AN EFFECT OF EPORTFOLIO SYSTEM ON COMPETENCE IMPROVEMENT AT THE DIFFERENT STAGES OF THE COURSE

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Abstract: Learning and training as a competence acquisition process excited masters' minds for ages. Nowadays world brings new educational challenges. On the one hand, modern technologies open up new possibilities for learners, make learning accessible for anybody anytime and anywhere; on the other hand, humans' society still needs recognize effective educational methods to engage learners and cope with the demand of lifelong learning. Obtaining of new competences requires students to show their respective attitude and willingness to do so. This paper examines an issue of learners' competence improvement process through their involvement into several self- and peer-assessments within two information systems: university's e-study portal and ePortfolio ones. The research takes notice to an importance of ePortfolio system in competence enhancement at the different stages of the studies. New approach in scaffolding learning, based on development and implementation of engaging ePortfolio systems, may have significant positive impact on further individual training and education developments.

Keywords: ePortfolio, information system, assessment, competence, lifelong learning, scaffolding.

Introduction

People so often lose interest of further knowledge acquisition if they do not get appropriate teaching staff's or more experienced person's advice. Scaffolding learning approach provides necessary support to a person in appropriate study directions which is decisive to move forward (Bruner, 1975). This assistance given in a mode of modelling which activates problem solving abilities and draws learners' attention to the key issues, as well encourages learners to think critically and reflect, is determinant (Wood, Bruner, 1976).

Reflection might be considered as a process which "describes, analyses and evaluates an experience" (National Health Service…, 1993). It is admitted that "the real value of an ePortfolio is in the reflection" (Barrett, 2009). Reflection on evidences of learners' activity and accomplishments within ePortfolios ought to be considered as essential component (Lyons, 1998). Reflection could be imagined as a set of learner's problem solving abilities and skills (Moon, 1999). It analyses processes in person's activities, changes of thoughts, acting, disclosures, and developments against appropriate criteria, as well is continuous and descends to particulars of specific practice issues in different circumstances, contexts and stages (Kim, 1999). Reflection on critical thinking notes and recommendations, as well own considerations may lead to notable competence developments.

Competence development always ought to be viewed in close connection with competence assessment activities (Baartman, Bastiaens, 2006). Competence assessment processes in different forms should be recognised as "competence development in itself" (Peer and Self-Assessment…, 2011).

Implementation of ePortfolio systems becomes more and more important to improve learners' competences. Nowadays ePortfolios are not just a signboard which could be used to show others own achievements. They changes together with educational paradigms and new challenges which bring us lifelong learning demands.

Methodology

Living Lab user centred research method (Chesbrough, 2003) was chosen to examine experimental ePortfolio system prototype. To conduct inspection about learners' possible engaging and their competences' enhancement ways, ePortfolio system algorithmic model was created (Figure 1) and embedded into existing, but for this case remodelled, bachelor level blended learning course "Business Planning for Open Markets (BPOM)". It has embraced two approaches and two systems.

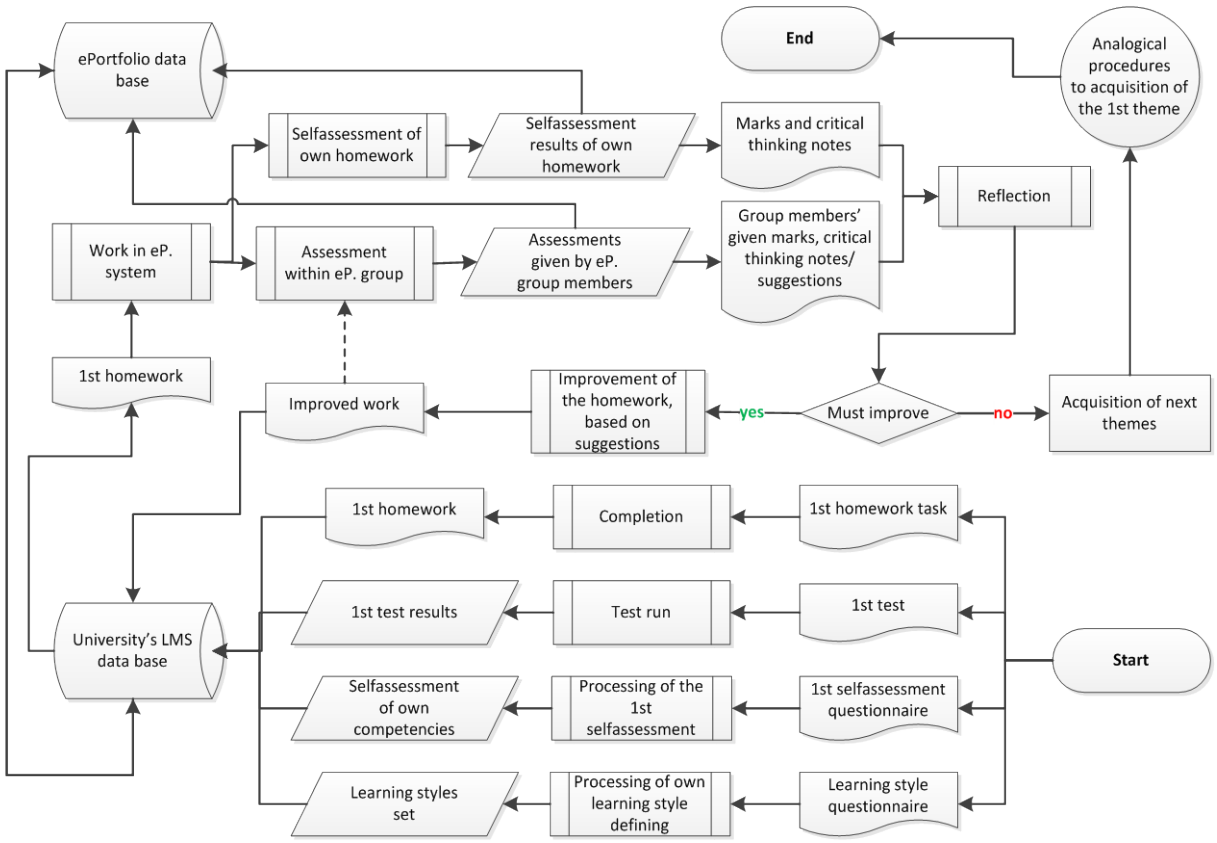

Figure 1. ePortfolio system algorithmic model.

The first information system was based on Riga Technical University's e-study portal "ORTUS", and employed open source environment "Moodle". The system was enriched by additional self-assessment questionnaires. They had the aim to point out learners' competence levels related to the course, such as the competence to estimate a viability of business idea, competence to find the ways of company's ability to carry out business idea, marketing competence, the competence to be aware of competition factors, the competence to estimate financial resources, the competence to assess and develop company's ability to carry out business idea, and the competence to identify possible risks. Entirely seven BPOM competencies were to be self-appraised totally eight times, starting from initial statement and continuing self-assessment procedures after every completed course theme, i.e. learning module, each second week. Students were asked to fill-in these forms by ticking appropriate level of competence in a scale from 1 to 10, where 1 meant the worst appraisement and 10 – the best one.

Tests and main learning objects, i.e. e-text-books, presentations, exercise tasks, practical templates and useful links, among them – direct connections to ePortfolios, were also placed in "ORTUS" environment.

The second information system in a form of collaborative engaging ePortfolio was built up completely anew. Students' accomplished homework tasks from the "ORTUS" were sent to ePortfolio system. There were formed groups, each of four students, in homework submission sequence. This rule applied to first two group-working activities within ePortfolio system. Starting from the third task, ePortfolio groups remained unchanged. The purpose to do so was our considerations that learners within particular group would better hip to group members' homework explanation, ideas and calculations. We have expected that the reflection on own and peers' remarks would show up to the best advantage in this case.

Students had to acquaint themselves with other ePortfolio group members' accomplished homework (essays and calculations) and assess them both in marks in a scale from 1 to 10 (the worst – the best valuation) and in a form of critical thinking notes – further possible work improvement

recommendations. Besides, the same procedure applied on assessors – they had to make self-appraisals similarly as they did so for their peers.

A template of assessments summary table within each ePortfolio group for every group-working task consisted of few columns to display there an accomplished work author's login name, assessors' (among them – own name in the case of self-assessment) login names, titles of assessed criteria, assessment marks in a scale from 1 to 10, and feedback in a form of critical thinking notes and recommendations on further improvements.

Both systems were tailored with links and availability to collect learning activities and outcomes data. These two dimensions allowed making appropriate correlation analysis of ePortfolio system impact on learning outcomes and competence development.

Results and discussion

The first experimental ePortfolio system prototype testing was implemented in the academic study year of 2011/2012. Totally 203 students really started abovementioned BPOM course. Many of them dropped-out from the university by causes which vary. 173 students finished the course in January, 2012.

The first part of analysis was devoted to examine whether competences levels increased during particular course modules and which sort of activity had most impact on it. The second analysis part examined learning outcomes correlations with activities within ePortfolios.

Firstly, we have detached results by students' initial self-assessment marks and checked corresponding developments during whole course. Only 145 participants filled in all eight self-assessment questionnaire forms. Solely these questionnaires were considered as valid to make inferences.

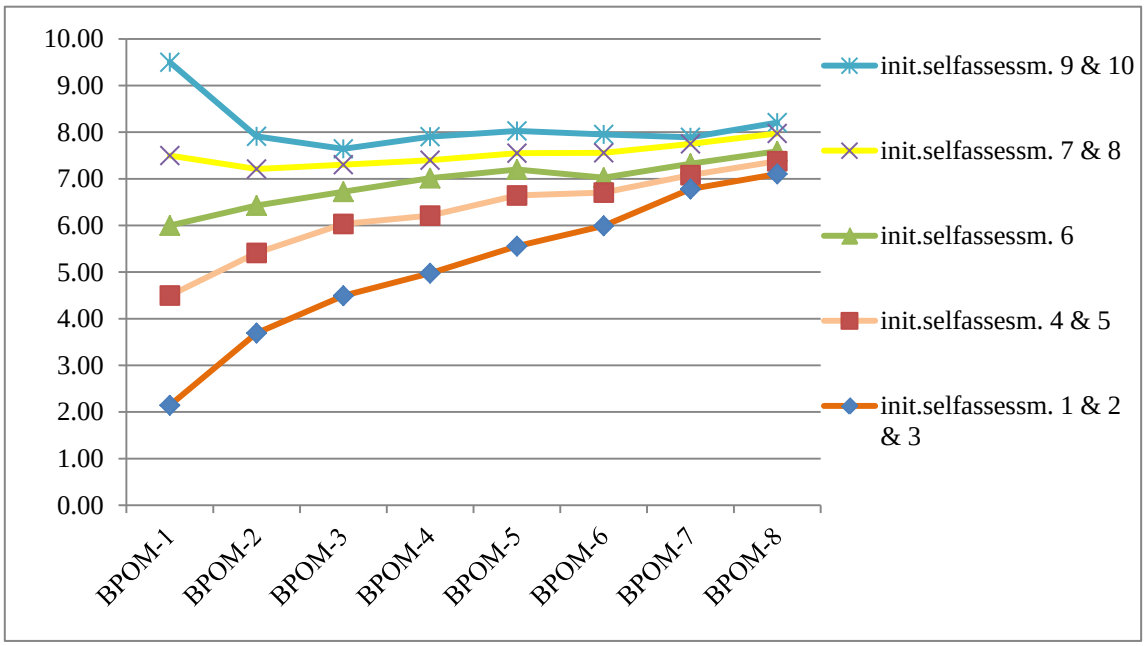

Figure 2. Competence development spectrum.

Students' answers show learning progress which is especially notable at the end of the course. All learners with different initial self-assessment marks achieved results, which are much higher than initial BPOM average competence level, and come to narrow spectrum of results. Figure 2 shows these progressions, where average BPOM competence development is illustrated in a form of five sets, based on initial self-assessment results (the first – with initial marks 1, 2 & 3, the second – with initial marks 4 & 5, the third – with initial mark 6, the fourth – with initial marks 7 & 8, the fifth – with initial marks 9 & 10). It could be stated that we have got competences development spectrum which characterizes changes in competence development during certain period (Gorbunovs, Kapenieks, 2012). Self-assessments illustrate also learners' chosen methods and tools, and their impact on

learning outcomes and competence development levels at different course stages. It is found that there is a notable gap in competences' self-assessments between the first and the second survey. Figure 3 displays BPOM competence change dynamic between course stages (where a designation "BPOM 2-1" shows changes between the second and first self-assessments within university's learning portal "ORTUS", the designation "BPOM 3-2" - changes between the third and second self-assessments, etc.; and competence graphs are displayed in the form of five sets based on initial self-assessment results, similarly to Figure 2). Some students overleapt themselves, some others were too circumspect. In both cases the second survey after initial course module shows adjusting of initial assumptions. Learners had been getting an impression about the course. Their self-evaluation took more and more precise lines as they approached final stage of the course. Almost all students had some stoppage in competence development at the course stages from the fourth to the sixth self-appraisal phase. This might be explained by a fact that at these modules learners have faced a problem of dealing with financial calculations to develop their business plan which most of them did not faced before. Activities within ePortfolio system, i.e. group-working, getting feedback and critical thinking notes from ePortfolio group participants, reflecting on them, and refining own business ideas, allowed students make necessary improvements in stages from the sixth to the eighth self-assessment phase.

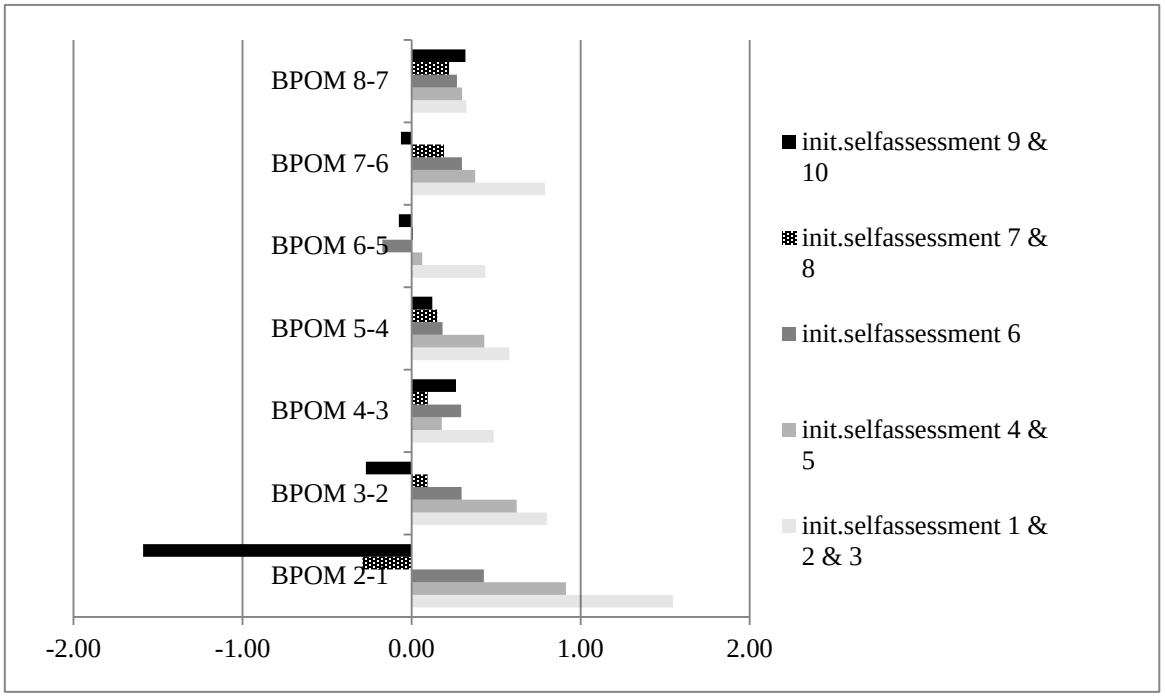

Figure 3. Competence change dynamic between course stages.

At the same time, investigating competence development process regarding initial self-assessments, we have not found any correlations between self-assessments, on the one hand, and achieved competence levels, test and exam results, on the other hand. Correlations were found when learners' activities within ePortfolios were analysed against learning outcomes (Gorbunovs, Kapenieks, Kudina, 2012). It was found that there was direct correlation between students' activities within ePortfolio group, accomplished tasks there and login files on the one hand, and their competence levels' improvement and better learning outcomes in the form of improved accomplished homework and exam results, on the other hand (for example, Figure 4 where learners results are shown depending on their activity level within ePortfolio: active users – 4 & 5 accomplished group-working tasks, moderate users – 2 & 3 tasks, and inactive users – 1 or 0 tasks). Collaborative group-working spirit, responsibility for own results and group members' progress allowed more active participants to feel themselves also more confident (Table 1) which led to draw parallels between their activities within ePortfolios and final self-assessment results.

Introduction of additional new educational methods and tools implemented during the course, noticeably improved competencies: both the theme's involving and related ones. Working in teams within ePortfolio framework aided students to achieve crucially another level of learning. Critical

thinking abilities and skills, reflection on feedback, tutors' and peers' support, recasting of essays and recalculating of financial arguments, as well further improvement of own business ideas – this all enhanced BPOM competence development.

Among those students, who did not participate in any of ePorfolio collaborating group-work activities, there were a few learners, who improved their homework final versions at different stages of the course. They accessed corresponding group ePortfolio work-space and acquainted themselves with their ePorttfolio group members' feedback. It made possible to detect errors and improve their homework versions if needed (in Table 1 – a ratio of ePortfolio login files with number of improvements).

Table 4

Impact of activities within ePortfolio system on learning outcomes

Accompl. tasks within ePortfolio	Initial self-assessm. (on aver.)	Final self-assessm. (on aver.)	1st test (on aver.)	Exam (on aver.)	No. of improved work (on aver.)	ePortfolio login files (on aver.)
5	5,67	7,83	7,65	8,75	2,21	10,39
4	5,59	7,96	7,47	8,94	2,38	10,38
3	5,45	7,45	7,78	8,39	1,83	7,78
2	5,39	7,71	7,28	7,47	1,24	5,06
1	5,69	7,19	7,43	7,38	0,71	2,62
0	5,60	7,15	7,19	5,94	0,18	2,12

Pursuant to correlation analysis related to initial self-assessment results it might be stated that learners could not make objective appraisals about own level of competencies. At the same time, it was observed that learning of one course theme had the impact on others. Both questions tailored in common consideration raise a necessity to enrich already tested experimental ePortfolio system prototype with artificial intelligence tools. These extra tools might cover the impact issue of mastering of definite theme (or its learning objects) on an acquisition of other course themes (or its learning objects).

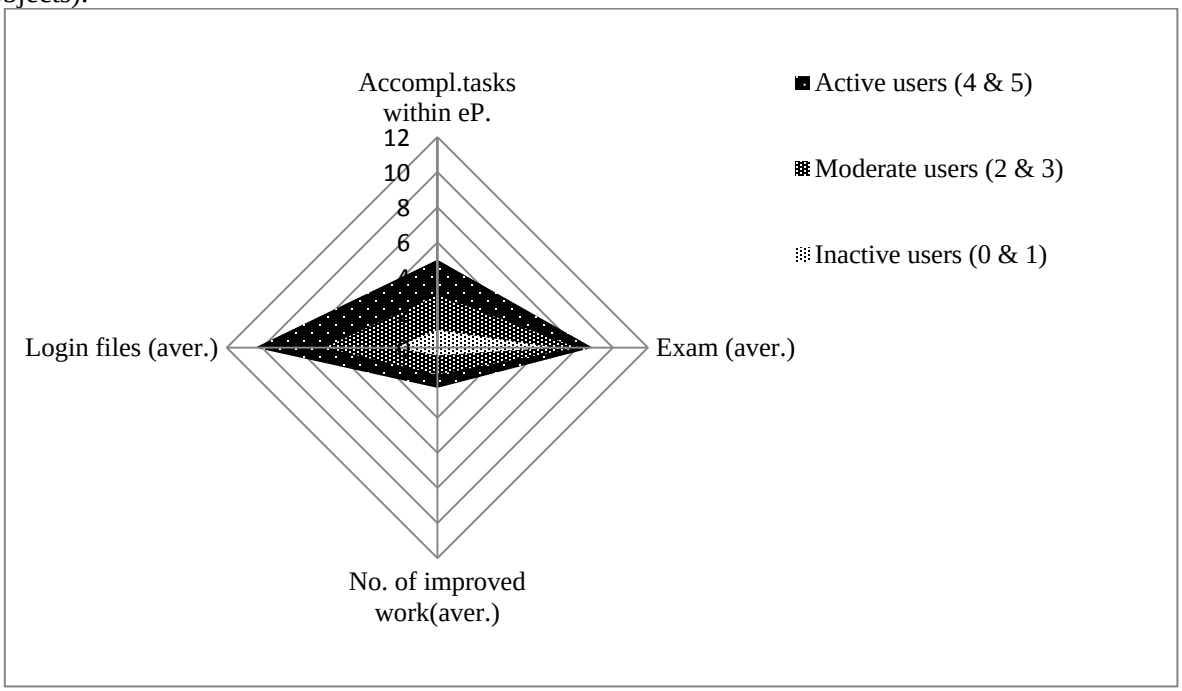

Figure 4. Correlative analysis of activities within ePortfolio.

Competences might be represented as the sets of clusters containing a number of sub-competences (Gorbunovs, 2011):

$$a = \{a_1, a_2, a_3, \ldots, a_n\} \quad (1)$$

where a – considered competence;
$a_1, a_2, a_3, \ldots, a_n$ – sub-competences.

This set of competences might be reformulated also in a matrix view. Similarly, each course theme and its learning object might be conceived as the set or matrix of corresponding weighted values. An acquisition of one theme or learning object leads to formation of the new matrix of competencies. For instance, in BPOM course case, where we defined seven course related competences, "m" theme's learning objects weighted values and obtained new set of competences might be seen as:

$$\begin{vmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \\ a_5 \\ a_6 \\ a_7 \end{vmatrix} \times \begin{vmatrix} m_{11} & m_{12} & m_{13} & m_{14} & m_{15} & m_{16} & m_{17} \\ m_{21} & m_{22} & m_{23} & m_{24} & m_{25} & m_{26} & m_{27} \\ m_{31} & m_{32} & m_{33} & m_{34} & m_{35} & m_{36} & m_{37} \\ m_{41} & m_{42} & m_{43} & m_{44} & m_{45} & m_{46} & m_{47} \\ m_{51} & m_{52} & m_{53} & m_{54} & m_{55} & m_{56} & m_{57} \\ m_{61} & m_{62} & m_{63} & m_{64} & m_{65} & m_{66} & m_{67} \\ m_{71} & m_{72} & m_{73} & m_{74} & m_{75} & m_{76} & m_{77} \end{vmatrix} = \begin{vmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \end{vmatrix} \quad (2)$$

where $a_1, a_2, a_3, a_4, a_5, a_6, a_7$ – person's initial competences;
$m_{11}, \ldots, m_{77}$ – course "m" theme's (learning objects') weighted values;
$b_1, b_2, b_3, b_4, b_5, b_6, b_7$ – person's competences after the "m" theme's acquisition.

It might be assumed that particular theme or learning object initially ought to be weighted by assigning of appropriate rate to the theme or learning object. Based on learning outcomes after each course module in a form of tests, assessments and exam results, it could be useful to match them against initial (or previous) given rate and correct if needed. Such rate assignment possibilities ought to be studied further to make ePortfolio system smarter and enhance competence development.

Conclusions

An application of ePortfolio system substantially allows improving learning outcomes and enhancing competence development. Engaging collaborative environment offered by the system improves system users' confidence, as well their critical thinking abilities and skills.

To ensure more efficient ePortfolio system operation, there is the necessity to work out additional smart instruments in the form of artificial intelligence tools. They would allow analysing the usability of utilized learning objects in the course, and offering learning objects according to existing and required competencies within common system.

Acknowledgments

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