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Understanding Learning Skills in Online Learning Environments

by Higher Education Students

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**Abstract**

Can virtual environments promote learning skills such that higher education students understand them? This paper examines the impact of new online educational scenarios as to how self-learning skills are perceived. The research covered 277 higher education students grouped into classrooms, and their tutoring included an online learning component. At the end of the academic semester, students responded to a range of self-learning skills adapted to learning in virtual environments. All participants attended Social and Human Sciences course units in higher education, in different institutions, respectively the State Public University and Private Polytechnic institutions. The results of the study show that virtual learning environments, anchored in a design focused on the development of skills and in a teaching model based on the principles of constructivism, autonomy and interaction can be positive in how higher education students perceive learning skills, according to the following dimensions: *Active Learning, Learning Initiative and Autonomy*. The study examines the implications of the findings, from the perspective of both the practical intervention and the reflection on the future of educational processes.

**Keywords:** Education; Learning Skills; Perception of self-learning; Online Environments; Higher Education.

## Introduction

Developments in technology and the Internet are on the agenda. They have fostered the emergence of a digital society that keeps pace with the marked changes in the daily management of peoples' lives, sets the pace for economy, for the labour market and relationships, thus driving the introduction of paradigms, models, more appropriate educational communication processes and new learning scenarios (Babin, 1993; Moreira, 2012). Indeed, the relationship between technology and pedagogy has changed drastically; the traditional teaching paradigm based on the "recommended school book" or on the teacher's "textbook", on the dominant figure of the teacher as the "source of knowledge" and on the strict observance of a pre-set curriculum has bowed to the need to reorganize education and higher education levels. The usability of digital technologies has become imperative. The easy access to information and the pressing need to update knowledge give teachers and students new experiences, the latter predisposed to accountability and to control their learning, supported by teachers in research tasks, autonomy and regulation. The fact that students have materials other than printed ones that compete with multimedia and attractive, common computer devices has enabled a closer contact with educational fields and learning environments in which information is available online,

bringing in the challenge of a different dynamics as presenting new limits for the freedom of teaching and learning. Students are no longer "mere" users of products or providers of answers, having become co-authors of processes and participants in the questioning of contents to be learned, co-producers of knowledge-supporting documents.

As higher education policy makers are aware that the improvement of education quality implies using Information and Communication Technologies, they have come up with reforming measures and have included in their strategic plans new operational structures and schemes, integrating solutions that involve e-learning and/or b-learning (Monteiro & Moreira, 2012).

However, not many higher education institutions actually promote real learning alternatives in these different scenarios. We have found that these initiatives largely tend to replicate existing policies, there being cases in which new environments are used as an attraction, yet they preserve conservative educational practices. The example of course contents being transposed from paper or oral presentations to virtual learning computer environments clearly illustrates this tendency to converge and perpetuate the "traditional". It also translates the fragmentation of knowledge, the transformation of the teacher's role to that of a distant tutor who often only

presents the project proposal but rules out the participation in its design and development. "Platforms" are sometimes used as information repositories, offering educational materials to students and collecting tasks performed and activities completed online for greater comfort and misleading modernization. In other cases, they are viewed as competing with the teacher's effort and dedication to students and with the preparation of classes. So we have confrontational attitudes, given the alternative of learning in a space and time different from the teaching practice. However, the role of distance learning is gradually increasing in significance.

E-learning has proven to be an opportunity for creating learning communities as it provides learning infrastructures accessible to all, irrespective of physical access. At the same time, while in e-learning, the relational nature of human cognition is preserved and the development of horizontal and cross-cutting skills is fostered in the students' social and cooperative construction, in facilitated communications and openness in the pedagogical relationship (Anderson, 2007).

Moreover, to bring about such a change, the teaching profession needs to be restructured, and the role of the teacher-tutor or of whoever follows-up the formative pathway needs to be properly understood. Innovation will, to a great

extent, provide the grounds for co-participating in and discussing pedagogy issues, developing what in Anglo-Saxon literature has gained impetus and has been called *scholarship of teaching and learning* (Shulman, 2000) or "learning communities" (McMillan & Chavis, 1986; Senge, 1990). It is, therefore, important that all those involved in higher education master such skills as team work and resource management, and keep the communication lines open on quality rather than on individuality, favouring a culture of collegiality and mutual help in solving pedagogical problems (Vieira, Almeida & Silva, 2008).

Studies on the experience of students, particularly as regards academic success/failure or academic integration processes in Portugal (Tavares, 2000; Tavares & Silva, 2001) have shed some light on what it means to learn in higher education. However, they provide scarce information on the role played by virtual learning environments anchored in constructivist pedagogical models and supported by learning management systems, in developing learning skills of higher education students. In recent years, we have seen the advent of various learning models in virtual environments related to the development of learning communities (Garrison & Kanuca, 2004; Moreira, 2012), which have sought to settle these concerns and enabled thoughts on the "new" roles that students and teachers

are asked to play in these new learning environments. Among the existing models, we highlight the e-moderation model (Salmon, 2000) related to the development of learning communities and the learning processes therein.

The aim of our study is to examine the impact of the new learning scenarios and of this new model on how higher education students view self-learning skills, in particular as regards self-sufficiency, accountability, self-guidance and self-regulation, confidence in their own skills, the issue of questioning, planning and decision making, the application of knowledge to practical situations, in investing and being motivated to learn, as well as exploring and deepening of learning, as reflected in improved outcomes.

The concept of learning skills under analysis is a predictive variable of the academic relation, associated to openness towards the learning opportunities, made possible by day-to-day experiences, and the ability to effectively use these formal and informal experiences. So, to engage in learning is to awaken within the self such skills as self-reliance, self-responsibility, self-confidence in pursuing goals and active participation in various social contexts, qualities that are required in all walks of life (Nyhan, 1996).

As we know, the ability to learn by oneself is now an essential requirement for school achievement. An independent student is one who can identify a need for learning and uses its personal resources effectively, using cognitive, social and creativity skills in a systematic and flexible way (Faria, Rurato & Lima Santos, 2000).

This notion is close to the competence that authors such as Rurato (2008) calls self-learning, i.e., key and core qualification that implies that each individual has its own awareness, motivation, confidence and ability to learn continuously. In order to learn to learn, student have to know the strengths and weaknesses of their skills and qualifications, know and understand their preferred learning strategies and be able to seek available formative and support opportunities.

Indeed, the ability to learn by oneself is a basic human capacity, which becomes an essential requirement for living in today's world, self-learning becoming a way of life. However, it should be noted that learning to learn requires intention, effort, discipline and responsibility, not to be confused with simplicity, laid-back attitude or shallowness of the learning process (Lima Santos & Gomes, 2009).

More than learning, learning to learn is an important means to progress, for enrichment and personal and social well-being.

This regulatory and controlled dimension to promote the ability to compete, cooperate and act is more and more decisive for the individual and society, due to the knowledge that they have accessed, built and mobilised (Lima Santos, Rurato & Faria, 2000).

Learning to learn requires the acquisition of basic core competences, such as literacy and numeracy, scientific thought, command of the mother-tongue and other languages; but the management of knowledge, skills and attitudes also requires self-control and monitoring of processes to achieve expected results. However, this learning "style" is often prior to and continued after formal learning contexts. Rurato (2008) corroborates the idea that the self-learning competence applies to both traditional and formal learning situations and informal learning experiences provided by day-to-day situations. The author points out that individuals who have this competence view learning as a natural, everyday experience and are able to explore opportunities by effectively using formal and structured teaching experiences, while benefitting from multimedia transmission systems and open learning (Rurato, 2008).

Currently, the term *self-learning* appears in online learning environments often associated to an educational philosophy of student-centred learning. In other words, the relationship

between self-learning and the educational model proposed is vast and flexible, enabling various ways of conducting the process, either face-to-face or distance (Alonso, López, Manrique & Viñes, 2005). The focus on self-learning places the student, the learning goals and contents in direct relation, and separates the student at the center of the process of the external educational agents.

To engage in self-learning is to awaken the capacity of self-sufficiency, self-responsibility, self-confidence in the ability to achieve goals and participate actively in various contexts (Lima Santos, *et al.* 2000).

Magalhães (2011) also states that self-learning must be defined as the ability to learn in a pro-active, responsible and independent way, in the sense that the student (re)builds its own learning pathway, chooses the contents to be acquired and self-regulates the learning process (although not necessarily alone).

More than a process through which students can gain knowledge, be educated and study independently based on the available contents, self-learning can allow learners to learn in an active, independent and responsible way, learning at their own pace and development; learn at their own initiative, steering their own learning process; update and renew their knowledge and skills

according to their needs; build their knowledge that will enable them to deal with future challenges, and value and complement their training (Rurato, 2008).

So, based on these assumptions, we believe it is crucial to invest in strategies that promote the sense of learning competence. The study of the sense of competence in higher education students is particularly relevant in this phase, and mostly in the early years, because young adults face various personal and external challenges that test their internal resources and the ability to deal with ambiguity and uncertainty. Being a less structured learning context and showing less constraints than other learning contexts, higher education requires students to have a greater degree of self-regulation that enhances the expression of differences in motivation and self-learning. In fact, in this period there seem to be more chances of exploring alternatives, making investments and increasing knowledge of oneself and one's abilities. The goal is, therefore, to learn to use personal resources effectively and maximize them, using cognitive, social and creativity abilities in a flexible way.

In the pedagogical relationship, guidelines provided by the teacher-tutor facilitate personal constructs and shared learning. The role of the teacher is that of a moderator. As such, our

reference conceptual framework is the already mentioned *e-moderating* model by Salmon (2000). This model is generally regarded as one of the most complete and integrated proposals as regards the role of the teacher in these educational environments. The model developed by Gilly Salmon (2000) is based on five levels or stages that guide the activity of the teacher-moderator in working with students in order to build virtual learning communities. This is one of the more structured proposals for the development of learning communities, in which each student's contribution has its own meaning and the role of the teacher (e-moderator) is a basic structural one. At its roots, this model is based on the activity of the e-moderator and aims at the student's independence, at the work with other group members. According to Salmon (2000), for the online learning process to be successful, students need support through a structured development process. This support is based on the following five stages that gradually make participants more independent in their learning process: *access and motivation, online socialisation, information exchange, construction of knowledge, and development.*

In short, our research aims to put into perspective possible and alternative learning scenarios and designs in the field of

pedagogy in higher education, studying the impact of this model on the learning competence of students.

### **Methodological aspects**

Our study basically aims to examine the impact of virtual learning environments and of an online pedagogical model on how higher education students view learning competence. Due to the nature of the concerns, we felt that an approach such as the *Design Based Research* (DBR) was relevant, based on the *design experiments* concepts (Wang & Hannafin, 2005).

According to Wang and Hannafin (2005), this strict and reflexive research methodology in education is better suited to test and refine innovative learning environments. Teachers assume the role of co-researchers, contributing to the development of the *design* theory in order to implement the innovations.

The methodology seeks to study educational problems in real pedagogical contexts, in order to solve relevant and practical problems, combining theory and practice through a collaborative link between researchers and professionals who seek to understand, document, interpret and improve the educational practice.

According to Dede (2005), DBR is associated to a pragmatic epistemology that considers the theory of learning achieved collaboratively by those involved in the process. The aim of this research is to solve real problems and, at the same time, allows the construction of *design* principles that can influence future decisions.

Indeed, *Design Based Research* represents a new research paradigm in learning to teach and is a systematic and flexible methodological strategy whose aim is to improve teachers' practices through interactive reflection (Wang & Hannafin, 2005); an innovative research strategy involving the construction of a theory that feeds on a plan tested in a natural context (Barab, Araci & Jackson, 2005); a methodology strategy of a qualitative and quantitative nature with implications on the development of new teaching and learning theories (Dede, 2005); and a strategy that allows the development of technological tools and theories that can be used to understand how students learn (Barab & Squire, 2004).

By focusing on the teaching-learning processes, on the features of the learning object/artefact and also on the teacher's knowledge (disciplinary, scientific, educational,...) in a real classroom context, *DBR* allows, firstly, educational research and pedagogical practice to draw closer and, secondly,

the construction of educational knowledge based on practice; in which researcher, teachers and students no longer have fixed roles in the entire process; and in which there is a continuous and flexible review of the project design, with a view to its practical success, so redesigns exist.

### **Participants**

In this sense, the empirical element of our suggested research follows a quantitative procedure arising from the outlined, quasi-experimental plan, because we included in our study 277 students from public and private, university and polytechnic institutions, already formally included in classrooms, without randomisation. We have considered the introduction of teaching-learning models and methodologies in course units of Education and Psychology courses as being statistically analysable, the impact of which we intend to know and systematise, suggesting a set of criterion variables and examining their impact based on predictors related to student characteristics and the analysis of tasks they are faced with.

**Table 1. Characterisation of the cohort according to institution, gender and age bracket**

Gender			Institution		Total	
			Public University	Private Polytechnic		
Female	Age	17 to 24	N	61	44	105
			%	35.7%	25.7%	61.4%
	Age	25 to 34	N	14	20	34
			%	8.2%	11.7%	19.9%
	Age	35 to 44	N	10	13	23
			%	5.8%	7.6%	13.5%
	Age	45 to 54	N	2	7	9
			%	1.2%	4.1%	5.3%
	Total		N	87	84	171
			%	50.9%	49.1%	100.0%
Male	Age	17 to 24	N	35	31	66
			%	33.0%	29.2%	62.3%
	Age	25 to 34	N	9	17	26
			%	8.5%	16.0%	24.5%
	Age	35 to 44	N	4	5	9
			%	3.8%	4.7%	8.5%
	Age	45 to 54	N	2	3	5
			%	1.9%	2.8%	4.7%
	Total		N	50	56	106
			%	47.2%	52.8%	100.0%
Total	Age	17 to 24	N	96	75	171
			%	34.7%	27.1%	61.7%
		25 to	N	23	37	60

	34	%	8.3%	13.4%	21.7%
	35 to	N	14	18	32
	44	%	5.1%	6.5%	11.6%
	45 to	N	4	10	14
	54	%	1.4%	3.6%	5.1%
Total		N	137	140	277
		%	49.5%	50.5%	100.0%

### Instrument

The instrument used for collecting data was the *Self-Learning Competence Scale* (Lima Santos, et al. 2000), with its 24 items adapted to online environments, for which the authors have granted their permission, given the relevance of self-learning studies in these "new" environments.

As mentioned, the *Self-Learning Competence Scale* - ECAA consists of 24 items, each rated on a 5-point *Likert*-like scale in which "1-Totally Disagree" indicates low competence and "5-Totally Agree" indicates high competence, showing the degree of each individual's self-characterisation in each field of competence. The ECAA items are organised in three general dimensions: (i) *Active Learning or Accepting Personal Responsibility through Learning*; (ii) *Learning Initiative and Guidance to Experience*; and (iii) *Learning Autonomy*.

The first one called:

(i) *Active Learning or Accepting Personal Responsibility through Learning* assesses the perception of the ability to learn in various situations and with others, and the acceptance of personal responsibility through learning, consisting of 12 items: (1) "When I have doubts, I ask questions in virtual classrooms (forums)"; (4) "I try to put what I learn into practice"; (7) I look up information on what I need to know more in online environments; (10) I am more attentive to the participation of Others in virtual classrooms to learn from these; (13) "I can learn how to overcome difficulties that arise in online environments"; (16) "I'm always learning from the activities prepared by the teacher in the learning management system (platform)"; (19) "I always learn something new from the activities in the learning management system (platform)"; (20) "In the virtual classrooms (forums), I can learn from points of view different from mine"; (21) "I know I can learn from my mistakes in online learning environments"; (22) "In online learning environments, I am able to analyse old problems in new ways"; (23) "I try to learn from all situations provided by the teacher in the learning management system (platform)" and (24) "I like to learn in online environments to improve personally and academically".

(ii) *Learning Initiative and Guidance to Experience*, which assesses how learning is guided to the experience of specific problems, as well as the initiative in the choice of learning, consisting of 6 items: (2) "I guide my experiences in online learning according to specific problems."; (5) "I take my experience into consideration when choosing new types of learning"; (8) "I am able to better manage my learning in online environments"; (11) "In an online environment, I steer my learning to what is useful to me"; (14) "I am able to decide what I should learn in an online environment" and (17) "In online environments, I am responsible for my learning".

(iii) and *Learning Autonomy*, which assesses autonomy in learning according to personal needs, consisting of 6 items: (3) "I'm a more active person in the learning management system activities (platform) when I know why I'm going to learn something"; (6) "I want to learn by myself in online environments"; (9) "My ability to learn by myself in online environments is changing"; (12) "In online environments, I know better than others what I need to learn"; (15) "In online environments, I learn well what best allows me to face new situations"; and (18) "In online environments, I learn better what I need to perform my tasks well".

Thus, we have maintained the structure of the self-learning concept, adapted to the virtual environment learning context.

### **Principles and elements of the educational environment**

Before conceiving the educational environment design of course units (UC), we have to consider a few principles that can be generally applied to online environments, including: (i) the design must focus on learning to achieve specific, doable and measurable goals; (ii) the design must focus on performance or significant achievements; (iii) the design must enable results to be measured in a reliable and valid way, developing the instruments needed to evaluate performance, and (iv) the design must be empirical and self-regulated.

In addition to these principles, some key elements were also considered for the proper development of the online teaching-learning process. First, the course unit produced an educational guide that served as principal reference for the student as regards contents, structure and activities. We sought to horizontally articulate in its design all its elements and provide an intelligible vertical articulation. We also had to clearly describe the goals of learning, described according to expected outcomes and not only focused on contents. The guide includes learning resources to be used by students (for ex., books and articles they should read and those they should consult in order to deepen their knowledge; videos, images and

Internet websites related to study topics), e-activities to be carried out and assessment criteria. Note that, despite the specific instructions in the guide, its application is flexible. The principles of flexibility and adaptability, believed by Garrison and Anderson (2003) to be indispensable in constructivist environments, have been present all along.

Secondly, different resources related to learning goals were made available on the platform. Articles on the topics discussed and online multimedia contents (audio and video) were made available to students, aiming to motivate and create a bond between students and the teacher.

Thirdly, there was a huge concern with the development of e-activities to be done by students, i.e., focusing the entire process on the problems that students should solve and, consequently, developing learning experiences (individual and collaborative).

Fourthly, the dynamics of virtual classrooms (forums), through asynchronous communication, was a decisive and structuring factor of the whole educational process. As a result, we sought to promote synchronous communication in virtual classrooms in all course unit topics, through three types of communication patterns: (i) interaction student(s)-contents, (ii) interaction student(s)-teacher, and (iii) interaction

student(s)-student(s). The forum was the preferred means of communication to enable student-teacher debates.

We would like to say that in addition to the environment, the methodological requirements based on well established models coherent with learning processes supposedly facilitate learning and, therefore, the positive perception of learning competence.

### **Outcomes**

Data were computer-analysed using the SPSS software (*Statistical Package for the Social Sciences* - Version 17).

As can be seen in Table 2, the ECAA showed good internal consistency with a value of .948, while the various dimensions: (i) *Active Learning or Accepting Personal Responsibility through Learning*; (ii) *Learning Initiative and Guidance to Experience*; and (iii) *Learning Autonomy*, show values of .902, .814 and .818, respectively. Assuming that an instrument with an internal consistency of .70 (Cronbach, 1984; Nunnally, 1978) can be considered fit to evaluate the variable to be measured (although, desirably, the alpha should be above .80), we believed that the instrument showed coefficients with very adequate internal consistency.

**Table 2. Analysis of internal Consistency -Cronbach's Alpha**

	Cronbach's Alpha	No. of Items
<i>ECAA</i>	0.948	24
<i>i)</i>	0.902	12
<i>ii)</i>	0.814	6
<i>iii)</i>	0.818	6

The correlation between the different sub-scales is also significant ( $p < 0.01$ ), which shows the consistency of the scale in its entirety.

**Table 3. Correlations between ECAA sub-scales**

	<i>Mean i)</i>	<i>Mean ii)</i>	<i>Mean iii)</i>
<i>Mean i)</i>	1	12	
<i>Mean ii)</i>	.869**	1	
<i>Mean iii)</i>	.846**	.842**	1

In the descriptive analysis, we have highlighted the central tendency (mean) and the mean deviation as a measure of dispersion, the minimum and maximum scale value in the answers given. Table 4 shows these values for each sub-scale.

**Table 4. Descriptive statistics for each ECAA dimension**

ECAA	Min.	Max.	Mean	Standard Deviation
<i>i)</i>	1	5	3.9143	.53486
<i>ii)</i>	1	5	3.9110	.53791
<i>iii)</i>	1	5	3.7575	.62576

The results show that the study participants used all points on the scale, clearly expressing positive views on their learning competences, with central values very close to 4, showing a positive impact of online environments on the promotion of competences in terms of active learning, initiative or learning autonomy.

For the comparative analysis of the sub-cohort of participants as regards gender and institutional origin of the training institution, we used a non-parametric statistics using the Mann-Whitney test (Marôco, 2007). Despite the robustness of parametric tests and the size of the cohort ( $N > 30$ ), distributions are not symmetrical or mesocurtical. On the other hand, no previous studies were found in online environments to allow us to assume that the variables under analysis would meet the requirements of normality in the population in question.

In the hypothesis tests for the differences, we found that, according to gender, the distribution of results in any of the

sub-scales did not differ, and the perception of self-learning is common for both boys and girls.

However, when groups were compared on the basis of their institutional origin, on all three sub-scales, students from polytechnic institutions show more favourable means, and they differ significantly from the university participants in the study as regards all three sub-scales.

**Table 5. Mann-Whitney's U Test on the basis of training institution**

	ECAA i)	ECAA ii)	ECAA iii)
University (n=137)	3.8 (0.60)	3.8 (0.58)	3.6 (0.65)
Polytechnic (n=140)	4.0 (0.44)	4.0 (0.45)	3.8 (0.57)
<i>U</i>	7757.5	7511.5	7487.5
<i>p</i>	0.006	0.002	0.001

### Conclusions

As we have said (Monteiro and Moreira, 2012), the success of education in online environments depends not only on technological and social conditions, but also, and especially, on pedagogical conditions. These new environments constantly force us to rethink the roles of teachers and students and the existing relationship between them, and also require a new way

of communicating, in which they share responsibility for learning.

As the perception of learning competences is an indicator of learning efficiency, which in a way validates the pedagogical models underlying the process of pedagogical relationship, thus study shows that, in general, students experiencing online learning environments have a positive perspective of their ability to learn actively.

In other words, we can say that the results of this study show that the built online environment, whose design focuses on the development of competences and on a pedagogical model -*e-moderating*- based on the principles of constructivism, autonomy and interactive had very positive effects on how students view learning competences, according to the following dimensions: *Active Learning and Accepting Personal Responsibility through Learning, Learning initiative and Guidance to Experience, and Learning Autonomy.*

Regarding the perception that boys and girls have regarding their performance in an online environment, it should be noted that in the study we did not find significant differences in any of the dimensions under consideration.

As to the differences between public and private education, we also concluded that there are significant differences in perceiving the ability to learn actively and accepting responsibility through learning, as well as in the learning initiative and guidance to experience, where private education students are at a clear vantage point. These more favourable results for private education students may be related to the greater experience of their teacher, who are clearly more at ease in these environments, while the public education teacher is less experienced in e-learning modalities. Besides the influence of teachers, we have to take into consideration the different training culture of both types of institutions.

Given these results, we believe that there has to be a change of culture and renewal of pedagogy in higher education, using the potential offered by these online environments. Indeed, it seems to us that online education is an open window for the adoption of a new educational paradigm, focused on the student's active learning. And whether it is e-learning and/or b-learning solutions we are talking about, what matters is that we need to combine different teaching approaches, use various (technological) resources and adopt different living spaces in the teaching-learning process.

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