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Distance education for health professions' students

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Abstract

This paper concerns the use of Moodle 2 as a suitable tool to improve the online learning project for the Health Profession courses offered by the University of Genoa. The student syllabus requires attendance to formal lectures and practical training sessions. Some of the Health Profession courses of our University (e.g., nursing, physiotherapy, and radiology technologist) are taught at different venues across the Liguria Region to facilitate students' access to high education and enhance quality of life-long teaching programs at local health centers. Over the years, managing this complex teaching network has called for the development of new educational tools supported by AulaWeb, the Moodle environment of our University. At the beginning, teachers used AulaWeb merely for information storage. In this experimental project, we investigated how to make some courses more attractive by proposing them in a blended form. Eventually we managed to catch the students' attention also for courses offered totally online. This approach meets two relevant requirements, (a) to ensure consistency, compliance, and quality of teaching at all local centers, (b) to reduce travel expenses for teachers lecturing at different venues. Thanks to the new features of Moodle 2, such as tools to monitor conditioned assets and track the activities performed and/or completed by students, we could arrange online courses that also ensure access of students to attentive and prompt tutorial mentoring.

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1. Introduction

The world of the health care professions is complex, for it includes twenty-two non-medical qualifications, each requiring a specific three-year degree to provide adequate skills, in accordance with the guidelines of the National Health System of Italy. The university degrees enjoy the common feature of being directly qualifying for the profession. Since 2001, these degrees have been grouped into four distinct classes (Nursing and Midwives Health Professions, Health Professions of rehabilitation, Technical Health Professions, Health Professions for the prevention).

The School of Medicine of the University of Genoa offers training programs in twenty health professions; some of the programs are available at different venues across the Liguria Region. This complex organization, which provides lecture hall education at eight training centers, has fostered the development of distance courses, thanks to the availability of AulaWeb, the Moodle-based platform of the University of Genoa. Our Faculty, which in the beginning was slow in taking advantage of AulaWeb, has progressed in recent years from using the platform as a mere repository of information, to the experimentation of blended courses, and finally to online learning. These developments have allowed combining the primary urge to ensure common, consistent programs at different premises with the need to control costs, which has been achieved by the reduction in teachers' mobility to the peripheral venues to carry out in person the educational activities. On one hand, all the students of a given course receive the same educational lectures and teaching material for the course; on the other hand, the teachers can devote their time and care to the preparation of lectures and teaching material instead of traveling around the region. Local tutors offer support to students in order to pave the way for course attendance. There is recent evidence that distance learning can contribute to healthcare professionals' base and practice knowledge (Glen, 2006; Moule *et al.*, 2010). Distance learning can take a variety of forms including in nurse and allied health professional education: simulations of clinical scenarios (Tait *et al.*, 2008); internet based discussion boards; and role play (Nelson & Blenkin, 2007). It can also overcome barriers to the learning such as distance or geographical location and provide online communities of practice in circumstances where different factors make it difficult. It can also offer students to communicate ideas and to learn in different ways and can help introverts to take part. Finally, the intrinsic properties to the technologies used in distance learning allow students to experiment with the identity of "professional nurse or technician" in a safe environment where they can make mistakes without damaging patients. In this context, a significant role was played by our ICT offerings.

Online education tools have traditionally been organized and supported through learning management systems (LMSs) or content management systems (CMSs), such as mainly Blackboard and Moodle, because these systems offer opportunities for organization, efficiency, and security (DeSchryver *et al.*, 2009; Lee & McLoughlin, 2010). We chose Moodle as educational portal of all the Schools of our University about ten years ago over several Learning Management System (LMS) with similar features. Since then, Moodle has been seen more as an interactive service than a research project. For this reason our staff focused on its improvements instead of keeping on comparing with other LMS. As a service to the entire campus, the stability is crucial, at least until it is well fitting the teaching requirements. Blackboard, Moodle, and more recently Sakai, are, among many others, LMS plenty of features allowing to achieve the same kind of goals.

Years ago, when our staff has been charged to choose an LMS for the whole campus, Moodle has been chosen for two main reasons:

- avoiding a proprietary product that would bind our university to the editorial choices of the manufacturer, that does not happen inside the wide and open Moodle community;
- having a good budget for training teachers in the use of it that was, and still is, a strength point of our staff. Moodle is free of license and the university has all the technical expertise to handle it, so the choice was made.

We don't agree with researchers that have argued that these platforms have generally been used as static repositories of content (Brady *et al.*, 2010; Lee & McLoughlin, 2010; Schroeder *et al.*, 2010; Whitworth & Benson, 2010). This was true at the beginning, but things are gradually changing also with the help of training for teachers themselves. At that time, Moodle (version 9.4) was far less advanced than it is now, but it was selected because of its large distribution, growing popularity in the academic world, and its easy availability as an open-source platform. We believed that these factors could ensure continuity to the project and provide an opportunity to achieve goals consistent with our educational requirements, which in fact occurred. Both quantitative and qualitative growth in the use of Moodle, especially in the medical field, has been slow but steady. The turning point from the previous ICT tools, which were merely of side support to classroom lectures, was the availability of the new features of Moodle 2, a breakthrough in distance education through its effective and timely mentoring functions.

2. Participative design as a planning strategy

2.1 The design

As mentioned in the previous section, the need to implement online learning was determined by several considerations including the following:

- the limited number of human resources in the scientific areas not covered by National Health Service personnel (such as basic science);
- the request of some teachers to identify teaching modalities that could allow simultaneous coverage of several sites with a single lecture to constrain costs but to ensure the same quality of education as that delivered in the past;
- the need to reduce educational costs, which largely depend on the number of peripheral venues for teaching activities.

In accordance with the Faculty of each course and the individual teachers responsible for any given subject, the coordinating committee of the Health Professions first identified three courses to be delivered experimentally in online mode, two non-medical (Sociology and Anthropology) and one in the health science area (Epidemiology). An “ad hoc” working group made up of teachers in the field, technical experts in e-learning and in the health education design, was convened to realize the project. The project was implemented through the non-traditional strategy of participative design (Hagen et al., 2012; Nicholas, 2012; Hagen, 2010; Palloff & Pratt, 2007). It followed a constructivist approach whereby the product does not originate by the view that the expert has on how it should be; in contrast, knowledge is shared and the project is built through the interchange of all players.

The end-user involvement in the design is therefore targeted to the following:

- improve the design, and increase knowledge in the process of project analysis;
- ensure realistic expectations of end users, thereby reducing resistance to change;
- help to increase democracy in education, providing students the right to take part in decisions that have an impact on their learning.

Experts in the subjects, employed locally by the public health scheme, were involved to define the scope of the training because of their long teaching experience and professional practice. Some students of advanced training courses (Master of Science in Health Professions) took part in the definition and implementation of the interactive procedures. Students enrolled in the courses were involved in the development of communication systems reputed more convenient for users themselves, in order to get more effectiveness and make users more aware of the interactive processes. A preliminary but complete development of the technological tools to use was needed to start the experimentation with a view to achieve a positive social environment (Schroeder et al., 2010).

2.2 Aim

The present study is focused on gaining a better understanding of health professions students’ perception of the e-learning environment proposed by the School of Medicine.

Based on the objectives outlined above, four questions were formulated. These were:

- 1) Are nursing and allied professions’ students able to apply the skills and knowledge from this program to their work setting?
- 2) Are the instructional design activities in the courses effective?
- 3) Are students satisfied with the online courses?
- 4) Are adequate the student’s support services provided?

3. The planning

3.1 The organization of content and the delivery modes

Three on-line courses in the fields of Sociology (1 European Credit Transfer and Accumulation System-ECTS points), Anthropology (1 ECTS points) and Epidemiology (ECTS points) scheduled for first-year students of Nursing enrolled in the academic year 2011-12 were offered in the second semester. The program of Sociology and Anthropology was developed in conjunction between the teachers so that the same issues of health interest could be treated consensually from the anthropological and sociological perspectives. The aim was to allow students to follow lectures in an integrated way. The course design for distance learning was supported by the AulaWeb portal, based on Moodle 2 platform.

AulaWeb is easy to use, dynamic, flexible, modular and fully manageable also by the individual teacher. It is the official platform of the University of Genoa and so that it is technically supported by the university computer center staff, both in the construction of educational materials and in the management of virtual classrooms. Round-the-clock access to the course was available, a flexible feature that avoided excess mobility and allowed the students to choose their own timing of study to best suite their personal needs. Teaching was developed mainly on the network, but, in this first experiment, three meetings were also planned in person at each center. The first meeting concerned the online approach,

materials and course organization; the other two meetings concerned specific needs also in teaching methods.

Particular attention was paid to course design and to the balance of hours of training between classroom and distance learning. Our aim was to enhance the scope of both educational approaches, the personal relation of the classroom and the flexibility of distance learning. The first meeting in the classroom was held to break the ice and to create some human interaction with a view to make the remote interaction more profitably. The classroom activities therefore were provided as a preparation for those online. Other in person meetings ensured quality control of online training activities, traced what had been done, and opened the way for reorganization or integration measures, if needed. The structure of distance learning consisted of modules composed of educational material (video lectures, slides, material details), of tutorials/self-assessment tests, and insights. In distance learning, it is crucial to subdivide the content in small conceptual units that are easily manageable by the learners. For this reason, the three courses were structured in lectures, scheduled for a given study timing. The time that the student required to complete his or her tasks and to study the individual educational materials was computed. Average time estimates are a weak variable. Some participants will spend less time than expected, for instance because they are already familiar with the topic or because they are particularly at ease with the content; on the contrary, other students will require extra time. In this experimental phase, no definite indication has been given of the average time needed for each module, but this feature will be implemented next year because we believe students should be enabled to better manage the time they spend to accomplish their tasks and to understand the level of details required in dealing with the materials. No specific time scale for the different modules was set, but a regular sequence of study was mandatory in order to proceed from one module to the following one. In traditional education, personal communication between teacher and student provides the opportunity to verify the level of learning of the contents. In distance-learning personal communication was replaced by meetings with tutors and by self-assessment tools useful to monitor the levels of achievement. Production of educational materials and online course design followed the principle of self-consistency (consistency, finiteness, clarity, comprehensiveness), which is particularly important for distance learning. In this context, learners have to rely mostly on their own; despite access to new tools of communication, such as email and forums, they enjoy fewer opportunities to get help from supporting figures (teachers, tutors, secretary office). A technical tutoring service has been activated in order to help students familiarize themselves with the tools of the platform hosting the courses. During course administration, as mentioned above, a first in person session was organized at the opening of the course, in order to provide the audience with a guide to the platform and its functions, and to simulate its key features to the participants. Some tools, provided by Moodle 2, allow tracking students' performance ("catch the mood" function) at a distance. In this experimental phase, it was decided not to use them, leaving the task to report problems, and critical elements of dissatisfaction to the meetings in presence and the forum, enabled on each course. The online discussion forum, a powerful tool for communication and deepening of the content, was activated to foster collaborative learning methodology, based on the theory of learning as a social process. A tutor was identified for each distance course in order to monitor messages in the forums and provide timely answers, possibly after discussion with teachers. The learning objectives of these courses did not concern only transfer of content competencies, but also the ability to learn through group interaction and online education. As a result, careful monitoring of participation and interaction was put in place using both quantitative and qualitative methods. Quantitative analysis is a simple task for the AulaWeb portal, which automatically records the data related to access for all users and makes them available to the analysis of the evaluator. The main aspects under consideration being the following numbers of: accesses to the platform; accesses to each course; accesses to the discussion forum; postings in the discussion forum; contributions sent by e-mail. The qualitative analysis of participation, of each participant and of the whole group, was achieved through analysis of messaging in terms of interaction variables, such as nature of the communication flows (student/teacher, student/tutor, student/student); presence of statements concerning group cohesion; and links between messages. Analysis of interaction in the classroom in the three scheduled meetings was also taken into account. Activities were certified in an in-person meeting, as defined by the syllabus and by the academic regulations of the courses of the Health Professions. Any course examination requires separate exams covering each of the fields included in the integrated course, no matter if lectures were given in the traditional format or online. Therefore, no testing of online evaluation was carried out.

3.2 The new features in Moodle 2

Today, Moodle is an Open Source Course Management System widespread in educational field because it allows conducting fully online courses (with online dynamic web sites supporting teaching and communities of practice) as well as simply support to enhance face-to-face courses (blended learning). It is presently available in 70 languages and used by about 65 million registered users. Moodle was planned and developed on the basis of a philosophy that tries to combine up-to-date training methodologies with collaborative IT tools. The guiding philosophy of this environment is to support a true cognitive and collaborative link between bearer of different experiences and skills recreating for them a real "online

learning community". Presently it has come to version 2.5, but the courses we are discussing about have been created in the 2.1 and 2.2 releases. The early experiences of distance learning have been implemented on the version of Moodle 1.9 and have been preceded by an introductory course addressed to teachers of the courses of the Health Professions (Siri & Rui 2011). However the significant change took place in the Academic Year 2011/2012, in conjunction with the installation of two instances of Moodle 2.1 for institutional courses provided on online or blended training and life-long learning. Version-2 Moodle, based on a complete update of the core components, has provided teachers and students with new features that have ensured more flexibility, which is particularly useful in education and specifically in the field of the Health Professions. This has permitted the shift from the initial testing phase to the adoption of online lectures. The aspects of Moodle that had a major effect for the online teaching and learning for the Health Professions include the capabilities of monitoring and evaluation. Distance learning is part of an educational context essentially ruled by lectures of mandatory attendance carried out in the classroom. The main problem concerning the performance of online activities and their integration with other activities carried out in person is basically to determine the relevance of individual student performance. The Completion and Availability Conditioning function offered by Moodle 2 was instrumental for this purpose, which is crucial in the health profession courses. These features have enabled the creation of learning paths that can provide to each student resources and activities that follow his or her progress in the learning path. This has contributed substantially to the completion of our monitoring. The teacher defines the tasks that the student has to fulfil in order to proceed in the syllabus, and can evaluate advancement or identify inactive students. On the other hand, the student has the opportunity to check his educational path and to report intervening technical problems. Each activity has alternative completion criteria, which are activated when required, a feature that opens the way for diverging routes. In particular, in experimental settings, the teacher can define through self-evaluation tests, the qualitative and quantitative conditions that must be met to proceed in the educational program. These variables are set under the supervision of the teacher who has the opportunity to use the most appropriate criteria for the envisioned educational goal; in particular, the logging history that Moodle 2 provides, ensures close verification of each student's advancement and the actual use of each module (resource or activity). In this context, the new report, which enabled teachers and participants to view the status of completion of the single activities and of the whole course, proved to be very useful.

The information is displayed and downloaded for further processing in order to highlight the trend of the students participation, to identify critical issues and to monitor the appreciation and the effectiveness of the measures adopted.

The criteria for completing the whole course were not activated because they require a mandatory final examination. The function, "Conditional availability and completion," was very effective. It was not restricted to allowing the next step only if the preceding step was shown, without detecting "how" the previous step was completed. In contrast, the possibility to include self-assessment test was used to identify how many attempts had been made to answer and what distractors (i.e. incorrect answers in multiple choice test) for each question were mostly selected. This approach was useful to understand the areas in which students were weaker.

4. Results and conclusions

This recent online experience offered insights on the quality of the courses, on current features, and on possible improvements. In general, there was considerable satisfaction of the students who were interviewed, when they took the final exam. The students who, according to current regulations, are required to attend all the educational activities of their study program, especially those who are enrolled at peripheral venues, have appreciated the possibility to freely attend at least two courses from home or from the nearest venue. They identified in this innovative offer a more responsible way to learn, which is self-managed. Course attendance also allowed students to share and discuss the educational material together. The project has been well monitored and evaluated at all levels to increase and establish its credibility. The program dedicates one staff member to coordinate the evaluation procedures and to formulate additional evaluation methods to more completely focus all aspects of the online experience. On-going questionnaires were offered to monitor the progress of the course, in order to gain useful information to allow possible reshaping of some stages of learning. Tracing the paths carried out by the students and recording of on-line intercommunication completed the available data for monitoring the course. These data were useful to solve problems of access, communication and participation, with an eye at redesigning future versions of the project. The survey, regular staff meetings, observing course interactions, and examinations of the listserv by the staff, helped to evaluate the effectiveness of all components of the online program and also to address the four main evaluation questions of the program.

Out of our 987 first-year health profession students, the 81% followed the distance learning courses offered on AulaWeb. The remaining 19% included students who received credit for previous studies and students who decided to take the course at a later time.

The exit survey is sent to all students attending the online courses in the academic year 2011-12 (response rate of 95%). The survey results proved a very high level of student satisfaction. One hundred percent of respondents reported that they - esteem the program very or somewhat worthwhile, that they were satisfied or very satisfied with the program. Moreover, 87% of replies agreed or strongly agreed that the online courses are relevant to the field of health professions. One hundred percent of respondents agreed or strongly agreed that they learned skills that were useful to their future job. For the technology service and support component, students are asked to respond to some statements on a scale from 1-5, strongly agree to strongly disagree. The following statements are included in each course evaluation; "instructions to assist me in developing the required computer skills were sufficient", "adequate technology support was available for this course," and "in general, accessing the course website was easy." Similarly, the curriculum component is evaluated through a combination of the surveys cited above and more informal monitoring by the staff. For each course, students are invited to list what teaching strategies they found useful in terms of increasing knowledge, instructional designers are requested to report new teaching strategies they worked on with faculty members and how successful they were, and faculty are asked what innovative strategies they used in their courses. Some of the techniques that were collected include: group projects to promote collaborative learning, postings on reflections of course content on discussion boards, case study based discussion boards, capstone evaluation assignments like projects or posters, and journaling.

When asked about course strategies, 54.6% of respondents agreed or strongly agreed that group activities contributed to learning of the course material. In addition, 67.9% of respondents reported that Discussion Boards were the most successful instructional activities over readings, group work and chat rooms. All of this feedback is used to inform the program about what pedagogical techniques have been successful.

The Graphs 1, 2, and 3, for the three distance courses, summarize the data from the reports available on the platform. The number of the active students in the various stages of the course is shown together with the activities of each module. Some students complained of lack of high-speed network access for videos. MP3 files of the lectures were then downloaded and handed to the students.

Figure 1 also indicates the trend of material accesses on the different modules and the on-going feedback; the modules that the students considered more difficult and were then the target of reshuffle in the following year.

Students with technical difficulties for access preferred to join other students and to attend in groups with their teacher's authorization of the teacher, even if self-assessment had to be done independently.

Figure 2 shows the students' activities for the Anthropology course; its second module, in particular, has a smaller number of accesses to the video lectures.

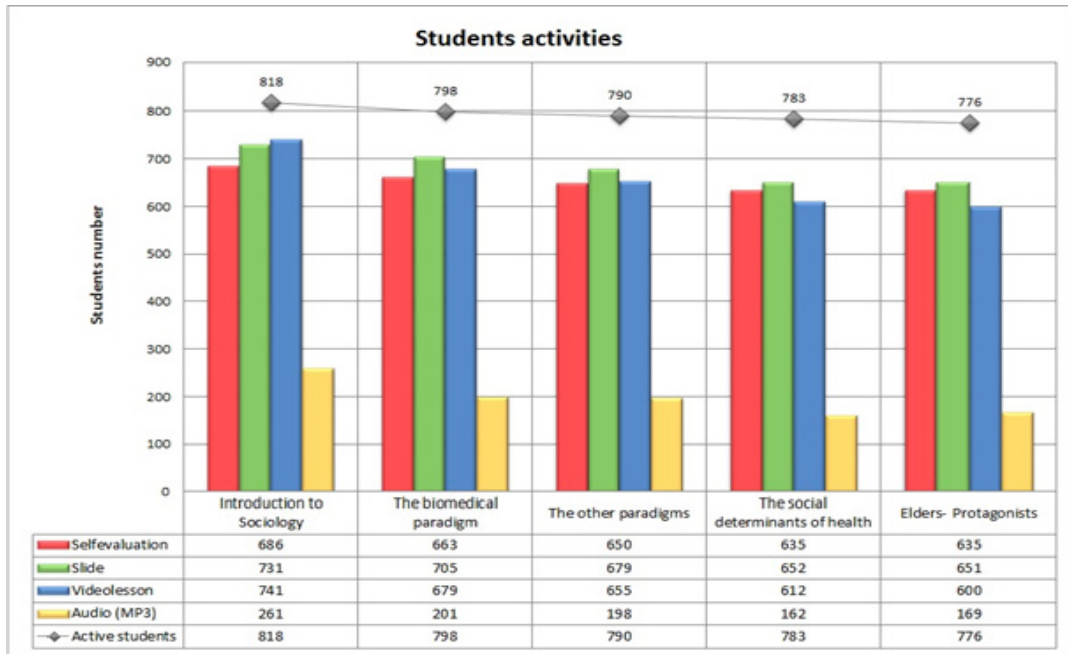


Fig. 1. Activities carried out by students enrolled in "General Sociology"

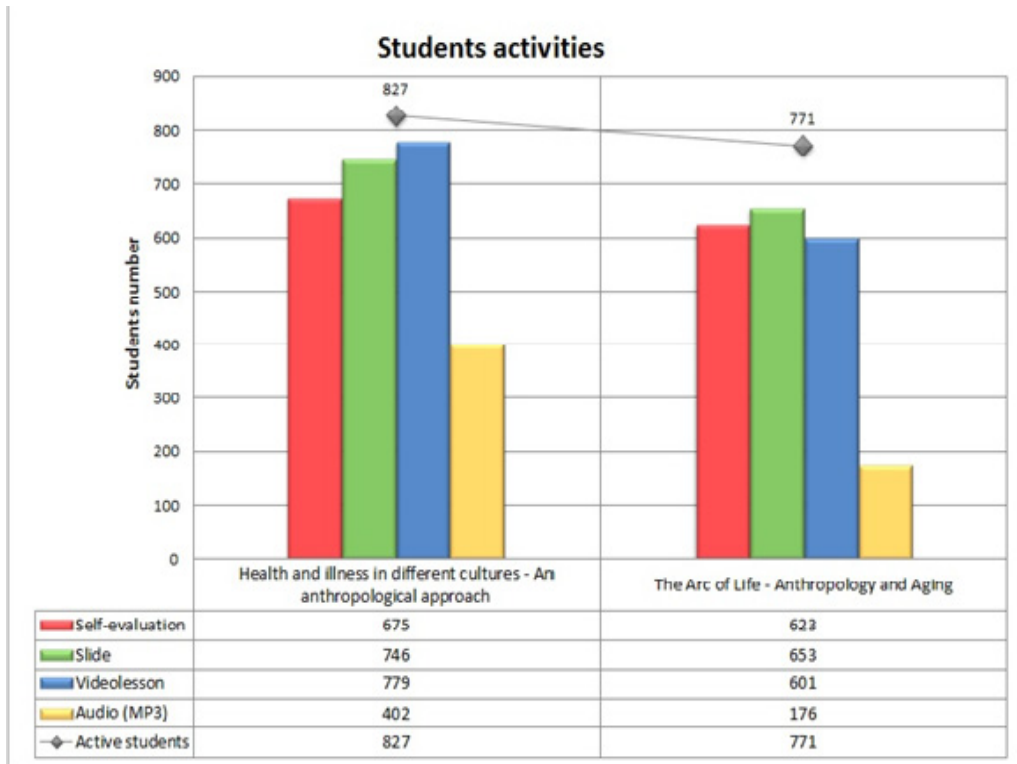


Fig. 2. Activities carried out by students enrolled in "Anthropology"

Same problems were identified for Epidemiology (Figure 3), a course that experienced a drop in video lecture accesses because of difficult in high-speed connections and postponement of the finale exam.

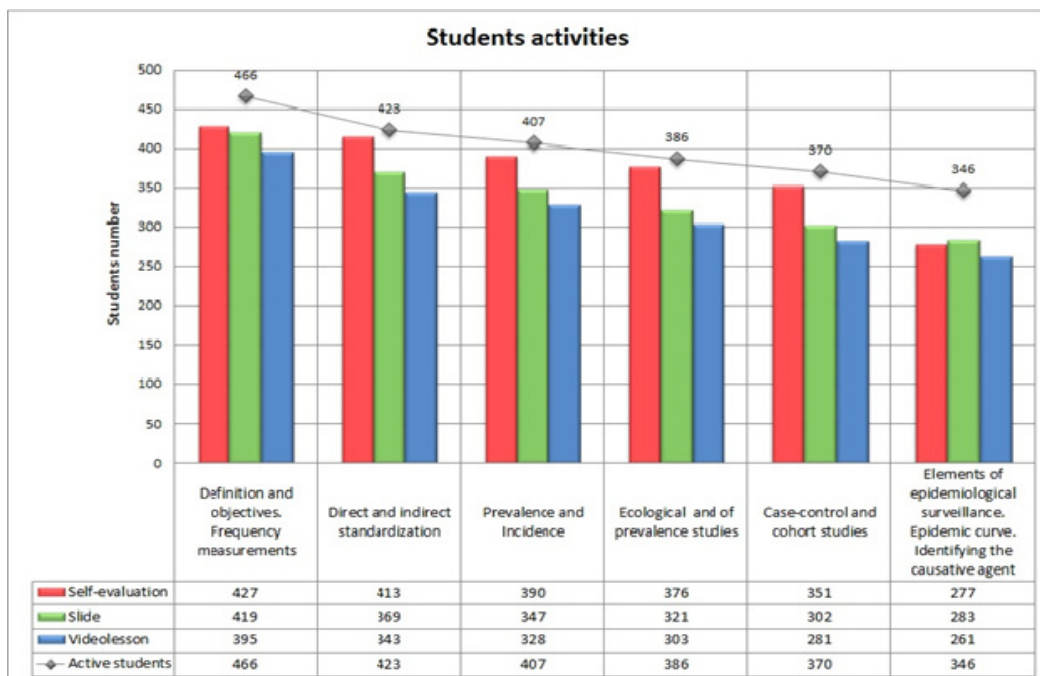


Fig. 3. Activities carried out by students enrolled in the teaching of "Epidemiology".

Participation in self-assessment test has remained high, even in the final steps of the courses, when students were no longer required to access the following chapters, a sign that the tests were perceived by students as a valuable tool to verify their readiness to sit for the final exam. A feedback questionnaire of the courses has been proposed to interested students to complement the Moodle information.

This experiment allowed collection of useful materials in order to make changes and additions to the content offered with the aim to overcome the operational and technical difficulties faced by students. In particular, for the next academic year, some video lectures will be proposed again in shorter format make access easier; additional details were added to some areas considered difficult by the students. The working group is envisioning, on the basis of reports received by tutors and students, upgrade to the FAQ format (with explanatory notes, bibliographical and site link suggestions of learning).

Furthermore, we wish to strengthen the effectiveness and traceability of self-assessment tests by improving feedback provided to the students and the audit trail. The self-assessment tests provide a useful educational tool of self-learning and a valuable tool for an active tutoring, but to really exploit its potential it is necessary that teachers and tutors are properly informed about the features and the best practices for the used modules, in particular "quiz" and "lesson", along with reports. For this purpose, the School of Medical and Pharmaceutical Sciences is enhancing its duty for supporting the use of Moodle that will closely work with the staff of the university computer center.

For next year it is expected to completely remote this experimentation with the only initial presentation of the course, without the assistance of tutors in presence in each educational pole. Off course, this will lead to a stronger online tutoring. Finally, the evaluation component itself is evaluated and the information collected is used to inform decisions about future evaluation activities.

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