Online or face-to-face? Experimenting with different techniques in teacher training

Manuela Delfino, Donatella Persico
Institute for Educational Technology, Italian National Research Council,
Via de Marini 6, 16149, Genoa, Italy

Abstract: This paper illustrates a five-year case study (from 2001 to 2005) regarding a course in educational technology that involved from 100 to 150 student teachers per year for a total of more than 500 trainees. Since the first version of the course, which was entirely based on a face-to-face approach, computer mediated collaborative learning techniques have gradually been introduced into the training program. The paper outlines the main problems faced in the various versions of the course, where different combinations were experimented with, and discusses the solutions adopted. The difficulties concern the demands of a large, diversified population and the methodological problems related to the non-neutrality of the introduction of online learning in the socio-cultural and organisational context of the study. The solutions include a highly flexible course design and a good balance and strict integration between traditional and online training techniques in the delivery of the course and in the assessment of trainees. Finally, we suggest possible directions for further research aimed at facilitating the infusion of online techniques in initial teacher training.

Key-words: pre-service teacher training, teacher education, online learning, blended learning, case-study, educational technology

Introduction

Policymakers and scholars both agree that a key objective of research into educational technology is to help ensure that in-service and pre-service teachers have the skills and the competence needed to select and use educational technology in an effective way (Wood et al. 2005; Collier et al. 2004). However, agreement has not been reached either on the content or on the methods with which to achieve this objective, possibly because different contexts require different approaches. Many studies have been carried out to identify content priorities
(Sime & Priesley 2005; Midoro & Admiral 2003; Watson 2001) and to devise effective methodologies (Angeli 2005; Winter & McGhie-Richmond 2005; LeBaron & Miller 2004; Taylor 2003). Differences among these proposals depend on the pedagogical standpoints, the objectives, the culture, the educational system and the resources available. However, there are some common elements among the studies developed so far. One is that educational technology cannot be taught without using educational technology. In other words, future teachers should be trained with methods and tools that are similar to those they are supposed to use with their own students. Furthermore, they should be given the opportunity to become acquainted with different forms of technology (Brush et al. 2003; Dawson et al. 2003; Ertmer 2003; Pope et al. 2002; Cox et al. 1999). Another common point is that there are a number of different problems involved in introducing these methods into teacher education, because such a process involves much more than simply adding technology to an existing program.

Many of the studies that discuss the way educational technology can be used to support teacher training propose online or blended learning approaches. These can be either in the form of fully fledged institutional courses (Prendergast 2004; Gray et al. 2004), mostly employed in pre-service training, or in the form of communities of practice, usually involving in-service teachers (Hartnell-Young 2005; Triggs & John 2004). In particular, Computer Supported Collaborative Learning (CSCL) approaches seem to have great potential because trainee teachers are usually mature and autonomous learners, with a wealth of skills and competences that give rise to very productive collaboration processes, especially if they involve people with different backgrounds and degrees of experience (Vonderwell & Turner 2005). In this respect, some studies suggest that differences within the learning community provide a richness whose positive impact outweighs the drawbacks, mostly related to the effort needed to handle an heterogeneous target (Rowley et al. 2005). Other
studies point to the need to offer targeted training to a homogeneous audience, for example, by teaching content-specific uses of technology through situated practice (Otero et al. 2005; Sutherland et al. 2004).

The following study describes the evolution of a course in educational technology addressed to 554 trainee teachers over five years (2001-2005). In this course, an attempt was made to reach an optimal balance of various options. As far as trainee heterogeneity was concerned, the course took as much advantage as possible of their diversity, while separating homogeneous groups when needed. As regards online techniques, they were gradually introduced and the course was redesigned each year according to the designers’ experience and the students’ feedbacks. The paper discusses the advantages and disadvantages of the different approaches adopted in the various versions of the course, as well as the difficulties and problems faced. The problems encountered in using online techniques include: technical issues, such as software /hardware problems and malfunctions; individual and cultural issues, such as emotional barriers and incorrect expectations about online training; pedagogical and methodological issues such as the suitability of the method to the learning objectives; social and environmental issues, such as limited access to technology and time or organisational constraints. The paper also discusses the need to define adequate assessment procedures and examines pragmatic aspects of course organisation such as logistics, cost-effectiveness and problems due to the size of the target population.

**Setting the scene**

The “Scuole di Specializzazione per l’Insegnamento Secondario” (henceforth SSIS, that is Specialization Schools for Secondary Teaching,) were set up in 1999. These schools are in charge of the training of secondary school teachers and provide a number of courses that
allow graduates to qualify as teachers of disciplines related to their degree. The SSIS training lasts two years and covers different areas: general pedagogy, didactics of the various disciplines and supervised practice in school. As regards training in educational technology, the different SSIS (there are twenty of them in the country) have made different choices. This paper refers to the experience gained by the authors at the Liguria SSIS, where all student teachers, during their first year of training and regardless of the disciplines they intend to teach, have to attend two technology-oriented courses. The first is a basic course concerning Information and Communication Technology (ICT) and the second a course in educational technology (henceforth EdTech). The rationale for training all future teachers together derives from the interdisciplinary nature of EdTech and its potential for the development of better cohesion among teachers (Issroff & Scanlon 2002). This is a critical aspect in secondary schools, where true collaboration is often hindered by constraints related to organisation, bureaucracy, time and classroom setting.

The object of this study is the EdTech course and, in particular, the five versions of it that were run yearly from 2001 to 2005. These versions shared the general objective of promoting the development of educational design competencies, with special focus on the evaluation and selection of learning strategies, techniques, tools, and on the infusion of EdTech in the school context. The course versions also had common contextual constraints: high number of participants (ranging from 100 to 150 per year); short duration of the course (25 hours in year 1, 21 in the following years); limited amount of resources available (in terms of both staffing and equipment); great differences among trainees as regards expectations, interests, and background (both technological and disciplinary). Finally, they all had difficulties in applying the certification of attendance required by SSIS regulations to online activities.
Despite these similarities, the approach adopted varied each year. We will call the method of the first version (2001) traditional or face-to-face (henceforth f2f), though it was not based just on lectures, but also entailed experiential learning and group work in the computer lab. In 2002, participants could choose between a blended approach and a traditional course. In the third phase, in 2003, the option was between a course delivered entirely online and a f2f. In the 2004 version, participants could choose between a f2f course, an online one, and a blended course. Finally, in 2005, the trainees had no choice but to do a single blended course. Since the method (and the tool) is not neutral (Furr et al. 2005), these changes had an impact on the contents presented (the evolution of course structure and content is summarised in Appendix 1).

Case study methodology

According to Yin (2003: 4), the case study is “the method of choice when the phenomenon under study is not readily distinguishable from its context”. This is the main reason why, in this paper, the case study was chosen as a research method with the aim of improving institutional practice in pre-service teacher training. The adopted methodology is a twofold one: on one hand it may be regarded as an exploratory case study, aimed at determining the feasibility of introducing the online approach into similar training initiatives and at defining research questions for subsequent studies; on the other hand, it could be regarded as a descriptive case study, in that it provides an overall picture of a phenomenon within its context. Strictly speaking, it is also a multiple-case study, because it includes the study of five cases that present similarities but also contrasting results, for predictable reasons.

The purpose of this study is to improve practice in pre-service teacher training in EdTech, by identifying the problems connected to the introduction of online collaborative techniques,
investigating the pros and cons of possible solutions with the aim of reaching an optimal blend between online and f2f for the given context. More specifically, the variables considered are: the size of the target population, the type of blend of f2f and online activities, the contextual constraints (such as, for example, the actual availability of internet access to course participants) and the resources available. The underlying hypothesis of this study is that the introduction of the online approach has such a positive effect that it offsets the costs even with large target populations (Jung 2005; Jung & Leem 2001). However, given the strong resistance on the part of trainees, it is important to implement it gradually and monitor expectations until such time as the use of online techniques can be made compulsory for all trainees.

This study was carried out by the authors, who were also designers, tutors and teachers on the course. This involvement has the disadvantage of not providing critical external feedback (Corcoran et al. 2004), but it is still a valuable tool to improve practice and interpret the learning and social dynamics from an inner perspective, taking advantage of membership knowledge (Have 2002).

Many actors contributed to the various versions. External experts and tutors provided useful feedback through discussions that took place in “staff only areas” available in the online course platform or at meetings held at various stages of the course. Trainee teachers contributed by filling in our pre-course, mid-term and final evaluation questionnaires with their opinions and, less formally, through meta-reflection activities that took place during the course (both f2f and online).

A wealth of data, both of a qualitative and quantitative nature, is therefore available that could tempt researchers into comparing the approaches adopted. Nevertheless, it is important to be aware that we are not attempting to assess the pedagogical effectiveness of the various
course versions and that direct comparison of assessment results or evaluation data requires
great caution, especially when, as in our case, there are so many variables influencing the
different processes. Just to mention one, assessment methods changed from year to year and
according to the delivery approach, so it is not possible to draw conclusions about students’
achievements by comparing their ratings. In this paper the focus is on the problems faced in
the various phases of our case study. The available data are used to investigate whether the
adopted solutions suited our context and target populations and, more in general, under what
conditions such solutions are likely to solve the most common problems of initial teacher
training.

**Course history**

*Year 1: Traditional Approach*

The first version of the course (2001) consisted of lectures and laboratories, for a total of 25
hours per student. Some lectures were repeated once or even twice to suit the needs of
different subsets of the target population: examples and software were chosen with reference
to different subject areas, to make it easier for participants to appreciate applicability in their
own field. Even so, large class sizes often made it difficult to conduct lessons with an
experiential approach. This was not the case with laboratories, where the number of
computers available restricted participation to no more than 20 students at a time: this made
it possible to run group work activities, but entailed running each laboratory 5 times for the
whole cohort of students. The course programme, learning material, and assessment
information were made available to participants through a course website, a feature that was
much appreciated by participants, especially towards the end of the course near exam time
because it provided coherent and comprehensive documentation and real time information about assessment procedures and results.

The data collected by the end-of-course questionnaire show that, although the overall quality of the course was highly appreciated, the lab activities were considered most useful and many students suggested that more time should have been devoted to them. When asked to make comments to improve the course, typical suggestions were “I’d increase the amount of time allocated for the analysis and use of educational software”; “Less theory, more practice!”; “It would really be great to have more laboratory activities”.

Given the amount of effort required to conduct the labs, this request would not be easy to meet, unless personal access to the Internet were more fully exploited (66% of the students had access to the Internet, see Table 1).

<table>
<thead>
<tr>
<th>Year 1 - N (and %)</th>
<th>Year 2 - N (and %)</th>
<th>Year 3 - N (and %)</th>
<th>Year 4 - N (and %)</th>
<th>Year 5 - N (and %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students</td>
<td>102</td>
<td>90</td>
<td>156</td>
<td>111</td>
</tr>
<tr>
<td>Sample size</td>
<td>59 (57.8%)</td>
<td>68 (75.6%)</td>
<td>72 (46.2%)</td>
<td>86 (77.5%)</td>
</tr>
<tr>
<td>Access to the Internet</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>20 (33.9%)</td>
<td>10 (15.2%)</td>
<td>9 (12.7%)</td>
<td>4 (4.7%)</td>
</tr>
<tr>
<td>How often do you use a computer?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often</td>
<td>36 (62.1%)</td>
<td>56 (84.8%)</td>
<td>52 (75.4%)</td>
<td>60 (72.3%)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>15 (25.9%)</td>
<td>8 (12.1%)</td>
<td>15 (21.7%)</td>
<td>21 (25.3%)</td>
</tr>
<tr>
<td>Never</td>
<td>7 (12.1%)</td>
<td>2 (3.0%)</td>
<td>2 (2.9%)</td>
<td>2 (2.4%)</td>
</tr>
</tbody>
</table>

In some cases students’ suggestions contrasted each other, which supported the case for offering more choices to suit different needs. At the end of the first year, several factors suggested that a collaborative online approach ought to be adopted, at least for part of the course: the belief that CSCL and its tools may best be understood if experienced directly; the notion that flexibility and a certain degree of personalisation can only be achieved through
small group interaction; the fact that many students would appreciate the possibility to reduce commuting time.

**Year 2: Traditional or Blended Approach**

Given the above considerations, the 2002 version of the course was designed with an eye to modularity and flexibility. After a general introduction the course offered participants a choice of different lessons.

In addition, each trainee had the opportunity to choose from six specific workshop-like modules run with different methods. Four of these were based on group activities carried out f2f, while the other two were based on a socio-constructivist approach and run in a CSCL environment. Surprisingly enough very few students signed up for the latter type of module, so much so that the two modules were merged in order for the virtual community to reach an adequate size. The reasons why the trainees shied away from the online training were object of a specific study (Manca et al. 2003). They included both cultural and logistical factors, such as perception of a heavier workload being involved, underestimation of the important role this method plays in professional development, preference for f2f interaction and lack of access to the Internet.

Analysis of the data collected from the end-of-course questionnaire revealed several trends. The overall course quality (see Table 2) was rated slightly higher than the previous year, both by participants who attended the f2f module and those who took part online. Course content and approach were rated quite positively. Course modularity and flexibility were regarded as very positive aspects, obtaining a mean rating of 4.3 (SD=0.9) in a scale from 0 to 5. Tutors perceived that the possibility to choose a learning path had dramatically reduced the
problems related to background differences. Course usefulness was also judged more favourably than in the previous year.

Table 2 - An excerpt of results of the final surveys (ratings ranged from 0=low to 5=high).

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f2f</td>
<td>blended</td>
<td>f2f</td>
<td>online</td>
</tr>
<tr>
<td>Number of students</td>
<td>102</td>
<td>74</td>
<td>16</td>
<td>99</td>
</tr>
<tr>
<td>Sample size (and %)</td>
<td>62 (60.8%)</td>
<td>27 (36.5%)</td>
<td>7 (43.8%)</td>
<td>49 (49.5%)</td>
</tr>
<tr>
<td>Average overall quality (M and SD)</td>
<td>M=3.4</td>
<td>M=3.9</td>
<td>M=3.6</td>
<td>M=3.9</td>
</tr>
<tr>
<td>Objectives and content relevance (M and SD)</td>
<td>Not available</td>
<td>M=3.8</td>
<td>M=3.1</td>
<td>M=3.8</td>
</tr>
<tr>
<td>Method adequacy (M and SD)</td>
<td>Not available</td>
<td>M=3.4</td>
<td>M=3.1</td>
<td>M=3.5</td>
</tr>
<tr>
<td>Course usefulness (M and SD)</td>
<td>M=2.9</td>
<td>M=3.7</td>
<td>M=3.3</td>
<td>M=3.7</td>
</tr>
</tbody>
</table>

In spite of the above data, the request for more practice and, in some cases, less theory was even stronger than in the 2001 course (see Table 3).

Table 3 - Students’ opinions on theoretical and experiential course balance
(in the online versions of the year 3 and 4 there was no distinction between theoretical and experiential part).

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f2f – N (and %)</td>
<td>blended – N (and %)</td>
<td>f2f – N (and %)</td>
<td>blended – M (and SD)</td>
</tr>
<tr>
<td>Theoretical part</td>
<td>Too short</td>
<td>0 (0%)</td>
<td>3 (11.1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Adequate</td>
<td>27 (43.5%)</td>
<td>16 (59.3%)</td>
<td>2 (28.6%)</td>
</tr>
<tr>
<td></td>
<td>Too long</td>
<td>35 (56.5%)</td>
<td>8 (29.6%)</td>
<td>5 (71.4%)</td>
</tr>
<tr>
<td>Experiential part</td>
<td>Too short</td>
<td>34 (54.8%)</td>
<td>18 (66.7%)</td>
<td>6 (85.7%)</td>
</tr>
<tr>
<td></td>
<td>Adequate</td>
<td>24 (38.7%)</td>
<td>8 (29.6%)</td>
<td>1 (14.3%)</td>
</tr>
<tr>
<td></td>
<td>Too long</td>
<td>4 (6.5%)</td>
<td>1 (3.7%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

* In Year 5 trainees were asked to express their opinion on the balance between online and f2f (ratings ranged from 0=low to 5=high)
Based on trainee comments and their answers to open questions on the questionnaires, it was possible to make some hypotheses as to why the online module did not satisfy this need for practice. First of all, the duration of the online module (three weeks) was judged to be too short. Module length was established bearing in mind that it had to be roughly equivalent to that of the f2f labs, but the two approaches are simply not comparable in terms of what can be achieved in the same number of hours. Secondly, the topic dealt with in the online module, “Learning theories and virtual communities” was a rather theoretical subject that probably reduced the positive impact of the experiential approach adopted. One last point can be made about trainees’ expectations of a course on EdTech - most hoped to come out of this course “knowing how to use computers in their future classroom”. This is quite an unrealistic expectation. Firstly, because the course is certainly too short to give trainees such solid know how, and secondly because such know how may not actually exist, if it is interpreted as recipes to be followed. In many cases, in fact, students quite clearly stated their expectation to be told how-to-do-things, even in very complex instructional design situations, where there is no real One Right Solution to problems.

Although these results were not totally positive, the online approach was considered sufficiently promising to deserve further investment and effort.

Year 3: Traditional or Pure Online Approach

In 2003 the online offer was enhanced so that student teachers could choose between an entirely online course and a f2f one.

The f2f course was quite similar in structure to the course in the first year, but the total amount of course hours was increased to provide different learning itineraries. Summing up
the hours covered by the 11 lectures and 16 laboratories, each participant could choose 21 hours of activities out of a possible 65 hours.

The online course lasted 10 weeks. All the activities took place online, with the exception of three f2f meetings at the beginning, middle and end of the course. Assuming that the term blended refers to courses where there is a strong interrelation between f2f lectures and online learning (Graham 2006; Garrison & Kanuka 2004), the nature of these meetings, aimed at discussing problems and reviewing ongoing activities, allows us to consider the course as a fully fledged online course. Contrary to expectations based on the previous year’s experience, the number of people who enrolled in the online course was quite high (Table 4).

To cope with these unexpected numbers, the course was partially re-designed and more tutors had to be recruited.

Table 4 - Students and tutors involved in online activities.

<table>
<thead>
<tr>
<th>Year 2 - N (and %)</th>
<th>Year 3 - N (and %)</th>
<th>Year 4 - N (and %)</th>
<th>Year 5 - N (and %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student enrolled in online activities</td>
<td>16 (17.8%)</td>
<td>61 (39.1%)</td>
<td>15 (13.5%)</td>
</tr>
<tr>
<td>Students who concluded online activities</td>
<td>16 (17.8%)</td>
<td>57 (36.5%)</td>
<td>14 (12.6%)</td>
</tr>
<tr>
<td>Drop out</td>
<td>0 (0%)</td>
<td>4 (6.6%)</td>
<td>1 (6.7%)</td>
</tr>
<tr>
<td>Weeks of online activities</td>
<td>3</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Tutors</td>
<td>2</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

The decision to let the student teachers choose their way of learning was received very favourably by students. However, some of them pointed out the need for a significant investment on their part, as the following quotation from the end of course questionnaires shows: “As far as the workload is concerned, the opportunity to choose when to participate in the online activities is very interesting. In addition, I think that at the end of the course you have a deeper and more solid understanding. The time required is probably longer, but the
absence of idle time makes the course more interesting and pleasant (I never had the impression I was wasting my time)”.

The coexistence of the two methods required a very big commitment in terms of workload and resources for the course organisers. For the students, an interesting consequence was that they kept making comparisons between the two modes. In particular, confirming what is maintained by Tu (2002), participants in the online course expressed the opinion that their course was more demanding and time consuming than the f2f one and they expected that this should be compensated by a more generous assessment.

At the end of the course some of the f2f students, during a debate, expressed curiosity about the online approach and regretted not having been brave enough: “I was quite curious about it, but I wasn’t sure I’d have been good enough”. Course designers felt it was time to integrate the two approaches by offering all the students the possibility to try the online mode, even if only for a few weeks.

Year 4: Traditional, Pure Online or Blended Approach

In the fourth version of the course (2004) an even higher degree of freedom was given to participants by offering them three options: the f2f course, the online one and a blended course, for those who wanted to experience the online mode, but were afraid of committing themselves to ten weeks of this method. While the first option was similar to the f2f version of the previous year, the online course was re-designed and integrated with the blended one. After some introductory f2f lessons, the blended mode students were expected to join their colleagues on the online course for five weeks in the CSCL environment. The online students were intended to act as tutors to their peers using a reciprocal teaching method.
In contrast to the designers’ expectations, the students’ choices went in the opposite way to the previous year: only 12.6% of the students subscribed to the online course (Table 4). Even more unexpectedly, only one trainee enrolled in the blended course. As a consequence, it was decided to cancel this option and the student who had chosen it decided to participate in the online course. The fourth version of the course therefore ended up with a structure similar to the third: a f2f course and a ten-week online course. An informal investigation of the reasons for the poor enrolment in the blended option suggested that students perceived that this method would be heavier and more difficult than the f2f one, but not as interesting and rewarding as the online course. It therefore seemed to combine the worst of both worlds.

As in the previous versions of the course, a high degree of freedom in the choice of the f2f activities was supposed to cater for the different training needs of the students. In many cases, though, it turned out that the very tight SSIS schedule and other logistical problems prevented them from taking full advantage of this flexibility.

**Year 5: Blended Approach**

In year 5, the time seemed ripe for overcoming trainee resistance to the online approach by requiring all of them to try it out, if only for a short time.

The course was therefore given a blended structure that consisted of 12 weeks online and 6 lectures. Each f2f meeting provided the theoretical and methodological background for the subsequent online collaborative activity, thereby achieving close integration between the two components of the course. The online tutors took part in the f2f sessions, which allowed the creation of a strong social bond and provided plenty of opportunities to discuss, give examples, analyse cases and go into the details of course content both online and f2f.

14
Since the trainees had no alternative but to do a course comprising online activities, the designers were particularly concerned about their reaction to this lack of freedom. The entire group of students succeeded in completing the course, although at the beginning many trainees voiced their concern about the amount of time and effort required and the practical difficulties of logging into the online platform. Nevertheless, their attitudes towards the course itself progressively changed, and many of those that had opposed the idea of working online became the most active participants. Some of them continued to be very critical, but they all participated and collaborated with their peers, especially in the areas devoted to meta-reflection on the course. Here is a revealing quote from one of them: “At the beginning I had many prejudices against online experiences, but I have to admit that this environment is a nice place to collaborate with others, talking about didactics and the cultural aspects of being a teacher”. Almost as revealing as this quote is the fact that there were no drop outs in this version of the course.

Problems Faced and Adopted Solutions

The EdTech course is the only course within the Liguria SSIS that makes use of online learning techniques. For most of the students this was their first experience working online, and even in years 2 and 4, when the number of people involved in online activities was limited, online participants were quite excited about the method- they felt they were the elite of the course, although many pointed out that the workload was quite a serious drawback. This favourable response was borne out by the percentage of those who answered positively to the question “Would you repeat such an experience?” in the final questionnaire (Table 5). Particular enthusiasm was expressed by students who would not have been able to physically attend the course or part of it, due to physical disabilities, illnesses or pregnancy.
According to our data, the aspects that participants most appreciated were the course organisation, its flexibility and modularity and the experiential approach (both in the online and the f2f case). The most important problematic aspects are discussed below.

**Table 5:** Willing to repeat the online experience.

<table>
<thead>
<tr>
<th></th>
<th>Year 2 blended – N (and %)</th>
<th>Year 3 online – N (and %)</th>
<th>Year 4 online – N (and %)</th>
<th>Year 5 blended – N (and %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely yes</td>
<td>11 (78.6%)</td>
<td>20 (38.5%)</td>
<td>11 (78.6%)</td>
<td>38 (52.8%)</td>
</tr>
<tr>
<td>Yes, provided that…</td>
<td>3 (21.4%)</td>
<td>26 (50%)</td>
<td>3 (21.4%)</td>
<td>28 (38.9%)</td>
</tr>
<tr>
<td>No</td>
<td>0 (0%)</td>
<td>4 (7.7%)</td>
<td>0 (0%)</td>
<td>6 (8.3%)</td>
</tr>
</tbody>
</table>

**Handling Big Numbers**

The size of the target population undoubtedly caused problems in all versions of the course, mainly because of the chronic lack of resources made available by SSIS. Providing hands-on experience for so many students in f2f lessons calls for adequate access to technological equipment and appropriate levels of technical support. Adopting an online approach with large numbers of people has different requirements, such as universal access to technology, and the definition and management of suitable social structures for the learning community.

Access to technology involves both availability of suitable means and sufficient technical skills. Both turned out to be problematic aspects in spite of the positive trend shown in Table 1. Student’s familiarity with ICT simply did not seem high enough. In addition, the SSIS educational contract did not require students to have internet access, and this was the main reason why course organisers had kept the f2f option alive for 4 years.

Year 3 experience clearly showed that managing a big online community is not simple (Lentell & O’Rourke 2004). Large virtual learning communities are usually handled through group learning techniques that entail splitting the whole cohort into smaller groups to carry
out specific learning tasks. Of course, if there is no interaction between these groups, then the result is equivalent to many separate courses with smaller target populations, each with its own tutor and with no need to synchronise activities. This approach, however, doesn’t exploit economies of scale and hinders exchanges within the larger community. As an alternative, it is possible to split the larger community into dynamic groups that work together for a while and are then rearranged into different groups, whose work draws on the previous phases, as in the jigsaw technique (Hinze et al. 2002). Implementing such techniques is of course much more complex and requires careful planning as well as close coordination among tutors and course designers. The payoff is that this approach takes full advantage of community richness as it results in one integrated course rather than several smaller scale ones.

The online courses run in year 3, 4 and 5 adopted the integrated approach and faced the problem of recruiting a sufficient number of competent tutors, to maintain a reasonable tutor/trainee ratio. Online tutoring requires time, competence and commitment. Although it is true that collaborative activities rely on peer support, trainees who are undergoing their first experience also need encouragement and guidance from their tutors to achieve learning objectives. The significant differences in the backgrounds of our trainees also imposed a high level of personalisation in training. For all these reasons tutors were recruited from researchers in the field of EdTech and in-service teachers- the majority of them had considerable experience in tutoring online. In some cases, however, novice tutors had to be employed. The integrated approach therefore revealed another advantage: it was possible to implement a sort of cognitive apprenticeship approach with less experienced tutors. Not only were they able to observe and imitate their experienced colleagues, but they could also ask them for advice and, more generally, discuss problems in a special conference of the online environment, invisible to students.
Allowing for Design Flexibility

Offering students the option between f2f and online means being flexible about course design. Whenever this choice was left to students, in fact, predictions about enrolment numbers were wrong and, as a consequence, the courses had to be partially or completely reshaped according to the actual number of participants (Delfino et al. 2004). For example the two online modules offered in year 2 had to be merged and the year 3 online community had to be re-structured to accommodate a much bigger population than expected.

In year 4, when the blended version of the course had to be cancelled, the few students who had chosen the online course were asked about the reasons for their choice, and it turned out that their main motivation was curiosity. On the other hand, most of those that chose the traditional approach had done so out of fear that the online option would require great familiarity with the technology or turn out to be too demanding.

The blended course in year 5 brought designers and tutors to reflect on the best way to merge and integrate f2f and online techniques, by choosing the best approach for the various phases and activities of the course. It was assumed that lectures were best suited to introducing and providing a general framework for a subject, while the online component lent itself better to student centred strategies, such as problem based learning, case studies, inquiry leaning. In addition, f2f sessions were also used to elicit feedback about the online activities and therefore fine tune their design. On the other hand, students frequently commented on the lessons in the online forums, so course designers could get a good idea of the impact they had on the students. Formative evaluation of the learning process allowed in itinere adjustments of the process itself, but it also imposed a considerable amount of flexibility on the designers and the tutors, which certainly made their job quite hard.
Non Neutrality of the Method

From the point of view of instructional design, the choice of one learning method over another is hardly ever neutral: although the general objectives of the f2f and online courses were pretty much the same, the adoption of the online approach rather than the traditional one required a re-definition of the learning activities and even an adjustment of their aims. For example, one of the activities aimed to make trainees aware of the different typologies of educational software and to develop evaluation competencies. In the f2f laboratories small groups of students took about six hours to analyse three or four different packages and discuss their features, ending up with a reasonably panoramic view of existing packages. During the online course, however, each group spent about two weeks thoroughly analysing and discussing a single piece of software, but the quality of the their reports was far higher than that of their f2f colleagues. This corroborated our hypothesis that, while the f2f mode is more suited to a general overview and a greater awareness of the variety available, the online approach, which is free from time constraints and keeps track of the written interactions, favours in depth reflection, critical thinking and the attainment of evaluation competences (Garrison et al. 2001; Meyer 2003).

The dynamics of social behaviour in online communication are another aspect that should inform instructional design. Looking at the interactions of the 2003 course, online students appeared very keen to express appreciation of their colleagues’ contributions and quite cautious about expressing disagreement. This seems to confirm the claim that, although online interactions seem to facilitate the proposal of different points of view, they sometimes inhibit argumentative exchanges: in particular, online beginners seem to be reluctant to criticise or disagree openly (Wegerif 1998). The same inclination to excessive politeness, though, was not showed by participants in the 2004 and 2005 courses, who behaved in a
much more polemical and contentious way. The main reason for their irritation was the imposition of the blended method on all the participants, and more generally the workload entailed by the SSIS courses. Although only a few students expressed their feelings in an impolite way, using swearwords and explicitly attacking trainees who showed appreciation for aspects they were criticising, they managed to create an uneasy atmosphere in the first weeks of year 5, in some of the course conferences. These controversies and flaming were mitigated by tutors and peers through dialogue and discussion, but they eventually stopped and gave way to a much more positive mood when, midway through the course, some of the students who had lead the criticism openly expressed their change of mind. Further research is certainly needed to investigate group dynamics online. For example, it seems that there are patterns in how the social climate evolves, and factors that sometimes prevent sincerity online while generating conflicts in other cases. In any case, tutors and course designers would certainly benefit from research findings about when and how discussion develops online, as it appears to be quite different from what happens f2f.

To conclude this section, it should be noted that it is not just tutors who need to adjust their teaching style to the online methodology, but also the students. All participants, especially trainees who are new to the method, need to learn how to relate to others online in order to limit the drawbacks of written asynchronous communication and exploit its advantages, such as the fact that message persistency favours reflection on content and allows flexibility in time.

Assessment

Learning assessment is another important and problematic area. Final assessment of the first year was based on small projects carried out in groups to evaluate educational software or
develop a technology based educational unit. In year 2 it consisted of a combination of two components: a short essay on a topic related to the theoretical part of the course and the assessment of the optional modules. Here, of course, there was a significant difference between those who had chosen the online module, and those who had participated in the f2f workshop-like modules. The former were evaluated on the basis of quality and regularity of participation and calibre of products, while the latter were evaluated on the basis of the products of their group work.

In years 3 and 4, the assessment systems for the f2f and online courses were completely separated. F2f participants were assessed in a traditional way, through an essay or an oral interview. Technicalities were deliberately avoided, while the focus of the evaluation was on methodological competence and critical reflection.

Online students were assessed in itinere, with the same method used for the online module of the previous year, save that the assessment was made by a committee that included all the tutors. Each of the online activities was given a weight, and each tutor rated his/her students for each activity according to their degree of participation, collaboration, creativity, originality of contributions, quality of argumentation, integration between theory and practice, consideration for peers contributions. The final assessment was made on the basis of the grades obtained on each activity. Correctness was not deemed to be important in the assessment of online activities, because students were supposed to be learning and therefore they were not expected to have already developed their new competences in full. As a consequence, the actual realisation of fully fledged collaborative processes was considered more relevant than the quality of the product, in accordance with assessment criteria in constructivist contexts (Anderson 2004). In spite of the different methods used in training and assessment, there were no major differences between the average grades achieved by
students who attended the two approaches every year (see Table 6). Tutors felt that the method used for the online courses was more accurate and made it easier to detect differences among students’ performances than a summative evaluation carried out through an oral interview or a written essay.

Table 6 - Assessment results (ratings are expressed in thirtieths, with eighteen being the minimum sufficient rating).

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f2f</td>
<td>blended</td>
<td>f2f</td>
<td>online</td>
<td>f2f</td>
</tr>
<tr>
<td>Mean</td>
<td>28.5</td>
<td>26.6</td>
<td>26.8</td>
<td>27.8</td>
<td>27.4</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.4</td>
<td>2.4</td>
<td>2.6</td>
<td>2.2</td>
<td>3.4</td>
</tr>
</tbody>
</table>

As mentioned before, the coexistence of the two methods induced students to compare them. Some students expressed the opinion that the online course was more demanding and time consuming than the f2f, and voiced their expectation for higher grades in return. They probably underestimated the fact that, at the end of the course, they were assessed with no additional effort on their part, while their colleagues had to study for the oral interview.

In online courses, basing assessment on quantity and quality of participation, and not only on learning outcomes, is a widespread practice (Benigno & Trentin 2000), but it does have drawbacks. Most of all, basing summative assessment on *in itinere* behaviour may be unfair towards competent students who have little time and beginners who need time to improve their competence. To compensate for this problem, online participants who were not satisfied with their assessment could sit for the final exam like f2f participants in order to improve their grades.

The introduction of a single blended approach in year 5 gave the tutors the chance to evaluate all the trainees on the basis of their participation in the online component of the course. In
order to mitigate the problems related to the use of data collected *in itinere* for summative assessment, students who obtained low grades could integrate their assessment with a written essay, evaluated with more traditional criteria.

**Conclusions and Future Developments**

In recent years, network-based electronic communication has proved to be a tool capable of fundamentally reshaping teachers’ professional development (Barnett 2002). While online training is well established in Italy for in-service teacher training, it is not so widespread in pre-service training. Nevertheless, the authors believe it important to invest in the adoption of online techniques for the training of future teachers. Student teachers are more likely to use similar methods with their students if they have had first-hand experience themselves; hence their acquaintance with the net is fundamental for their future profession, and for lifelong learning in general. Last but not least, acquaintance with the concept of online learning communities may encourage future participation in communities of practice, which is acknowledged to be one of the most promising means of teachers’ development (Fusco *et al.* 2000).

Further research is needed, though, to develop the potential of this method and to design courses which can best exploit the advantages of online techniques. The problems outlined in this paper can stimulate further work in some of the fields mentioned. For example, devising new ways to structure the learning community (Persico & Sarti 2005) may help to deal with large target populations in pedagogically productive and cost-effective ways, while investigating the relationship between learning objectives and training strategies adopted (Willis & Cifuentes 2005) may support course design and turn the non-neutrality of the method from a problem to a strength of the online approach.
Much of the literature on constructivist learning focuses on formative assessment, discarding summative assessment because it is “not in line” with the basic ideas of collaborative learning. However, educational institutions are often required to conclude courses with a summative evaluation. Devising innovative methods of carrying out formative and summative assessment in a harmonious way can alleviate tutors’ workload and reduce the subjectivity of judgement. Finally, higher levels of design flexibility can also be reached through the development of software environments and tools that support both the design and the implementation of these kinds of courses in a more adaptable way.

Acknowledgements

This study was conducted within the educational technology course for SSIS Liguria, in accordance with a contract between SSIS and ITD-CNR. Thanks are due to Stefania Manca and Luigi Sarti, co-designers, with the authors, of several course versions, and tutors in several online activities.

References


Appendix

Appendix 1 – Structure and contents of the course versions.

Year 1

Lectures included:
- the definition of educational technology, its history and the underlying learning theories;
- criteria for media selection;
- educational software and examples of use;
- online resources for teachers;
- collaborative learning and the web;
- educational technology case studies;
- reflections on the impact of educational technology on the Italian school system.

The laboratory sessions consisted of group work, and focussed on:
- development of a small teaching unit;
- analysis of educational software and web resources;
- analysis and discussion of a case study.

Year 2

Lectures included:
- introduction to educational technology;
- criteria for media selection;
- methods and strategies for implementing educational technology;
- telematics and education;
- projects and case studies in educational technology;
- reflections on the impact of educational technology on the Italian school system.

Each student had to choose one of six modules. Four modules were lab activities on:
- (1/2/3) educational software in arts and humanities/math and science/foreign language;
- (4) learning environments and constructionism;

The other 2 were online modules on:
- (5) virtual communities;
- (6) learning theories.

Year 3

Lectures and lab sessions: see Year 1

The online course was divided into four modules:
- familiarization with the learning environment and participant socialisation;
- educational software analysis;
- educational project;
- meta-reflection on the learning process.
Year 4

**Introductory lectures**

**choice between**

**Online course**

1\(^{st}\) phase

2\(^{nd}\) phase

**Lectures and labs**

**Lectures and lab sessions**: see Year 1

The online course was divided into streams of activity:
- familiarization with the learning environment and participant socialisation;
- theoretical framework of educational technology;
- educational software analysis;
- practice with online educational activities, with particular focus on webquests;
- in-depth study of one topic chosen from “teachers’ communities of practice”, “analysis of the educational potential of CSCL environments” and “case study on an European project concerning the definition of a syllabus for teacher training in ICT”;,
- meta-reflection on the learning process.

Year 5

**Lectures and online activities**

Blended activities consisted of:
- tutorial on the use of the online platform;
- introduction to the field of educational technology;
- methods and strategies for implementing educational technology;
- online resources and practice with online educational activities;
- case studies on Computer Supported Collaborative Learning;
- meta-reflection on the learning process.