ePortfolio is implemented at the institutional level (college, university), as we have performed in our studies.

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