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A Comparative Evaluation of E-learning and Traditional Pedagogical Process Elements

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ABSTRACT

In modern pedagogical processes various teaching methods and approaches (elements of the pedagogical process – EPPs) are used ranging from traditional ones (e.g., lectures, books) to more recent ones (e.g., e-discussion boards, e-quizzes). Different models for evaluation of the appropriateness of EPPs have been proposed in the past. However, the literature shows that these models typically focus only on the appropriateness of a single EPP and do not provide information about its relative appropriateness in relation to other EPPs. Unfortunately, this considerably limits the use of such evaluation models for the needs of the educational institutions' management. In order to decide which EPPs to promote or modify, management requires a comparative overview of the appropriateness of all EPPs that are part of the pedagogical process under consideration. Therefore the goal of our study was to design a model which would facilitate a comparative evaluation of many e-learning and traditional EPPs by simultaneously considering perspectives of students' and teachers' who participate in a certain pedagogical process. We applied the proposed model to three real-life pedagogical processes that are presented in this paper. Three groups of students, their teachers, and the college's management participated in the study. The management confirmed that the evaluation model provided them with valuable information in order to plan actions for improvement of the pedagogical processes.

Keywords

E-learning, Teaching methods, Tools, Evaluation, Model, Pedagogical process

Introduction

When planning curricula it is useful to have a variety of teaching and learning methods and approaches to meet the diverse learning needs of the target audience (Haw, & Keating, 2006). In this paper, the term Element of Pedagogical Process (EPP) is used for such methods and approaches. Many studies discuss the possibilities of use of different e-learning EPPs in curricula (e.g., Fernández Alemán, Carrillo de Gea, & Rodríguez Mondéjar, 2011; Forsberg, Georg, Ziegert, & Fors, 2011; Gaberson & Oermann, 2010; Pucer, 2011; Starčič, 2008). With the advent of Web 2.0, many new interactive technologies which can be used in pedagogical process became available (e.g., e-quizzes, e-forums). Existing studies (Brown, 2011; Gabriela, 2009; Gunnar, 2009) have encountered benefits and problems related to the use of Web 2.0 in higher education. Moreover, the introduction of new e-learning EPPs can be lengthy and often requires a lot of effort. Therefore it is important to realize that the success of e-learning EPPs largely depends on the context. For instance, Brown (2011) argues that blanket application of Web 2.0 is not appropriate and that e-learning is useful in promoting student-centred learning, but not at all times and in all contexts. To understand the value of e-learning EPPs, it is important to evaluate them in relation to the actual context.

According to Haw and Keating (2006), the implementation of pedagogical processes and its EPPs should be appropriately evaluated. Different models and methods that measure the quality of curricula, quality of education, effectiveness of pedagogical processes, etc. already exist. Although these models can be used to help evaluate and improve the pedagogical process, they have two considerable limitations. First, they either evaluate the pedagogical process at a very high level (i.e. at the level of curricula or even institutions), omitting the details of individual EPPs (e.g. Haw, & Keating, 2006), or at a level of an individual EPP ignoring the pedagogical process as a whole (e.g., Fernández Alemán et al., 2011; Kelly, Lyng, McGrath, & Cannon, 2009). Richardson (2005) states there is no reason to think that obtaining feedback at one level would be effective in evaluating or improving quality at another level. Therefore it is important for teachers and management to obtain feedback at different levels simultaneously: at higher levels to understand the process as a whole and to compare different EPPs, and at lower levels to be able to understand single EPPs and propose tangible improvement actions. Second, many studies focus only on one group of

EPP users, typically teachers (e.g., Yuen & Ma, 2008) or students (e.g., Richardson, 2005) and study their attitudes towards a certain EPP. However, evaluation of an EPP from the students' or teachers' perspective alone is insufficient, because teachers might consider some EPPs as appropriate even if they are not well accepted by the students, while students might favour certain EPPs which are less effective or unpopular among teachers. As a result, improvement of the individual EPPs and the pedagogical process as a whole can be managed appropriately only through a combined understanding of students' and teachers' perspectives on e-learning and traditional EPPs and of the pedagogical process at different levels.

In order to improve the understanding of the adoption and value of EPPs used in the pedagogical processes we pose the following research questions: R1 - How can we model the evaluation of pedagogical process by concurrently considering students' and teachers' perspectives on e-learning and traditional EPPs? R2 - Can such model provide relevant information about e-learning and traditional EPPs previously unknown to teachers and management? R3 - Can such model be used to identify less effective or ineffective e-learning and traditional EPPs that should be improved or replaced? R4 - Can such model be used to compare the effectiveness of e-learning and traditional learning EPPs? R5 - Can such model help to improve the pedagogical process?

These questions are addressed in the continuation of the paper as follows. *Background* section presents a review of previous studies, followed by *Evaluation model* section, which presents our model in detail. The application of our model in three real pedagogical processes is presented in *Application of the evaluation model in practice* section, followed by sections *Discussion* and *Conclusion*.

Background

In order to construct an appropriate evaluation model a thematic review of the literature was undertaken. Several studies evaluate the quality of the pedagogical process at the level of EPPs (Kelly et al., 2009) including studies which compare the effectiveness of a certain e-learning EPP to the effectiveness of traditional EPP (Fernández Alemán et al., 2011). Unfortunately, these studies typically evaluate only one EPP or at most compare two EPPs (Campbell, Gibson, Hall, Richards, & Callery, 2008), but do not compare the quality of many different EPPs used within a particular pedagogical process. Hence, it is difficult to objectively compare the effectiveness of different EPPs, which is fundamental for the improvement of the pedagogical process. A similar situation was detected in the field of software development process evaluation by Vavpotic and Bajec (2009), who also proposed a solution for this situation. Although pedagogical processes and software development processes are quite different in content, they share many similarities in terms of their general structure and they both can be considered as specialised types of business processes consisting of different process elements. For instance, in both process types we can find people who perform certain roles (e.g., teachers / programmers), activities that are performed by these roles (e.g., lecturing / programming), tools that help perform these activities (e.g., books / software modelling tools), etc. All these process parts can be evaluated and eventually changed to improve the process. Hence, we used the idea proposed by Vavpotic and Bajec (2009) that was already successful in the field of software development processes to evaluate the pedagogical process and its EPPs.

Currently, several models and methods can be found in the literature that assure the quality of pedagogical processes and provide documentation for evaluation and accreditation processes (Little, 2009). They often consider the following dimensions of pedagogical processes or their EPPs: opportunity for use, quality of knowledge gained, and student's level of acceptance. There have been a variety of studies focusing on the acceptance of e-learning by students (Yu, Chen, Yang, Wang, & Yen, 2007; Žvanut et al., 2011), discussing the opportunities of using e-learning in pedagogical processes (e.g., Emerson, 2007; Moule, Ward, & Lockyer, 2010; Ruiz, Mintzer, & Leipzig, 2006) comparing e-learning versus traditional learning on the acquisition and retention of knowledge (e.g., Campbell et al., 2008; Fernández Alemán et al., 2011) and evaluating the quality of knowledge gained by the students through the use of e-learning and the level of student's acceptance of e-learning (e.g., Kelly et al., 2009). However, all these studies consider only one or at most two dimensions, but do not consider all three dimensions concurrently.

The literature review shows that opportunities for use, quality of knowledge gained and student's level of acceptance are commonly evaluated for e-learning and traditional EPPs. However, none of the previous studies consider all of these dimensions concurrently, and they only focus on one or few specific EPPs. Based on these findings, we

propose an evaluation model that facilitates the concurrent evaluation of the three key dimensions for different EPPs used in the pedagogical processes.

Evaluation model

Structure of the evaluation model

To evaluate a pedagogical process we propose a model that comprises three main dimensions (Figure 1). The first dimension is the frequency of opportunities for use of an EPP. This dimension is evaluated by teachers who participate in the pedagogical process. It does not consider how often the EPP is actually used but only evaluates the perceived number of opportunities for the use of the EPP. EPPs with higher opportunities for use play a more important role in the current pedagogical process. However, that does not necessarily mean that EPPs with lower opportunities for use are not important. In some cases it is possible to alter the pedagogical process in order to increase the opportunities for use of the EPP that is otherwise evaluated as valuable. The dimension is grounded on existing studies as discussed in the Background section and is evaluated through a single property that is adopted from the model proposed by Vavpotic and Bajec (2009).

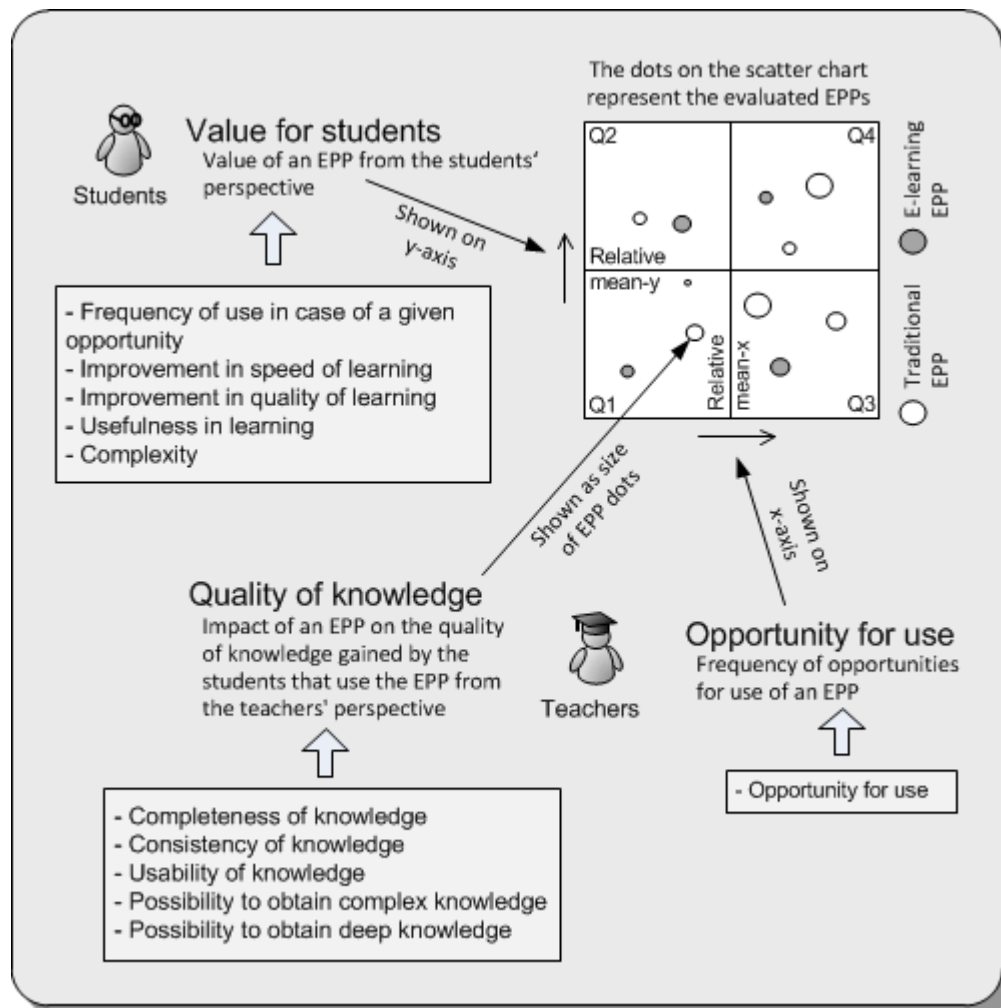


Figure 1. The evaluation model and presentation of the results

The second dimension is the impact of an EPP on the quality of knowledge gained by the students that use the EPP. A theoretically sound approach would be to create several individual groups of students (each group using the EPP that other groups do not use) and compare their exam results. Unfortunately, such an approach is not feasible in

practice as a large number of EPPs under evaluation would require the formation of many individual groups of students which would consequently be too small to produce conclusive results. Thus, this dimension focuses on the teachers' perceptions of the quality of knowledge gained rather than on actual quantitative data (e.g., exam results). Quality of knowledge is evaluated through five different properties, which consider both declarative and functional dimensions of knowledge (Biggs & Tang, 2011): the completeness, consistency and usability of obtained knowledge, and the possibility to obtain complex and deep knowledge.

The third dimension is the value of an EPP from the students' perspective. Five properties were used to measure this dimension. The first property is the EPP's frequency of use in case of a given opportunity. It is measured in two ways depending on whether the EPP under consideration is mandatory (e.g., mandatory lectures) or non-mandatory (e.g., participation in e-learning forums). In the case of non-mandatory EPPs, students report how often they actually use the EPP during their study, while in the case of mandatory EPPs they report how often they would use the EPP during their study even if it would not be mandatory. In this manner, the students' perceived acceptance of a particular EPP is measured regardless of whether the EPP is mandatory or not (adopted from Vavpotic & Bajec, 2009). Additionally, to better understand the reasons for the EPP acceptance level the students evaluate four properties grounded on the diffusion of innovations theory (DOI) (Rogers, 2003). Although DOI uses several different predictors of innovation diffusion, we only focus on two, namely relative advantage and complexity, as our preceding study (Žvanut et al., 2011) showed that only these two predictors have a significant impact on the nursing student's adoption of the EPPs. Relative advantage is evaluated through three properties, namely improvement in quality, improvement in speed, and usefulness, while complexity is measured through a single property. These properties are derived from existing studies which use similar properties to measure relative advantage and complexity (Riemenschneider, Hardgrave, & Davis, 2002; Vavpotic & Bajec, 2009; Vavpotič & Hovelja, 2012).

The concurrent evaluation of the three dimensions gives us a comprehensive understanding of the EPP's value from students' and teachers' perspectives. Such an understanding provides the basis for the improvements of the EPPs and the pedagogical process as a whole.

The measurement instrument

The measurement instrument comprises two questionnaires (one for students and one for teachers). Both questionnaires use closed-ended questions where frequency of opportunities for use (teachers' questionnaire) and frequency of use in case of a given opportunity (students' questionnaire) were evaluated on a 7-point ordinal scale (never=1, very seldom=2, seldom=3, sometimes=4, often=5, very often=6, always=7) while all other items of both questionnaires used a 7-point Likert scale between 1 (strongly disagree) and 7 (strongly agree). For each EPP the teachers' questionnaire consists of 6 questions and the students' of 5, respectively (Figure 1).

To assure the content validity of the questionnaire, three experts in the field of pedagogy re-examined the questionnaire. The questionnaires were pilot tested on a group of 21 students and 4 teachers for 10 commonly used EPPs. This group also examined the items of both questionnaires for clarity. Both dimensions that comprise multiple properties of the quality of knowledge gained and value for students showed good internal consistency. The correlations between the properties of these two dimensions and the opportunity for use dimension were significantly lower than the internal correlations. These results were later reconfirmed on real life cases presented in the continuation of the paper.

The method of application of the evaluation model

The method of application of the evaluation model is organized in three phases. The first phase is to catalogue the EPPs used in a pedagogical process. In order to identify them correctly, it is important that the teachers involved in the evaluated pedagogical process participate in focus groups, where EPPs are catalogued. In the second phase, teachers and students, the participants of the evaluated pedagogical process, evaluate the catalogued EPPs. In the third phase the results of the evaluation are individually analysed and discussed with the members of the college's management (i.e. the dean, the vice dean, the head of the nursing department, and the president of the governance board).

A scatter chart (Figure 1) shows the opportunity for use and value for students on horizontal and vertical axes, respectively. The evaluated EPPs are shown as numbered dots on the scatter chart, where the quality of knowledge gained is represented by the size of the dots. Relative means of opportunity for use and value for students divide the scatter chart into four quadrants (Figure 1: Q1 – Q4). Relative means are used since we are interested in EPPs' positions relative to other EPPs to be able to identify improvement opportunities. Q1 contains EPPs with low opportunity for use and low value for students, Q2 contains EPPs with high value for students but low opportunity for use, Q3 has EPPs with low value for students but high opportunity for use, and Q4 shows EPPs with high opportunity for use and high value for students.

In order to improve the pedagogical process teachers and management should focus primarily on the EPPs that have a considerable positive impact on the quality of knowledge and are positioned in either Q2 or Q3. For the EPPs in Q2 (e.g., Figure 2, EPP 10), teachers and management should investigate whether it is possible to alter the pedagogical process to create more opportunities for the use of such EPPs or to introduce new similar EPPs with more opportunities for use. In case of the EPPs in Q3 (e.g., Figure 2, EPP 8), further investigations are required and actions should be taken to improve their value for students by either properly presenting them to the students or by replacing them with EPPs that are more acceptable from the students' perspective. Different actions should be taken for the EPPs in Q1 (e.g., Figure 2, EPP 13). These EPPs neither have high value for students nor high opportunity for use. Consequentially, teachers should determine whether these EPPs can be replaced by other EPPs or removed from the pedagogical process. Finally, the EPPs in Q4 (e.g., Figure 2, EPP 5) that have high opportunity for use and value for students should be periodically monitored in order to identify significant changes of their position.

The positioning of EPPs on the scatter chart helps to identify the EPPs which should be improved and indicates the general cause of action for the improvement of EPPs. However, actual improvement scenarios are based on additional discussion and in-depth analysis of the use of EPPs. Examples of such analyses are presented in the following section.

Application of the evaluation model in practice

Overview

We used an embedded case study design as defined by Yin (2009) to evaluate the EPPs of the three nursing pedagogical processes that represented our units of analysis. The investigation took place at the College of Health Care Izola, University of Primorska, Slovenia at the end of the 2010/2011 academic year before the first exams. The college is located in a bilingual territory (Slovenian and Italian are the official languages), located 10 km from Italy. After the ethical commission of the college confirmed the research plan and questionnaire, the request for approval was sent to the management board, which approved and supported our study.

Table 1. EPPs identified in the focus groups

No. in scatter chart	EPP	EPP type
1	role play	traditional
2	e-learning (as an activity)	e-learning
3	laboratory practice (nursing)	traditional
4	traditional lectures	traditional
5	clinical practice	traditional
6	Consultations	traditional
7	laboratory practice (non-nursing)	traditional
8	Seminars	traditional
9	Books	traditional
10	simulation mannequin	traditional
11	educational films	traditional
12	e-mail	e-learning
13	e-quizzes	e-learning

14	e-discussion board	e-learning
15	case study	traditional
16	digital learning material	e-learning
17	team work	traditional

The three pedagogical processes were performed at two different units of the college, attended by three different groups of students, and supervised by common management. Our embedded units of analysis represented three commonplace situations in undergraduate education: a pedagogical process attended by full-time students, a pedagogical process attended by part-time students, and a pedagogical process attended by full-time students at the college's remote unit. Although all three pedagogical processes were based on the same curriculum, different teachers participated in each pedagogical process. Therefore for each pedagogical process a focus group of three teachers was formed, where two main groups of EPPs used in the pedagogical process were identified, namely activities and tools. These teachers also evaluated the quality of knowledge and the opportunity for use of EPPs that were part of the pedagogical processes in which they participated. Table 1 presents the identified EPPs with their respective numbers in the scatter charts (Figures 2 – 4).

In the following subsections we discuss the most relevant results of the three situations to demonstrate how the model provided relevant information about e-learning and traditional learning EPPs (R2), helped to identify less effective or ineffective e-learning and traditional learning EPPs (R3), was used to compare the effectiveness of e-learning and traditional learning EPPs (R4), and helped to improve the pedagogical process (R5). The evaluations of only selected representative EPPs are discussed, although other EPPs were examined in a similar manner.

Situation 1

The first group consisted of first year full-time students, who attended the study at the remote unit, approximately 100 km from the college's headquarters. Even though the same undergraduate study programme of nursing took place in this unit as at the headquarters, the students in this group suffered from a substantial lack of resources required for the study (e.g., distance to the library, lack of support from teachers and administrative staff). The group consisted of 38 students from Slovenia and Italy: 10 males and 28 females. Their average age was 20.0 ± 1.2 . The results are presented in Figure 2.

EPP 9 (books, positioned in Q3) was evaluated as having relatively high opportunity for use while value for students was below the relative mean. Discussion with the dean and the head of the nursing department showed that the distance from the library located at the college's headquarters presented a serious obstacle for this group of students. Consequentially the EPP 16 (digital learning materials) had higher value for students than EPP 9 as EPP 16 was used in many courses and it was easily accessible through the Internet (R2, R3, R4).

Surprisingly, EPP 2 (e-learning as an activity, positioned in Q1) had relatively low value for students and opportunity for use. This EPP plays an important role in this group as it bridges the spatial gap between the unit and the headquarters. The discussion with all the interviewed management confirmed the validity of our results. For instance, the vice dean, responsible for the quality of pedagogical processes, noted that the use of this EPP was discussed with teachers in this unit on several occasions. The teachers generally did not favour this EPP, as a lot of effort is required to prepare the e-contents and to promote its use. However, both the vice dean and the head of the nursing department were previously unaware of the EPP's low value for students (R2, R3). Both of them confirmed that this result would serve as an argument for justifying promotion activities about this EPP in the future (R5).

EPP 17 (team work, located in Q1) has value for students and opportunity for use below their relative means. Generally, teamwork and other social skills are very important in clinical practice. Hence, the opinion of the vice dean and the head of the nursing department was that this EPP should not be omitted from the pedagogical process. The discussion showed that they were previously unaware of this problem and that the use of this EPP would have to be substantially reconsidered (R2, R3). In order to better understand this situation, the dean suggested conducting an additional investigation among students and teachers (R5).

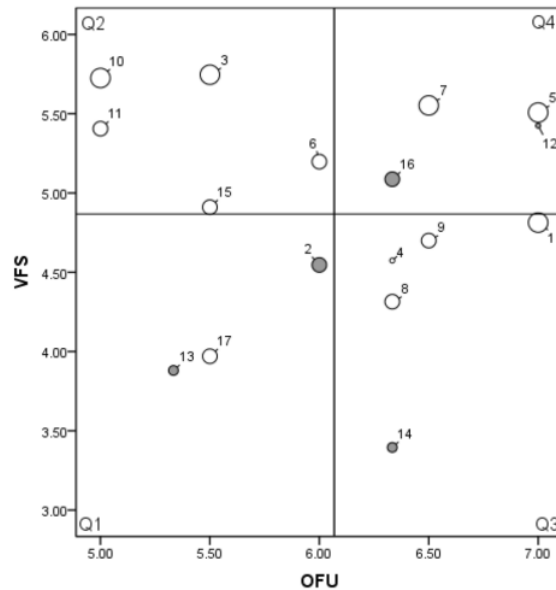


Figure 2. Situation 1 – results

Situation 2

The second group consisted of first year regular students, who attended the pedagogical process at the college’s headquarters, where a plethora of resources is available for study (e.g., full time presence of the entire staff for consultation and technical support, library, computer classroom, etc.). The group consisted of 48 students from Slovenia and Italy: 11 males and 37 females; their average age was 19.8 ± 0.8 .

In this group, EPP 15 (case study) fell into Q1, as its value for students and its opportunity for use are both below their relative means (Figure 3). The vice dean noted that they were previously unaware of the low opportunity for use and low value for students of this EPP (R2). As in Situation 1, the vice dean confirmed that these results represent a valid argument for future activities to increase the opportunities for use and improve the value for students of this EPP (R5).

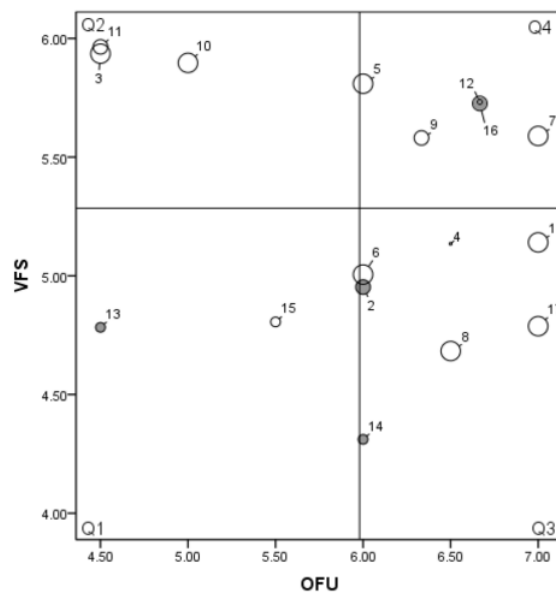


Figure 3. Situation 2 - results

EPP 2 (E-learning as an activity) fell in Q3 as the value for students is below and opportunity for use slightly above their relative means. A relatively low value for students was detected also for e-learning EPP 13 (e-quizzes) and EPP 14 (e-discussion boards). The dean and the vice dean again expressed surprise over the low value for students of these EPPs. According to their experience, first year students often complained about the EPP 5 (clinical practice) and EPP 3 (laboratory practice). However, the results of the evaluation revealed that the aforementioned traditional EPPs have considerably higher value for students than the three e-learning EPPs. This was contrary to the management belief that e-learning EPPs are generally very popular among students (R4). On the basis of these results, the vice dean, the head of the nursing department, and the president of the governance board suggested to conduct a further investigation on the value of e-learning EPPs in order to decide which of them should be promoted or omitted from the pedagogical process in the future (R5).

Situation 3

The third group consisted of first year part time students. As in the preceding group, they attended their study at the college's headquarters, but only two days per week. The members of this group were older students who already had certain work experience in nursing. Their average age was 31.1 ± 6.5 . This group consisted of 30 students from Slovenia: 3 males and 27 females. The critical problem of this group was lack of time, as they had to combine their work and study activities.

EPP 14 (e-discussion board) fell into Q3 and resulted in the EPP with the lowest value for students (Figure 4). This result came as a surprise to the vice dean (R2, R3). According to the vice dean's experience part-time students were usually more aware of the importance of social skills required for working in clinical practice than regular students. This observation was confirmed by evaluation of traditional EPPs like EPP 1 (role play) and EPP 17 (team work), which are typical EPPs that help the students to gain social skills. As expected, both EPPs fell into Q4, contrasting with the EPP 14 (e-discussion board). The vice dean and the head of the nursing department noted that the most probable reason for these results was that the this group of students perceived traditional EPPs as more appropriate for learning social skills than e-learning EPPs due to lack of direct contact (R4). To improve this situation the dean and vice dean decided to instruct teachers to better present the EPP *e-discussion board* to this group of students (R5).

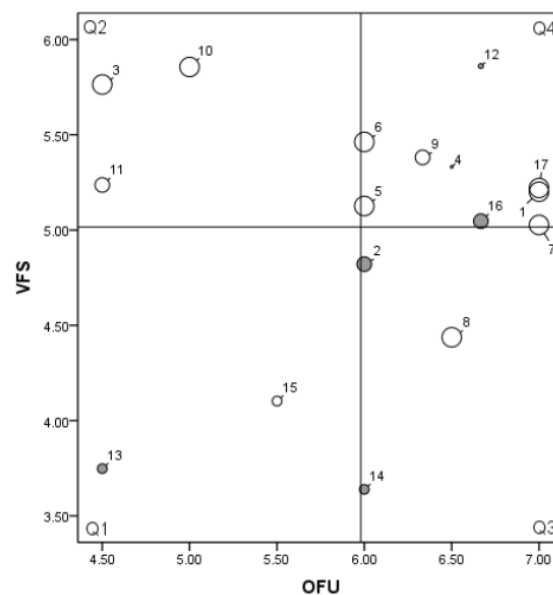


Figure 4. Situation 3 - results

EPP 3 (laboratory practice, positioned in Q2) had high value for students, relatively low opportunity for use and high quality of knowledge. The vice dean and the head of the nursing department noted that they were previously unaware of the high value for students of this EPP (R2). The vice dean suggested to increase the opportunity for use of this EPP as this group suffered from lack of time for studying. The vice dean's opinion was that the reason for the low

opportunity for use was in the relatively low number of hours devoted to this EPP in the curriculum. President of the governance board suggested that according to these results, the number of hours of laboratory practice in nursing should be reconsidered, as laboratory practice has a substantially lower cost than clinical practice in this institution. All members of school management concluded that this information represented a valid argument for a modification of the curricula for this group of students (R5).

Discussion

The evaluation model was applied in three typical situations, where it was successfully used to identify less effective EPPs (R3) and to compare e-learning and traditional EPPs (R4). The results of the evaluations were carefully analysed and discussed with the members of the college's management, who confirmed that the evaluation model helped them to considerably improve their understanding of the three pedagogical processes (R2) and consequentially reach better decisions related to their improvement (R5). For instance, all higher education institutions in the EU have to periodically reaccredit their curricula. Reaccreditation provides an important opportunity for its modification. However, according to the college's management, decisions about the EPPs used in the curricula are often subjective. Therefore, the presented model can be used as a valuable tool that helps to bridge this gap by identifying less effective e-learning and traditional EPPs (R3), thus providing a more objective basis for the modification of the curricula (R5).

The concepts and processes of continuous quality improvements (CQI) are becoming relevant for the higher education (Heydman, 2006). Biggs and Tang (2011) suggest that in order to improve the pedagogical process, the focus should be shifted from teachers to students (i.e. student-centred teaching). Hypothetically, when students' wishes and opinions are fully considered there is a latent danger of excluding teachers' opinion about the use of a particular EPPs. However, excluding students' opinion could lead to instructor-centred teaching, where the teacher is the expert on the content and the delivery approach (Young & Maxwell, 2007). This lowers the flexibility of the pedagogical process, which is very important in a rapidly changing environment. The presented model considers both students' and teachers' opinions and helps the institution management and teachers to search for compromises, when decisions about the use of an EPP are under consideration. This is in accordance with CQI, where it is recommended that cross-functional teams assess whether the systems are optimal to produce best practices and results (Heydman, 2006). Our model, if used continuously, could represent a contribution to the CQI of an institution.

The importance of the presented model was confirmed through its application in practice which showed that several initial expectations of the college's management were misaligned with actual students' evaluations. For instance, some e-learning EPPs were quite unpopular among students even at the remote organizational unit where access to certain traditional EPPs was severely limited (R4). Although the management expected that e-learning EPPs would serve as a substitute for the less accessible traditional EPPs, the results of the evaluation showed that the students did not perceive some of the e-learning EPPs as valuable. The model enabled management to detect this situation and to use its results in further improvements of the pedagogical processes (R5). Similar misalignment was detected also in the teachers' and students' perceptions of certain EPPs. On one hand, the teachers perceived these EPPs as having significant positive advantages for students, but on the other hand, the students' level of adoption was relatively low. These findings are consistent with the DOI theory which states that even when an innovation has obvious advantages it is not always diffused and adopted rapidly (Rogers, 2003).

In practice, students typically have the opportunity to evaluate the pedagogical process at the course level and only rarely at the level of EPPs. Although evaluation at the level of the course suffices for the purpose of general course benchmarking, it does not provide detailed information about particular EPPs and their effectiveness in different courses. Consequently, the selection of suitable EPPs is typically left to the judgement of teachers and management.

An important advantage of the evaluation at the level of EPPs is that it facilitates application of the DOI theory to understand the students' personal adoption of different EPPs. A whole course or even a whole pedagogical process is typically too broad and complex to be viewed as a single innovation. Furthermore, the students' perceptions of the course or the pedagogical process are typically very limited and are often affected by their recent positive or negative experience with a certain part of the course or the pedagogical process. This severely inhibits the possibility for the application of the DOI theory on the level of the course or the pedagogical process as the students are not able to objectively evaluate them. However, our study demonstrates that students perceive a properly defined EPP as a

single innovation which they are able to objectively evaluate. With the development of information and communication technologies, innovations are continuously being introduced into pedagogical processes. In our opinion, the use of our model could be easily extended to additional pedagogical process innovations under the condition that these innovations could be defined at the level of the EPPs, i.e. at the appropriate level of granularity.

When using the presented model, the institution should take into consideration several limitations. Bastable (2008) presents three groups of barriers to conducting evaluations: lack of clarity, lack of ability, and fear of punishment and loss of self-esteem. In order to avoid or minimize the lack of clarity, a clearly stated purpose must explain why the evaluation is being conducted and what is being evaluated to all evaluation participants (i.e., the students, the teachers, and the management). All the evaluation participants should be motivated to participate and should recognize that their evaluation is essential for the improvement of the pedagogical process. The EPPs under evaluation must be properly presented to the students so they can fully understand and objectively evaluate them. To minimize the negative effects of lack of ability, the evaluators should be familiar with the presented model and have moderating skills and experience in order to guide the teacher focus groups who identify the EPPs used in the pedagogical process. Fear of punishment and loss of self-esteem could represent a problem for teachers participating in focus groups, as their participation is not anonymous as in the case of students. The evaluator of the pedagogical process has to take this into account when guiding the focus groups, as some teachers (e.g., newly employed teachers, old-fashioned teachers) are often not prepared to discuss the use of EPPs with other colleagues. Lee, Cerreto, and Lee (2010) in their study report that the subjective norm is a determinant of teachers' intentions to use the technology. It is not a rare situation that opinion leaders in some old-fashioned groups of teachers inhibit the innovative colleagues to express their opinion and present the innovative EPPs they used in practice. However, a skilled and independent evaluator can successfully manage such a situation by combining focus groups with individual informal interviews. Finally, the unit of analysis and the evaluation participants should be carefully chosen (Yin, 2009). In order to get reliable information from the evaluation, it is important that both students and teachers evaluate only the pedagogical process that they are actually involved in.

Conclusions

In this paper, we proposed a model for comparative evaluation of e-learning and traditional EPPs. In comparison to the existing evaluation models our model has two distinguishing capabilities: it concurrently considers students' and teachers' perspectives and it facilitates the comparative evaluation of different EPPs that comprise the pedagogical process. These permit the users of the model to observe the value of pedagogical processes in detail, detect less suitable e-learning and traditional EPPs, and formulate focused actions for the improvement of pedagogical processes through improvement of their EPPs. The model was used to evaluate three commonplace pedagogical processes in the field of nursing, where it provided valuable information to the college's management who used it to direct their improvement efforts.

Our future work will focus on the application of the proposed model in a longitudinal manner in order to continuously monitor and improve the pedagogical processes. We will focus on questions such as: how frequently should the re-evaluation of a pedagogical process be performed, how different generations of students evaluate different EPPs, and how the context of use affects the dimensions used in our model, especially when e-learning EPPs are under consideration.

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