



Mentoring program for students newly enrolled in an Engineering Degree

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Abstract

This work presents a mentoring program for first year engineering students in the Telecommunications Engineering College (ETSIT) at the University of Malaga (UMA). Actors involved in the program are professors from staff, veterans mentoring students and, of course, freshmen. All of them has been organized trough the Moodle based Virtual Learning Environment Platform of the UMA. The program has gone through several phases over three years. This paper shows the main objectives of this mentoring program, the initial design to get them where professors played mentor role, and successive changes made to try to improve the results, including the assumption of the mentor role by senior students (peer mentoring). The tools used for program evaluation are shown too. Despite the low participation, it has been a framework for the development of various educational and socializing activities (for mentors and mentees) focused on developing generic competences. Furthermore, it has been a research tool to get a better understanding of problems affecting students newly enrolled.

Keywords

Advising program, Mentoring Program, European Higher Education Area, Engineering Degree, Peer mentoring





1. Introduction

The European Higher Education Area (EHEA) involves the adoption of new methods of teaching and learning, as well as a new approach to mentoring (Pallisera, 2010). The proposed mentoring program offers a help and a guidance in specific academic issues, as well as a framework to support to students from joining the University. Therefore, it is a framework for the teaching-learning process.

These general guidelines set by the European Commission have been translated into Spanish law in different ways. Firstly, RD-1393(2007), as amended by RD-861 (2010), included the "Student Orientation", asking to the Bachelor's degree "support and guidance systems for students". Secondly, RD-1791 (2010) provides in Chapter V that the general principles of the mentoring systems integrate, in a coordinated manner, the actions of information, guidance and training support to students, developed by teachers and specialized staff. This approach distinguishes between general mentoring and subject mentoring. The first one, referred to by experts as integral mentoring, considers not only instructive aspects but also social, personal and emotional aspects. A Mentoring Program is defined as the design and development of support mechanisms, information, guidance and training to students, in response to the needs identified in the academic, administrative and social-professional fields. A possible approach to implement this integral mentoring is to use peer mentoring.

Several Spanish universities have been performing mentoring projects for more than a decade. In Spain, the origin of those activities is the SIMUS Project (Valverde, 2001), sponsored by the University of Seville. Other universities (Polytechnic University of Madrid, University of Burgos, University of Las Palmas, etc.) subsequently joined this initiative. Engineering degrees has often been scenarios of this kind of programs, as in our case. Engineering degrees in public universities have high dropout and failure in the first

year (MECD, 2014), so it seems reasonable to focus the mentoring towards students newly enrolled in an Engineering Degree, both freshmen and students of international exchange. Moreover, and following EHEA (ENQA, 2015), the verified memories of the Bachelor's degree collect a methodology for managing and improving the teaching-learning process, which is included under the so-called Quality Assurance System (QAS). Within the QAS implemented by the Telecommunications Engineering College (ETSIT) of the Malaga University (UMA), the key process PC05 "Guidance to Students" establishes the way in which the College revised, updated and improved procedures relating to host-driven actions, mentoring actions and support actions for training and orientation of their students. For all these reasons, our College started in the year 2012 a Mentoring Program (henceforth called PAT from the Spanish expression 'Plan de Acción Tutorial'), under the QAS-PC05. The first PAT (version 0, V0) has continued the following two courses (V1 and V2) up to date, although it has been annually reviewed in a continuous improvement process. This paper will present the design of the PAT V0 and following changes in V1 and V2.

An orientation program must be adapted to the characteristics and context of the University and College where it is to be implanted. However, you can set a general structure and working methods from which the action will be organized. Therefore, first step to carry out our PAT was to analyze diverse experiences of different universities in order to get the PAT's structure and methodology. Among others, we took as reference some similar active programs as Buddy-Program (UGR, 2015), Program-orient (UCLM, 2015), PAT-MENTOR (UBU, 2015), and GOU (UMA, 2015). The last one, an experience conducted by colleagues from University of Malaga, has been a particularly important support to our mentoring program.

The organization of this paper is as follows. After the introduction, the following section presents the general lines and objectives of the PAT, which constitute its essence beyond the necessary adjustments. The development and results of the first year and the PAT

redesign, implementation and results of the PAT V1 and V2, will be the target of the next two sections. Finally, conclusions and future lines of this work will be presented.

2. Outline of the PAT in ETSIT

As stated in the previous section, we considered developing actions to improve guidance of students, primarily of freshmen. So, the general lines of intervention (goals) will focus on:

- a) Facilitate the transition of new university students from undergraduate education, including orientation towards more efficient working methods.
- b) Detecting and coping with the most relevant typical problems that arise newly enrolled students.
- c) Facilitate the integration of students in the institution, that is, make an orientation, in addition to academic, administrative and social.

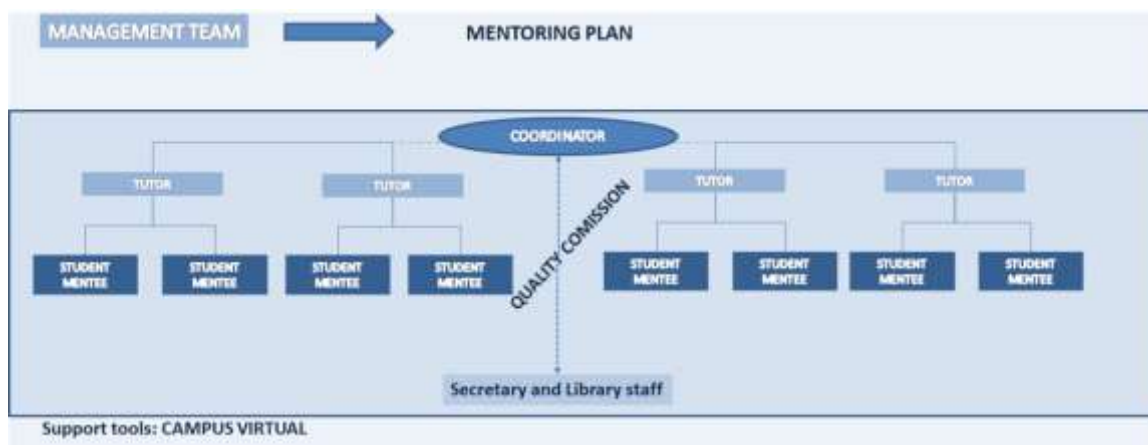


Figure 1. Overall organizational structure of the PAT.

Relating to the design, it was initially left open to develop the guidance through teaching staff (classic style) or peer mentors, students of higher levels supervised by a teacher, whose

objective is the guidance and advice of a group of freshmen (mentees) to achieve the above objectives. The second case involves an additional objective related to training of mentors in order to enhance their social skills (relationships and leadership), that is, mentors become both collaborators and beneficiaries.

The overall organizational structure that we assume is presented in Figure 1, where main actors involved in the PAT are shown. The functions of each one are briefly shown in Table 1.

Table 1. Functions of the main actors in the program

<i>Management Team</i>	Head of the PAT
<i>QAC -Quality Assurance Commission</i>	It approves and evaluates all improvement actions, such as the PAT, and develops the QAS
<i>PAT Coordinator</i>	He is responsible for the organization, coordination and development
<i>Mentor (volunteers)</i>	They develop the actions specified in the PAT on a group of students mentees
<i>Mentees</i>	They receive the PAT's activities. They are first-year students who volunteer to participate
<i>Secretary and Library staff (PAS)</i>	They collaborate to develop guidance activities in their respective areas
<i>Virtual Campus</i>	It is a virtual learning environment where you can neatly manage the interaction between different users, and the exchange of documentation and materials involving the PAT; it was created as a course in Moodle, with different sections and use privileges for each of the actors, with private communication forums groups, with Wikis for compilation of experiences and with questionnaires for evaluation purposes

Figure 2 shows a partial view of how is organized the Moodle based virtual learning environment (Virtual Campus, VC) in the PAT V2¹. On the other hand, the general working methodology is presented in Figure 3. As it is shown, a guide to advice and to collect information (HeGAE) was performed, and a tool to evaluate the PAT itself (HeEP) was envisaged.



Figure 2. Virtual Campus PAT V02.

HeGAE, is a mentor' guide. The guide summarizes all the possible key aspects for successful integration of junior student, so, it would help mentors, while they are talking

¹ We must highlight the difficulty of the various roles of the participants: a) faculty coordinator with full access as managers; b) collaborating lecturers without edit permission; c) mentors, with restricted areas and resources for intercom use; d) PAT students; constituted by young students enrolled in the PAT and therefore members of a steering group led by a mentor, who also had an own communication space, e) students in general which included, in addition to the above groups, all novice students. Most of the documentary resources generated in the activities had just placed at the disposal of this large group.

with the PAT students, to get information about whether these aspects were really key for students (it was also a socializing tool to facilitate the conversation and to identify topics of common interest). In addition, it was intended to gather information that could identify potential problems on their integration into this College, so, that could be the seed of improvement actions within the QAC. The Table 2 summarizes the issues included in the HeGAE and related PAT objectives. Note that it has two different blocks, one for each semester, because novel students evolve rapidly during their first months in the College. Regarding the assessment tool for the PAT (HeEP), its main objective is to gather information about the level of satisfaction of the participants in program, mentor and mentee.

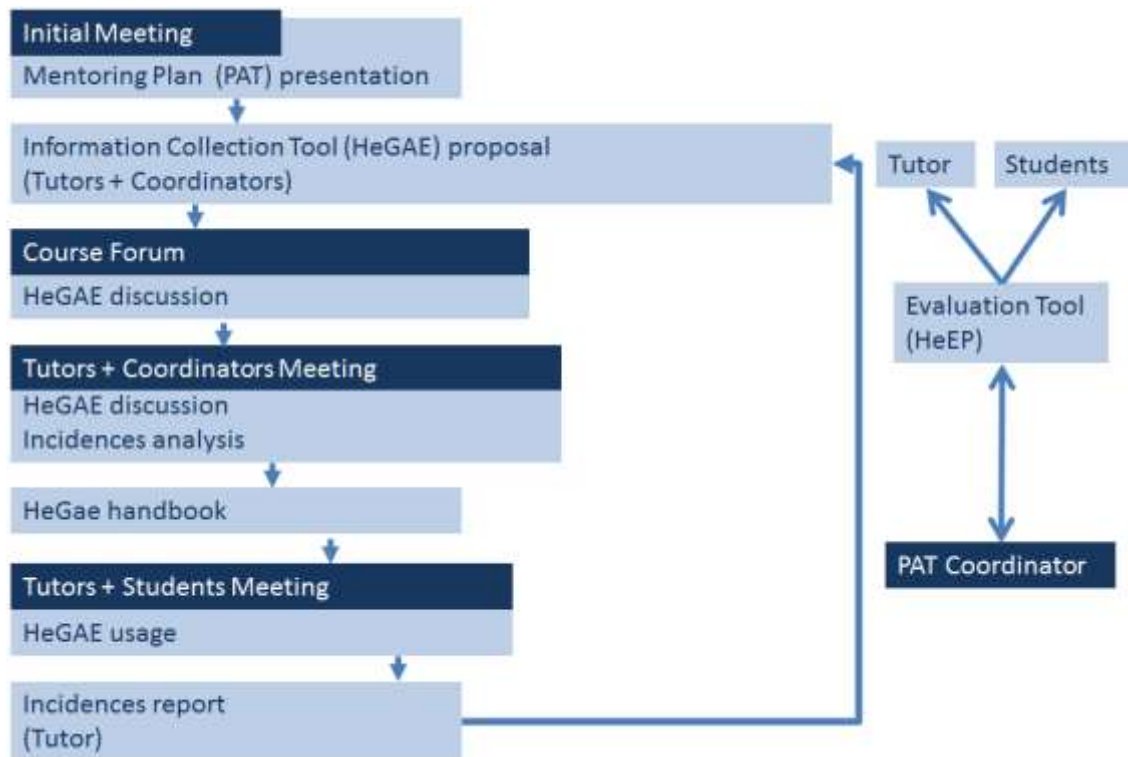


Figure 3. PAT general working methodology.

The design of both, the HeGAE and the HeEP, has been changing in new versions of the PAT. Henceforth, we will show only the results of the issues highlighted in italic in Table 2, which are directly related to the work presented here.

Table 2. HeGAE design and goals.

	<i>Issues related to ...</i>	<i>Goal</i>
FIRST SEMESTER	Input profile (type of degree, option of choice)	To be treated by the QAC
	Expectations (motivation, prospects for success, coping strategies planned)	Advising / To be treated by the QAC
	<i>Level of knowledge of the degree itself</i>	<i>Advising / Check need for advice</i>
	<i>Level of knowledge of resources (rules of residence and registration, Library and Virtual Campus)</i>	<i>Advising / Check need for advice</i>
	Lack of study forecast for intrinsic reasons (work, family problems ...)	Advising
SECOND SEMESTER	Problems with the pre-university training and experience with the ZERO course	To be treated by the QAC
	Degree of difficulty for each subject and experience with continuous assessment	To be treated by the QAC
	<i>Coping strategies (time spent studying, methodology, attendance, tutorials)</i>	<i>Advising / Check need for advice</i>
	Results (reflection on the results and their relation to strategy) and overall satisfaction with the course	Advising / To be treated by the QAC

3. Design, implementation and results of the PAT V0 (Year 2012-13)

3.1. Final Design of the Tools

In the PAT V0, we marked a further objective: improve the communication between teachers and student, which traditionally came being reported as unsatisfactory. Therefore, the choice of student-mentors was postponed and the PAT V0 stage responds to Figure 1 with the role of mentor played by teachers.

Regarding the HeGAE, we chose to materialize it in two ways. First, mentees were asked to complete a VC questionnaire. After, an interview, made for mentors to mentees, allows completing the information gathered by the questionnaire. For this interview, it was generated a Guide (semi-structured interview) with the philosophy explained in the previous section. Finally, interview reports was collected (without identifying the students²) through Virtual Campus in order to be analyzed by the PAT coordinators and the QAC.

On the other hand, the HeEP was materialized in a VC questionnaire, asking information on user satisfaction, on compliance with the additional goal of the PAT V0 and on the possible use of peer mentoring in future editions.

3.2. Results and analysis for redesign

Table 3 shows the level of participation of students and mentors during the first year. The initial turnout was about 20% of 250 new students in total.

Table 3. Participation data.

<i>Initial participation</i>		<i>Student participation in HeGAE</i>				<i>Participation in HeEP</i>	
Students	Mentors	Survey 1	Interview 1	Survey 2	Interview 2	Students	Mentors
53	23	52	39	34	19	8	23

Table 3 is only for mented students. Participation data for other students (new students but non-participant in the program) were: 44 (first semester) and 22 (second semester) in the HeGAE, and 3 in the HeEP. The provided data for both groups scarcely showed significant

² From the outset, it was requires to the tutors a confidentiality agreement and transmit the information without identifying the source to give confidence to the students. So were transmitted to them too.

differences, so we decided not distinguish between them in later editions. As it is shown, the participation of students was declining as the year progressed³.

Table 4 shows the relevant global data from the first survey, while Table 5 gives specific information about students enrolled in the PAT. Table 6 shows the data collected by HeEP.

Table 4. Global Data collected with HeGAE.

<i>Level of knowledge of the degree itself</i>	33% have a clear idea of the degree to which they have enrolled, the rest reported substantial doubt
<i>Part-time Regulations</i>	It is known by 16%
<i>Minimal Credit requirements Regulations</i>	It is known by 28%
<i>Regulations about maximal Permanence</i>	It is known by 22%
<i>Registration fee</i>	It is known by 28%

Table 5. Data collected with HeGAE about students in the PAT.

<i>Level of knowledge of resources (Library and Virtual Campus)</i>	64% of students considered to have sufficient knowledge and 4% depth of both resources. Teacher comments reflect that the Library is the most unknown among both resource.
<i>Coping strategies (time spent studying, study methodology, attendance, tutorial services)</i>	There are large spread among the interviewees. The main problems reported are lack of use of mentor services and the lack of organization in the study. It seems to have enough hours of study but not well distributed throughout the semester or dedicated especially to matters they love.

Conclusion: the need for better information of the regulations that affect them is appreciated. Also it was decided, for subsequent editions, introducing some changes as

³ Basically, mented students did not respond to tutors e-mails, although it was occasionally reported the impossibility to close an appointment because of scheduling problems between both parts.

incorporating Secretary and Library Staff or providing to students some study skills workshops.

Table 6 Data collected with HeEP.

<i>Compliance with the target student-teacher approach</i>	62% of teachers believes that it has reached a high or very high level. 62% of the students understand a high level, 0% very high.
<i>Advisability of introducing mentor students</i>	85% of teachers understand it would be worthwhile 100% of students understand that it would be worthwhile
<i>Overall satisfaction</i>	3,8/5 Teachers Appreciation 3,5/5 Students Appreciation
<i>PAT utility for students</i>	100% Rating of teachers (very useful). Not asked to students
<i>Broadcasting</i>	100% of students not participating in the PAT says he has not heard of it

Conclusion: We decided to evolve into mentors students, despite losing in terms of teacher-student relationship, on the other hand, it has not been fully satisfactory (62%).

4. Redesign, implementation and results of the PAT V1 and V2 (Years 2013-14 and 2014-15)

The main novelty of these two versions is that the scenario to develop the PAT responds to Figure 1 but with the mentor's role played by veteran student volunteers instead of professors. The participation of these students had incentives:

- a) ECTS, because orientation activities that are covered by the UMA (up to 2 per year);
- b) Specific training for their role of guidance and mentoring, that is, develop of generic skills which are projectable to their professional future (requires external monitors, such as psychologists and educators)



c) Certainly, and in view of their attitudes and results, the main incentive was simply their willingness to help peers who are going through what they are gone before.

Therefore, a dual training scheme was planned: on the one hand, for mentors, enhancing the skills expected of them; and on the other hand, for mentees, helping them to acquire some generic skills that can facilitate adaptation to overcome the university, but without forgetting aid for socialization, aspect often neglected in Engineering Colleges⁴.

In addition, the participation of two members of Secretary and Library Staff, has enabled the development and provision of two students guides in FAQ format ("Frequently Asked Questions") of such services. Finally, the tools HeGAE and HeEP were gradually simplified, transferring part of questionnaires towards the below indicated semi-structured interviews.

4.1 Redesign of the tools

Regarding the HeGAE, and aware that students currently have excess prospective surveys, each year we have tried to simplify and reduce them. In the PAT V2, we just keep the semi-structured interviews (one per semester), and we have released quite content of mentor's guide. We think this simplified guide continues to fulfill its dual mission of informing freshmen of little known interesting issues and gathering information on their specific difficulties. The delivery of the information collected by mentors through Virtual Campus, remains as a control that the mentor was properly performed his duties.

As there is a relatively low percentage of students involved in the PAT and also many of them leave during the year, we developed a specific questionnaire to find out the reasons (HeEP), addressed to all novice students. It asked about the students expectations regarding the PAT. If they have been part of the program, it asked too about relations with their

⁴ There have been seminars and workshops on coping with exams, time management and study skills for different subjects, and there are several plans for future editions. In the PAT V0 only fit a small workshop by time limitation.

mentors. To improve participation in this survey -the first year was held on Virtual Campus and was very low-, the second year it was decided to spend class time students. We desisted from repeating it in the PAT V2 because student's petitions seem clear from the information gathered by HeEP in the PAT V1.

Table 7. Participation data; V1 and V2.

	<i>Initial participation</i>		<i>Participation Mentors / Mentees in HeGAE</i>				<i>Participation in HeEP</i>	
	Mentees	Mentors	Survey 1	Interview 1	Survey 2	Interview 2	Mentees	Mentors
PAT v1	92	16	-/78	7/11	With second interview	5/7	159	With second report
PAT v2	112	24	With first interview	8/18	With second interview	4/7	Not performed	With second report

4.2 Results

Table 7 shows the level of participation of students and mentors along the two years. The initial participation of new students is about 25% in both editions. Regarding the data collected with HeGAE on the PAT students, they are shown in Table 8.

Table 8. Data on PAT students (with HeGAE).

<i>Level of knowledge of resources (Library and Virtual Campus)</i>	Library- Level of knowledge reported V1 4,0/5 -- V2 4,2/5 Virtual Campus - Level of knowledge reported V1 4,0/5 -- V2 4,3/5
<i>Coping strategies</i>	No data was collected during the interviews

Conclusion: The data collection by the mentors is poorer than the one made by teachers in V0. It is proposed to associate faculty to the mentor-mentee groups in following editions to get better guidance or to let teachers themselves collect information on certain issues. HeGAE data collected on all students are very similar to those of V0. The data contained in the mentors reports reflect high degree of satisfaction with the received training (all of them mentioned it) and the desire to continue as PAT mentor. Also they made recommendations for improvement for future editions. The findings are summarized in starting the activities earlier⁵ and carrying out some joint recreational activity to introduce mentor-mentees team. Last one action will be proposed to the V3.

A summary of the data collected on all students (HEEP), is shown in Table 9. The most relevant data were selected.

Table 9. Data on all first year students (HeEP). Survey completed on schedule class time in mid-course.

<i>Student expectations regarding the PAT</i>	<ul style="list-style-type: none"> - Only 65% read all e-mails they receive from the Virtual Campus. - 50% of those who signed up for the PAT declare that they have not followed the activity later and another 25% say they have not had occasion to contact. - 40% left because they thought he was going to lose time to other things.
<i>Relationships with mentors</i>	<ul style="list-style-type: none"> - Most students gave more value to more advice on specific curricular subjects, followed distantly by global information titling and moral support. - To a lesser extent, they ask a teacher mentor directly as well as transversal and specific workshops. - All of them declare their intention to continue the PAT.
<i>Perspective of those who do not participate</i>	<ul style="list-style-type: none"> - 56% claims guidance from someone who had overcome the same difficulties in the subjects they (contradictory). - 38% demand workshops on how to study different subjects. - 31% demand an external control of working time

⁵ In the V1 we could not meet the team of mentors to 2 months after the start of the course, which was partially remedied in the V2 to select that team at the end of the previous year.

Conclusions: There was a communication problem with the email (in later editions, phone number was additionally asked). The high percentage of students not enrolled, who ask for something very similar to what the PAT is, revealed that the communication problem is really deep. The technical problems of curricular subjects outweigh any other concerns and students fail to perceive the benefit of transferable skills, which clearly constitutes a future line of work.

4.3 Planning the PAT V2

Figure 4 shows the schedule of activities in the PAT V2. Each activity involves a significant workload in what, for brevity, we cannot enter.

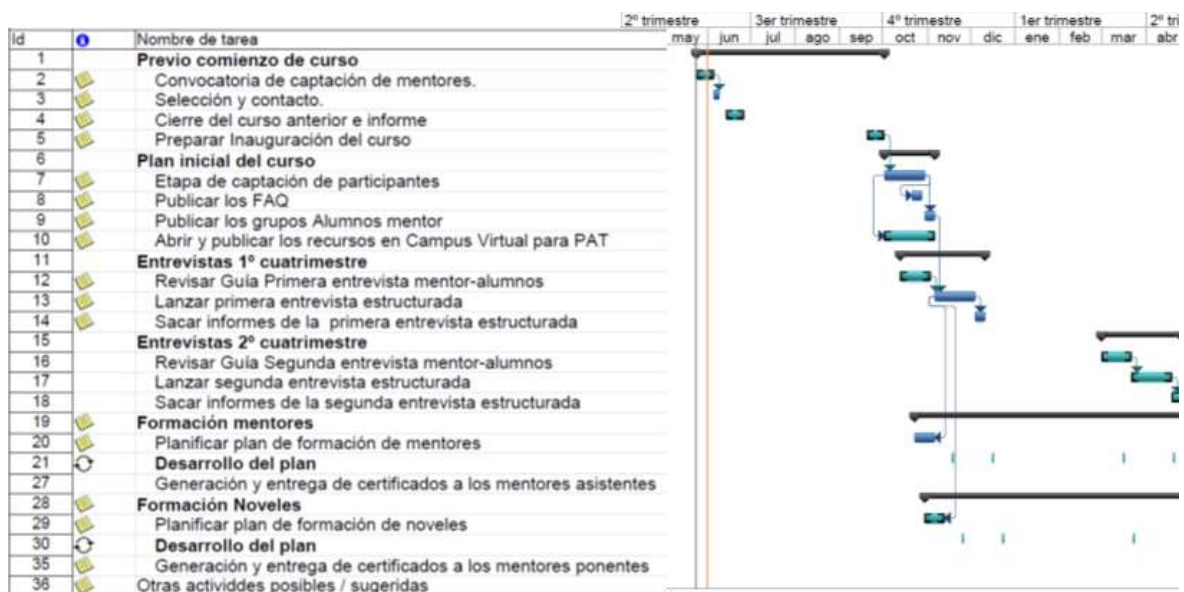


Figure 4. Summary and approximate annual schedule tasks.

4.4 Process outputs

A process of size and complexity described here has multiple outputs / results that are summarized in Table 10.

Table 10. Main process outputs.

<i>Process outputs (documents and materials)</i>
- Topics of interest for new students, as documentation of the workshops and seminars organized for them or other guidance documents that can provide important information (e.g. guides using the services of Secretary and Library).
- Training subjects for mentors: allow the formation on the functions of guidance, mentoring and evaluation, as well as action strategies with peers.
- Materials for the evaluation and monitoring of the activity (interview guides, questionnaires, etc.)
- The generated virtual learning environment is in itself a valuable technology resource, which mostly represents work done for the future.

5. Conclusions and future lines

Mentoring Program that we have conducted over the last three years was conceived as a process of continuous improvement, which has been keeping its achievements and modifying the parameters that have been problematic. In Table 11 are shown schematically conclusions as detected, by one side benefits and on the other problems and challenges for the future. We must highlight our excellent experience with veteran student as mentors but also, clearly, we have failed to convey the message of the group of new students. In addition, we say that we agree fully with (Zabalza, 2013) about "the importance of mentoring, guidance and support to students are called to be the new university of the XXI century".

Therefore, it has already started the PAT V3 with new actions aimed at first courses students.

Table 11. Conclusions.

<i>Benefits</i>	<i>Problems and challenges</i>
• We have obtained high actual knowledge of the thought and feeling of new students.	• The decline of the participation requires retention activities (under study).

<ul style="list-style-type: none">• Activities, despite poor attendance, have been highly regarded, so we expect better future.• In the group of mentors abandonment was much less (50%), high motivation, success of the training course and curriculum improvement in their social skills.• Dynamic designed and can be expected to have lower labor cost on these courses.	<ul style="list-style-type: none">• Also for improving retention and because it is demanded, we must plan collective activities at very early stages of the year.• The priority of approving outweighs everything else, but we do not manage to associate these activities with an indirect benefit on their exams success (under study).• Program coordination has cost too many hours, which cannot be maintained over time. The challenge is to automate the process where possible.• Increase training offered by the project (note that the workshops / seminars are opened to all new students).
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