International Journal of Modern Education Research
2015; 2(3): 18-28
Published online June 30, 2015 (http://www.aascit.org/journal/ijmer)
ISSN: 2375-3781

American Association for Science and Technology

Keywords
Assessment for Learning,
Self-, Peer and Co-assessment,
Learning/Assessing in Groups,
Assessment in Teacher Education,
Assessment in Collaborative Learning,
Assessment and Wikis in Higher Education

Received: May 29, 2015
Revised: June 11, 2015
Accepted: June 12, 2015

Self-, Peer and Co-assessment of Pre-Service Teachers in a Wiki Project

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Citation

Galini Rekalidou, Jim Prentzas, Konstantinos Karadimitriou. Self-, Peer and Co-assessment of Pre-Service Teachers in a Wiki Project. *International Journal of Modern Education Research.* Vol. 2, No. 3, 2015, pp. 18-28.

Abstract

In this paper, we describe a study carried out to investigate self, peer and co-assessment processes of pre-service teachers in a Wiki project. Thirty-four undergraduate students of an Early Childhood Education Department worked in pairs for an entire semester in order to prepare Wikipedia articles under the guidance of the authors of this paper. All of them had previously attended courses and seminars about assessment strategies in education as part of their obligatory theoretical training. During this project, students had to assess both their peers and their own work with a specially designed protocol. Self-assessment results were correlated to peer and co-assessment results. Students also had to justify their assessments, to provide feedback and to improve their own work based on feedback they received. A last aspect of this research was to examine whether this Wiki project promoted students' skills in self-, peer and co-assessment. Results indicate that not only did students manage to apply their theoretical knowledge about assessment successfully in the Wiki context but also acknowledged that their participation promoted their skills on this subject. Students have also significantly improved their scores in several categories of the protocol in the second round of peer assessment compared to the first. That makes us believe that they provided effective feedback to each other and that they also took into consideration the feedback they received. Finally, most students mentioned "innovation of the project" and "the disclosure of their work to the public" to be the most interesting aspects of this implementation.

1. Introduction

For over two decades, researchers express a constantly increasing interest in the assessment of higher education students and maintain that the traditional types of assessment in higher education need to be reexamined. Systematic efforts are required in the application of modern assessment methods and strategies. Research has shown that application of peer-assessment, self-assessment and co-assessment strategies in higher education enhance students' learning. This is due to the interaction that takes place among students and the ensuing feedback processes. Corresponding studies examining the application of such assessment strategies have shown positive results as far as students are concerned in the development of critical thinking, communication and collaboration skills, self-observation and self-criticism (Boud et al. 2001; Van Gennip et al. 2010; Deeley 2013; Deeley 2014; Kearney 2013; Strijbos and Sluijsmans 2010).

Assessment strategies can apply in combination with Web-based tools to all types of

higher education settings. More specifically, collaborative content creation activities with Web-based tools are gradually becoming popular in higher education. Different types of Web-based environments with varying popularity can be exploited. Wiki environments constitute typical representatives of collaborative content creation functionalities. Wiki activities are becoming part of the curriculum in all levels of education. On the one hand, they can be integrated in all or most of teaching subjects enhancing authoring capabilities and knowledge acquisition. On the other hand, they assist in promoting significant aspects concerning learning such as collaboration, content understanding, information filtering, critical thinking and assessment. Assessment strategies are promoted among learners through wiki activities as learners assess their own and their peers' work.

Wikipedia is a well-known wiki environment and has become the largest encyclopedia in the world due to the collaborative nature of content creation. Its articles cover a broad scope of subjects in several languages. Wikipedia plays an important role in education since its articles are frequently consulted by learners while working on their assignments. Learners and tutors also promote knowledge sharing by authoring and editing articles.

Wiki activities have been integrated in teacher education curriculum the last years (O'Bannon et al. 2013; Poyas 2013; Peled et al. 2012; Hadjerrouit 2013; Donne 2012). The education of teachers is enhanced in various aspects. An important aspect in teacher education involves assessment strategies. Very often, teachers need to assess the work of students, their own work and the work of colleagues. As assessment is inherent in wiki activities, teachers may gain experience in assessment aspects by taking part in wiki projects. Furthermore, the role of teachers is important as far as the authoring and editing of Wikipedia articles are concerned. A requirement of Wikipedia articles concerns reliability and sufficiency of their content. Teachers may contribute to providing reliable and sufficient content to the benefit of students and other members of society. Teachers enrich their knowledge and simultaneously become members of virtual communities of contributors by collaborating with colleagues and other Web users. Teachers learn to endorse the notion of open resources that modern society is based on and instill it to their students and students' parents.

In this paper, we present an approach combining three assessment strategies in the context of a Wikipedia project in a university setting concerning pre-service teachers. The purpose of the approach is multifold. A primary goal for learners is to participate in different types of assessment processes putting into practice corresponding aspects taught in theory. Furthermore, the approach introduces pre-service teachers to the notion of community creation for authoring articles concerning pedagogical issues. Emphasis has been put to classroom sessions and face-to-face meetings. Results from other approaches involving integration of wikis in teacher education have shown that classroom sessions and face-to-face interaction are necessary to familiarize learners with assessment and feedback issues and enable tutors to act as facilitators (Hadjerrouit 2013; Poyas 2013; Hutchison and Colwell 2012; O'Bannon et al. 2013). To the best of our knowledge, there is no other approach applied to higher education that combines the three aforementioned assessment strategies in the context of a Wikipedia or any other type of wiki project.

The scope of the presented approach is extensive. First, it may be employed in every department educating pre-service and in-service teachers. Second, it can be adjusted to every higher education department as assessment strategies improve the education of learners and the subjects of Wikipedia articles cover many scientific fields. Third, it can be adjusted to collaborative content creation beyond article authoring. Higher education students in several fields often use Web-based tools to create products in collaboration. In this context, students need to familiarize themselves with different types of assessment processes in order to enhance teamwork and product creation and prepare themselves to participate in collaborative communities.

This paper is structured as follows. Section 2 discusses issues involving peer, self, and co-assessment in higher education. Section 3 briefly discusses the role of wikis and Wikipedia in teacher education. Section 4 presents the methodology of our approach. Section 5 presents the results of our approach. Section 6 discusses the results. Finally, Section 7 concludes.

2. Assessment Strategies in Higher Education

2.1. Peer Assessment

During the last decades, definitions given for the peer assessment of students vary according to the undertaken scientific approach.

Peer assessment in higher education attracts the increasing interest of researchers and "*is described by Falchikov and Goldfinch (2000) as involving engaging with standards and criteria in order to make judgments about the work of peers"* (Cassidy, 2006, p. 509).

Most of corresponding publications examine the credibility of students' assessment compared to tutors' assessment, the factors that potentially affect it and positive results regarding quality of students' learning and development of skills. Based on derived results, it is maintained that processes involving assessment of fellow students' work are to the benefit of both parts, students assessing as well as students whose work is assessed. Through meditative processes, it is possible for both parts to explain and document their assessment according to specific criteria, to provide and receive feedback. This is important for students since the responsibility for learning is assumed by students themselves and its confirmation is not up to the tutor (Zhang et al. 2008). Recent works verify these results and the value of capabilities developed during peer

assessment (Nicol et al. 2014). Moreover a point on which researchers agree is that assessment among students cannot be carried out without thorough preparation of involved students. Students should be gradually educated and shape a culture of assessment. Some researchers believe that the design of peer assessment should involve a specific goal, specific expected outcomes and focus on the content of comments made by involved students when assessing peers (Nelson & Schunn, 2009). Peer assessment in universities should possess all the characteristics that would prevent the undermining of involved students' learning and rebate every form of competition that may arise (Boud et al. 2001). For the work presented here, all the aforementioned characteristics of peer assessment were taken into consideration. The proper context of students' gradual education was shaped. It involved an evident goal and expected outcomes as well as the shaping of a common assessment culture, aiming at the mutual assessment for the enhancement of students' learning quality.

2.2. Self-Assessment

The term 'self-assessment' refers to the involvement of every learner in the judgment of his/her learning and specifically in the judgment of his/her learning achievements and outcomes (Falchikov and Boud 1989).

The application of self-assessment in higher education is scientifically studied mainly concerning the enhancement of student learning and the acquisition of skills. There are a large number of publications that more often follow a pedagogical/educational approach and study various variables that mediate during the application of self-assessment. According to their results, this specific strategy contributes, among others, to the cultivation of students' reflection capabilities, development of their responsibility and problem solving capabilities (Boud 2009; Thomas et al. 2011).

Many researchers regard the self-assessment strategy as one of the goals pursued by universities so that students will gradually become better reviewers of their work and develop their critical capability. In the review paper of Sluijsmans et al. (1998) it is mentioned that feedback processes seem to improve students' self-assessment capabilities. Towards this direction, other researchers (Boud 2009; Thomas et al. 2011) maintain that students should be educated and prepared at universities to develop their self-assessment capabilities. In addition, Orsmond and Merry (2013) argue that the design of students' scaffolding in providing and receiving feedback should always consider the support to the students in applying self-assessment practices. Self- and peer assessment are often applied in combination or jointly as the one strategy may enhance and support the other while Brown et al. (2013, p.170) regard peer and self-assessment of students not as methods/techniques/strategies but as sources of assessment for various tools and methods.

2.3. Co-assessment

Co-assessment is described as a collaborative assessment method and is closer to traditional assessment types when carried out by the student and the tutor. Nowadays, any combination of self-assessment with peer-assessment as well as tutor assessment can be regarded as co-assessment. Dochy et al. (1999, p. 42) mention that in the specific assessment process there is a common goal of the involved persons concerning their agreed mutual assessment. Co-assessment can be used as summative as well as formative assessment (Jessop et al. 2012; Nicol and Macfarlane-Dick 2006). In all its forms, the application of co-assessment aims at thorough learning (Hounsell et al. 2008; Hattie and Timperley 2007) and at the development of social skills and learning capabilities of students (Smith and Sodano 2012). As far as its results are concerned, co-assessment has the advantage of retrieving information from different sources although this requires more time. The most important is that when co-assessment is carried out by peers in combination with self-assessment, critical thinking and collaboration among students are cultivated.

Despite the positive aspects pointed out by studies examining the self-peer and co- assessment applications, there are also deficiencies (Nanine et al. 2010). In the review paper of van Zundert et al. (2010), a number of issues are mentioned involving the methods used, the variables considered and the superficial or substantial nature of results derived from corresponding studies.

3. Wikis in Teacher Education

Several approaches have been presented during the last years involving integration of wikis in teacher education curriculum (Prentzas and Rekalidou 2014). A number of issues have been reported that may create difficulties in the successful integration of wikis. More specifically, reported issues concern contribution in the authoring/editing process, participation in assessment process and necessity of face-to-face communication as well as classroom sessions. These issues are outlined in the following.

In certain cases, a low level of collaboration among learners was reported while producing their work. For instance, learners may be unwilling to alter their peers' wiki entries (O'Bannon et al. 2013), may display a sense of ownership concerning their wiki entries (Poyas 2013) and may not trust other learners (Poyas 2013). Learners may also not participate evenly throughout the designated time period that the wiki project has to be completed (Hadjerrouit 2013; Poyas 2013; Donne 2012).

Main issues concerning participation in the assessment process that have been studied involve establishment of assessment criteria and peer feedback. Learners' viewpoints on assessment criteria may differ (Ng and Lai 2012). Results regarding peer feedback vary. In (Donne 2012; Ng and Lai 2012; Ng 2014) participants are reported to have provided useful feedback. In (Peled et al. 2012) it is mentioned that learners were unwilling to provide and receive peer feedback. In (Poyas 2013) it is mentioned that participants were unwilling to provide critical feedback in discussion forums and preferred other means of communication such as

face-to-face interaction and e-mail.

Results show that face-to-face communication and classroom sessions are necessary in wiki projects (Hadjerrouit 2013; Poyas 2013; Hutchison and Colwell 2012; O'Bannon et al. 2013). They are necessary in order to improve the created content (Poyas 2013; Peled et al. 2012), to improve peer feedback (Peled et al. 2012), to introduce learners to collaborative content creation and corresponding assessment criteria (Peled et al. 2012; Ng and Lai 2012) and to scaffold them.

Wikipedia is a special type of wiki environment whose content is publicly available and is accessed by many users. Wikipedia articles exhibit specific characteristics and follow certain rules. The content of Wikipedia articles is formal and citation of sources is required. Furthermore, articles have a particular structure and formatting. Therefore, effort is required by collaborating article contributors to conform to the required specifications and assessment plays an important role. Less than 20% of Wikipedia contributors are female (Hill and Shaw 2013; Collier and Bear 2012) despite the fact that the number of male and female Wikipedia readers is almost equal (Collier and Bear 2012). Higher education departments educating teachers could make policies encouraging female pre-service and/or in-service teachers to become Wikipedia contributors. Such an attempt involving female pre-service teachers is presented in a research conducted by Rekalidou et al. (2015). Based on results presented in the aforementioned approaches, teachers require preparation in order to provide their contribution to Wikipedia articles in a collaborative context.

4. Methodology

A research project was designed and implemented in the context of an undergraduate obligatory course involving collaborative learning in early childhood. The main purpose was to provide students with experiences in self-, peer and co-assessment processes by authoring Wikipedia articles in topics corresponding to the course.

4.1. Main Goals

This paper has a number of goals with the first being to examine if after their theoretical education, students are able to:

1) Take part in self, peer and co-assessment processes according to specific criteria in the context of a wiki project and reach specific conclusions,

2) To justify their assessments,

3) To provide feedback to others in order to improve their work,

4) To exploit received feedback in order to improve their work.

A further goal was to study how students' self-assessment results were correlated to peer and co-assessment results. This paper examines all processes involving the aforementioned project and, in relation to the project, it focuses on the following goals:

A) To examine if wiki projects promote students' ability to self-, peer and co-assessment in order to improve themselves,

B) To study how responsibly students participated in the aforementioned processes and to what degree these processes inhibited, provided feedback or improved students,

C) To study the types of feedback provided by assessors,

D) To study possible resemblances and variations of the aforementioned processes, advantages, deficiencies and problems that came to light.

4.2. Description of the Research

This study took place in the Department of Education Sciences in Early Childhood in the Democritus University of Thrace in Greece. Students that participated in the project had enrolled in the obligatory course taught in the third year of their studies. Since the second year of their studies, the students had taken courses, had attended seminars and had taken part in workshops involving assessment. The design and implementation of the project took at least six months.

Students were invited to voluntarily take part in the research process after being presented with the goals, processes and expected results. A prerequisite for a student was to take part in all project sessions till the project's final goal was achieved. The project gave bonus to course marks. The involved students were also asked to choose an initial topic area concerning their articles.

Forty-two students declared their participation. All students were female. They were divided in pairs of their choice. In the initial stages of the project, four pairs of students withdrew. Thirty-four students organized in seventeen pairs took part in the assessment processes and submitted the final version of their article.

Sessions were carried out to identify article topics by taking into consideration Wikipedia website content. The purpose of these sessions was to identify articles which needed authoring from scratch or editing. The final selection of topics was made in cooperation with the researchers. A prerequisite for all topics was their relevance to course curriculum. During these sessions, the specifications and requirements of a corresponding article were analyzed. Issues concerning structure, content, ethics, bibliography and further article parameters were discussed. Finally, a deadline for the preparation of an initial version of students' work was set. Students had to meet the specific deadline so that subsequently self- and peer assessment processes regarding their work could be carried out.

4.2.1. Data Collection

When the initial version of articles was prepared, a plenary session took place in which students received instructions about subsequent self-, peer and co-assessment processes. During this session, a protocol was handed out. The protocol concerned seven specific assessment criteria on which the assessment scale was based. The criteria were very thoroughly discussed in the plenary session. Table 1 highlights the criteria. Students used the criteria initially in self-assessment and subsequently in peer and co-assessment processes regarding

their work.

Table 1. *Assessment criteria for students' articles.*

1. Correspondence between title and content
2. Content accuracy and clarity
3. Structure
4. Text fluency
5. Sufficiency and validity of sources
6. Bibliography (formatting and citations)
7. Hyperlinks to other Wikipedia articles

Students/assessors could assign distinct marks to articles for each individual criterion in a scale ranging from 1 (least) to 5 (maximum). Furthermore, assessors were asked to point out their remarks so that they could be used as feedback. The definition of self- and peer assessment criteria drew ideas from the work presented in (Sluijsmans, 2002; Cho, Schunn, & Wilson, 2006; De Grez, Valcke, & Roozen, 2009).

4.2.2. Self-Assessment

In the self-assessment process, each pair member individually assessed the pair's article according to the aforementioned criteria. Subsequently, sessions of both pair members took place in which they discussed their individual assessments and they submitted a single, joint assessment of their article (i.e. self- and co-assessment). Fig. 1 depicts tasks regarding self- and co-assessment.

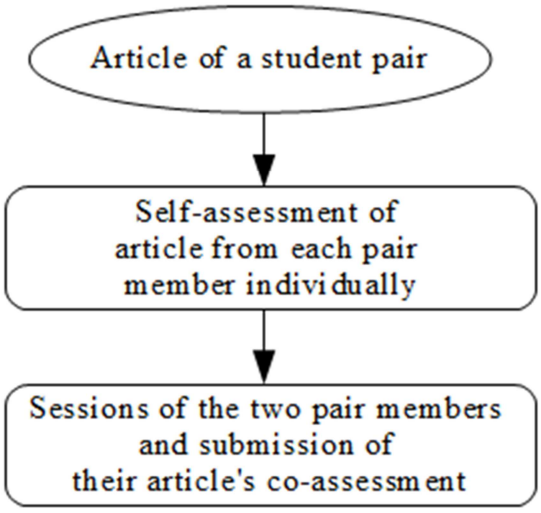

Fig. 1. *Self- and co-assessment tasks regarding student articles.*

4.2.3. First Round Peer Assessment

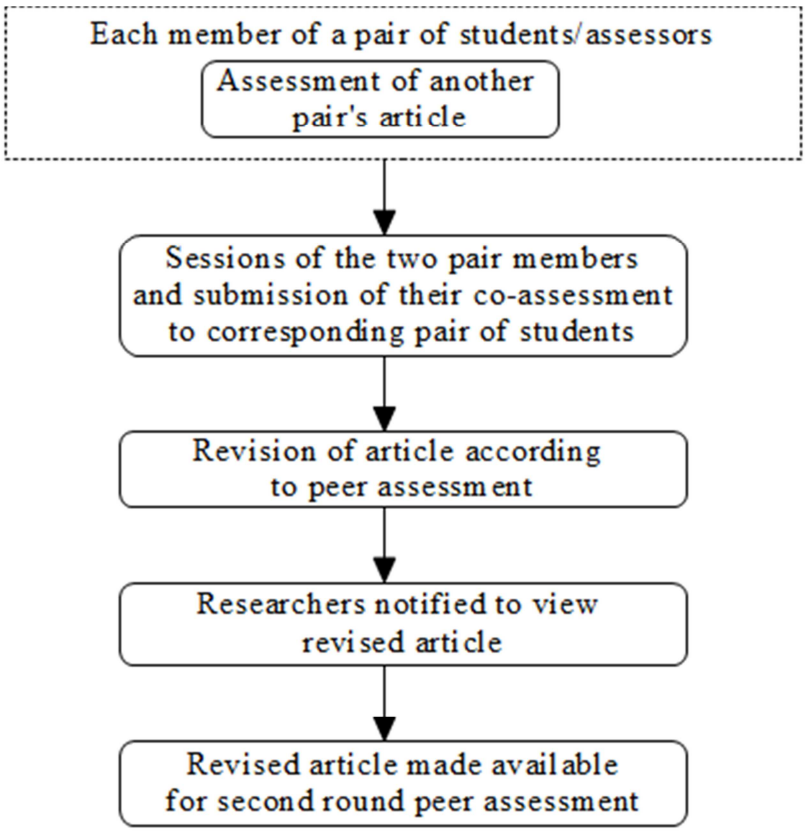

Fig. 2. *Peer and co-assessment tasks regarding student articles.*

Each pair had to assess another pair's article. Each pair member individually prepared his/her assessment according to aforementioned criteria. Each pair subsequently submitted a joint assessment (with the write-pair-share method) to corresponding student/authors. In the end, each pair received assessment from their fellow students in order to revise their article. The process was supported with sessions carried out in classroom and involved peer and co-assessment. At the end of the first round peer assessment, the researchers were notified to view the revised articles. Fig. 2 depicts corresponding tasks of the assessment process.

4.2.4. Second Round Peer Assessment

Each pair worked to improve their article by taking into consideration the assessment provided by fellow students. After the lapse of reasonable time, the second round peer assessment was carried out. The revised articles were assessed by the same students/assessors that had also assessed the initial version of the articles. Besides the criteria used in first round peer assessment, students/assessors had also to assess to what degree the assessed pair took into consideration their fellow students' remarks and feedback. The students revised their articles according to received comments and notified the researchers to view their work.

4.2.5. Final Assessment by Students

Besides submitting the final version of the article, students also submitted their final assessment. More specifically, each student submitted an overall assessment regarding the processes and an assessment regarding learning outcomes derived from completing their tasks. As far as the overall process and learning outcomes were concerned, students were asked to assign a mark in a scale from 0 (nothing/none) to 3 (maximum) to each one of the following:

a) To what degree were self-assessment skills essentially developed?
b) To what degree were peer- and co-assessment skills essentially developed?

Furthermore, students could indicate in open-ended questions the most interesting and the most deficient aspects of the project.

4.2.6. Limitations of the Study

This study was carried out in a Department of Early Childhood Education where Assessment in Education is extensively taught. Furthermore, all of the participants were female due to the high proportion of women in this Department (over 98%). Therefore the outcomes cannot be generalized to students of other Departments with potentially different demographic characteristics and a different curriculum.

5. Results

A one-way repeated measures ANOVA was used to test for statistically significant differences between the three assessment processes of the seventeen pairs (thirty four students) i.e. self assessment of pair (SAP), first round peer assessment (FRPA) and second round peer assessment (SRPA). Post hoc multiple pairwise comparisons were made with the Sidak method in order to identify individual mean differences. All tests were two – sided with a 95% significance level. Analysis was performed using IBM Statistics SPSS 21. Student responses to open-ended questions were grouped into categories according to their content. Subsequently, a qualitative content analysis of the students' judgments was carried out.

For criterion 1 (i.e. "Correspondence between title and content") students seem to assign high marks to their work in self-assessment (Mean: 4.71). For the same criterion, their fellow students in the first round peer assessment assign approximately the same marks (Mean: 4.65). In the second round peer assessment, the mean mark coincides with the mean mark in self-assessment (Mean: 4.71).

For criterion 2 (i.e. "Content accuracy and clarity"), the mean mark in self-assessment (Mean: 4.00) is less than the mean mark in first (Mean: 4.35) and second round (Mean: 4.24) peer assessment. Students do not seem to have significantly improved during the processes. As far as criterion 1 is concerned, one could mention that the expected results were more visible to students. For criterion 2, details involving the desired characteristics of the content in terms of accuracy and clarity were provided to students in order to formulate their judgments. However, the required knowledge at a more demanding level was unknown to them. From the comparison among all marks do not derive statistically significant differences.

As far as criterion 3 (i.e. "Structure") is concerned, statistically significant differences came to light ($p<0.05$) among marks as shown in Table 2. More specifically, the analysis showed statistically significant differences between the means of marks of first and second round peer assessment (FRPA - SRPA: $p<0.05$). Moreover, the means of marks have an augmentative trend. This finding enables us to reach the conclusion that students during first and second round peer assessment of their articles improved significantly the structure of their work. Furthermore, there is improvement among self-assessment and peer assessments without statistically significant differences.

Table 2. *Results for criterion 3 (i.e. "Structure").*

Assessment process	Mean	S.D.	N	Comparison	F	df1	df2	p
SAP	3.47	0.943	17	SAP vs FRPA				n.s.
FRPA	3.53	1.007	17	SAP vs SRPA	4.972	2	32	n.s.
SRPA	4.18	0.883	17	FRPA vs SRPA				0.001

Note: n.s. = non-significant

For criterion 4 (i.e. "Text fluency"), there are no significant variations in the means of marks (Means: SAP= 4.18, FRPA=4.24, SRPA=4.12) probably for the same reason as in the case of criterion 2. For criterion 5 (i.e. "Sufficiency and validity of sources"), students gave high marks to their articles in self-assessment (Mean: 4.07) as they also did for previous criteria. However, in first round peer assessment, the mean is lower (Mean: 3.50). After the articles were revised according

to comments of fellow students, the mean (4.36) in second round peer assessment is higher than the other two means. It can be said that students were improved during peer assessment processes although no statistically significant difference was derived.

Table 3. *Results for criterion 6 (i.e. "Bibliography (formatting and citations)").*

Assessment process	Mean	S.D.	N	Comparison	F	df1	df2	p
SAP	3.43	1.453	17	SAP vs FRPA				n.s.
FRPA	3.21	1.578	17	SAP vs SRPA	4.466	2	32	n.s.
SRPA	4.43	0.756	17	FRPA vs SRPA				0.013

Note: n.s. = non-significant

For criterion 6 (i.e. "Bibliography (formatting and citations)") statistically significant differences among the means of the three processes have been derived ($p<0.05$). More specifically, once again there is a statistically significant difference between the means of first and second round peer assessment (FRPA – SRPA/ $p<0.05$) which demonstrates significant improvement of students from the first to second round peer assessment in the specific criterion. Results are outlined in Table 3.

For criterion 7 (i.e. "Hyperlinks to other Wikipedia articles") statistically significant differences were derived ($p<0.05$). More specifically there are differences between SAP and SRPA ($p<0.05$) and between FRPA and SRPA ($p<0.001$). Table 4 outlines results for criterion 7. As far as criteria 6 and 7 are concerned, it should be mentioned that they are criteria facilitating the judgement of students.

Table 4. *Results for criterion 7 (i.e. "Hyperlinks to other Wikipedia articles").*

Assessment process	Mean	S.D.	N	Comparison	F	df1	*df2*	*p*
SAP	2.43	1.555	17	SAP vs FRPA				n.s.
FRPA	1.86	1.562	17	SAP vs SRPA	11.65	2	32	0.016
SRPA	4.43	1.284	17	FRPA vs SRPA				<0.001

Note: n.s. = non-significant

5.1. Final Assessment by Students

Several results came to light based on data derived from the protocol administered to the thirty-four students for final assessment of project processes. More specifically, 69.7%, 27.3% and 3% of the participating students responded that the project provided much, fair and little assistance respectively in developing capabilities related to their self-assessment. 69.7% and 30.3% of students responded that the project contributed a lot and fairly respectively to the enhancement of peer assessment capabilities. Moreover, 74.6% and 25.4% of students responded that the project contributed a lot and fairly respectively to enhancing capabilities regarding exploitation, authoring, and updating of Wikipedia articles.

Students had the opportunity to reflect on and formulate their judgments by responding to open-ended questions and expressing their opinions about the estimated interesting/positive and negative aspects of the processes. As far as positive aspects were concerned, student responses were organized into the following groups: *(i) peer assessment*, *(ii) self-assessment*, *(iii) innovation of the wiki project*, *(iv) broadening of knowledge* and *(v) various aspects*. It should be mentioned that each student could prepare more than one critical reports. Three groups of responses were derived regarding negative/weak aspects of the project: *(i) negative critique of fellow students' assessment*, *(ii) critique of project implementation* and *(iii) critique of practical issues of processes.*

5.2. Positive Aspects

Positive aspects reported by students are outlined as follows:

- *Peer assessment.* 33.8% of students mention that peer assessment is an interesting process and this is possibly related to the fact that peer assessment is a process that is not familiar to students in the context of everyday educational practice. However, a portion of them believe that students are able to participate in peer assessment processes and strictly conform to the criteria: *"The most interesting aspect was peer assessment […] with which our article was improved as students are the most rigorous reviewers" (Stud. 33)*. However, in almost all descriptions of this category, students were not able to provide in-depth responses and their documentations were superficial. Their speculation ended to "what" and "how" everything happened in the process following a rather vague approach without being able to penetrate into "why" the process was interesting. *"[…] I believe that the most interesting aspect of this project was the fact that assessment was performed among students" (Stud. 23)*.
- *Self-assessment*. 21.2% of students regard self-assessment as a positive/interesting aspect. In this case as well, students did not particularly provide in-depth analysis in their reports. They mostly focused on the fact that the overall process was a type of experience

for which they had only theoretical knowledge from courses they had taken. *"The most important thing is self-assessment… because it was something we had not done before…" (Stud. 14)*. As a "step" beyond these formulations, some students were able to distance themselves from the process itself and to perceive (beyond the cognitive part) the enhancement of their role in educational practice similar to which they did not have the chance to actively take part in before. "*[…] there was great interest in self-assessment. We assess by ourselves our work…I think that in this way, we develop our responsibility for everything we learn" (Stud. 11)*. "*[…] for the specific project I believe that the most interesting aspect is that the opinion of students counts […]"(Stud. 17).*

- *Innovation of the wiki project.* 34.6% of the responses mentioned the innovation of the project as an interesting aspect "*It is an innovative project compared to other ones we have done in the past […]" (Stud. 3).* When students mention "innovation", they often give further (although not thorough) explanations. With these explanations, it becomes clear that the ultimate goal of the project (i.e. publication of a Wikipedia article) was an attractive/significant reason to regard the project as innovative. It seems that they also acknowledge as important the fact that although they are students (and are therefore only learners in the traditional perception), implementation of the project is not only used for their assessment by the tutor but also provides knowledge and thus they do not only acquire but also transmit knowledge. "*[…] it is unprecedented to have the opportunity as a student to publish on the Web an article of mine" (Stud. 24)*. Beyond publication itself, some students mention their responsibility as far as potential readers are concerned. "*it is very important…[…] because many people will read it […]" (Stud. 10)* or *"the interesting aspect is that our work will be accessed by people beyond our tutors […]" (Stud. 17)*.
- *Broadening of knowledge.* 14.2% of students declared that the project was interesting because it broadened their knowledge. In the descriptions of students, the terms "Web" or "wikis" are very often cited when, among the positive aspects, they mention the contribution of the project in knowledge acquisition. Perhaps it should be mentioned that this contribution involves technological aspects such as searching on the Web and Wikipedia article formatting/uploading more than the subject of the project: *"Such types of projects should be assigned in other courses as well. This project enhances our ICT skills. We learn how to use ICT, how to author and publish Wikipedia articles […]" (Stud. 33)*. Finally, roughly 4.8% of students regarded as positive certain aspects (mentioned at most twice) that involve practical issues in the design and implementation of the project.

5.3. Negative/Weak Aspects

Most students either stated that there were no deficiencies to be pointed out or did not reply to the corresponding question. However, a portion of students made interesting observations about deficiencies they identified and outlined as follows:

- *Negative critique of fellow students' assessment.* 18% of students criticized negatively their fellow students' assessment. Some of them mentioned that the assessment provided by their fellow students was quite superficial and their assessors did not show the required seriousness while some others attributed these deficiencies to lack of experience and knowledge: *"It is certain that we are not experts…[…] the pair of our assessors did not review our work with the required responsibility… […]" (Stud. 7)*. On the other hand, other students pointed out that their assessors were extremely rigorous: *"I believe that students that assessed our work exaggerated… […]…our work did not have all the deficiencies they pointed out […]" (Stud. 24)*. Some of these remarks are valid and it is examined to what degree the responsibility of participants can be guaranteed. Other remarks are possibly connected with personal perspectives and they are studied in the context of the impact of personal perspectives to such types of projects.
- *Critique of practical issues of the processes:* 15% of students identified negative aspects mainly in practical issues such as scheduling of self/peer assessment sessions, long duration of the project or pair coordination issues.
- *Critique of project implementation:* 10.2% of students critiqued the processes of project implementation. They mainly mentioned the high demands, the responsibility that students had since the article would become available to the public and that implementation of the project was difficult for them. *"In the beginning as it was the first time that we dealt with such a type of project, the whole process seemed difficult to us until we completed it…[…]" (Stud. 10)*. As difficulty they also mentioned the fact that they were not certain that peer assessment results were reliable while all students that belong to this portion pointed out that further mentoring from tutors' part was needed.

From the aforementioned, a number of issues came to light reflecting a reality for some of our students. In the discussion of results, these issues are thoroughly analyzed.

6. Discussion of Results

The discussion is according to the goals that had been set out for this research work as mentioned in the corresponding section of this paper.

According to the results, it seems that the participating students managed to exploit to a certain degree satisfactorily the knowledge and skills acquired during their education prior to the implementation of the project. This is induced by their ability to actively participate in alternative assessment processes. The ultimate goal was to complete a project with specific requirements as well as to participate in an alternative

learning environment such as the one involving wikis.

Co-assessment became an integral part of self-assessment. This was due to the fact that first the joint assessment/consultation took place and afterwards pair members reached into the final self-assessment of their work. During their self-assessment, students tried to distance themselves from their project and to approach it through visual reflection and self-criticism. This was a consequence of the fact that there was a specific goal for students that gave meaning to their efforts (and this agrees with results presented in (Nelson and Schunn 2009) but also constituted a primary focus of their actions. Furthermore, the fact that efforts were made to ensure the clarity of criteria, seems to have supported students' work to a large degree. In her study involving peer assessment in a wiki project, Ng (2014) argues that been given an assessment rubric to help them was an important factor for students in order not to encounter problems.

In our work, this support was stronger when, based on the criteria for article assessment, students could determine the "desired characteristics" of the article. This means that the verbalization of self- and peer assessment was more effective when the criteria involved some "evident" result and were not very demanding in knowledge and skills. Perhaps it should be mentioned that based on this type of criteria, students seemed to self-assess their work with a higher mark than the one assessed by their fellow students in first round peer assessment. Explanations that may be given for this aspect is that in the initial assessment, students are not able to discern their deficiencies as they have not received feedback yet. In a corresponding study presented in Longhurst and Northon (1997) and cited in (Falchikov 2013), the authors mention in the results that certain students during their self-assessment tended to overrate their work and these students were usually the weak ones.

In three of the seven criteria on which self- and peer assessment processes were based, statistically significant differences were derived in the results between first and second round peer assessment. Students seem to have significantly improved in second round compared to first round peer assessment. This not only confirms that students knew very well the ultimate goal of the project but also that on the one hand as assessors they provided constructive feedback to their fellow students and on the other hand, as assessed persons they took into consideration feedback received from their assessors and improved their work.

This specific result of our study, according to results of research as well, involves the significance of the role of feedback among fellow students during peer and self-assessment and the contribution of feedback in the improvement of their learning and their assessment skills (Ferguson 2011; Orsmond and Merry 2013). Furthermore, as indicated by the results, students themselves seem to acknowledge that with their participation in the project they acquired skills connected with their co- and self-assessment, peer assessment and exploitation of Web-based environments in education.

The students' course in the process and completion of the project was not something accomplished easily and the progress in this course was not the same for all participants. These were due to the great difficulty that there was for students to deconstruct their traditional perceptions and to construct new ones for learning and assessment processes. More specifically, learning as well as assessment may be implemented with alternative methods and it is very important for students themselves to actively and substantially participate in these processes.

The education of students and their participation in the project was assessed by themselves. The largest portion of students mentioned the innovation of the project and the availability of the work to the public. This can become a subject of debate in the implementation of projects as well as the methodological approaches applied nowadays in higher education. Moreover, as derived from students' remarks, exploitation of Web-based environments to publish articles with reliable content not only provides abundant inter-scientific knowledge but also enhances their self-confidence. In early childhood education departments, students are mostly female. An ultimate goal of our approach was to encourage our students to become Wikipedia contributors. The satisfaction of our students shows that education departments may contribute to the increase in the number of female Wikipedia authors and editors.

A satisfactory portion of students support their active participation in learning and assessment processes estimating that they are able to meet the requirements for a peer assessment process and this constitutes an encouraging aspect for the shaping of their attitude towards corresponding processes. However, another portion of students that was smaller than the aforementioned but not negligible expressed two contradicting opinions/reservations. One of them refers to their fellow students' low level of responsibility in the assessment of articles. These students claim that their fellow students' remarks and feedback were superficial and did not offer much help. The other opinion/reservation refers to the overwhelming rigidity of their assessors. Both interpretations constitute deficiencies of the process and are thoroughly examined by the authors. It is possibly interesting that there were no reservations about the co- and self-assessment process. All the aforementioned concerning students' critique are possibly connected, among others, with the quality of cooperation relations among pair members but they are also likely connected with the difficulties of students to surpass grounded traditional attitudes and viewpoints about learning and assessment processes.

7. Conclusions and Implications

In this paper, we present an approach combining three assessment strategies in the context of a Wikipedia project. The involved assessment strategies are self-, peer and co-assessment. Students had the opportunity to put into practice assessment knowledge and gain experience in different types of assessment. Furthermore, students familiarized themselves with Wikipedia article authoring and

editing. Results are positive and provide an impetus for further research.

The design of our approach took into consideration issues and problems reported in other approaches integrating wikis in teacher education that play an important role in the success of wiki projects. More specifically, we put emphasis on aspects such as explaining the overall goals and assessment criteria in the initial stages of the project, initiating learners to the collaborative context and the use of the Wikipedia environment, scaffolding, encouraging learners to provide their assessment and retaining students' interest throughout the time period they worked on the project. Face-to-face interaction and classroom sessions contributed to the aforementioned aspects as well as to improving the created content and enhancing assessment.

We put emphasis on the successful integration of the wiki technology in the educational environment of our department. Educational technology constitutes the combination of tools and methodologies in order to satisfy specific educational needs (Roblyer and Doering 2012). Methodologies play an important role in the successful integration of technological tools in education. The presented approach provides a methodology for enhancing integration of Web-based collaborative content creation environments in higher education and promoting assessment and learning. Furthermore, a priority of the Wikipedia Foundation is to have 25% female contributors by 2015 (Collier and Bear 2012). Our work may provide a methodology towards this goal.

Our approach was applied to an undergraduate context and involved pre-service early childhood teachers. Future work involves two main directions. First, we intend to work with in-service besides pre-service early childhood teachers. Second, we intend to apply our approach to a postgraduate context. A goal is to create collaborating groups of pre-service and in-service teachers as well as undergraduate and postgraduate students that participate in assessment processes and contribute to Wikipedia article authoring and editing.

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