INTEGRATING EDUCATIONAL AND ICT INNOVATIONS: THE CASE OF DAOSAN MASTER COURSE

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ABSTRACT
The present paper aims to explore the effectiveness of a new computer-supported collaborative problem solving educational approach in higher education at master course level. First, the technological and pedagogical characteristics of a new digital cooperative environment and the constructivist, learner-centered philosophy of the Daosan Master (Management of Health-care Services) at the University of Salerno are outlined. Then, the integration between the educational approach and the technological support is reported and discussed in an exploratory case-study of computer-supported cooperative problem solving. It shows that several post-graduate students have been able to carry out a dense collaborative problem solving activity within a relatively short lesson time, working and reflecting upon a real problem of health-care management. The experience seems to be effective in fostering reflexivity, collaboration and situated learning in management training.

KEY WORDS computer-supported cooperative environment | problem-based-learning | healthcare | management training.

1. Theoretical premises
The idea of problem solving in education has been long influenced by the traditional representation of schooling, considering the classroom as a social context in which students have little ownership of decisions
(Bruner, 1996). Teaching and learning were considered asymmetrical roles, where students had to make basically individual decisions, such as in problem solving tasks, attempting to choose the correct solution previously established by the teacher. Since Vygotsky, we know that in education, as in any other social or work context, the ability to solve problems is situated and depends upon the interactions, the affordances and the shared knowledge created in classroom (Cole, 1996). This leads to the idea that teaching must improve students ability to make decisions and solve problems, both individually and collaboratively, in order to enable them to better face the real world’s situations. Within this general framework, an educational approach has been developed by LEAD project - *Technology-enhanced learning and problem-solving discussions: Networked learning environments in the classroom*, www.coffee-soft.org – funded by the EU VI FP. The basic idea is to use the computer supported collaborative problem solving to foster student’s ability to produce new knowledge and creative solutions, instead of re-producing and simply applying what was taught by the teacher. This approach is the outcome of a joint research activity in four EU countries, carried out by psychologists, pedagogists and computer scientists in school, university, R&D and software evaluation.

Although it is broadly accepted that computers can support collaborative problem solving; it is indeed a matter of fact that putting into practice the theoretical concept above stated in a real classroom’s problem solving activity is not an easy task to accomplish. The first requirement is to make visible the structure and context of the problem students are required to solve, that is to “embody” the process of collaborative problem solving interaction is crucial. The interaction between different perspectives leads to more in-depth thinking, to manage information but also to participate in the process of sharing information through discussion and argumentation (Ligorio et al., 2009). These requirements also affect the management of time constraints, materials, participation and group-working in classroom. Collaboration requires communication between participants (students and teacher) during their attempts to solve problems, in order to reach shared understanding about what the questions means, about how to answer it and checking answers, and about how to coordinate how they will work together: who will do what and when? Such a coordinated collaboration is actually what a collaborative environment could enhance.

From this perspective, the educational focus is on the development of collaborative, reflective and creative skills rather than on learning the ability to solve specific problems, the latter becoming a conceptual tool to experience those skills. Thus, in this study the concept of collaborative problem
solving is used in a broader sense, including a wide range of those collaborative activities in which students must analyze, apply, share, make decisions, argue and discuss, summarize, etc. to achieve a common solution to a real-life problem. This vision has been instantiated in a new collaborative environment, named CoFFEE.

2. A digital face-to-face cooperative environment

CoFFEE (Cooperative Face2Face Educational Environment) (De Chiara et al., 2007; Manno et al., 2007) is an open-source suite designed to enhance multi-modal, face-to-face and computer supported, collaborative problem solving. CoFFEE has been already used in several studies, testing a wide range of collaborative problem solving pedagogical activities (Ligorio et al., 2009) (Enriquez et al., 2008). A brief overview of CoFFEE tools and features will be now provided in order to describe the digital educational environment in which the case study has been situated.

CoFFEE is a software suite - based on Eclipse Rich Client Platform - made of five main applications (Figure.1). The CoFFEE Controller is the teacher application that coordinates class’ activities, while each student runs a CoFFEE Discusser client application. The classroom activity is described in a XML session file (that is a sequence of steps including a set of tools),
managed run-time by the CoFFEE Controller. A session can be designed using two different applications: the Lesson Planner (a quick and easy design tool that offers a set of sessions templates, including steps and tools configurations, that the teacher can adapt to specific topics); and the Session Editor enabling teachers to design a new session from scratch or to modify in detail an existing session. The Class Editor is the application to edit the class roster, that is the students’ list, setting also usernames and passwords when needed.

CoFFEE provides students with a wide range of collaborative tools to support effective problem solving in classroom (Figure 2). The core tools are: the threaded chat; that enables students to post contributions, organize them in threads, categorize and label them; a graphical tool, in which posts are placed within a two-dimensional visual space of debate, using boxes, labels and connectors. CoFFEE also provides other collaborative tools, such as a co-writer, a voting tool (named positionometer), a streaming and videoconferencing tool, a shared repository, etc.

CoFFEE has been designed to improve the effectiveness and provide scaffolding for face-to-face collaborative problem solving activities in educational contexts along four main dimensions (Ligorio et al., 2009; Enriquez et al., 2008):

• flexibility: the software can be used for a wide range of educational activities (problem solving, planning, hands-on activities, brainstorming, etc.), tailored on students of different ages (from primary school to professional training), and can be used on different subjects (e.g. humanities, science, nurse training, etc.);
• parallel interaction: CoFFEE can be used to support parallel discussions, so to enhance participation and knowledge construction. Comparing
face-to-face discussions with CoFFEE-enhanced discussions shows that the latter produce a higher number of contributions, in which students can better share their opinions. This is due to the multi-modal nature of CoFFEE-enhanced interaction, exploiting both face-to-face and digital communication channels. Students can indeed come through the limited turns of speech of face-to-face interactions. They can also participate in a more democratic, giving voice also to shy and less dominant students, improving both quantitatively and qualitatively the discussion;

- **productivity**: CoFFEE enhances classroom productivity by keeping permanent trace of the interactions. Everybody can take notes and everything that happens during the computer mediated discussion is recorded, together with the digital artifacts produced. This helps students and teachers to come back to the knowledge and reflect upon it;

- **anonymity**: the last added value of CoFFEE-enhanced collaboration is the possibility of anonymity while the face-to-face speaker is always identifiable, CoFFEE can be configured in anonymous state, in order to reduce students’ status inequalities and shyness. Anonymity can be also very useful when discussing sensitive topics, such as those related to health-care.

The integration of face-to-face and CoFFEE supported interaction allows teacher and students to experience a richer and more productive communication. Collaboration in classroom leads to better learning by itself (see Cole, 1996), and CoFFEE enhances face-to-face collaboration with respect to the dimensions above described. The efficacy of using CoFFEE to enhance collaborative learning has been assessed mainly in school context (see Ligorio et al., 2009 for further readings). Less data exist with respect to higher education and professional training. The case study presented in the following paragraphs will thus explore how flexibility, parallel interaction, productivity and anonymity can foster more effective learning in a master course.

### 3. A learner-centred master course

One of the challenges in higher education is to provide in-depth theoretical knowledge combined with the ability to apply such knowledge to the real contexts, enabling students to go from theory to practice. We will attempt to demonstrate that the endeavor can be carried out by combining the collaborative problem solving approach and the CoFFEE environment into a specific context, such as the DAOSan Master Course (www.daosan.it). The University Master for Leadership in Health-care Services (DAOSan) is
a post-graduate course at the University of Salerno, organized by the Dept. of Business Studies Research, in partnership with the Dept. of Preventive Medical Science of the “Federico II”, University of Naples, the Dept. of Analysis of Economic and Social Systems, University of Sannio (DASES) and the Campania’s Regional Health Agency (ArSan).

The DAOSan approach is related to a more general ongoing reflection within health-care organizational studies, questioning the technocratic and bureaucratic managerial approach dominating the last two decades of 20th century (Glouberman, 2005). This reflection points out the rays and shadows of the managerial reforms taking place since the 80’s that tried to innovate and renew the Western health-care systems, in a sort of positivist philosophy both on the medical and the managerial sides. The failure of this endeavor made evident the need for a conceptual change rather than an organizational one. Therefore, Daosan promotes a new health governance which goes beyond positivist managerialism to enhance a patient-centered approach, re-establishes the centrality of the individual, joining means and ends, blending logics of action that differ from those that are strictly of an economic-financial kind, and recovering a reflective role for managers, to enable them to evaluate the consequences of technical-economic-normative productivity and to control the risks of a complexity that surpasses by far the tools available to manage it (Adinolfi, 2005).

In line with the approach which tend to re-establish the centrality of the individual, the DAOSan Master Course proposes a new learner-centred educational approach, in which educational objectives are not given as such and the goal is not just to acquire knowledge and skills. These are considered means for managing Change.

It is nowadays widely understood that well-chosen case studies support students in acquiring competence at a higher level than just learning context-independent information and rules. In higher education and in professional schools the case-based teaching approach is becoming central (Flyvbjerg, 2006, 222). The DAOSan educational philosophy too is oriented towards the achieving of a context-based professional competence and a more general set of life skills – such as reflection, collaboration, creativity, communication, adaptation, etc. - through a case-based learning (Adinolfi, 2006).

The first requirement for this kind of new educational approach is to have learner-centered training programs, such as Mintzberg’s IHML, that support students in developing mind tools (Jonassen, 1999) as well as reflective and planning skills. The second requirement is to go from theory to practice, applying theoretical knowledge to real-life problems and field experience. The third requirement is to set up place for collaboration and
collective reflection. Finally, this approach requires a continuous monitoring and evaluation of students’ achievements and improvements. One of the training methods, that seems to fulfill all these requirements, is Problem-based learning (PBL) (Woods, 1994). PBL is one of the most effective constructivist instructional approaches, that enables students to work on authentic tasks, to keep the ownership of the solution process, and to experience the complexity of the environment they should be able to work in at the end of learning (Duffy et al., 1993). It is also aimed at challenging learners’ thinking and pre-conceptions, in order to create and test new ideas (Duffy & Jonassen, 1992).

The PBL approach, developed since the 70’s in medical education, has been instantiated in DAOSan teaching methodology, including, for instance different training activities such as: case-study discussions, group-work, classroom exercises, role-playing, simulations - in addition to traditional lectures and seminars with experts from the health-care sector. The common constructivist ground is what made the encounter between DAOSan and CoFFEE possible. The DAOSan’s teaching method, for instance, requires students to carry out independent reflection’s group sessions about the lessons topics. The PBL, adopted as main approach in DAOSan, has been easily integrated with the collaborative problem solving approach of CoFFEE. In the next paragraph a case study of such an integration will be described and discussed.

4. Integrating technological tools and educational approach: the Daosan case

The discussion of the conceptual framework leads us to define some basic propositions about the positive role of collaborative problem solving approach in order to improve students’ “life skills”, their ability to reflect, to create new knowledge and to link theory and practice. Such life skills become even more relevant in higher education and professional training. The effectiveness of this general approach can be improved by the use of CoFFEE-enhanced collaborative problem solving, which provides more flexibility, parallel interaction, productivity and participation when applied to support master students in argumentative discussion aimed at generating ideas, arguing and reflecting upon them.

4.1. Research question and methodology

In order to provide understanding and empirical support to the above stated propositions and to instantiate them in a real educational context,
the case-study analysis will try to answer the following research question:
how is a collaborative face-to-face and digital educational environment
useful to enhance master’s students ability to reflect, participate, collaborate,
debate and to apply knowledge?
The choice of the case-study methodology is of course driven by the nature
of the object to be studied and by the research question. The descriptive
case study approach is here used in order to describe the educational in-
tervention and its related phenomena within the real-life context in which
it occurred (Yin, 2003).
The data source for the case study are:
• the students’ evaluations of teaching and tutoring: during the course
students are required to answer some teaching’s evaluation forms, pro-
viding information about customer satisfaction, teacher’s performance
and proposals for improvements. The students notes have been analyzed
in order to define their evaluation, needs and requests with respect to
collaborative activities;
• the transcripts of CoFFEE-enhanced collaborative problem solving ses-
sions: CoFFEE keeps trace of a session including the participants, the
groups’ composition, all the messages and the products created. The
transcripts of three different sessions carried out during master’s courses
have been taken into account and analyzed;
• researcher’s field notes: one researcher observed all the CoFFEE sessions
taking field notes about the classroom’s atmosphere, the students’ par-
ticipation and the teaching and tutoring styles. These notes have been
used to scaffold the case-study analysis.
First, students’ evaluations of the courses before the introduction of CoF-
FEE are discussed in order to grasp the needs and expectations with respect
to classroom’s activities. Then, three CoFFEE-supported activities are pre-
sented and sessions transcripts are analyzed with respect to the flexibility,
parallel interaction, productivity and participation dimensions. The analysis
is supported by transcripts of the interaction via CoFFEE. Finally, students’
evaluations after the CoFFEE-supported activities are analyzed and dis-
cussed.

4.2. The context

The DAOSan master course enrolls three types of students:
• graduate students from different domains (healthcare, law, economy, en-
gineering, etc.);
• healthcare professionals (i.e. surgeons);
• administration professionals (healthcare managers, administrative staff). Students can choose between full-time and part-time status. Full-time students must follow all courses and have to graduate in a shorter time, while part-time students, namely professionals, can spread the courses over a longer time span. Each class is made approximately of 40 students, including a 30% of part-time students.

The lectures include healthcare systems, human resource management, marketing, communication and quality management, as well as law, computer systems and case management. Students must also carry out project works and stages in healthcare organizations. During the courses, students' achievement are constantly monitored and, in return, students are asked to evaluate anonymously teachers' performances at the end of each lecture. In particular, students are asked to evaluate on a 5 grade scale aspects such as teacher's clarity, completeness, and attention to students' needs. These dimensions generally receive high scoring (4 and 5), proving students' satisfaction with respect to master teaching approach.

Students can also provide free comments with respect to the courses. Such comments are the source for a more in-depth evaluation of the general DAOSan teaching approach. Students' notes highlight both the commitment in debate and the need for a real-case application of knowledge. Students, especially part-time, also point out that during classroom debates there are some colleagues which tend to monopolize the discussion leaving little room for others to contribute.

In order to overcome such problems, it has been decided to experiment the use of CoFFEE in order to improve the quality and participation of collaborative activities in classroom.

4.3. Pedagogical scenarios

CoFFEE-supported activities are based on a pedagogical scenario, that is a narrative description of what should happen in classroom – a sequence of steps - and of the configuration of CoFFEE tools. For the sake of this study, and in order to make more clear how this kind of activity is carried out, the description of the three pedagogical scenarios used in the master course is now provided.

4.3.1. The choice of a general manager

The general learning objective of the activity is to involve students in an argumentative discussion about the criteria to be applied in the choice of the general manager of an health-care institution. In particular, the teacher
wants to evaluate student’s pre-conceptions about the lesson topic and
to foster a reflection about the main dimensions involved in the choice of
a manager in healthcare, the outcome of the discussion being later used
as a starting point for the front lesson.
The scenario of the activity, co-designed by the teacher and the researcher,
is a 50 minutes discussion, organized in 3 steps:

1) Brainstorming: the class is asked to provide a set of criteria that should
lead to the choice of a general manager, to categorize them and to
argue against or in favor of each specific criterion. Students discuss
both face-to-face and by the CoFFEE’s threaded chat tool. At the end
of the step students vote, using the positionometer tool, the most rel-
levant criteria that should be kept into the next step. Duration: 20 min-
utes.

2) Knowledge consolidation and organization: students, divided in five
small groups, are asked to draw collaboratively a conceptual map -
using the graphical chat tool - of the most relevant criteria, individu-
alizing pros and cons of each one, and to graphically connect them by
arrows (Figure 3). Duration: 20 minutes.

3) Restitution: in the final step students are asked, anonymously, to reflect
upon the discussion and to synthesize individually the “lesson learnt”,

Fig. 3 - Screen-
shot of graphical
tool’s discussion
using the *threaded chat* again. They are also asked to evaluate the teacher’s performance at the end of the lesson using the *positionometer*. Duration: 10 minutes.

This scenario is a good example of the type of activity to be carried out with CoFFEE. The basic structure of this activity consists of three main phases: brainstorming, knowledge consolidation and organization, restitution (Ligorio et al., 2009). This scenario has been used during a law course as starting point for the lecture about the procedures and criteria to select and hire the general managers.

4.3.2. Marketing for healthcare organizations

The pedagogical objective of the scenario is to make students better understand the principles and competences of marketing for an healthcare organization (marketing course) and how to apply these principles to a real case. Students are first asked to define concepts, roles and professional competences of healthcare marketing. Then, they work in small group to write a project of introduction, implementation and assessment of marketing activities in a real organization.

The activity lasts about 50 minutes and is organized in three steps:

1. Organization of knowledge: students work in 4 groups using the *threaded chat tool* to discuss and report the basic principles of healthcare marketing they learned during the previous front lessons. Each group must provide a summary of these principles using the *co-writer tool*. The objective is to make them appropriating the fundamental concepts and characteristics of marketing by the collaborative re-formulation and summary of the knowledge acquired. Duration: about 15 minutes.

2. Building a conceptual model of marketing management: students work in 4 groups using the *threaded chat tool* and the *graphical chat tool* to build a conceptual scheme representing the relationships between the concepts of the marketing management cycle in healthcare. The teacher uses the *Positionometer tool* to ask a stimulus question in order to guide the discussion:

   Teacher question: “Actually, it is not possible to apply the marketing management cycle to an healthcare organization. You can just follow a general improvement of the communication in healthcare. How much do you agree or disagree with this statement?”

   The students are then asked to motivate their position and build the conceptual model of the management cycle (fig. 4).
The objective is to scaffold students in acquiring an integrated overview of the concept and the professional competences of healthcare marketing. Duration: about 20 minutes.

3. Apply concepts in a real context: students work in plenary discussion in order to provide an individual proposal of application of the marketing cycle to a specific healthcare organization. Students work with the threaded chat tool providing their proposals of application and discussing together pros and cons of their proposals. Duration: about 15 minutes.

4.3.3. ICTs in healthcare

The third scenario here presented has been designed to discuss and evaluate the project works carried out by the students during the computer science course. One of the characteristics of the DAOSan teaching approach is that students often have to carry out projects in order to apply theoretical knowledge to real situations and to develop their planning skills. At
the end of the computer science course focused on the computer supported collaborative work, the four groups of students were asked to write collaboratively a project about how to introduce ICT in their healthcare organizations. Each group choose a real healthcare organization and a service (treatment, emergency service, administration), elaborating a project to introduce and assess ICT technology in order to improve the service. During the final classroom session each group had to present its own project and discuss it with the rest of the class. The scenario is organized in three steps in about 80 minutes:

1. Choosing the spokesman: each group must choose a spokesman that will present the project work to the rest of the class and agree on the way to present the final product. In this case, the discussion is supported by the threaded chat tool and the decision is made face to face, benefiting form the two communication modalities. Duration: 5 minutes

2. Presentation: each group by turns presents face to face its own project to the class, while the students are taking individual notes by the CoF-FEE's note tool. Duration: 40 minutes.

3. Discussion: the teacher sets up four discussion rooms, one room for each project, using the threaded chat tool. Students are asked to discuss pros and cons of each project work, providing suggestions for further improvements. In particular, students can ask question to the projects authors, provide comments and make suggestions. Duration: about 35 minutes.

The objective of this scenario is to make students reflect upon their project works by a peer reviewing process that can also provide useful hints for improvement.

The following example is an excerpt of the discussion about one of the four projects presented by the students. Namely, one of the small groups elaborated an idea about a geo-reference system to map and visualize the healthcare services in a given area (i.e. surgeons, hospitals, pharmacies, etc.) to support citizens and stakeholders in choosing the healthcare assistance and planning the distribution of services into the different areas. The idea is quite simple: to show on a virtual map the different healthcare services so that citizens can choose with respect to their needs (proximity, availability, quality, etc.) and accessing the information and the reservation's system just by clicking on it. The idea is also feasible because it is based on Googlehearth technology. The service is also useful for the stakeholders and the healthcare management because it can be used to visualize the geographic distribution of services and the amount of people using
them. It can be then used to reallocate resources and even decide where to start new services. After the presentation, the class discussed the “geo-reference system” project using the threaded chat tool.

5. Discussion

The focus of the paper is how to apply some constructivist educational principles - namely collaborative knowledge construction, its application to real problems and reflexivity – to health-care management training by using a collaborative digital environment. The question how is it possible to enhance master’s students ability to reflect, participate, collaborate debate and to apply knowledge by using a collaborative face-to-face and digital educational environment will be now discussed using the scenario above referred to, in order to describe the compliance with those principles. For the sake of brevity in this exposition, we will present some excerpts of the CoFFEE sessions described above as specimens of the similar processes occurred during the three sessions considered in the present exploratory study.

The first example is drawn from the scenario #1. The collaborative problem solving activity’s task was: “We have to choose a general manager for an health-care institution. What are the suitable selection criteria?”. The CoFFEE-enhanced session was flexible enough to carry out a brainstorming, the building of a conceptual map, an argumentative discussion and a classroom restitution, allowing the teacher to set up a rich problem-based activity. The session was also productive with respect to both students’ parallel interaction (e.g. during the 20 minutes brainstorming, 166 contributions were posted) and outcomes (students were able to find by themselves the most relevant dimensions of selection criteria: candidate’s training and background, recruitment’s procedure and formal criteria, who is going to decide the hiring). In excerpt 1 is presented an example of a discussion thread.

Excerpt 1:

[P] Student 1: the training background must be both management and medical because the organizing choices concern the medical domain.
[A] Student 2: I agree, but management has priority
[P] Student 3: he must come from the management of a large company
[A] Student 3: I mean a private company

The three students are trying to individualize the most suitable training background of a candidate to an healthcare management position. The
first point to highlight is that all the students are using the contribution labels provided by CoFFEE threaded chat (see paragraph II.I) in the right way. They are able to build a correct argumentative debate by organizing and supporting their proposals with arguments. Secondly, in just four turns they come to an agreement about the need for a managerial background. This is an example of how the visual representation of the argumentative debate – using threads and labels – can lead to a more productive and parallel interaction in classroom.

The second example (Excerpt 2) is taken from another step of the session #1. Students are asked to re-organize and synthesize the discussion, building a conceptual map of the candidate’s profile, using the graphical tool (see paragraph II.I).

The first remark is that the graphical representation of the debate is impressively clear and well-organized (Figure 5).

The group of students has been able to organize concepts and relationships between them in a relatively short time, building a graph of the criteria (yellow boxes), the arguments (light blue boxes), and the pros and cons (respectively, green and red arrows).

Excerpt 2:

[Criterion] Teacher: there are 3 possible educational backgrounds: medical, economic, legal

[Argument] Student 1: do not forget the social aspect of management

[Argument] Student 2: finally we could have national open competitions

[Argument] Student 3: it seems right to me, because it gives the opportunity to everybody to apply, and may the best win

[Argument] Student 4: do not forget the social aspect of management background which will give a soul to the human conduct.
Excerpt 2 is an example of how students are able to apply some of the basic principles of DAOSan philosophy – meritocracy and human-centered approach in healthcare – during the classroom debates. They are not directly prompted by the teacher, which instead synthesize the “educational background” issue, nevertheless they can link the practical issue of education with the more abstract concept of human-centered healthcare. The scenario #2 provides a significant examples of parallel interaction and productivity: during about 50 minutes 210 messages were posted, where students made a considerable effort to apply concepts and tools of marketing management to their health care organizations. The recording of the session has been used by the teacher to evaluate (through the analysis of individual proposals) to what extent participants had learnt to manage the theoretical knowledge and to foresee its practical impact. It has been saved on the master’s e-learning platform, as a classroom “collective memory”, so that students can look it up as didactic material in the prosecution of the course. It has also been considered by the teacher a useful starting point to plan the lesson for the next class.

The third specimen is taken from the activity presented in the scenario #3. The discussion was parallel and productive: during about 35 minutes 59 messages were posted in this single room, more than 150 messages were posted in total during the discussion of the four projects. The second relevant aspect is that students were able to self-evaluate their project works and provide each other with comments and suggestions about how to improve the projects. Last but not least, the discussion has been traced and stored so that students were able to come back on this collective repertoire of ideas, using the suggestions to reflect and improve the projects.

In excerpt 3 is presented a short discussion thread in which students are discussing a particular aspect of the project. The idea is to include in a single geo-system the information, the surgeon assistance and the pharmacies. In this way, the citizen could book a medical service directly into the nearest pharmacy.

**Excerpt 3:**

[D] 1 – Student 1: if the purpose is to enhance the role of the physician, why involving into the reservation system also the pharmacies etc.?

[C] 1.1 – Student 2: Pharmacies are a second phase of development. The opportunity to book healthcare services also from the “pharmacy points” is just a possibility, but it must follow the physician’s decision

[C] 1.2 – Student 3: the physician prescribes the medical examination or
the medicines, anyway he is always informed about the patient’s data

[C] 1.3 – Student 4: the system takes into account the availability of the medical services required; the physician can evaluate case by case the service and assign a priority ranking.

Students discuss simultaneously three different topics: which is the role of the physician with respect to the system; how the physician can monitor the patient and the available resources in the area; if the citizen can book medical service of his own into a “pharmacy point”. This short excerpt shows how deep can go the discussion supported by CoFFEE. Students have the possibility to reflect upon many different aspects and technicalities that a simple presentation of the projects and a face-to-face only discussion would not allow. Besides, this type of collaborative problem solving scenario let students reflect upon the practical aspects of healthcare management, by linking the project to the practices of everyday life, as for instance how people actually behave with their physician.

Going back from the detailed description of how the educational approach has been instantiated in CoFFEE sessions to a more general evaluation of the scenarios presented, a final remark is about the students’ evaluation of such a classroom activities. The evaluation forms after the CoFFEE sessions have been compared with those filled before the introduction of CoFFEE, concerning teachers’ performances at the end of each lesson. No relevant difference has been found with respect to teacher performance. Teacher’s clarity, completeness, and attention to students’ needs received high scoring (4 and 5).

Nevertheless, students free comments put instead in evidence students’ self awareness about their “life skills”. They claim to feel more adaptive and able to deal positively with real-life situations related to their work. Students also observe an improvement of participation and absence of complaining about the democratic distribution of speech turns. In other words, it now seems that everybody is participating without few students monopolizing the discussion.

6. Conclusions

Despite of the exploratory and descriptive nature of this case study, it can be maintained that an educational approach like the one adopted by DAOSan master can foster student reflexivity and involvement, enabling them to fully understand the relationship between both theoretical and case-based knowledge acquired during the course and the real problem
that they will face in healthcare organizations. The case study provides empirical evidences in favour of the introduction of CoFFEE in problem-based learning activities in higher education.

It does not prove that ICT per se is not sufficient to enhance collaborative problem solving in educational contexts. ICT has in fact been embedded in a suitable learning approach which can deal with the complexity and flexibility of each collaborative type of learning. The examples provided have shown a wide range of different activities and topics carried out by a quite large classroom of master’s students. In spite of the high number of participants, the pedagogical scenarios have been able to lead the classroom interaction towards the pedagogical goals in a reasonable amount of time. Besides, the quality of the interaction was high, as showed by the students evaluations and by the quantity and depth of the contribution posted via CoFFEE. The type of collaborative activity, called CoFFEE-enhanced pedagogical scenario, seems to be a good deal between the need for managing and pre-designing a lesson – for a large number of students about complex topics – and the flexibility required in a problem-based approach – in which students must be able to discuss and self-organize the group work. Finally, the features and tools provided by CoFFEE – traceability, threaded and graphical chat, notes, etc. – seem to allow a rich parallel interaction. The traces can be used as “collective memory” of the class and as didactic material for reflection and further activities.

To sum up briefly, by the use of CoFFEE and the related pedagogical approach, it has been possible to carry out a dense collaborative problem solving activity with a quite large number of post-graduate students in a relatively short lesson time. The result of this activity has been that of enabling students to work and reflect upon a real problem of health-care management. Students seemed to improve some of those “life skills” that will be part of their professional identity, such as – collaboration, reflection, communication, creativity, etc. They also seemed more aware of the relevant aspects of the human-centered approach in healthcare.

The first positive evaluation of the experience has led to the formal integration of CoFFEE-enhanced problem solving approach into the DAOSan curriculum. Obviously, these preliminary results require rigorous evaluative analyses, which will be carried out during the following academic year.
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