

# Student's Autonomous Activities In Multidisciplinary Registers Learning

Cristina Tudela Andreu

Polytechnic University of Valencia, C/ Camino de Vera, s/n, 46022 Valencia (Spain)  
ctudela@idm.upv.es

Fernando Fargueta Cerdá<sup>1</sup>, Inmaculada Tort Ausina<sup>2</sup>, Rosa Martínez Sala<sup>3</sup>

**Abstract** - The teaching in universities involved in the Bologna process and the student's future professional development in the information and knowledge society demands the introduction of new learning methods and styles in teaching at university level. These new methods cannot be based exclusively upon the simple transmission of knowledge of subjects with no communication among them, but must contribute both to the construction of a knowledge integrating different disciplinary registers and emphasise the skills that encourage the student's capacity towards autonomy. This is the aim of the activity presented here. This activity, mainly based in the student's autonomous work, puts forward the solution of a real case study, where the teacher acts as a guide whereas the student takes the active role in his/her learning process. The subjects joining this multidisciplinary proposal are included in the syllabus of the Technical Architect degree in the Polytechnic university of Valencia — English as a Second Language, Applied Foundations of Physics and Building Structures. Although this method of work may create some uncertainty about its effectiveness, it offers unquestionable advantages in the sense of including professional competences such as problem-solving, decision-taking, knowing a foreign language, working in multidisciplinary teams, working in an international context, etc.

*Index Terms* - autonomy, multidisciplinary, real case.

## INTRODUCTION

In the last twenty-five years there have been great changes in the field of teaching and learning. It is easy to see that as long as teachers do not involve students in the learning process, as long as teachers are not aware of diversity in the classrooms and help students to know themselves as learners, being responsible of their own learning to become autonomous learners, the classroom will remain as the place where the students go because they feel obliged to do so, with the only aim of passing the compulsory exams fixed in their curriculum.

We can mention some aspects related to the classroom: the existence of an established curriculum and objectives, the

teacher as the only source of feed-back, the materials previously chosen by the teacher, an impossibility of taking decisions about work organisation i.e. sequencing of activities, amount of time to carry them out..., the teacher or institution as the only responsible to evaluate learning results, etc.

We do not pretend to suggest that such circumstances cause an individual not to learn a certain subject in the frame of a teaching institution. Nevertheless, they are the cause for a learner to be dependent of external factors such as the teacher and the teaching materials, and it is this what is going to make difficult for him/her to carry out the correct reflections about all what happens when a learning process is being developed.

When we refer to autonomy we do not mean a new methodology but an attitude adopted by the learner in his/her learning process which is based in the learner's responsibility. Learner autonomy is reflected in a wide variety of behaviours such as the capacity detachment, critical reflection, decision-taking and independent action. We might quote Trim [1] when he says: 'No school, or even university, can provide its pupils with all the knowledge and the skills they will need in their adult lives [...] It is more important for a young person to have an understanding of himself/herself, an awareness of the environment and its workings and to have learned how to think and how to learn.'

Understanding autonomy requires a comprehensive and complex way of thinking. The challenges are linking and redefining knowledge into wider frames as well as analysing and distinguishing without separating. To achieve this it is necessary to build 'operating links' between subjects. Thinking of autonomy requires a way of thinking able to tackle interdisciplinarity from the point of view of a teaching-learning practice.

The teacher's role adopts a new perspective where the learner is the centre developing an active and conscious attitude and the main interest is the research of his/her learning processes from which 'helping frameworks' will be built to facilitate the consecution of his/her learning in a more and more autonomous way.

One of the reasons that support autonomy boosting is the existence of a variety of different learning styles that is, the

<sup>1</sup> Fernando Fargueta Cerdá, Polytechnic University of Valencia, ffarguet@mes.upv.es

<sup>2</sup> Inmaculada Tort Ausina, Polytechnic University of Valencia, inort@mes.upv.es

<sup>3</sup> Rosa Martínez Sala, Polytechnic University of Valencia, rmsala@fis.upv.es

fact that each person learns in a different way.

We can consider a great deal of educational reasons in favour of encouraging learning autonomy. Most of them are related to learners' diversity as there are certain characteristics that differentiate a person from the other and can have influence in their learning. In fact, it is quite obvious for any teacher to observe that his/her students do not like the same way of learning and although the goal of each lesson is made clear by the teacher, the result, with regard to students' learning varies to a great extent. It will be enough to check the different outcomes that each of them obtain in the final evaluation. This shows that there is not a cause-effect relationship between teaching and learning i.e. the learners do not always learn what the teachers teach [2].

Autonomy is not something inborn and dependence is what accompanies us since educational institutions make us relate learning something with the need of a teacher presence in the context of a classroom. But this does not mean that autonomy can not be encouraged from the classroom as long as the learner and the teacher accept their new role. As Little states [3]: 'It is not easy for teachers to stop talking: after all, if they stop talking they stop teaching, and if they stop teaching, their learners may stop learning. And it is not easy for teachers to let learners solve problems for themselves; for that takes time, and there is always so much ground to cover. Committing oneself to learner autonomy requires a lot of nerve'.

In this situation the teacher-learner relationship will transform into an absolutely equality. The teacher has to become a facilitator in the learning process playing the role of adviser and guide. He has to be conscious of his/her students' individual differences regarding their learning styles and needs or learning paces. He has to make the student see that his/her task is to give advice in so far as it is possible with the aim of developing the learning process in the most effective way and, most important, he has to have complete confidence in the learner's capacity to be responsible of his/her own learning process. In the same way, the learner will abandon his/her role as a passive part and accept a responsibility that implies him/her to get involved in everything dealing with learning, therefore taking a more active attitude and learning, among other things, to plan, to choose the best way to learn and to be responsible of the results.

It is important to make the student aware of the objectives of the different tasks as well as the skills that are going to encourage them. In the same way, it is advisable to make the student conscious of the different possibilities that the different activities can offer to carry them out. To achieve this, the teacher, in his/her role of facilitator, is a key piece, since he/she is the one who can give advice to the student.

### OBJECTIVES

Building Process Technology is a subject studied in the last year of the Technical Architect degree at the Polytechnic University of Valencia. It is a specialization subject taught by three Departments: Applied Physics, Building Structures

and Architectural Construction. In this subject the student must be able to incorporate and put into practice the acquired knowledge of the previous years and of the different subjects to very close to professional practice situations. This is why the approach of this subject sets off an eminently practical point of view, especially focused on the student's learning and based basically on the students' autonomy and group work.

The School offers a total of six specialization subjects of which the student must compulsory attend one of them. All those subjects consist of a total of 18 ECTS, that is to say  $18 \text{ ECTS} \times 25 \text{ hours/ECTS} = 450 \text{ hours}$  of work in all. A 40% of these hours of work are classroom hours i.e.  $0.40 \times 450 = 180 \text{ hours}$ , which represent a total of 6 hours/week in the classroom. The other 60%,  $0.60 \times 450 = 270 \text{ hours}$ , correspond to the student's autonomous work.

Since the academic year 2003-2004, some educational experiences are being developed in the subject of Building Process Technology. These experiences are being modified and improved year after year, with the aim of creating a favourable atmosphere for developing in the student some skills and abilities as:

- Planning and organising work.
- Setting up his/her own learning objectives
- Deciding when it is better to work on one's own, when to collaborate and when it is necessary to ask for advice.
- Learning from experience.
- Identifying and solving problems.
- Thinking creatively.
- Communicating effectively and efficiently, both orally and in writing.
- Being more responsible and autonomous.
- Being fully aware of his/her own learning
- Decision-taking
- Searching and organising information

The educational experience developed in the academic year 2005-2006 is the one we are going to set out in this paper.

### EXPERIENCE

The point is that the students — a total of 35 — in groups of five carry out a study of a building which must hold a small auditorium as well as some music classrooms. This building may be one suggested by the teachers or an alternative building proposed by the group of students. In any case each group of students will work on a different building. The outline of this work will be as follows:

- **Architectural and constructive definition.** In this section, the architectural generic characteristics of the building will be described and specified in detail not only descriptively but also graphically. Besides, a picture will be incorporated in order to illustrate the building description, even if it were a virtual building.
- **Characteristics of the materials.** In this section the main characteristics of the materials to be used will be described, itemizing specific numerical values as well as the units of mechanical, physical and chemical

properties considered as outstanding from the point of view of the specific use of the material. This refers specially to the nominal tensile and compressive strengths, the modulus of elasticity, the Poisson's ratio and the acoustic and heat (thermal) absorption and transmission coefficients of the selected materials for the external walls and internal partitions once the acoustic and thermal (heat) study has been carried out.

- **Actions considered for the structural calculations.** In this section, the actions to be taken into account in the structural calculations of the building will be considered and the specific values of these actions will be determined according to the specified constructive characteristics and the current regulations.
- **Structural calculations.** In this section some part of the structure incorporating different types of structural elements — beams, pillars, columns, etc. — will be calculated and measured.
- **Acoustic study.** In this section, the echograms will be obtained in different representative points of the auditorium. The geometric design of the acoustic roof to favour reflections in the rear part of the hall will be carried out and it will be arranged to get the ideal reverberation time. To finish, the acoustic insulation of the building will be studied adapting it to the current regulations.
- **Thermal study.** In this section and with regard to the “*Código Técnico de la Edificación*” (“Building Technical Code”) in its HE-1 section, the study of thermal transmittance of the external walls which make the thermal surround of the building and internal partitions. The study of the condensation risk in the internal surfaces and the interstitial condensation risk will also be developed.

#### DEVELOPMENT OF THE EXPERIENCE

The stages that will follow for the development and drawing up of the work will be the following:

- **Work-groups description:** As mentioned before, the students will make groups of five to develop the tasks. Each group of students will name one of them as a coordinator. The group will be formalized when the coordinator personally submits a document signed by all the members in the group in which the following data must be included: name, surname and e-mail of the members, coordinator of the group and three responsible members for each of the 2, 3, 4, 5 and 6 sections. Section 1 will be the responsibility of all the members in the group. In this way each group is organised so that all its members participate more actively in four of the different sections. For example, the group formed by A, B, C, D and E is organized as follows:  
 Section 1: A, B, C, D and E  
 Section 2: A, B, and C  
 Section 3: A, D and E  
 Section 4: B, D and E  
 Section 5: A, B and E  
 Section 6: C, D and E

- **Initial working proposal and validation:** Each group will carry out — by means of a document signed by all members in the group — an initial proposal of the work to be done with the generic characteristics of the building subjected to study. This document will be given to the teachers who will, in turn, give their corresponding agreement and so, the group will be able to start working.
- **Work development:** In this stage each group, according to the established organisation in phase a), will proceed to develop each of the work stages to its culmination. During this stage, fifty per cent of the class hours per week — 3 hours/week of a total of 6 classroom hours per week — plus the office hours will be devoted to discuss the different uncertain and problematic aspects that arise in each group work.

It must be said that special attention is given to English as a Second Language in this approach. In fact, the students forming the different groups who, at the same time, are attending any of the English subjects as a part of the Technical Architecture Degree curriculum have to integrate their background in English to this experience.

First of all we will describe the different English subjects taught at the School:

- **English I.** This subject is considered as Technical English and deals with the field of architecture and construction.
- **English II.** In this case, the objective is to provide the student with the necessary tools to be able to write an academic report.
- **Oral Skills in English.** Here the students will develop the skills of listening and speaking in English with the purpose of developing a final exercise consisting in an oral presentation of a task chosen by both the student and the teacher.

The students who take part in this experience and, at the same time attend an English subject are asked to develop tasks such as glossaries of technical terms, translations of the different sections of the work, reports and summaries, and a final exercise which will consist in an oral presentation of this experience. They are given the possibility of working in groups of two students or on their own, in case they prefer so.

The type of task they are to develop will depend on the English subject they are attending to, and this will serve as the final work to pass the corresponding subject. We want to point out that the English teacher works together with the teachers of the other subjects who represent a great support in terms of dealing with technical concepts. Also, he/she helps the students with the bibliography written in English and any other kind of source they must consider to do their work properly.

The distribution of classroom hours and autonomous work is the same as for the rest of the subjects that take part in this experience i.e. 40% and 60% respectively. As it was said in the introduction, the teacher acts as a guide and lets the students be the centre of their own learning as much as

possible in order to create the appropriate atmosphere for an effective learning.

During the work development stage in this experience, the main aim of the classroom sessions is the exchange of information and experiences between teachers and students about the students' learning process so that the students are able to identify their progress and, at the same time, those aspects in which they should improve.

We must point out some specifically important matters that the teachers take into account in these sessions [4]:

- To clarify the necessary aspects dealing with the very content of the work and, in general, with the students' learning process.
- To share experiences related to the knowledge and abilities or skills that are being worked through and which may be of use for the students.
- To observe the performance and achievement in the group.
- To inform the students of their progress and every other aspect they should improve in their learning process.

### EXPERIENCE RESULTS

During the last month of the course a survey was carried out in which the students had to give evidence of their satisfaction in the experience. The form consisted of the following questions:

- Q1. The structure of the activities is appropriate to reach an effective learning.
- Q2. The development of the subject encourages knowledge acquisition.
- Q3. The development of the subject encourages skills and capacities acquisition.
- Q4. Teachers encourage students' autonomous learning.
- Q5. The distribution between classroom activities and students' autonomous activities is considered appropriate.
- Q6. The subject has provided me with knowledge and abilities and skills that are important for my educational training.
- Q7. In general, I am satisfied with the approach and development of the subject.
- Q8. I would recommend this subject to other school mates.

The answers evaluation scale is shown in table 1.

TABLE 1. VALUATION SCALE.

Total disagreement	Rather in disagreement	Middle way	Rather in agreement	Total agreement
1	2	3	4	5

It has to be taken into account that 3 of the 35 students abandoned the follow up of the subject during the academic year. The results of the answers of the 32 students who completed the course are shown in Table 2.

TABLE 2. RESULTS OF THE STUDENTS' SATISFACTION SURVEY.

Number of responses in each item of the survey	Mean
Q1	7.34
Q2	6.95
Q3	6.95
Q4	7.81
Q5	6.25
Q6	7.11
Q7	7.50
Q8	7.11
Overall mean value =	7.13

	1	2	3	4	5	value
Q1	1	2	4	16	9	7.34
Q2	0	3	9	12	8	6.95
Q3	1	3	6	14	8	6.95
Q4	0	0	6	16	10	7.81
Q5	2	5	7	11	7	6.25
Q6	1	2	6	15	8	7.11
Q7	1	1	5	15	10	7.50
Q8	1	2	7	13	9	7.11
Overall mean value =						7.13

The right column of the above table shows the average score of the answers on a scale 0 to 10 points. The score scale which has been set up in order to obtain these values is shown in table 3.

TABLE 3. SCORE SCALE.

Total disagreement	Rather in disagreement	Middle way	Rather in agreement	Total agreement
1	2	3	4	5
0 points	2.50 points	5.00 points	7.50 points	10.00 points

The overall mean value — shown on the bottom right side of Table 2 — has been obtained taking into account the number of responses for each of the questions or items.

With regard to the results shown in Table 2 we can affirm that, in general terms, the students are satisfied with the working method in which the subject is set out and with the results, in terms of learning, that can be reached. It can be especially highlighted — with a score of 7.81 — the assessment given by the students to the stress given to the autonomy in the students learning, which is an inherent approach of the subject.

### CONCLUSIONS

With the experience presented here we can observe the consecution of various objectives:

- With this teaching method the students have been experiencing as future professionals.
- This experience is an excellent tool to encourage learner autonomy and self-assessment.
- They have been working in groups, collaborating in the different tasks they have had to accomplish,
- They have also been sharing concepts related to different subjects, thus enriching themselves in a multidisciplinary context.
- The students' personal satisfaction has been high as shown in this study.

### REFERENCES

- [1] Trim, J.L.M., Preface. In *Autonomy and self-directed learning: Present fields of application*. Consejo de Europa. Estrasburgo, 1988.

- [2] Allwright, R., "Why don't learners learn what teachers teach?- The interaction hypothesis", *Language learning in formal and informal contexts*, Irish Association For Applied Linguistics. Dublin, 1984.
- [3] Little, D., "Autonomy in language learning". In *Autonomy in language learning*. Ed. CILT. London, 1990: 11 - 12.
- [4] Benito, A., Cruz, A., "Nuevas claves para la docencia universitaria en el Espacio Europeo de Educación Superior", Nancea S.A. de ediciones, Madrid, 2005.