KNOWLEDGE SPIRALS, SITUATIONAL LEADERSHIP AND INFORMAL LEARNING APPLIED ON B-LEARNING METHODOLOGY

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Abstract

The methodology “b-learning” is a new teaching scenario and it requires the creation, adaptation and application of new learning tools searching the assimilation of new collaborative competences. In this context, it is well known the knowledge spirals, the situational leadership and the informal learning.

The knowledge spirals is a basic concept of the knowledge procedure and they are based on that the knowledge increases when a cycle of 4 phases is repeated successively.1) The knowledge is created (for instance, to have an idea); 2) The knowledge is decoded into a format to be easily transmitted; 3) The knowledge is modified to be easily comprehensive and it is used; 4) New knowledge is created. This new knowledge improves the previous one (step 1). Each cycle shows a step of a spiral staircase: by going up the staircase, more knowledge is created.

On the other hand, the situational leadership is based on that each person has a maturity degree to develop a specific task and this maturity increases with the experience. Therefore, the teacher (leader) has to adapt the teaching style to the student (subordinate) requirements and in this way, the professional and personal development of the student will increase quickly by improving the results and satisfaction. This educational strategy, finally combined with the informal learning, and in particular the zone of proximal development, and using a learning content management system own in our University, gets a successful and well-evaluated learning activity in Master subjects focused on the collaborative activity of preparation and oral exhibition of short and specific topics affine to these subjects. Therefore, the teacher has a relevant and consultant role of the selected topic and his function is to guide and supervise the work, incorporating many times the previous works done in other courses, as a research tutor or more experienced student. Then, in this work, we show the academic results, grade of interactivity developed in these collaborative tasks, statistics and the satisfaction grade shown by our post-graduate students.

Keywords: blended learning by ICTs, tutoring and educational feedback, informal learning, knowledge spirals, situational leadership.

1 INTRODUCTION

In the current university academic context, following the guidelines developed by the European Higher Education Area (EHEA), one of the most controversial and iconic issues is how to ensure a high academic performance in order to satisfy teachers and students regarding the workload level [1] within the duration of a subject. And, on the other hand, the assimilation of abilities, both generic and specific ones, in an optimal level of traceability in order to provide a positive impact or benefit to our graduates after having been incorporated into the labour world.

It is important to reflect on how to achieve high levels of academic performance and satisfaction of those involved in the current academic context, basically based on the paradigm of blended learning, or b-learning methodology. Therefore, the design and drawing up of each teaching guide of a subject, both master or graduate, it should be taken into account the combination of different learning activities connected with the assimilation of several learning objectives and specific and general abilities by using, efficiently, several instrumental and technological resources that allow a reliable assessment for the society and the labour world. In this sense, a good starting point on the combination of learning activities for this assimilation could be those derived from UPM- Competencias Genéricas [2]:

- Solution of problems
- Use of Technologies of the Information and the Communication (ICT)
- Oral and written communication
- Creativity

- Environmental respect
- Analysis and synthesis
- Planning and organisation
- Teamwork
- Leadership

One of the typical learning activities at the university is the design, drafting and oral presentation of works related to a subject. In this paper, a practical experience is shown about the teaching management developed in several subjects on the Master in Optometry and Vision Sciences (Advanced Visual Optics [3] and Advanced Visual Ergonomics [4]). For several academic years, the academic efficiency and satisfaction of all stakeholders (teachers and students) have been improved by means of new learning tools, like "oral exhibitions". After the last courses, it is important to note the acceptance of this learning methodology combined with knowledge spirals, situational leadership and informal learning, supported by an efficient use of ICTs since both the academic results and the satisfaction degree is very high.

The activity “oral exhibition” consists of the assimilation of generic abilities (use of ICTs, oral and written communication, creativity, analysis and synthesis, planning and organisation, teamwork and leadership) and specific abilities (both cognitive and procedural ones). Then, the main challenge is to simultaneously monitor the work developed by students, to create and receive feedback and also to present the work for other students (by applying knowledge spirals) during the course.

The situational leadership model applied in this learning methodology was developed by Hersey and Blanchard around the 70s (Fig. 1). It has been implemented at different academic contexts in all the world at different levels of operational capability, both an academic and research level.

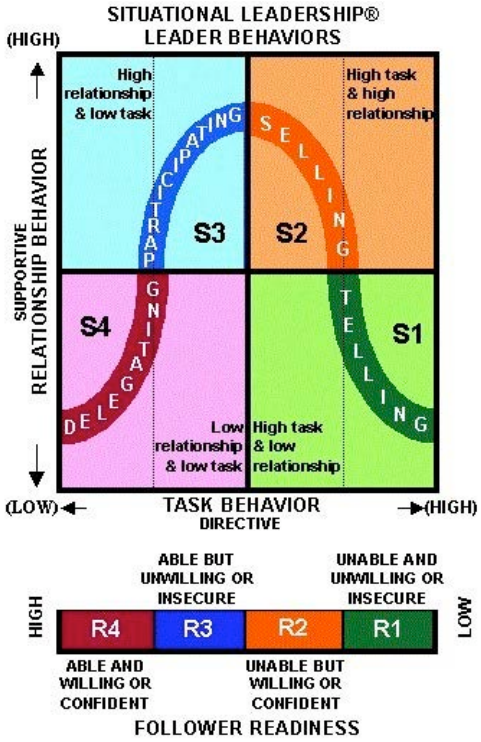

Fig. 1. General scheme about the situational leadership model developed by Hersey and Blanchard.

Following this diagram (Fig. 1) and by applying this model to the student work in the “exhibition oral” activity, the aim of the student is to give a talk with confidence, both at a communication and technical level with a preparation in a fixed period of time (approximately during four months). In this way, the teacher has to exchange the “instructor” role by the “persuasive” role in order to guide for the selection of the exhibition topic and after that, by a “participative” role, like other member of the group but with more experience, to do the monitoring and feedback tasks to achieve a good oral exhibition.

A very important aspect about the informal learning theory of Vygostky [7] is the zone of proximal development (ZPD, Fig. 2). The guided participation of the tutor (teacher) on the roles diagram developed by Hersey and Blanchard (Fig. 1) fits with the participative support behaviour in a good way, that is, by giving less importance to the task (design of the oral exhibition) and more importance to the relationship (monitoring and feedback). This kind of role is typical from a PhD director.

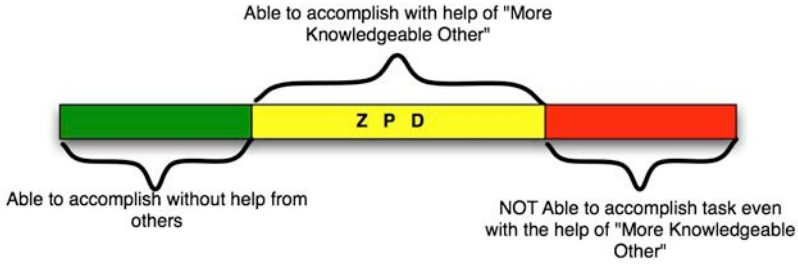

Fig. 2: Zone of proximal development (ZPD) of Vygostky.

Another important aspect of this methodology is the knowledge spirals, whose didactic approach is extracted and applied from the blog of Ángel Fidalgo [8] (Fig. 3), although it is well known in Knowledge Management. As it can be seen in Fig. 3, the knowledge spirals are based on that the knowledge increases by following a complete cycle of different stages: 1) The knowledge is created (for instance, to have an idea); 2) The knowledge is decoded into a format to be easily transmitted; 3) The knowledge is modified to be easily comprehensive and it is used; 4) New knowledge is created. Therefore, relying on the above developed theory within the context of oral exhibitions, it is logical and much more productive, to take advantage of oral exhibitions of previous courses. Thus, the process of improving a topic, repeated in a previous course, involves a seemingly minor effort, but just as intense to be more selective, and just avoiding the literal repetition of the first examples of similar works.

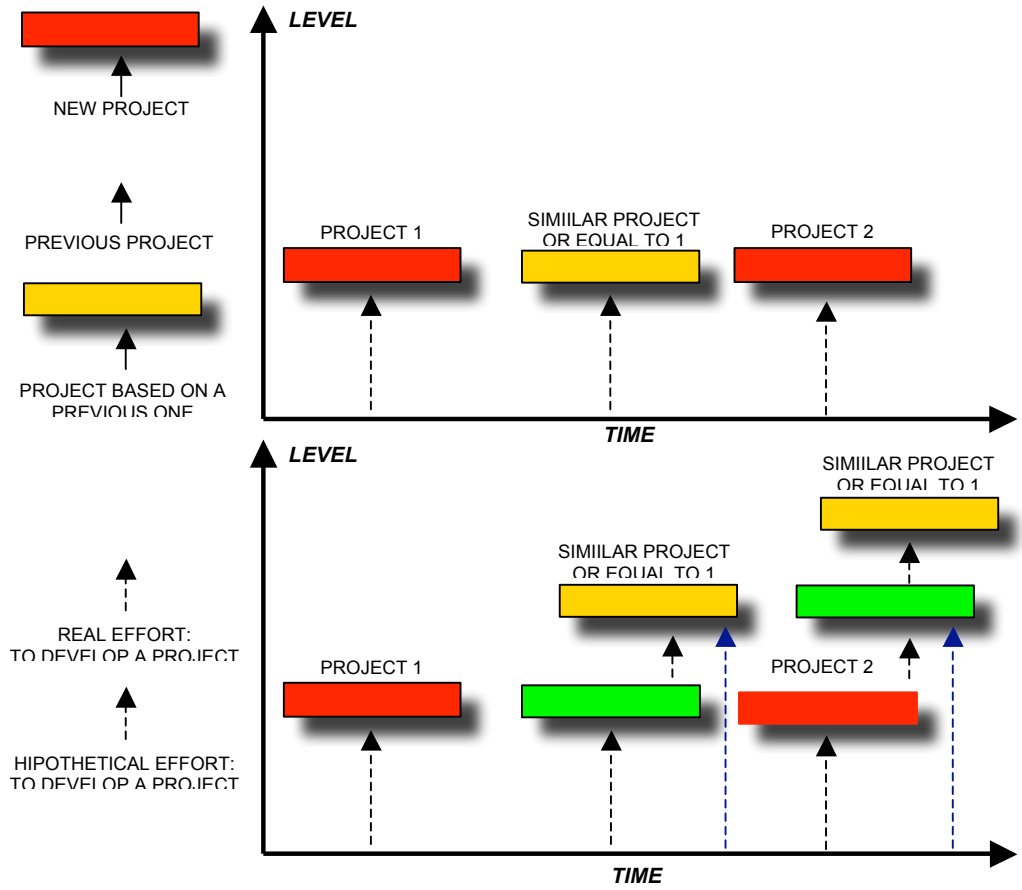

Fig. 3: Implementation scheme of knowledge spirals on educational projects.

Finally, it is worth to point out, like finishing touches of this methodological combination, the zone of optimal cognitive performance of Goleman (Fig. 4a) [1, 10] and the high performance teams of Tuckman-Jensen-Maples [11] (Fig. 4b).

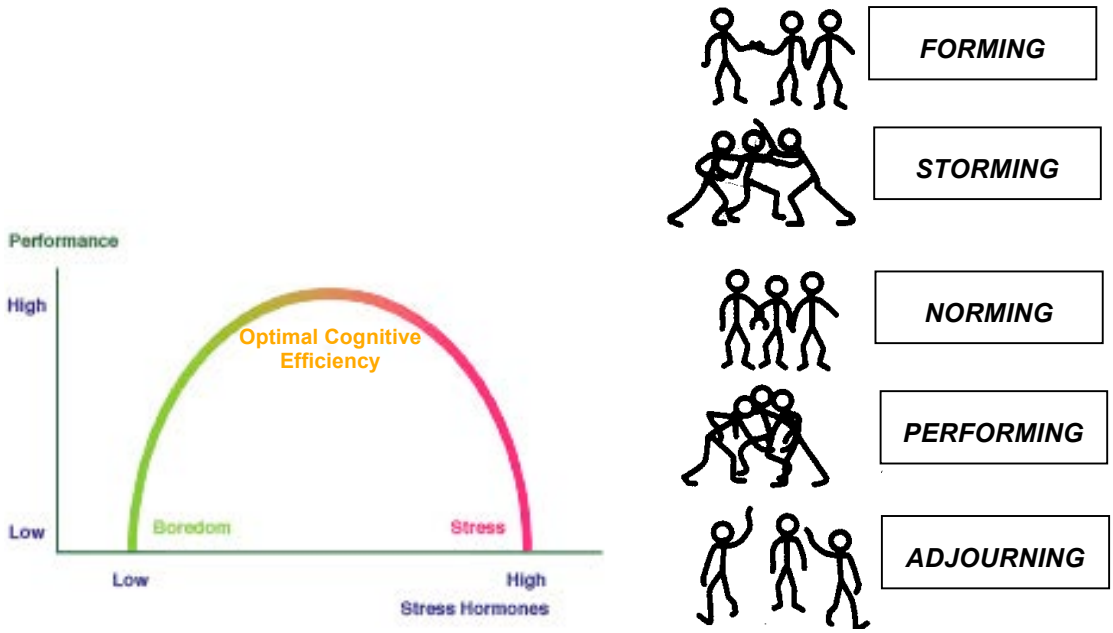

Figura 4: a) Zone of optimal cognitive performance by Goleman
b) Stages of Group development of Tuckman-Jensen-Maples.

In this learning context, to obtain an optimal performance it is very important to configure a set of instruments on the first stage of "persuasion" (Fig. 1) in order to ensure that the learning challenge is intermediate at technical and motivating level. Nowadays, the emotions are considered as an important factor to achieve a high performance. Therefore, the main teacher's task (and business leader) is to try that the students (and employee) reach the maximum of the curve (optimal cognitive efficiency) and they keep this situation. In the same way, the scheme from Fig. 4b can be very useful to achieve a team commitment (students and teacher). Therefore, by mixing both strategies, this implies to propose and monitor learning challenges directly related to the individual abilities of each member of the group and also, directly related to the synergistic and collaborative abilities of group of work.

Consequently, the main objective of this work is to show the result balance and the satisfaction degree of students and teachers about the implementation of these learning strategies (tutoring, feedback and management of high performance groups) for the learning activity "oral exhibition" at different subjects during the last academic years.

2 METHODOLOGY

2.1 Description of the context and the participants

The learning methodology previously explained was implemented in two subjects on the Master in Optometry and Vision Sciences with approximately 12 students per year. The subjects are: Advanced Visual Optics (AVO) [3] and Advanced Visual Ergonomics (AVE) [4]. This methodology has been optimized continuously during the last 10 years as it was also implemented in the subject Visual Ergonomics from the Optics and Optometry Degree [13].

To develop the activity "oral exhibition", the students were divided into groups (teamwork) with 3 students per group and the supervisor/teacher, whose main and important task is focused on the beginning by helping on the initial bibliography search.

2.2 Materials

A list of topics is provided to the students in order to select one to do this activity after the formation of groups (Table 1). The first day of the course, the importance of this transverse learning activity is noted through the description of the teaching guide by pointing out the competences and the relative weight for the final evaluation. Therefore, by means of the implication and commitment between the students, the strategic principles of situational leadership, informal learning, knowledge spirals and teamwork management are used in this first stage.

Table 1: List f topics provided to the students for doing the learning activity "oral exhibition" on the subjects AVO and AVE.

Advance Visual Optics (AVO)	***Advance Visual Ergonomic (AVE)***
Age-related changes of eye parameters	Ocular risks from the use of lasers
Geometrical optics of the refractive surgery	Lighting design of tasks and settings
Optical quality criteria of the retinal image	Visual performance + age + task
Adaptive optics in the human eye	HCI (visual fatigue, displays technologies, etc)
Geometric-optical models for the human eye	Vision and driving (lighting, etc)
Geometric-optical design of intraocular lenses	Vision and sport (visual training)
Innovations on ocular aberrations	Vision and special education (visual training)

A list of instructions is also provided to the students to guide them in the teamwork organization and the time dedication in order to avoid an overload of work [1] with the rest of lectures and subjects. The attendance dedication for this activity associated with group tutorials (GT) is 7.5 h; whereas the non-attendance dedication, both individual and collective one, is 15 h. For instance, on the AVE subject, with 3 ECTS, that is, 75 h of total dedication from the student (22.5 h attendance dedication and 52.2 h non-attendance dedication), the temporal dedication for this activity is about the 30% what justifies the relative weight of the 40% in the final evaluation. On the other hand, the complete teaching dedication of the teacher is similar to the student, that is, 20-25 h.

The initial bibliographic materials provided by the teacher are papers from research journals, conferences, book chapters, international normative (CIE, CEN, ISO, etc), scientific webs (Ophthalmic Hyperguide, UPC lighting, etc), and examples of previous oral exhibition based on the concept of knowledge spirals.

2.3 Instruments

The basic ICT tool for the parallel communication between the teacher and all the groups and to advise and to follow the group progress is the *Learning Context Management System* (LCMS) called "Campus Virtual" developed at the University of Alicante (Fig. 5), in particular the section "Debates (Discussion)". This tool is used in a coordinate way in combination with the participation in group tutorials during the course. Therefore, the progressive tracking and the feedback actions from the teacher are continuous; which is based on the concept of participative and delegating situational leadership (Fig. 1). Nevertheless, this advising, monitoring and feedback activity is possible to be done with free and open software (GoogleDocs, etc).

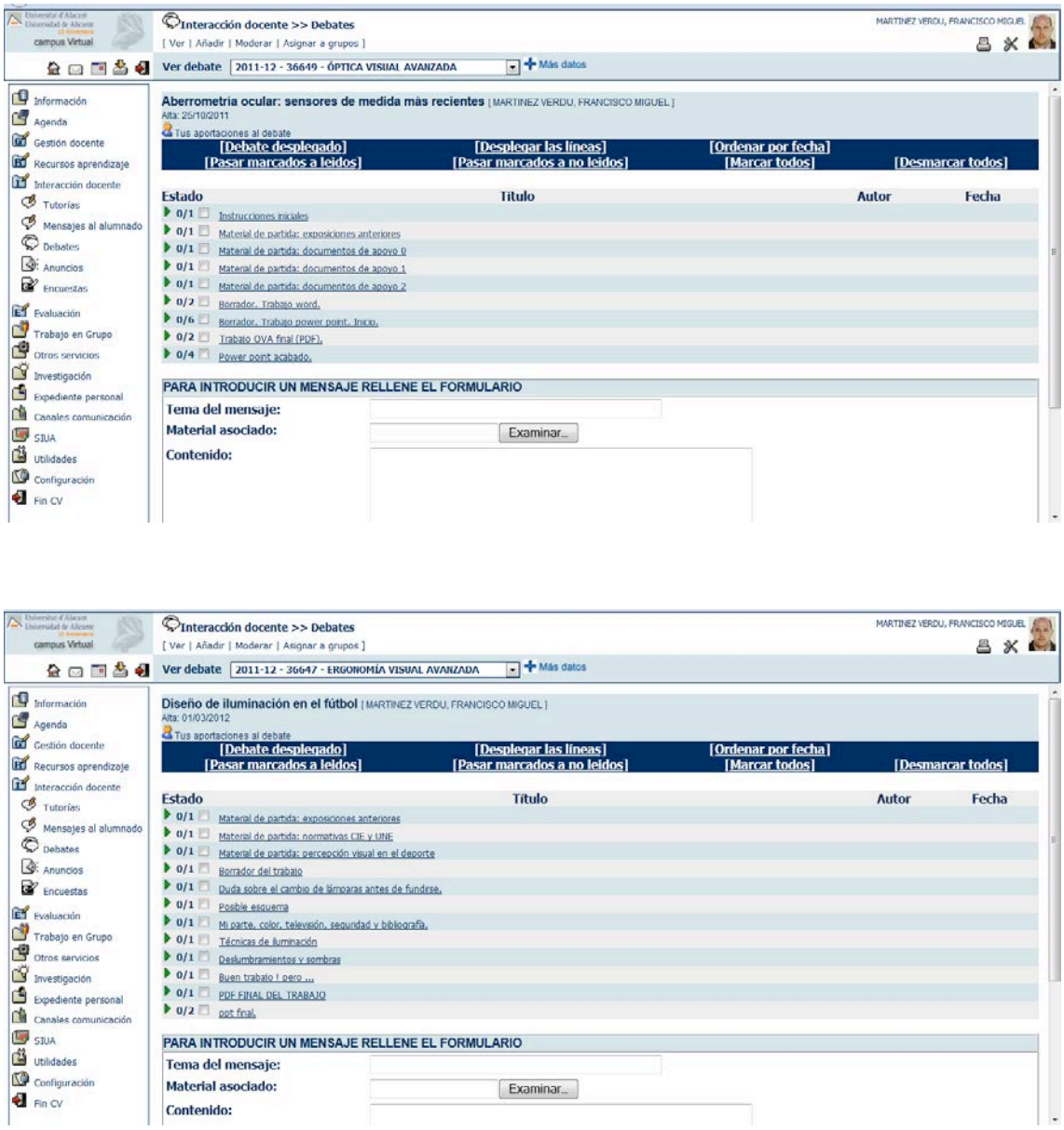

Fig. 5: Examples of monitoring of some exhibition works using the discussion tool inside the *Learning Context Management System* (LCMS) developed at the University of Alicante.

2.4 Procedure

The main challenge of this learning activity is the parallel or multi-level management of the different groups of work from the teacher. Next, the tracking/feedback procedure applied for the teacher is summarized:

1. Offer of the exhibition topics.
2. Selection of the exhibition topic with possible changes.
3. Selection and upload of the basic bibliography (previous oral exhibitions) and complementary information (chapter books, research papers, webs, etc) at the section “Debates (Discussion)” from the CVirtual-UA.
4. Presentation of the initial materials in the first GT. First conversations with the sub-groups.
5. Advising for the selection of the initial information and the pre-design of the oral exhibition at the second GT. Conversations with the sub-groups.
6. Final supervision of the oral exhibition at the third GT. Conversations with the sub-groups.

7. Final activity: oral exhibition and final evaluation of the work, both an individual and collective level.

The evaluation is based on different aspects: level of contents, relationship with the subject, individual participation and presentation design. However, it would be interesting to evaluate other aspects related to generic and specific abilities like the individual leadership ability.

3 RESULTS

The average marks obtained in this learning activity were higher than 8 over 10, that is, 3.2 points regarding the total mark (10) what demonstrates a high performance degree. In general, the satisfaction degree of students and the teacher is very high for this kind of activities. In addition, the students can review the works from other students what allows to complement the technical contents acquired at the subject.

The success of this activity was due to the small number of students involved in these subjects what allowed to motivate and to follow them in a continuous way during all the development of the activity. The main question would be whether this methodology could be applied in other academic contexts, with more students per group and with students less motivated from graduate courses. We think it could be feasible whether the teacher staff is in agreement with this requirement for the continuous student monitoring. However, we don not mean that a teacher has to take charge of this activity for a large number of groups, whether not that it would be very convenient to separate or divide the students into groups like in the practical sessions in the lab. In this way, there would be teachers dedicated only for this learning activity such important due to the transversality for the assimilation of abilities [2].

However, there is another important risk factor to achieve the integral success with this learning activity: the initial strategy for the course design with a well-balanced implementation of assimilation of general, generic and specific abilities. Recent recommendations [14] suggest that it would be convenient to select a reduced group of subjects in each course (two subjects per four-month period). In this way, it would be possible to evaluate gradually all the generic and specific abilities with a good course planning.

Therefore, the implementation of this methodology could be feasible with a large set of groups whether:

- Teacher resources are available, for instance by equating this activity to practical sessions in the lab, for example via tutorial groups (GT). In this way, a teacher/tutor for each 4 teams in a group of 50 students, and therefore, with 16 or 17 teams in total, he would have a teaching load of 8 h.
- The temporal design of this activity is adjusted to the student's course load for the subject.
- This activity is not implemented in an uncoordinated and simultaneous manner in all the subjects in a four-month period, and perhaps preferably for the last two years of undergraduate courses.
- Finally, the teachers involved are well motivated and trained in a technical-bibliographic level and also in the management for high performance groups.

4 CONCLUSIONS

With the use of the ICT tools available at the University of Alicante, and mainly, based on the continuous use, but in an asynchronic and parallel way, of the tool “Debates (Discussion)” from the Campus Virtual, it was possible to put in practice methodological techniques of informal learning, knowledge spirals and situational leadership. These methodological techniques allowed assimilating different individual and collective abilities and also the simultaneous assimilation of several contents and scientific-technical objectives in the learning activity “oral exhibition”. This activity was completely satisfactory for students and teachers involved at different subjects belonging to the Optometry and Vision Sciences Master during the last years.

The success of this methodological combination to assimilate several generic abilities (use of ITCs, oral and written communication, creativity, analysis and synthesis, organization and planning for teamwork and leadership) was due to the fact that the implementation was done for small and motivated groups from master courses, and thus, the students were more mature in a psychological

and cognitive level. However, we consider that this academic experience could be very useful and could be implemented on other academic contexts (for instance, graduate courses) with a bigger number of sub-groups but taking into account the time dedication of students for this kind of activities.

REFERENCES

[1] Martínez-Verdú, F.M. (2010). El impacto de "Bolonia": balance cuatrimestre 1, curso 1. Es hora de hacer balance, marcar prioridades para ser eficientes y aplicar gestión de conocimiento. Blog Xarxes/Redes VrPEQ-ICE. Recovered on 5 May 2012, from: http://blogs.ua.es/redesice/2010/12/28/el-impacto-de-bolonia-balance-cuatrimestre-1-curso-1/ .

[2] Vicerrectorado de Ordenación Académica y Planificación Estratégica. Universidad Politécnica de Madrid (2012). Competencias genéricas. Recursos de apoyo al profesorado. Recovered on 5 May 2012 from: http://innovacioneducativa.upm.es/competencias-genericas/formacionyevaluacion .

[3] Illueca Contri, J.C. & Martínez-Verdú, F.M. (2011). Guía docente de Óptica Visual Avanzada, curso 2011-12. Recovered on 5 May 2012, from: http://cv1.cpd.ua.es/ConsPlanesEstudio/cvFichaAsiEEES.asp?wCodEst=D061&wcodasi=36649&wLengua=C&scaca=2011-12 .

[4] Martínez-Verdú, F.M. (2011). Guía docente de Ergonomía Visual Avanzada, curso 2011-12. Recovered on 5 May 2012, from: http://cv1.cpd.ua.es/ConsPlanesEstudio/cvFichaAsiEEES.asp?wCodEst=D061&wcodasi=36647&wLengua=C&scaca=2011-12 .

[5] Martínez-Verdú, F.M. (2008). Liderazgo situacional aplicado al aula y aprendizaje informal. Blog Pionero en Universitas. Recovered on 5 May 2012, from: http://blogs.ua.es/verduset70/2008/04/23/liderazgo-situacional-aplicado-al-aula-y-aprendizaje-informal/ .

[6] Fernandez, C.F. & Vecchio, R.P. (1997). Situational leadership theory revisited: A test of an across-jobs perspective. The Leadership Quaterly, 8(1), pp. 67-84.

[7] Livingstone, D.W. (2006). Informal learning: conceptual distinctions and preliminary findings. In Bekerman Z, Burbules, N.C. & Silberman-Keller (eds.), Learning in places. The informal education reader (203-228). New York: Peter Lang Publishing.

[8] A. Fidalgo (2008). Espirales de conocimiento. Cómo mejorar el trabajo en equipo y la competitividad …. Blog Innovación Educativa. Recuperado el 5 de mayo de 2012, de: Recovered on 5 May 2012, from: http://innovacioneducativa.wordpress.com/2008/12/10/espirales-de-conocimiento-como-mejorar-el-trabajo-en-equipo-y-la-competitividad/ .

[9] Nonaka, I., Toyama, R. & Konno, N. (2000). SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation. Long Range Planning, 33(1), pp. 5-34.

[10] Goleman, D. (2006). Social Intelligence: The New Science of Human Relationships. New York: Bantam Books.

[11] Hunsaker, P. & Alessandra, T. (2010). The New Art of Managing People, Updated and Revised. New York: Free Press.

[12] Bou Pérez, J.F. (2009). Coaching para docentes, 3ª ed. San Vicente del Raspeig: Club Universitario.

[13] Martínez-Verdú, F.M, et al. (2011). Ergonomía Visual – OpenCourseWare de la Universidad de Alicante, curso 2009-2010. Recovered on 6 May 2012, fromhttp://ocw.ua.es/ciencias-de-la-salud/ergonomia-visual-2009/Course_listing

[14] Vicerrectorado de Ordenación Académica y Planificación Estratégica. Universidad Politécnica de Madrid (2012). Criterios básicos sobre la formación por competencias. Recovered on 6 May 2012 from: http://innovacioneducativa.upm.es/competencias-genericas/criterios