



FAMILIA Y EDUCACIÓN EN UN MUNDO EN CAMBIO

**EVALUATING PSYCHOEDUCATIONAL SUPPORT INTEGRATED INTO AN E-LEARNING SCENARIO:
SUPPORT MODEL AND IMPACT ON ICT PRACTICES**

M^a Elena del Campo

PH. Doctor of Psychology. Holder of University. Psychology faculty. UNED. C/ Juan del Rosal, 10, 28040
Madrid. Spain. Phone: 34-913986257. mcampo@psi.uned.es

Mar Saneiro

Degree in Psychology. Technical Researcher of aDeNu Research Group. UNED.C/ Juan del Rosal, 10, 28040
Madrid. Spain. Phone: 34-913986257. masterdiscap@psi.uned.es

Fecha de recepción: 9 de febrero de 2012

Fecha de admisión: 15 de marzo de 2012

ABSTRACT

The aim of this article is to describe the methodology and plan applied to evaluate the psycho-educational support framework (learning flow, adapted resources and services) integrated into a course delivered through a virtual learning environment (VLE). The adapted course was implemented with the educational specification Instructional Management System Learning Design (IMS-LD). The main adaptations considered were the following: adapted learning flow including alternative contents formats (video, audio, easy reading), alternative assessment activities, additional support resources like glossary, conceptual maps, chat, forum, etc. The evaluation process will allow us to determine the impact of Information and Communication Technologies (ICT) while supporting students with disabilities in higher education. Coherently with the activities already undertaken, the focus of this work is placed on the psycho-educational support integrated into a real learning and teaching scenario where an adapted course was designed integrating the needed adaptations according to the students preferences and needs. This document sections include: i) A theoretical description of the main issues involved into a virtual learning environment that should be considered in order to validate the support framework efficacy and efficiency ii) a description of the methodology to be used in the evaluation process.

Keywords: Dynamic and adaptive psycho-educational support, disabilities; personalization learning strategies and scenarios; e-learning platforms; user model; virtual learning environment.

INTRODUCTION

The psycho-educational support for students with disabilities is a constant need present along the different educational stages, regardless which teaching methodology is used. In particular, phys-



EVALUATING PSYCHOEDUCATIONAL SUPPORT INTEGRATED INTO AN E-LEARNING SCENARIO: SUPPORT MODEL AND IMPACT ON ICT PRACTICES

ical and cognitive barriers on the resources offered through the e-learning platforms appear. From a psycho-educational perspective there are some factors related to the Virtual Learning Environment (VLE) usability and accessibility features that should be considered because otherwise the methodology, which is mediated by technology, will turn into a barrier to teaching and learning. The main factors are: adjustment of the tasks, controllability, privacy, user subjective satisfaction, efficiency, personalization possibilities, adaptation to learning capabilities (Schneiderman, 1998), sensuality of the user interface (Hofmeester et al. 1996; Nielsen 1995).

VLE should be adapted to the learner's physical, cognitive and perceptual abilities and limitations, facilitating the accomplishment of the different social and academic tasks posed to the learner. Following to Blöchl, M, Rumetshofer, H and Wöb, W. (2003) the course adaptation to the user's individual characteristics implies that a learning system has to: (i) consider the learning patterns of each student, (ii) create a training knowledge space, (iii) allow the instructional material organization, and (iv) allow to dynamically select the best suited selection and sequence for each student in a particular course stage. The adoption of this approach has relevant technical implication on the course' design. In order to minimize or remove the obstacles and barriers faced by students with disabilities, a psycho-educational support framework has been designed and integrated into an instructional learning design.

The psychoeducational support framework was designed to advise the training and to improve the learning strategies, capacities and competences that are lacking or inadequate to address tasks proposed in the learning environment. In order to facilitate the psycho-educational support an Instructional Learning Design has been designed and implemented on a course. To offer a personalized service, the course considered the information about the learners and tutors stored in the user model (UM). The learner accesses and fills in the questionnaires about his needs through the Need Assessment Service (NAS), the user model (UM) stores these properties together with other properties such as the learning style or the technological experience using the platform. Taking into account this information, the learner is given access to a course with activities and resources personalized according to the student's profile. The course will enable the learner to learn about the VLE itself and experience the functioning and the available resources. Moreover, the course contents and the resources offered have been designed according to the reusability criterion, which is meant to support learning needs that may arise in different types of disabilities (e.g. information processing, memory, reasoning, attention, language and understanding problems).

Taking into account that information, specific support has been designed and integrated into the course (Del Campo et al, 2010). Learning strategies such as cognitive, meta-cognitive, interaction, communication and affective strategies have been considered along the learning design and applied along the instructional design (content, support resources, activities and assessment). In general the targeted learners received the following resources: work schedule/organizer, study register, adapted learning materials (e.g. shorter lessons, content in video and /or audio format, material enriched with icons, easy reading), glossary of the services/resources available at the platform, glossary of specific terms related with content, forum for comprehension/writing support, conceptual maps, adapted evaluations (true-false, matching, multiple choice, short answer..). Also the support design included both face to face and VLE mediated support.

For the latter, psychoeducational strategies have been applied in the design of a semantic educational recommender system to help the educator both in design and run time to support the psycho-educational needs previously identified. The support is provided both to tutors (when preparing the contents) and to students (when interacting in the course).

A relevant issue from the psychoeducational viewpoint is to validate the support model designed (learning design, adapted support resource, practice activities and alternative assessment form) evaluating its suitability according to the targeted user need and preferences. This evaluation activity will allow us to improve the support to student with a given disability. This document constitutes a



FAMILIA Y EDUCACIÓN EN UN MUNDO EN CAMBIO

first analysis of how the support model has impacted so far in the ICT practices by the roles involved in the teaching/learning process. The document describes the methodology to evaluate the psycho-educational impact of ICT while supporting students with disabilities in higher education. This impact is evaluated by assessing the support activities- availability and suitability- according to the student/teacher need and preferences.

FACTORS IMPACTING ON TEACHING/LEARNING ACTIVITIES

The effectiveness of the support provided along the learning/teaching process depends on different issues that may affect the student and teacher performance in a VLE. Some research on this has been done, Harasim et al (2000), where psychological aspects implied in VLEs have been studied. For instance, anxiety related to communication, time management, speech fluency, the sense of being in competition with others, instead of feeling of sharing a collaborative space. In Swan et al (2000), motivation to work collaboratively is analyzed, as well as the facilitators in synchronous on-line learning environments. These facilitators are related to the user experience of the system, ease of use and satisfaction, clarity of the defined work spaces, etc. In Salmon (2000) some aspects to consider in VLE are reviewed, such as accessibility and motivation, sharing of information, socialization, knowledge building, etc. Becta (2004) analyses how the teacher makes use of technology, motivation, rejection, anxiety, etc. It is also essential to consider that learning for adult students entails different characteristics to those of learning for children and young people. The process is affected both by the past experiences, and by future expectations.

The psychoeducational support model designed seeks to be able to support the learning/teaching activities. The support model is addressed to facilitate a self-regulated learning/teaching improving the student/teacher psycho-educational strategies to enable the autonomy needed to be able to reach an optimal performance. Relevant factors that could have impact on the student and teacher performance when the educational process is mediated through a VLE are described in the next sections.

Teacher performance

Designing

Following Thalheimer (2003) and Whitlock (2001) there are a number of key design elements that the teacher should consider to define a quality course:

To understand how people with and without learning difficulties learn, taking into account this information in order to support the teacher on what can be designed, selected, and made for a more flexible learning course according to the learner needs.

To select and adapt learning material in a user-friendly format depending on the user's profile (e.g. video, audio, colors, fonts, visual aids, appropriate language, avoiding excessive information providing only vitally important information, recognizing the more crucial points of interest, ensuring that pictures and words appear in close proximity in order to help promote better integration between text, graphics...) .Course contents need to be adapted according to the student's abilities. Also it is needed to determine which tools and materials the user is familiarized with or which type of support is required.

To organize the learning material and resources into a modular structure engaging learning presentation where the objectives are clearly specified and the student can easily infer the relationship between the different components, providing different types of tasks addressed to practice in making decision, training to apply knowledge in real environment.

To assess the student achievement through different assessment techniques.



EVALUATING PSYCHOEDUCATIONAL SUPPORT INTEGRATED INTO AN E-LEARNING SCENARIO: SUPPORT MODEL AND IMPACT ON ICT PRACTICES

To communicate with students and monitor them through asynchronous or synchronous sessions, facilitating feedback on progress to give learners opportunities to ask questions and get feedback from instructors or experts, helping the student learn from his/her own mistakes; providing reminders of tasks deadlines

Teaching

The dynamic nature of the ICT and the evolving eLearning technologies could create some problems for teachers in higher education. E-learning initiatives are creating new educational issues for them, such as changing work patterns and in some case the reluctant integration of technology. Lecturers will always play a key role in the effective delivery of eLearning initiatives, following Wilson (2001) *"it is the lecturer not the technology that facilitates the students learning experience"*. But the teaching activities change in a virtual learning environment, in this sense educator should be involved in all stages of elearning course development: determining the audience, designing contents, selecting the best format and providing constant support to the student.

Following to Ribiero (2002) *"the lecturer is not only the knowledge source but is also a knowledge navigator using the Internet as a teaching tool"*. In this sense the lecture teaches using the technology but he also guides the learner along the learning process improving their learning strategies. If the teacher receives the adequate training and support on using technology and learning difficulties, he will probably not be reluctant in accepting aspects of technology during their teaching practices. Often they are not resistant to training in the use of technological applications; they are simply confused as to how to implement such techniques into lectures or more formal teaching methods.

Assessing

Sometime students encounter difficulties on how to prepare online assessments, in other cases the assessment techniques are not adapted to the student preference or needs, as consequence their academic results are not in accordance with their efforts because they can not show their real level of knowledge in a specific subject (Serwatka 2002). Taking into account this information, the assessment process requires an educational understanding of the student needs and the different assessment techniques for a more flexible, easily accessible learning environment, which can be offered through distance learning. On line assessment tools offer educators new ways to impact learning:

Analyzing the student results stored in the databases, by taking into account these data the teacher could facilitate a more suitable assessment form according with the student needs.

Providing immediate individualized feedback for students, this would allow them to study and review content in more depth, to know what their mistakes are, etc.

Providing alternative assessment techniques depending of the user's profile (text, video, audio or combinations of these, multiple choice, fill in blanks...)

Learning performance

Knowledge on ICT skills

The user's previous knowledge on ICT affects how the learner experiences and perceives the learning environment and the proposed academic tasks. O'Connell (2002) proposes that student from non-technical backgrounds or those who are more accustomed to traditional face to face learning environments, experience problems absorbing course material in eLearning environments. The way the student faces them is closely related to his skill and abilities. If the students have not a previous knowledge about how to use the e-learning system, they may feel anxious. ICT skills can prove problematic for students if the requirement for training is not addressed, students will not experience the full benefits of the eLearning environment (Holley, 2002). Furthermore, a lack of IT skills is one of the main reasons for student non-participation in eLearning courses (Wilson 2001).



FAMILIA Y EDUCACIÓN EN UN MUNDO EN CAMBIO

Persistence

Persistence refers to the strategies and compromises that learners make to maintain participation in formal instruction. Learning through a virtual learning environment is a viable methodology to address this goal because the learning environment provides a unique and beneficial one-to-one relationship between teacher and student that is not as common in a traditional teacher-directed classroom. Moreover, the student feels more obligated to complete what he has committed to do (e.g. if a student stops coming, teachers often call and send a message to encourage the student participation). However the learning framework should be flexible to include more alternative forms of instruction according to the student needs and preferences (Coming et al ,1999).

Motivation

The motivation to carry out a course using an e-learning-system differs from user to user, e.g. the possibility to learn at home, the new media, the chance to extend knowledge, the necessity through the job, etc. Various factors have been adduced for poor performance of students in virtual learning environments: volume of work to be completed, students' task orientation and skill knowledge acquisition, students' personality and self-concept, motivation and self-confidence, anxiety, poor technological resources, quality of instructional materials for effective teaching (Oshibodu, 1984, Akpan 1987, Odogwu, 1994). Moreover, of all the personal and psychological variables, motivation seems to be gaining more popularity and leading other variables (Tella, 2003).

Learning strategies

The differences between good learners and bad learners, or between experts and novices, usually lie in their use of learning strategies. Learning strategies described by Del Campo et al. (2010), are used by students to learn. Several researches indicated that embedding learning strategies in a computer program was effective (Barba, 1993 and Thornburg,1991). Learners in a group which had learning strategies embedded inside the program not only performed better than those without learning strategies embedded, but also retained these strategies after months. According to Merrill (1997) and Whitlock (2001) the learner and teacher must manage learning strategies, and they should consider along the learning methodology involved along all academic activities. (e.g. practice, guidance, communication, design, assessment). The ability to cope with learning strategies enables to teachers and students on the one hand to improve their learning/teaching and on the other hand to become more independent users. Learning in a virtual environment requires specific strategies, the learners need to communicate and require the ability to share knowledge and skills from distance. Interactive multimedia provides the stimulation for students to be actively involved in their learning. They can be encouraged to think by themselves to gain a better understanding of the content material. An effective and efficacy learning methodology must allow the students to learn in their own way or own time controlling their own experience is likely to learn the most.

SUPPORT MODEL BASED ON LEARNING STRATEGIES

E-learning benefits can be heightened when e-learning is dynamically personalized to both groups and individuals. The idea is to guide teacher and learner to a self-regulated teaching/learning process and apply the use of the learning strategies described in Del Campo et al. (2010). The adapted course designed by the authors provides dynamic support to optimize the user's learning effort to acquire and apply knowledge, and to perform the academic tasks involved in Higher Education. As aforementioned the support model will provide adapted content in alternative format (video, audio, easy reading...), adapted course structure (including a sequential flow of activities, glossary,



EVALUATING PSYCHOEDUCATIONAL SUPPORT INTEGRATED INTO AN E-LEARNING SCENARIO: SUPPORT MODEL AND IMPACT ON ICT PRACTICES

calendar, conceptual maps, summaries), communication tools (forum, chat,..). As it is justified in Rodríguez-Ascaso et al. (2008) the adaptations provided when a course is designed may not be sufficient to support students, and they should also take runtime adaptations on board (Boticario and Santos, 2007). For this reason, the psycho-educational support is complemented through the recommender system (RS). The idea is to show the recommendations as a list of actions that the user can carry out in the system. Each element of the list (i.e. action) contains a link to the service of the platform where the recommended action can be taken. The user can decide whether to read the recommendations or not (and of course, once read, she also has the freedom whether to follow them or not). The recommendations address the different roles identified in the scenario, so they are focused on the different role involved in the virtual learning environment.

In order to provide psycho-educational support an inclusive learning, accessibility requirements have to be necessarily met. This implies considering personal needs and preferences regarding the interaction with the contents and devices. The main technological support to cope with this functionality is the management of the user properties in the User Model server. In particular, eLearning users have a wide variety of backgrounds, interests, level of experience on the use of resources, etc. and they demand an environment that adapts to each individual user needs. The adaptation should be based on standards and focused on user's needs, which, in turn, will be managed in terms of users' models.

For this purpose, users have to be modelled according to their preferences on accessing the technology and the electronic resources. When the student accesses the platform, he fills some questionnaires, and values are stored as properties in the user profile. The user's characteristics are linked with the resources that they can be defined in terms of conditions in the learning course. The information managed includes: (preferences, demographics, learning style, progress, competences). The dynamic support facilitated during the learning process is thus determined by the user profile.

EVALUATION METHODOLOGY

Objective

To elicit an evaluation methodology of the psycho-educational support framework designed and integrated into an instructional learning design, considering all the roles and academic activities that should carry out by them along the teaching/learning process.

Participants and sampling procedure

The target population for the evaluation process is comprised of all roles involved in the teaching/learning process at Higher Education institution: teacher, tutor, students, disability officer, and administrative staff. The evaluation is to be done through:

Validation by psycho-educational experts: A group of psycho-educational experts with interest in learning and special needs will evaluate the support model designed (course content, learning design, adapted support resource, practice activities and alternative assessment form) considering its suitability according with the targeted user need and preferences.

Validation with roles involved in the educational process: like content designers, disability officers, lecturers, and administrative staff.

Validation with end-user: Students with or without disability registered on the course will be a group volunteers recruited across different educational disciplines and backgrounds.

Variables to be assessed

Evaluation methodology will include the analysis of different variables that could affect to each user group performance according with his different functions and activities through the learning process. The following variables will be considered:



FAMILIA Y EDUCACIÓN EN UN MUNDO EN CAMBIO

User interactions with resources (contents, services) in order to analyze them from the learning usability viewpoint.

Efficiency and efficacy of the support provided to teacher and student, according with the user profile (learning styles, accessibility preferences, psycho-educational needs, previous knowledge, competency level per course, etc).

Motivation and satisfaction perceived by the users about service and resources provided in the support framework.

Persistence: to evaluate how the component, resource and services integrated into the support framework impact on the student persistence improving the learner goal setting, offering a flexible support using communication tools (synchronous and asynchronous), providing a structured formation programs, designing resource and service according with the student needs and barriers.

Generalization and transfer of learning strategies acquired by user. Efficacy and efficiency of the learning strategies implemented through the different resources, component and services integrated into the support framework should be evaluated into a real learning scenario.

- Impact on teacher performance: the impact of the support model on the teacher performance will be evaluated considering different topics like Designing, Teaching, Assessing.

Procedure

All the students will receive train with the course, introducing them to online learning. This training will occur at the beginning of their participation in a course. But later they will be assigned into two different groups. The performance of the experimental group will be compared to the performance of the control group.

- A control group: student with and without disability who will receive the standard version of the course of study, where the resources and service available in the support framework (forum, chat, calendar, adapted contents, etc) will not be integrated.
- A experimental group: student with and without disability who will receive the course of study, with all resources and service available in the support framework (forum, chat, calendar, adapted contents, recommender system, etc.).

Instruments

Different instruments can be used in order to gather data about the impact of the support model on ICT practices. We will attain both learner and teachers opinions through:

- Interviews: focused on to collect information about the impact of support model (e.g. content suitability, resources and adaptations, success in current course of study compared to previous courses; opinions regarding the training course itself, how the support resources and services are of satisfactory quality to help meet their needs.)
- Questionnaires: The questionnaire gathers from the participant's demographic information like sex, age, learning difficulties, accessibility preferences. Therefore it contains items in the scale of Likert type format. In particular, the user will be asked about his motivation, satisfaction, suitability, availability, etc.
- Data on academic performance: this information will be gathered through achievement assessments constructed by the teacher in the subject content area, as well as by analyzing the rate of drop out.
- Data on real interaction between the user and the platform: such as the participation in forums, access to specific contents, etc. will be gathered through the tracking mechanisms provided by the VLE.



EVALUATING PSYCHOEDUCATIONAL SUPPORT INTEGRATED INTO AN E-LEARNING SCENARIO: SUPPORT MODEL AND IMPACT ON ICT PRACTICES

CONCLUSIONS

In a previous paper (Del Campo et al. 2010), we have presented how psycho-educational support can be offered through dynamic guidance provided by an adapted instructional learning design. To illustrate our approach, a typical scenario in higher education universities that covers the psycho-educational requirements to support students with disabilities was showed.

In this paper we have showed a methodology to evaluate the support model framework and to analyze how this model can impact the ICT practices carried out by different roles involved in the teaching/learning process in an e-learning scenario. The application of this evaluation is the next step. Results will be provided in another future publication.

REFERENCES

- Barba, R., "The effects of embedding an instructional map in hypermedia courseware", *Journal of Research on Computing in Education*, 25 (4) 1993, pp. 405-412.
- Boticario, J.G., Santos, O.C.(2007) An open IMS-based user modelling approach for developing adaptive learning management systems. *Journal of Interactive Media in Education Adaptation and IMS Learning Design. Special Issue, 2007/01 (September)*.
- Blöchl, M, Rumetshofer,H and Wöß,W. (2003). Individualized E-Learning Systems Enabled by a Semantically Determined Adaptation of Learning Fragments.Proceedings of the 14th International Workshop on Database and Expert Systems Applications (DEXA'03). Description of the evaluation scenario
- Comings, J.P. Parella ,A. & Socione, L., (1999). Persistence among adult basic education students in pre-GED classes.National Center for the Study of Adult Learning and Literacy, Cambridge, MA., p.3.
- Del Campo, E., M. Saneiro, O. C. Santos, J. G. Boticario, (2010). "Psycho-educational support for students with disabilities in higher education, applied through a recommender system integrated in a virtual learning environment", *International Journal of Developmental and Educational Psychology*, vol. 3, pp. 237-247.
- Harasim, L., Hiltz, S., Turoff, M. &Teles, L. (2000). *Redes de aprendizaje: Guía para la enseñanza y el aprendizaje en red* , Barcelona:Gedisa/EDIUOC (Versión en Inglés Learning networks. A fiel guide to teaching and learning online. Cambridge (EE.UU.): Massachusetts Institute of Technology,1995)
- Hofmeester, G. H.(1996).Sensuality in product design: a structured approach. En: CHI'96 Conference Proceedings (1996). p. 428-435
- Holley, D. (2002). "Which room is the virtual seminar in please?". *Education and Training*, 44(3), pp. 112-121.
- Merrill, D. M. (1997). *Instructional Strategies that Teach*. CBT Solutions, November/December, 1-11.
- Nielsen, J. (1993). *Usability engineering*. New York: Boston: Academic Press.
- O'Connell, B. (2002). A Poor Grade for ELearning. (Classroom Students Did Better). *Workforce*, 81(7), p. 15.
- Odogwu, H.N. (1994). Primary Secondary Teachers and the Teaching of time Concept in Schools. *Education Today*, 7(2).
- Oshibodu, B.M. (1984). An investigation of teacher's instructional problems in mathematics. *Benin Journal of Education Studies*, 11(3), 43-54.
- Ribiero, T. (2002). From a distance: Look at distance learning's increased following. *Education*, 152(9), p. 85.



FAMILIA Y EDUCACIÓN EN UN MUNDO EN CAMBIO

- Rodríguez-Ascaso A., Santos O C., del Campo E., Saneiro M., Boticario J G., (2008) Personalised support for students with disabilities based on psycho-educational guidelines”, Proceedings of the IEEE international conference on advance learning technology (ICALT 2008): workshop on advanced learning technologies for disabled and non-disabled people (WALTD), Santander, Spain, IEEE Computer Society Press
- Salmon, G. (2000). E-moderating: The key to teaching and learning online, London: Kogan Page.
- Santos, O.C., Boticario, J.G., Raffenne, E., Pastor, R. (2007). Why using dotLRN? UNED use cases. FLOSS (Free/Libre/Open Source Systems) International Conference.
- Serwatka, J. (2002). Improving student performance in distance learning courses. *The Journal of Technological Horizons In Education*, 29(9), pp. 46-52.
- Shneiderman, B.(1998). Designing the user interface – strategies for effective human-computer interaction. Reading: Addison-Wesley, 1998.
- Swan, K., Shea, P. Fredericksen, E., Pickett, A. Pelz, W., Maher, G. (2000). Building knowledge building communities: consistency, contact and communication in virtual classroom, *Journal Educational Computing Research*, 23 (4), 359-381.
- Tella,A. (2003).The Impact of Motivation on Student’s Academic Achievement and Learning Outcomes in Mathematics among Secondary School Students in Nigeria.*Eurasia Journal of Mathematics, Science & Technology Education*, 2007, 3(2), 149-156
- Thornburg, D., Pea, R., “Synthesizing instructional technologies and educational culture: Exploring cognition and metacognition in the social studies”, *Journal of Educational Computing Research*, 7 (2) 1991, pp. 121-164.
- Wilson, J. (2001). Lessons of a Virtual Timetable: Education. *The Economist*, (17 February), p. 1 (CD-ROM).
- Wilson,B (2004). Bounded Community: Designing and facilitating learning communities in formal courses.*The International Review of Research in Open and Distance Learning*,Vol 5, No 3 (2004).
- Whitlock, Q. (2001) Course design for online learning – what’s gone wrong. In J. Stephenson (Ed.). *Teaching Online & Learning Online: Pedagogies for New Technologies*, (pp.182-191). London: Kogan Page Limited.

