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# The student experience of a collaborative e-learning university module

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ABSTRACT

The aim of this paper is to present a picture of student experience of a collaborative e-learning module in an asynchronous e-learning environment. A distance learning module on music education worth five credit points for a bachelor online degree for primary school educating teachers was assessed using a self-evaluation questionnaire that gathered quantitative and qualitative data about student satisfaction of the collaborative e-learning activity. The quantitative part of the questionnaire consisted of 27 closed questions on a 10-point Likert scale and offered data about satisfaction with the module. The qualitative part of the questionnaire provided an insight into the participant perspective of the online collaborative experience. General open questions on satisfaction and dissatisfaction were analyzed with an inductive analysis which showed the evaluation criteria used by 92 students. Results of the analysis showed five themes of the participants' perspectives, which were interpreted by the researcher as: teamwork, cognitive, operating, organizing, and emotive/ethic for the positive aspects and teamwork, operating, organizing, and emotive/ethic for the aspects to be improved. The aspects that were associated with satisfaction include: collaborating, comparing ideas, sharing knowledge and skills to support each other, peer learning, analyzing and integrating different points of view, the usability of the platform, group planning and workload management. Aspects of the student learning experience that should inform the improvements of e-learning include: more collaboration between students since some students engage differently; more coordination and organization, the workload management in the group activities, some technical problems such as updating modifications. The participants' results in the module increased their didactic potential as primary school teachers. The findings are discussed in relation to their potential impact on developing collaborative activities addressed to teacher education in distance learning. Implications for future research are also considered.



## 1. Introduction

The expansion of e-learning products is one of the fastest growing areas of education since it allows to cut down the costs and it improves the cost-effectiveness of education (Gilbert, Morton, & Rowley, 2007). Despite the proliferation of papers into distance learning in the last past decade, most research has considered technical, financial and administrative aspects and less research was focused on didactic issues. More recently, methodological issues were addressed by researchers, considering various approaches for delivering online courses (EL-Deghaidy & Nouby, 2008). The model of a training based on self-instructional materials and independent study was deeply revised and the focus of distance learning research enlarged to the application of innovative didactic methods such as cooperative learning, having the constructivist learning theory as a reference (Amhag & Jakobsson, 2009; So & Brush, 2008; Wheeler, Yeomans, & Wheeler, 2008). The Internet information technology offered tools for developing collaboration and cooperation activities in distance learning (Jara et al., 2009; Macdonald, 2003), facilitating student interactions in a constructivist perspective linked to Vygotsky's theory (1978). Cooperation implies an engagement to peers through social interaction (Amhag & Jakobsson, 2009; Hew & Cheung, 2008) and collaboration activities delivered in the virtual social environment offered the student the possibility to develop understanding through their own constructs, becoming active learners. Chao, Saj, and Hamilton (2010) believe that collaborative course implementation is the best way to design high quality online courses.

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The research project reported in this paper addresses the issue of using a cooperative method in delivering distance learning modules, adopting a collaborative way of working through the internet. The purpose was to analyze student perceptions of a collaborative distance learning environment and the factors that affected their online performance. Quantitative and qualitative data were collected from learners to offer insight into their perceptions and expectations of the e-learning experience. The relevance of the use of cooperative activities through virtual environments was discussed and suggestions for the development of future research on new approaches in e-learning courses were proposed.

## 2. Theoretical background

The research about the use of cooperative approaches in online learning addressed several issues, such as how to develop student collaborative learning skills, the aspects involved in the formation of a virtual community and how course characteristics influence collaborative distance learning activities. Anderson and Simpson (2004) evaluated the asynchronous discussion in distance education, showing that small group discussions were considered the most valuable for the communication; however, non-participation was considered a significant problem. Amhag and Jakobsson (2009) showed the following three different levels of dialogs used by students as a tool for learning when they collaborate within the group during the following distance learning activities: passive and authoritative, persuasive and preliminary negotiation, persuasive and co-authorial negotiation. Nagel, Blignaut, and Cronjé (2009) analyzed some variables facilitating the formation of a virtual community of learners such as: communicate the required number of online classroom duties; encourage submission of highquality grade discussions and give formative feedback; award individual grades for group projects and rotate members of groups; augment facilitator communication with internet independent media to convey important information. Tsai (2010) showed that in collaborative online activities it is relevant to have teacher initiation. De Smet, Van Keer, De Wever, and Valcke (2010) considered the process of tutor feedback in asynchronous discussion groups, showing the following e-moderator roles: information supplier, social supporter, motivator, challenger for personal development and knowledge constructor. O'Neill, Scott, and Conboy (in press) analyzed the factors that influence collaborative learning in e-learning activities, showing aspects such as course rationale and design, instructor characteristics, training, group dynamics, the development of a learning community, and technology. With regard to the technology, there are several tools available and wiki is considered a very good tool for working collaboratively through the Internet (West & West, 2009). Shiha, Tsenga, and Yangc (2008, p.1039) defined wiki as "a web-based hypertext system which supports community-oriented authoring, in order to rapidly and collaboratively build the content."

Other research analyzed how individual characteristics impact collaborative distance learning activities. Dewiyanti, Brand-Gruwel, Jochems, and Broers (2007) explored individual characteristics that regulated aspects of collaborative learning and aspects of collaborative learning that regulated student satisfaction. Results showed that a group product influences group process regulation and group cohesion influences student satisfaction with collaborative learning.

So and Brush (2008) examined the relationships of the levels of collaborative learning as perceived by students, social presence and general satisfaction in a blended e-learning course. Results showed that student perception of collaborative learning has statistically positive relationships with perceptions of social presence and satisfaction: students who perceived high levels of collaborative learning tended to be more satisfied with their distance course than those who perceived low levels.

Johnson, Hornik, and Salas (2008) developed a model of e-learning which adds social presence, examining the factors contributing to success. Results indicated that self-efficacy in computer application and perceived management was related to course performance, satisfaction and instrumentality. Social presence was related to course satisfaction and course instrumentality, and course interaction was related to course performance and satisfaction.

Nam and Zellner (2011) evaluated specific aspects of cooperative learning using an experimental design with three groups: "positive interdependence group", "group processing group" and "no structure group". The first two groups received subsequent associated skills training, whereas the "no structure group" was a control group that did not receive any additional training. Results at the end of the activities indicated that the "positive interdependence group" had significantly higher achievement than the "group processing" and the "no structure group". With regard to the student attitude toward the experiences of cooperative learning - which were participation, communication resources, and online activities - there was no significant difference among any of the three groups.

The literature considered above, employed a variety of methods with, in some cases, relative small groups of participants. Several factors were shown and the aspects for developing the group cohesion and students satisfaction with collaborative learning. What is missing in this scenario, however, is an overview of all the aspects that could be relevant in distant learning cooperative activities from a participant perspective. The lack of research on the participant perspective was reported by several authors (Blass & Davis, 2003; Gilbert et al., 2007; Seddon & Biasutti, 2009) and is particularly evident for the field of online collaborative activities. Research about the participants' perspective developed more recently (Gilbert et al., 2007; Seddon & Biasutti, 2009), but it was not yet applied extensively in collaborative e-learning environments.

The current study is aimed to add some missing data by presenting more complete research on online education, involving a sufficiently large number of participants, and employing quantitative and qualitative data collection techniques. The objective is to analyze how participants evaluated their experience, and what they reported about the learning processes activated during the cooperative activities.

## 3. Aims of the study and research questions

The aims of the current research are to contribute to the literature on student experience and to express the criteria used by students in their evaluation of a collaborative distance learning activity in an asynchronous e-learning environment. The following research questions were considered:

(1) Does the specially designed distance learning module enable the participant to learn effectively the content delivered in the collaborative e-learning environment?
(2) What is the participant perspective on the most significant aspects of the collaborative online activity?
(3) What is the participant perspective on the most significant aspects to be improved in collaborative online activity?

## 4. Methods

### 4.1. Distance learning module

The data presented here derive from a student module evaluation process associated with the delivery of a distance learning module on music education (five credits) for a bachelor online degree of three years for educating teachers of primary school in a University in the North of Italy. The module was delivered in the second semester of the second academic year of the degree, when participants already had had at least 10 distance learning modules prior to the current module. The participants were divided into four groups, where each group was managed by a single tutor in a virtual class of approximately the same number of students. Each participant was randomly assigned to one of these groups and it was assumed that the aspects of previous study habits of individual students were decided only by the randomization in group placement (Nam & Zellner, 2011). The process of tutor feedback to the students was a very important aspect of the module: the tutors promoted student participation in the asynchronous online activities and accomplished all fundamental e-moderator roles (De Smet et al., 2010).

The platform used for delivering the distance learning module was Moodle, which allowed an asynchronous e-learning environment. The structure of the module as a whole included various activities, such reading tasks, discussions online, processes of peer feedback, and collaborative group tasks. Participants had to read a paper about curriculum planning in music education, then discuss it through online thematic forums and finally design a learning unit using the wiki virtual environment. When designing the task of the online collaborative activity, a scenario was used with authentic problems as previous research indicates the positive effects of collaborative learning when it is applied to tasks embedded in an authentic context (Tsai, 2010). The task of this study (to plan a learning unit) was an activity that could be applied commonly during class work of a primary teacher.

During the wiki activities participants had the possibility to share experiences, to negotiate understanding, to build joint meaning and to support each other in the process of learning in the virtual environment. For designing the learning units, participants worked asynchronously in subgroups of four people each using the following framework: objectives, contents, methodology, tools and instruments, duration, setting and evaluation. Participants worked for one month and they repeated the activity (every 15 days), designing two learning units to be delivered to primary school children: one on music listening (during the first 15 days) and the other on music composition/creativity (during the following 15 days). In the music listening learning units, participants planned activities based on listening to various pieces of music, while in the music composition/creativity learning units, participants implemented activities such as inventing or completing small melodies or rhythms.

### 4.2. Profile of online learners

92 students located across Italy were enrolled on the e-learning module on music education. Participants were grown-up work students, who were studying part-time since most of them (about 90%) were in-service primary school teachers. The majority of the participants were female ($M = 7$, $F = 85$). As this ratio reflected the general sex ratio of school teachers in Italian primary school, the imbalance was not considered significant. Participant ages ranged from 25 to 55 and the mean age was about 41. The profile of the participants matches the characteristics of the groups of students for which distance learning is considered particularly beneficial since they have the potential to develop as independent learners: they are well motivated to complete their studies, through both personal and institutional support (Gilbert et al., 2007).

### 4.3. Questionnaire

A self-evaluation questionnaire was used for assessing the student satisfaction of the course. The questionnaire was an adaptation of another student self-evaluation on the basis of theoretical models described in the relative literature (Marsh & Bailey, 1993; Marsh & Dunkin, 1992). Two categories of questions were included: a quantitative evaluation of specific module aspects, and a qualitative evaluation that invites overall comments.

The quantitative part of the questionnaire was composed of 27 closed questions. A set of statements was presented and participants were asked to express agreement or disagreement on a 10-point Likert scale. The five sections of closed questions were the following:

1) *processes induced* (6 items, e.g.: “I expanded my knowledge on teaching music”; “I understood the importance of curriculum planning in music”);
2) *module activities* (4 items, e.g.: “the activities gave me ideas about how to teach the discipline”; “the activities were appropriate to my training needs”);
3) *didactic competences* (6 items, e.g.: “I improved my ability to define the didactic objectives”; “I improved my ability to define the assessment phase”);
4) *teaching materials* (5 items, e.g.: “the teaching materials were clear”; “the teaching materials were educationally useful”);
5) *tutor performance* (6 items, e.g.: “the tutor stimulated the cooperation”; “the tutor gave feedback about how to improve the work”).

With regard to the qualitative aspects, the following two questions were asked for overall comments:

1) Please indicate which aspects of the collaborative methodology you consider most important.
2) Please indicate which aspects of the collaborative methodology you consider should be improved.

These questions induced a good range of qualitative comments by participants which offered a variety of insights into the strengths and the weaknesses of the module.

### 4.4. Procedure

Students participated in the module activities, which included reading tasks, online discussions, processes of peer feedback, and wiki collaborative group tasks. At the end of the module participants were invited to complete the questionnaire without any consultation. Student evaluation questionnaires are configured to help the improvement of the module for next year, and as quality feedback for the organization process. Participants were informed that questionnaires remain anonymous and were encouraged to give accurate answers, to see answers as subjective, and that questionnaires are used for research purposes only. The aim of the research was to elicit their opinions about several aspects of the e-learning activity. The questionnaire was available through the internet and it took an average of 25 min to complete.

### 4.5. Analysis and results

The collected data consisted of a review of the interim student examination results in the learning units and the results in the final examination. Furthermore, data were gathered from participants' responses to the evaluation questionnaire. Quantitative data (closed questions) and qualitative comments (open questions) from the evaluation questionnaire were analyzed using respectively statistical analysis (descriptive statistics, exploratory factor analysis and Cronbach's alpha) and an inductive method (constant comparative method) described in the following sections.

#### 4.5.1. Evaluation of the learning units/module

The learning units that participants carried out during the activities were evaluated. The following (all participants) means were found (maximum score 30): the first learning unit on music listening scored 28.39, the second learning unit on music creativity scored 28.72. At the end of the module 83 students took the final examination and all had positive marks: the mean was 27.94 out 30. The remaining students completed the examination in the following examination sessions. The results indicate that the module was successful.

#### 4.5.2. Closed questions of the evaluation questionnaire

The quantitative part of the participants evaluation questionnaire consisted of 27 closed questions with rating levels of 1–10 (1 = minimum; 10 maximum). In order to assess the consistency of the subscales, an exploratory factor analysis was used to identify the factor structure of the subsections of the questionnaire. The Kaiser criterion (Kaiser, 1960) was used, and the exploratory factor analysis produced an unrotated one-factor structure for each section showing that all the subscales were unidimensional. The reliability analyses were determined by measuring the internal consistency of each scale calculating the Cronbach's alpha. Alpha coefficients ranging from 0.89 to 0.96 were all well above the 0.70 standard of reliability. The mean, the standard deviation and the Cronbach's alpha were as follows: *Processes induced* (6 items) mean of 8.82 (SD: 1.31, Cronbach's alpha: 0.91), *Module activities* (4 items) mean of 8.92 (SD: 1.40; Cronbach's alpha: 0.89); *didactic competences* (6 items) mean of 8.45 (SD: 1.54; Cronbach's alpha: 0.96); *Teaching materials* (5 items) mean of 8.93 (SD: 1,34; Cronbach's alpha: 0.91); *Tutor performance* (6 items) mean of 9.43 (SD: 1.09; Cronbach's alpha: 0.91). These results indicated a very high level of student satisfaction.

#### 4.5.3. Open questions of the evaluation questionnaire

An approach based on the "grounded theory" by Glaser and Strauss (1967) was followed as theoretical framework for the analysis of the qualitative data of the participants' evaluation questionnaire. An inductive method based on the "constant comparative method" (Strauss & Corbin, 1998) was employed to analyze and to categorize the two open questions. One of the main characteristics of this inductive approach is that the categories emerge from the data by the use of an inductive analysis rather than coding the data according to prearranged categories (Charmaz & Henwood, 2008).

The following five phases of the constant comparative method were applied for analyzing the two open questions: 1) immersion, in which all the discernibly different answers are recognized, 2) categorization, in which 'categories' appear from the discernibly different answers, 3) phenomenological reduction, in which "themes" come out from the "categories" 4) triangulation, in which supplementary aspects were used for sustaining researcher interpretations, 5) interpretation, the final step in which a complete explanation of outcomes is carried out in connection to previous research and/or models. This method of analysis has been fruitfully adopted in earlier research examining online music learning (Seddon & Biasutti, 2009,2010). For further clarification, two diagrams of the first three steps of analysis of qualitative data are reported in Fig. 1 (positive aspects) and in Fig. 2 (aspects to be improved).

In the immersion phase, the researcher read through the answers several times to acquire a high level of familiarity with the material. 156 and 63 discernibly different answers were identified for the positive aspects and for the aspects to be improved respectively. In the categorization phase, the similar answers were grouped together and 28 categories emerged for the positive aspects and 19 for the aspects to be improved. In the phenomenological reduction phase, five and four themes emerged from behavior categories which were interpreted by the researcher as: teamwork, cognitive, operating, organizing, and emotive/ethic for the positive aspects and teamwork, operating, organizing, and emotive/ethic for the aspects to be improved. In the triangulation phase, quotes from the answers to the open questions and comments on discussion forums were used to support the researcher interpretation of the "themes". Examination of this material revealed that the participants independently referred to researcher interpretations of the participant perspective themes. These aspects are reported in Tables 1 and 2, which include illustrative quotations from the participant answers on the self-evaluation questionnaire.

The coding of the open questions was later validated by an independent researcher who separately checked the data coding. A reliability analysis using the Kappa statistic was performed to determine consistency among raters. The initial reliability for the raters was found to be Kappa = 0.807 for the 28 categories emerged for the positive aspects and Kappa = 0.846 for the 19 categories emerged for the aspects to be improved. The author and the independent researcher examined any disagreements relating to their coding and through a process of negotiation reached 100% agreement.

The categories and the themes of both the positive aspects and of the aspects to be improved were subjected to a quantitative evaluation counting the number of times they were mentioned by each participant. This analysis allowed insight into the relevance of

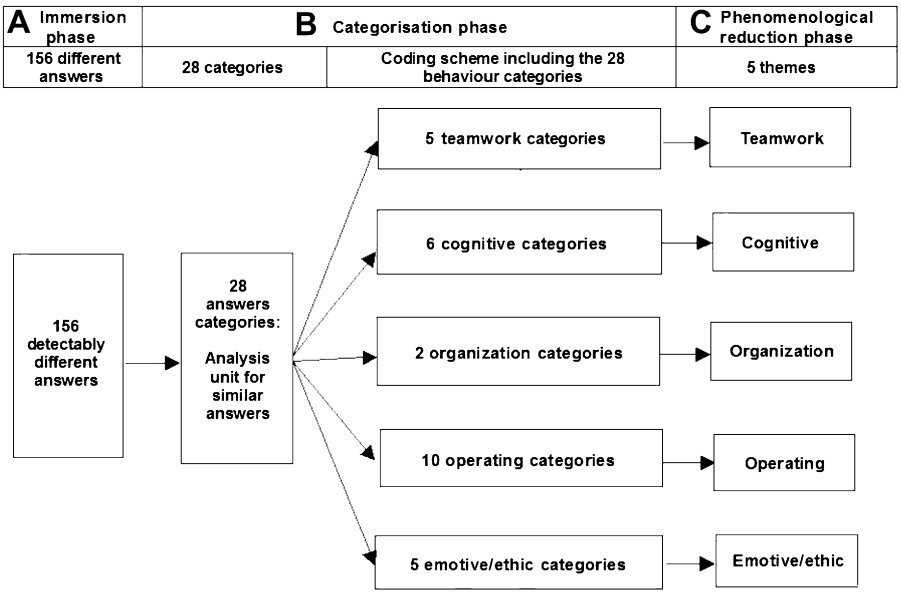


**Fig. 1.** Diagram of the first three steps (A, B and C) of the inductive analysis for the qualitative part of the self-evaluation questionnaire (positive aspects of the collaborative distance learning activity).

each category and theme. It has to be noted that nine participants did not provide any answers for the positive aspects and 31 participants gave no answers for the aspects to be improved. For the question about the aspects to be improved, five participants explicitly wrote that it was good and that there was nothing to be improved. For these reasons there were considerably less answers and categories for the aspects to be improved. The quantitative data of the categories and of the themes were reported in Table 3 (positive aspects), and in Table 4 (aspects to be improved).

## 5. Discussion

### 5.1. Research question one

Does the specially designed distance learning module enable the participant to learn effectively the content delivered in the collaborative e-learning environment?

During the e-learning module the participants developed their skills to plan a learning unit in music education. This aspect was assessed considering the learning units that they carried out in the asynchronous e-learning environment, the results in the final examination and the quantitative and qualitative results of participant self-evaluation questionnaire. Overall results were very good: the learning unit on music listening scored a mean of 28.39 for all the participants out of 30 while the second learning unit on music creativity scored 28.72 out of 30. Participants in the final examination score 27.94 out of 30.

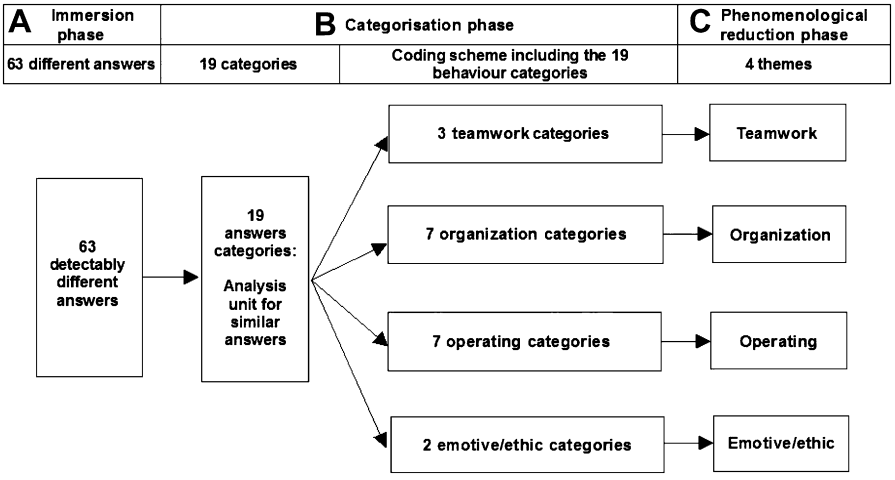


**Fig. 2.** Diagram of the first three steps (A, B and C) of inductive analysis for the qualitative part of the self-evaluation questionnaire (aspect to be improved of the collaborative distance learning activity).

**Table 1**
Triangulation phase: supporting quotes for the five themes of the positive aspects of collaborative distance learning activity extracted from the answers given by participants.

| Themes | Supporting quotes | Interpretation |
|---|---|---|
| Teamwork | "It was nice because I was involved in collaborating with other colleagues for learning during the activities."<br>"We realized a product that is really the expression of a teamwork."<br>"We worked collaboratively with many hands on the same document."<br>"We shared different experiences and opinions." | These quotes support explanations of 'teamwork' theme in which the participants express social components of the learning process. |
| Cognitive | "I learned from the others who knew more than me."<br>"We analyzed and integrated different points of view."<br>"I learned to cooperate and to collaborate."<br>"I understood my own and other people's limits." | These quotes support explanations of 'cognitive' theme in which the participants express mental components of the learning process. |
| Organization | "We organized a rich and complete learning unit."<br>"It was helpful for organizing the activity."<br>"It was useful for scheduling the time rationally."<br>"We distributed the workload in an organized way." | These quotes support explanations of 'organization' theme in which the participants express the management components of the learning process. |
| Operating | "Wiki is the ideal tool to produce a collective document."<br>"It was useful because it allowed us to contribute when the work had already begun, to make updates, to insert personal points of view and these modifications were not definitive and any update was possible."<br>"It was very interesting to see how the work grew and was shaped."<br>"It is a simple tool." | These quotes support explanations of 'operating' theme in which the participants express the advantages of the interventions. |
| Emotive/ethic | "The friendly environment and teamwork were very supportive and this facilitated the process."<br>"I felt a positive environment."<br>"I developed my sense of responsibility."<br>"We worked in a dimension of respect for all participants." | These quotes sustain explanations of the 'emotive/ethic' theme in which the participants report their feelings and the ethic. |

**Table 2**
Triangulation phase: supporting quotes for the four themes of the negative aspects of collaborative distance learning activity extracted from the answers given by participants.

| Themes | Supporting quotes | Interpretation |
|---|---|---|
| Teamwork | "I think it is needful to have a preliminary discussion and agreement."<br>"The wiki activity is very positive if there is cohesion and cooperation within the group."<br>"It is essential to have the effective participation of all the participants."<br>"The main problem was the different level of participation within the group." | These quotes support explanations of the 'teamwork' theme in which the participants express social components of the learning process. |
| Organization | "It is important to have more coordination and organization in the work".<br>"The sectoral organization of the work does not allow easy checking of the whole document."<br>"Greater division of the work."<br>"Timing: it was difficult to coordinate times with the commitments of each participant." | These quotes support explanations of the 'organization' theme in which the participants express the management components of the learning process. |
| Operating | "I had problems in updating modifications."<br>"The software was too sophisticated."<br>"It would be nice to use all the functions of wiki such as references, links […]."<br>"It would be interesting, but I do not know if it is technically possible, to support the wiki methodology with a synchronous communication tool, such as chat." | These quotes support explanations of the 'operating' theme in which the participants express the problems in the interventions. |
| Emotive/ethic | "Greater confidence in the wiki tool and in the possibilities that it offers."<br>"Scarse respect for the others."<br>"Stricter ethics."<br>"Scanty of mutual respect." | These quotes sustain explanations of the 'emotive/ethic' theme in which the participants report their feelings and the ethic. |

**Table 3**
Quantitative data of the positive aspects of collaborative distance learning activity.

| Categories | Participants | Categories | Total | Theme |
|---|---|---|---|---|
| 1. Interacting | 8 | 4.06% | 50.23% | TEAMWORK |
| 2. Comparing | 29 | 14.71% | | |
| 3. Sharing | 23 | 11.68% | | |
| 4. Collaborating | 36 | 18.26% | | |
| 5. Mediating | 3 | 1.52% | | |
| 6. Reflecting | 1 | 0.51% | 14.22% | COGNITIVE |
| 7. Analyzing and integrating different points of view | 13 | 6.59% | | |
| 8. Learning to collaborate | 3 | 1.52% | | |
| 9. Peer learning | 7 | 3.56% | | |
| 10. Understanding of own and other people's limits | 2 | 1.02% | | |
| 11. Commitment | 2 | 1.02% | | |
| 12. Group planning | 5 | 2.54% | 5.08% | ORGANIZATION |
| 13. Workload management | 5 | 2.54% | | |
| 14. Distance work | 2 | 1.02% | 22.33% | OPERATING |
| 15. Simplicity of wiki | 4 | 2.03% | | |
| 16. Flexibility of wiki | 3 | 1.52% | | |
| 17. Useful for collaborative | 12 | 6.09% | | |
| 18. Direct intervention | 4 | 2.03% | | |
| 19. Modifications | 3 | 1.52% | | |
| 20. Revision | 4 | 2.03% | | |
| 21. Work development | 5 | 2.54% | | |
| 22. Productivity | 4 | 2.03% | | |
| 23. Tutor feedback | 3 | 1.52% | | |
| 24. Satisfaction | 2 | 1.02% | 8.14% | EMOTIVE/ETHIC |
| 25. Positive environment | 6 | 3.05% | | |
| 26. Personal growth | 5 | 2.54% | | |
| 27. Developing responsibility | 2 | 1.02% | | |
| 28. Respecting the others | 1 | 0.51% | | |

In the quantitative section of participant self-evaluation questionnaire, the didactic competences scale scored 8.45 out of 10 (items such as “I improved my ability to define the didactic objectives”, “I improved my ability to define the assessment phase”), showing that participants increased their didactic potential as primary school teachers. Module activities had a score of 8.92 out of 10 (items such as “the activities gave me ideas about how to teach the discipline”, and “the activities were appropriate to my training needs”) indicating that the activities were well received by participants. Additional factors emerged from the questions about the processes induced with a score of 8.82 out of 10 (items such as “I expanded my knowledge on teaching music”, and “I understood the importance of curriculum planning in music”), demonstrating the professional development of the participants. The teaching material was evaluated 8.93 out of 10 (items such as “the teaching materials were clear”, and “the teaching materials were educationally useful”), showing that the material was well conceived. The most meaningful aspect was the tutor performance (items such as “the tutor stimulated the cooperation”, “the tutor gave feedback about how to improve the work”) which obtained the score of 9.43 out of 10 and provided evidence that tutors were very important for their ability to stimulate and motivate the groups. Tutors accomplished the functions reported by De Smet et al. (2010), which were relevant to give support and to provide participant feedback.

**Table 4**
Quantitative data of the aspects to be improved of collaborative distance learning activity.

| Categories | Participants | Categories | Total | Theme |
|---|---|---|---|---|
| 1. More cohesion, cooperation and collaboration | 9 | 11.68% | 22.07% | TEAMWORK |
| 2. More discussion | 3 | 3.90% | | |
| 3. Different level of participation | 5 | 6.49% | | |
| 4. Lack of preliminary agreement | 2 | 2.60% | 42.86% | ORGANIZATION |
| 5. Setting a more articulated work | 6 | 7.79% | | |
| 6. Lack of links between aspects | 6 | 7.79% | | |
| 7. More punctuality | 2 | 2.60% | | |
| 8. Workload management | 8 | 10.39% | | |
| 9. More material exchange | 1 | 1.30% | | |
| 10. More coordination and organization | 8 | 10.39% | | |
| 11. Using more techniques | 2 | 2.60% | 28.58% | OPERATING |
| 12. More explanations about wiki | 1 | 1.30% | | |
| 13. Software too sophisticated | 4 | 5.19% | | |
| 14. Software graphics | 3 | 3.90% | | |
| 15. Updating modifications | 8 | 10.39% | | |
| 16. Asynchronous discussion | 2 | 2.60% | | |
| 17. More tutors feedback | 2 | 2.60% | | |
| 18. Greater confidence in wiki | 1 | 1.30% | 6.49% | EMOTIVE/ETHIC |
| 19. Scanty mutual respect | 4 | 5.19% | | |

Also, in the qualitative part of the evaluation (open questions), participants expressed specific comments about the most successful aspects of the module as well as a general satisfaction about the activities delivered. Comments such as "It was a very good tool for developing teamwork and producing a specific document"; and "it was a positive experience. My group was very collaborative and this allowed us to create valid leaning units because there was comparison between us and coherence in the work.", were reported by participants.

It could be argued that one possible reason for the effectiveness of the module was because it applied the following main components: correct pedagogical approach, proper technology, clear and organized didactic material, opportunity for participants collaboration, group dynamics, support and online tutor feedback (Blass & Davis, 2003; Garrison & Anderson, 2003; O'Neill et al., in press). In the current study, also the virtual environment was relevant since it presented a simple yet efficient asynchronous e-learning setting, which allowed participants to work collaboratively through the internet, to share experiences, to build joint meaning and to support each other in the process of learning with the help of the online tutor. This interpretation of the results supports the findings of analog research on collaborative online learning conducted by Nam and Zellner (2011).

### 5.2. Research question two

What is the participant perspective on the most significant aspects of the collaborative online activity?

Responses to the general question on the aspects of the module activity that were useful, showed the criteria expressed by participants. Results of the inductive analysis revealed the following five themes: teamwork, cognitive, operating, organizing, and emotive/ethic. The participant perspective assigned a great value of the teamwork theme as the most relevant aspect of the online collaborative activity. The development of social skills during teamwork was considered very important by participants as it is shown in the following example: "[…] Wiki is a gym where young and old can work out their social skills, just like our children at school, to whom every day we try to teach collaboration, cooperation, and to see the diversity of the individuals as a resource. And where understanding each other can be a bit difficult, it is certainly a significant opportunity to grow together." This outcome supports the research findings by Jones and Issroff (2005), who provided evidence of affective and social issues in computer-supported collaborative learning. Gilbert et al. (2007) reported that discussion forums and other student interactions were mentioned by participants as one of the most important aspects of the e-learning activity, So and Brush (2008) considered the student perception of collaborative learning as an indicator of satisfaction of the e-learning course and Johnson et al. (2008) showed that course interaction was related to course performance and satisfaction.

In the current research, online collaboration was useful for the learning process and aspects such as "it was nice because I was involved in collaborating with other colleagues for learning during the activities", and "it was important for the continuous inter-exchange of ideas between people sharing the same aims" were reported by the participants. The importance of being member of a group as a factor for their collaboration was perceived by a number of participants: "we realized a product that is really the expression of a teamwork", and "we worked collaboratively with many hands on the same document". Group members collaborated and established a group cohesion during the realization of the task: "we shared knowledge and skills to support each other", showing mutual support among group members.

These findings are coherent with Anderson and Simpson (2004, p.2) who reported: "when students are remote, online communication provides an effective means of drawing students together to develop a sense of community". Hudson, Owen, and van Veen (2006) suggested that the students' feeling of the atmosphere of the learning community promoted their learning. In line with the Hudson et al. (2006) the relevance of social aspects could be argued and that the feeling of being part of a learning community is an important characteristic linked to the studying process.

Other aspects considered were the operational ones, with about 22% of the answers. The comments reported by participants were connected with the platform which was considered particularly useful for the online collaboration and to produce a collective document. "Wiki is a valuable resource: I like to call it building work in progress. In the various sections you have the opportunity to review the routes, to modify them layer after layer, always enjoying the safety of software that keeps track of any changes […] This is valuable! It is an environment - community of practices, where you can co-construct - polishing, removing, adding, expanding, improving - to get valid and acceptable results, especially in terms of product quality and process."

Also other practical aspects were mentioned, including the flexibility of wiki as a facilitator for the development of collaborative online tasks: "It was useful because it allowed us to contribute when the work had already begun, to make updates, to insert personal points of view and these modifications were not definitive and any update was possible.". This finding supports the study by Wheeler et al. (2008) who analyzed the advantages in the use of wiki. Another interesting aspect linked to the way of working was the perception of the development of the work and seeing how the work grew and was shaped: "It was interesting to observe how from the first ideas, gradually, thanks to the clarifications, the workable units have been defined. It was most rewarding to let the exchange of different experiences define the activities to be carried out in practice", was mentioned by one participant.

The collaborative online activity developed also the feeling that the cognitive domain was important (about 14% of the answers). Participants mentioned processes linked to the social dimension of cognitive development, such as "I learned to cooperate and to collaborate", and "I learned from the others who knew more than me" that showed the importance of peer learning in agreement with EL-Deghaidy and Nouby (2008) who reported learning from peers as a relevant aspect of a collaborative e-learning activity. The quality of the cognitive processes could be discussed also, as they occurred during the activity. Several studies addressed that in online discussion forums there are extensive interactions in which processes such as giving of information and exploration of ideas were included, but more complex elaborations such as integration of ideas and synthesis of a range of perspectives were substantially less considered (Anderson & Simpson, 2004; Angeli, Valanides, & Bonk, 2003). In the current research, it seems that also upper levels of cognitive skills were involved since participants reported aspects such as: "we analyzed and integrated different points of view", which showed that the wiki virtual environment enables students to collaboratively synthesize subject specific knowledge, developing also critical thinking skills. These findings are coherent with Bliuc, Ellis, Goodyear, and Piggott (2011) who showed deeper focus on specific aspects of the topics during asynchronous discussions.

It could be argued that also other characteristics than the wiki tool were relevant, such as course planning, since previous research showed that the instructional design could influence the way in which participant interact (Anderson & Simpson, 2004). In the current

research, the task of curriculum planning was conceived for addressing abilities such as integrating different modalities and facilitating the synthesis of concepts since the final result was not only a mere discussion, but a definite product (the learning unit) was realized. Also the small size of the group intensified the possibilities for engagement reaching to greater opportunities for the integration of different points of view: "it was very surprising to develop such a variety of interesting learnings within the group", one participant said. The online tutor had a fundamental role in this, facilitating the activated processes and guiding the activities toward higher-order cognitive levels (Anderson & Simpson, 2004).

The emotive/ethic theme had about 8% of the answers reporting the participants' satisfaction since they felt a positive environment and reported a personal growth: "the friendly environment and teamwork were very supportive and this facilitated the process". Also the following ethic aspects were reported: "I developed my sense of responsibility" and "we worked in a dimension of respect for all participants". This result supports the findings of other studies, in which the relevance of emotive aspects in computer-supported collaborative learning was shown (Jones & Issroff, 2005). These findings provided evidence that the virtual environment, as well as the face-to-face environment, involved social and emotive aspects at the same time.

Finally, 5% of the answers were about organization, expressing the management aspects of teamwork such as the articulation of group planning and workload: "it was helpful for organizing the activity"; "it was useful for scheduling the time rationally" were some comments reported by participants. There was also a reference to the coordination of the subgroup activities: "we distributed the workload in an organized way". This theme was not often mentioned by participants since it received only the 5% of the total answers, probably because it was the most crucial activity factor to be improved, as we discuss below.

### 5.3. Research question three

What is the participant perspective on the most significant aspects to be improved in collaborative online activity?

It could be argued that online collaboration has some weak points, even within the picture of success provided by the questionnaire results and comments reported above. Responses to the general question on the aspects of the module that would be improved in the future, showed some interesting suggestions expressed by participants. They reveal the following four themes: teamwork, operating, organizing, emotive/ethic. The participant perspective showed a great value of the organization theme (42% of the answers) as the most relevant aspect to be improved of the online module. Aspects such as more coordination and organization, workload management, lack of links between aspects, greater division of the work, and more relaxed time of work were addressed for improving the organization of the module. One participant said: "for me the organization represents the core business of the wiki approach: the division of tasks (often interlaced) and the ability of the group to allow the construction of a project that is impossible to do individually. You must be willing to write, edit, and lose your own ideas." The importance was mentioned of clearly defining the assignments within the group: "the only thing to do, maybe, is to better define the tasks that each member has to do". One participant addressed the importance of having a coordinator within the group: "to recognize immediately a persons as work coordinator, which in other courses are called "secretary", would have facilitated finding the right way: it's not easy among many thinking heads and so many ideas, just how to find the right way and the right method to be followed from the beginning. This is also because it is a work of mediation, cooperation and ongoing revision, and would require a little more time." Other participants expressed different opinions: "small group size was valuable, as well as peer collaboration without having a coordinator run the group." and "I don't think it's right to have a group coordinator, because it is not right that one person has to do more work than the others". Other comments provided evidence of specific work organization aspects to be improved: "it is important to find ways to better coordinate the various parts of the text"; and "the sectoral organization of the work does not allow easy checking of the whole document". Other research reported organizational problems and ambivalence regarding the potential of the wiki (Wheeler et al., 2008).

Also, the operating theme was relevant (28% of the answers) and aspects such as "updating modifications"; "too sophisticated software"; were addressed. One participant suggested to use more techniques: "It would be interesting, but I do not know if it is technically possible, to support the wiki methodology with a synchronous communication tool, such as chat.". These findings support research by Wheeler et al. (2008), who reported some problems in using the software during the collaborative e-learning activities.

The teamwork theme represented about 22% of the answers of the participants, addressing mainly more cohesion, collaboration and discussion within the group. The issue of the group constitution and cohesion was mentioned by a participant: "in itself, to work online with wiki is not complex and it's so exciting, but it involves a feeling among the members of the group which is not so simple to build. Initially, you spend time "to get to know each other" and to break the ice, as we say. Then, during the fully blown activity, it can happen that proposals are made which are not understood by some of the members (it happened also to me). Sometimes I was afraid to intervene in the work of others in a too invasive way […]". This statement demonstrated that collaborative online learning works if you are able to create the group. These findings are coherent with Dewiyanti et al. (2007) who showed that group cohesion influences student satisfaction with collaborative learning. Other comments were: "the main problem was a different level of participation" demonstrating that the small group nature of much of the work is dependent on all students participation (Anderson & Simpson, 2004; Gilbert et al., 2007). If one or two participants in a group of four or five decide to not participate, or participated with low commitment, this behavior cuts down the number of potential linkages significantly, reducing the quality of the induced processes. There is a difference between the current research and the previous research (Anderson & Simpson, 2004), where non-participation in online group activities was the major concern expressed by participants, whereas in the current research it was the third according to percentage. These results could explained by the different characteristics of the participants and the organization of the two studies.

The last theme was the emotive/ethic (about 6% of the answers) and comments such as "Greater confidence in the wiki tool and in the possibilities that it offers"; "stricter ethics" and "scanty of mutual respect" were expressed. These findings confirm the already mentioned relevance of emotive aspects in virtual collaborative learning environments (Johnson et al., 2008; Jones & Issroff, 2005; So & Brush, 2008).

## 6. Conclusion

The current research provided the participants perspective of an e-learning module, proposing collaborative activities in an asynchronous e-learning environment and informed us about the processes that occurred during the module. For nearly all students, small group

activities improved communication and the development of social skills, demonstrating that also in virtual environments group size in learning is important. Several benefits in collaborative activity participation in an online virtual environment were found, including the development of teamwork skills, the attitude to collaborate, the development of cognitive processes such as analyzing and integrating different points of view, understanding of own and other people's limits, and the development of the sense of responsibility and respect for the others. Despite the importance of small group work, participants reported organizational and operational problems as major development task issues. Also the different level of individual participation in small group activities was considered an aspect to be improved for the development of motivation and continuous engagement within the group.

The results of this study are consistent with other research conducted in virtual collaborative environments (Anderson & Simpson, 2004; Dewiyanti et al., 2007; EL-Deghaidy & Nouby, 2008; Hudson et al., 2006; Nam & Zellner, 2011; Wheeler et al., 2008). Taking into account that the results of the current study also match research on students experience in e-learning (Gilbert et al., 2007; Seddon & Biasutti, 2009), a complete overview of how participants perceived the collaborative activity could have practical implications for designing new collaborative virtual environment modules. Group organization was considered a crucial point and it needs to be carefully watched for good functioning of the subgroups.

Another aspect to be improved was the assessment phase which could be considered a way for developing teacher potential awareness of the participants. Participants reported a lot of interesting data about the processes experienced during the online activities. A follow-up discussion or a focus group could be set up about the learning processes involved in the online collaborative activity for developing meta-cognitive strategies and self-reflective practices about peer interaction and teamwork development among teachers (Biasutti, 2010).

### 6.1. Implications for further research

The results of this study have implications for the field of research on virtual collaborative environments, and support the need for further study of the nature of small group processes in online collaborative activities. All aspects the participants labeled (both positive and negative) provided a rich and comprehensive maze of how participants considered the online experience. These aspects are useful for developing a quantitative questionnaire for evaluating the effects of online collaborative activity. In this framework, knowing what the opinions of the participants are, they provide a base for developing a survey that respects and reflects the points of view of the participants. Finally, as a stimulus for further research, I suggest to study the differences in student response to the range of available interaction contexts, comparing student experiences from a virtual collaborative environment to those in an individual e-learning environment.

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