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Technology Enhanced Learning in Higher Education: results from the design of a quality evaluation framework

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Abstract

This paper presents an ongoing research that deals with the development of a quality framework of reference for Technology Enhanced Learning in Higher Education. We will present the design of the methodology used for building our framework linked to a collection of internal and external references. We will also present criteria derived from this data collection phase. We will set landmarks for discussing what determines quality in Technology Enhanced Learning and what dimensions must be considered to evaluate its quality.

1. Introduction

The impact of Information Communication Technologies (ICT) on the student learning experience in Higher Education (HE) has not been evaluated on regular bases due, probably, to the lack of importance that is given to ICT integration in pedagogical strategies. The increasing demands of the different University stakeholders, however, suggest a more sustained evaluation of the impact of the use of ICT in teaching and learning. This paper aims to present an ongoing study that aims to develop: (i) a framework of reference for Technology Enhanced Learning (TEL) quality and (ii) a model for monitoring and evaluating TEL practices that brings together the different dimensions of the teaching and learning process. We will explore concepts related with the foundations of TEL and related with the quality of e-learning. We will discuss the importance of quality and its dimensions of assuring and enhancing learning. We will present the methodology used in the research as well as the preliminary results of the TEL quality framework of reference. In this paper we aim to present criteria than can be used as landmarks to allow

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the discussion on what is quality in TEL and what dimensions of the learning process must be used to evaluate its quality.

2. Theoretical background

Most has been said about the definitions of e-learning, online learning and distance learning (Guri-Rosenblit, 2005; Moore, Dickson-Deane, & Galyen, 2010). With the advent of the Internet and the intensive use of this medium by users worldwide these definitions drive us to the process of learning as a result of the use of one medium that is, in the majority of the cases, the Internet. But if one concedes that the Internet is an ideal medium to support the learning experience it does not constitute per se an enhancement of the quality of teaching and learning (Ehlers, 2007; Stella & Gnanam, 2004). The use of Internet based Information Communication Technologies (ICT) in teaching and learning (TL) strategies can, in most cases, be responsible for: (i) promoting lack of leadership (Jara & Mellar, 2009); (ii) enabling difficulties in communicating (Jara & Mellar, 2009); (iii) fostering disaggregated teaching and learning processes and learning strategies (Jara & Mellar, 2009) and (iv) increasing drop-out rates (Parker, 1999), especially when comparing with the more traditional TL strategies.

The lack of leadership (Jara & Mellar, 2009) relates to the fact that in the majority of e-learning based courses the teacher is surrounded by a vast number of different actors that participate actively in the learning environment. These actors can be other teachers with different specializations, tutors, instructional designers, and technical support staff, students and even, in some open learning environments, visitors that are not directly enrolled but who are willing to participate. This number of different participants in the learning environment, with different responsibilities and tasks, change the common paradigm of a classroom, usually very much focussed on the relationship between the teacher and the student. This facet of e-learning presents organizational changes regarding the coordination of the course, with a more horizontal leadership where it is more difficult to understand who is accountable and responsible for the success of the course (Connolly, Jones, & O'Shea, 2005; Jara & Mellar, 2009).

Another aspect of the use of ICT as a mediator or a tool to enhance the learning environment is that it can lead to difficulties in the communication process between both teacher and student (Jara & Mellar, 2009; Walmsley, 2004). In e-learning environments the opportunity to communicate synchronously with the student is limited and usually it depends on the availability of the student. And even so, one cannot be sure of the willingness of the student to communicate or the effectiveness of the communication since written communication is rather different from oral communication. The temporal flexibility that e-learning allows has to be seen as an important feature as it allows all participants to participate in the learning process regardless of their availability (Gomes, 2006; McKenzie, Mims, Bennett, & Waugh, 2000) but it also must be well designed and the participants must be aware of the required competences related to ICT mediated communication processes.

E-learning can also foster the disaggregation of the learning process as far as the different actors that participate in the design of the curricula and the learning materials, the assessment and classroom teaching presentations are concerned (Harvey, 2002; Jara & Mellar, 2009), but also the disaggregation of the teaching strategies. In blended learning it is common for online activities not to be assessed online; rather they are assessed in a traditional classroom exam setting. Although it is easier to monitor the students' learning achievement using ICT (Harvey, 2002; Jara & Mellar, 2009) this procedure is commonly non-existing and, when it exists, it is not effective due to the lack of competences from the actors involved.

Finally e-learning is very commonly related with high dropout rates. Some authors suggest that students attending ICT mediated courses dropout at a higher rate than those in on-campus courses (Parker, 1999; Xenos, 2004). The reasons pointed out for such high dropout rates relate to the locus of control from the learner (Xenos, 2004), the satisfactory rate in the first two weeks of the course and the students' demographic characteristics (Levy, 2007). However, one cannot neglect the role played by the instructor mainly regarding the instructional design and organization of the e-learning courses and their discourse and interaction with the students (Shea, Pickett, & Pelz, 2003).

The limitations present above that can be found when ICT is used in TL practices enable the need to evaluate the impact of technology in the learning experience in HE.

2.1. Foundations of Technology Enhanced Learning

Regarding TL activities in education ICT can be used in different contexts, with different objectives and forms. The teacher can use it to promote its own face to face (f2f) strategies, to develop autonomous learning, to extend virtually the f2f sessions or to develop distance learning (Gomes, 2006). The student can use it to communicate with his/her colleagues, to develop his/her own learning strategy or to enhance the learning experience. The effective use of technology in education, however, is not instantaneous and must take into account that it must be used with thoughtful planning, design, reflection and testing. A teaching and learning strategy using ICT, regardless of its potential, is, in some cases, untested and lacks planning and design (Vrasidas, 2004). To be enhancive and effective the TL strategies that use ICT must be directly linked with the student-centred orientation to teaching (Hannafin & Land, 1997). The teacher should reflect on the impact that a specific strategy has on the learning experience and orient practices to the student needs. Student-centred learning foundations reflect a more user-centred view about the nature of knowledge and the role of the learner (Hannafin, Hall, Land, & Hill, 1994) that has to be more active in the pursuit of knowledge. Thus, this more active role of the student in the learning process engages in constructivism paradigms that sustain that the learner determines what, when, and how his/her learning will occur (Hannafin, et al., 1994). Course design has to promote forms of active learning since the more active a student is in the learning process, the more student-centred the learning process is (Tigelaar, Dolmans, Wolfhagen, & van Der Vleuten, 2004). Therefore, in TEL, the course design and the learning environment must profess meaningful scenarios in a form of a problem or a specific goal that have to be connected to the learning strategies and activities. Hence it should promote decision-making, problem-solving, manipulating, interpreting, hypothesizing, and experimenting (Roth & Roychoudhury, 1993).

Shea, et al. (2003) argue that for an online learning environment to be effective it should encourage: (i) contact between students and faculty members, (ii) reciprocity and cooperation between students, (iii) prompt feedback, (iv) time on task, (v) active learning techniques, (vi) communication of high expectations and (vii) respect diversity and ways of learning from each student. Casanova, Costa, Leal, & Oliveira (2011) also stress the importance of active learning techniques suggesting (i) problem based learning, (ii) collaborative and cooperative learning and (iii) role-play simulation as relevant techniques for promoting active learning in online environments.

These requirements address both teachers and learners and demand new roles and competences. Learners have to develop individual learning plans which require skills to judge their individual needs, while the teacher has to guide this process in the form of tools, resources, and, if needed, direct instruction (Roth & Roychoudhury, 1993). This change in the teaching and learning paradigm is not exclusive from the direct participants in the learning process. As Reichert & Tauch (2005) sustain: "*In re-designing more student-centred curricula, institutions must foresee that students will need more guidance and counselling to find their individual academic pathways in a more flexible learning environment*" (p. 18).

This change of educational practices will have consequences in (i) educational policies, (ii) teacher training, (iii) understanding the best ways to integrate ICT in TL practices and (iv) in the design of information systems and technological applications (Lea, Clayton, Draude, Manager, & Barlow, 2001). Teachers, learners and institutions have, therefore, to adapt to new demands in order to use technology in a manner that enhances the learning experience.

2.2. Quality in e-learning

The definitions of quality vary and commonly reflect the different perspectives of the individual and of the society (Harvey & Green, 1993). Authors such as Davok (2007) define quality as a set of proprieties, attributes and conditions related to a specific object or process that allow to compare with a set of benchmarks. This definition alludes to a comparison between the object evaluated and a set of criteria related to quality or a set of other similar objects (Ehlers, 2007). Therefore, quality can be used for comparing the quality of two courses or to compare a course with a set of criteria and indicators that characterize quality.

In education the term quality is a client-oriented concept in which quality requirements are defined through a participation process between clients and providers. Pawlowski (2007) defines quality as *"appropriately meeting the stakeholders' objectives and needs, which are the result of a transparent, participatory negotiation process within an organization"* (p. 4). When referring to quality in education one has to respond to stakeholders' perceptions and thoughts. Criteria and benchmarks have to be understood and must be validated by all participants enrolled in the process, in spite of the different perceptions of quality of both teacher and student. Another perspective of the term

quality is the reason for its use. Quality can be used to certify that a specific process or object is being conducted with quality or it can be used to improve a process or an object giving a set of landmarks that one has to undertake to achieve this quality. These two uses of the term quality are referred by several authors. Mellar & Jara (2009) refer that quality assurance makes a comparison with a predetermined standard (minimum standard) and quality improvement (enhancement) is related with the relation between the current standard, the benchmark and the pathway to achieve this benchmark. For these authors: *"quality assurance and quality enhancement can be seen as parts of a larger process of quality management: assurance being concerned with determining that objectives and aims have been achieved, while enhancement is concerned with making improvements"* (p. 20).

For e-learning, and because of its characteristics, quality can be related to all the processes, products and services supported by ICT (Pawlowski, 2007). Dias (2010) argues that it is crucial for institutions to determine what is quality in e-learning, what they consider to be their own teaching culture (per instance one institution can assume that the learner must be autonomous and that quality stands from a teaching strategy that fosters this autonomy). Ehlers (2004) prefer to address the importance of understanding what is quality for learners in e-learning suggesting some preferences for each specific target group of students (the individualist, the result oriented, the pragmatic and the avant-gardist).

In conclusion, quality in education, and specifically in e-learning, must involve the different actors interaction and participation and, at the same time, must introduce two different perspectives of quality: to assure that quality exists and to be used as a tool to its improvement.

3. Research background

The increasing competitiveness in HE space has led Institutions to look for ways of managing quality in their day-to-day processes and in their delivery programs. The quality of TEL is not an exception. Since it is still, to some extent, innovative and untested, there is the need to evaluate the impact of this delivery mode. This in turn has led to the development of frameworks for structuring and stabilizing these processes (Inglis, 2005).

Evaluating TL quality is a complex process that, based on theoretical perspectives and on systematic data collection, analysis and interpretation, leads to a judgment that should promote a better understanding of quality of TL and the enhancement of its quality. This process of evaluation must be structured and consolidated, respecting all stakeholders objectives and needs (Pawlowski, 2007) and must comprise a set of criteria that allow practitioners and evaluators to conduct their judgment in a sustained and contextualised manner. During an evaluation process it is necessary to understand: (i) the expectations of different stakeholders (Prosser, Ramsden, Trigwell, & Martin, 2003), (ii) what criteria and performance indicators emerge from the literature and (iii) measure to what extent these expectations and referential are considered and achievable (Kirkwood & Price, 2005).

The stakeholders must be embraced in this process reflecting and giving their feedback so the evaluation process can be understood and respected as their own. We consider in this research the evaluation process as valuing a process, a strategy or a product based on criteria and performance indicators. All the evaluation process and the respective accreditation must make reference to the set of criteria that sustains it. This valuing process will trigger a set of information that will allow the various stakeholders enrolled to assure that the quality exists and, if needed, to ensure that practitioners have the necessary tools to improve the process, the strategies and the products based on a set of criteria (Scheerens, Glas, & Thomas, 2003).

Technology mediated courses have special characteristics that make them partially different when compared with traditional courses. The evaluation of TEL, in HE, as been confined, in most cases, to one dimension of the TL process rather than sustained in a more holistic evaluation as the framework proposed by McGorry (2003). This author triangulates different dimensions of the TL process such as flexibility, feedback, interaction, technical support, students' learning and their level of satisfaction. We agree partially with Stella & Gnanam (2004) that there are similar criteria for evaluating the educational quality in traditional and online learning, but we consider that there are variables that must be attended.

Expectations and perceptions are different in both learning environments. Students expect different attitudes from the teacher; probably they would not expect a more active role, but a more present one. The teacher, however, will expect from the learner a more autonomous profile, and a more independent learning path. The evaluation process must consider these specificities. Learning strategies must also be adapted to a different environment and, as referred to above, must be more student-centred (Anderson, 2004). They should be active and goal oriented (Caplan,

2004) so that students can be directed to their own individual paths. This is of most importance since there are moments of absence of contact between both teacher and student. Of course it is important that both teachers and students share the same competences in ICT use, in online communication, in adaptation to one another or understanding their specific schedule and availability, so competences needed must be evaluated. Finally it is also important that the HE institution responsible for this technology mediated courses ensures that all actors have the same facilities and equipment available so they can enjoy the same conditions and, at the same time, that all the support is given to both teachers and students. For evaluating TEL courses we concur with the thoughts of Barbera (2004) that evaluation must assume all the dimensions of the course as an integrated reality so that all actors and dimensions of the course can be evaluated. Thus, we suggest five dimensions to evaluate the quality of TEL:

1. **Expectations and perceptions**: all the criteria related with the expectations and the perceptions of stakeholders when facing TEL practices and if these expectations are fulfilled.
2. **Competences**: all criteria related with the competences needed by the actors in the process of teaching and learning: teaching staff and students. As referred above we considered, for the definition of competences, all characteristics, behaviours and attitudes, skills and knowledge that one actor as to possess to take part of TEL practices.
3. **Learning environment and learning resources**: all the criteria related with the quality of the learning environment designed by the practitioner, the learning resources proposed and the context they are proposed for.
4. **Teaching, Learning and Assessment (TLA) strategies and practices**: all criteria related with the strategies that both teachers and students develop when facing TEL practices.
5. **Logistics and support**: all the criteria related with the logistics and equipment needed for a TEL practice, and the support given by the university in the form of tools, helpdesk and training.

Those dimensions arose from the literature review phase and from data retrieved from the empirical study that we will present further on.

3.1. Quality framework

A framework is generally something that provides form and a degree of rigidity. The framework of a building gives the building its structural integrity and stability. The framework that we present in this paper intends to bring structure and stability to processes of evaluation. This structure is intended to assist institutions to organize their processes related with TEL quality. They do not aim to prescribe quality processes, but they intend to direct the stakeholders according to best practices (Inglis, 2005) and quality standards. For this research we use the definition of *Framework of Reference,* proposed by Figari (1994), which refers to the development of a framework of references (internal and external) of one object or reality from which two diagnostic outcomes can derive: evaluation processes and training programmes. The *Framework* of *Reference* design process is an effective practice that allows contextualisation, transparency, data triangulation, knowledge production, while involving all educational stakeholders in the process (Reis & Alves, 2009). In the use of this practice we distance ourselves from the role of the evaluator by focusing on the process of developing sustained and contextualized knowledge in a dialectic process where all stakeholders contribute with their input (Figari, 1994). The design process of the *Framework* of *Reference* allows to find and/or develop references, diagnose, define evaluation dimensions and justify the chosen criteria (Alves, 2001).

4. Research overview

As mentioned in the previous sections there has been a loophole in the research related with the evaluation of the use of ICT in HE TL practices that has to do with the definition of quality standards in TEL and with the need for holistic models for evaluating the impact of ICT use, that at the same time can be used by practitioners and researchers to enhance the learning experience (Jara & Mellar, 2010). This loophole justifies the study we are conducting which is confined to the following general objectives:

- To design a quality reference framework about Technology Enhanced Learning in Higher Education;
- To develop and validate an evaluation model to evaluate and monitor Technology Enhanced Learning practices in Higher Education.

In order to accomplish these research objectives our study is divided in two different phases (see fig. 1): (i) to design a *Framework* of *Reference* (phase 1 with stages one and two) and, based on this framework, (ii) to develop an *Evaluation Model* (phase 2 with stages three and four) for evaluating TEL in HE (figure 1).
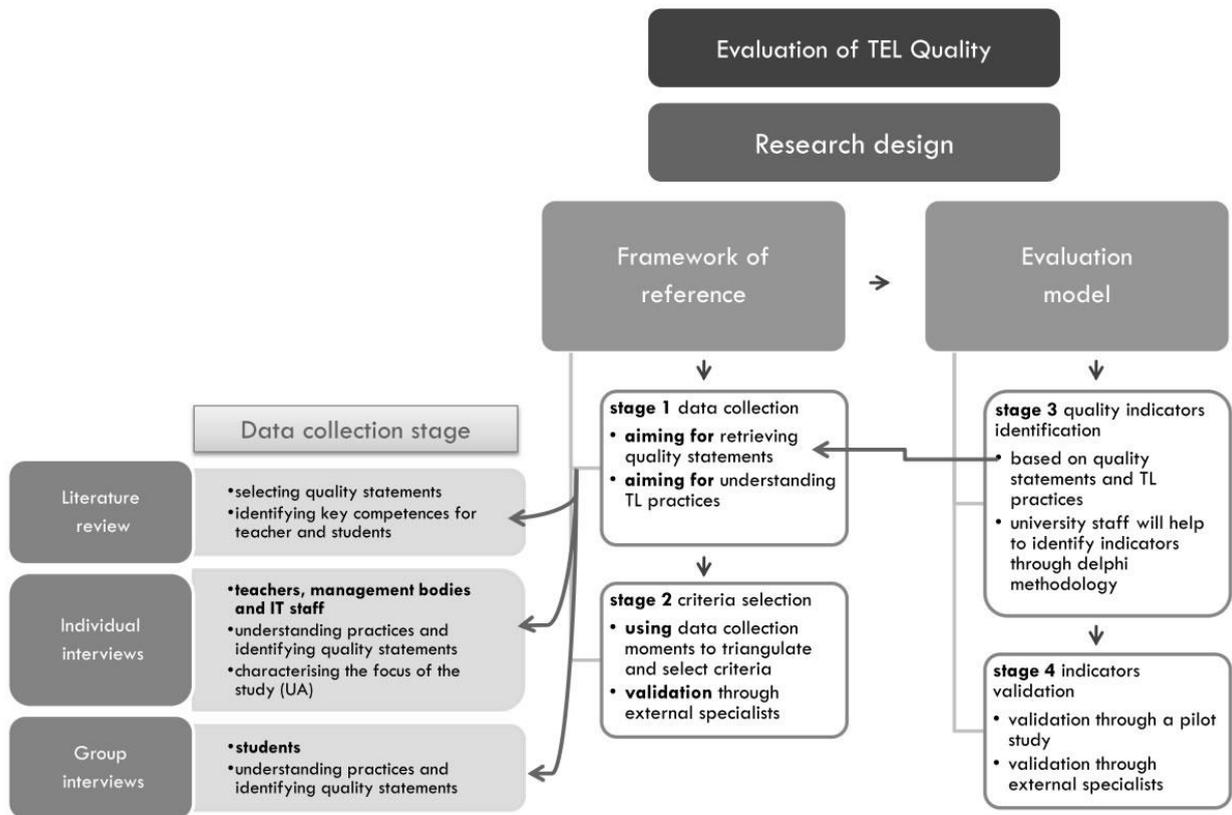

Figure 1. Research design overview divided in two phases: (i) framework of reference and (ii) evaluation module

In the *Framework* of *Reference* process we aim to present a group of quality statements (standards) related with the use of TEL in HE, and to relate these standards with criteria that can hopefully be used as a quality standard. In the evaluation model phase we will conduct an identification of indicators that can be used to operate the criteria selected in the previous phase. We will also set mechanisms to validate these indicators using a pilot study at the University of Aveiro (UA) and the validation by external experts. The difference between both of these phases is that the *Evaluation Model* will be directed towards a specific context and reality. It is not our intention to enclose our *Framework of Reference* in a specific context; we want to allow other researchers and practitioners in HE in general, and in Portugal in particular, to use their own evaluation models based on our *Framework of Reference*. To do so the indicators selected in phase 2 will be oriented for the context of the UA. In this paper we will focus on the first phase of this study, the design of a *Framework of Reference*, which comprises two stages: the data collection process and the selection of criteria.

4.1. The Framework of Reference phase methodology

As presented in figure 1 (in the previous section) the *Framework* of *Reference* phase is divided in the data collection stage and in the selection of criteria stage. The data collection stage is the moment when we collect the quality statements related with the use of ICT in TL (Casanova, Costa, & Moreira, 2011). For a statement we used a

broad definition of a best practice, a requirement and a needed competence. These statements were collected through a set of techniques and data collection moments:

- Other research related with the evaluation model for online learning, e-learning and distance learning (Dias, 2010; McGorry, 2003; Wasilik & Bolliger, 2009).
- Interviews to different actors from the UA, teachers with experience of delivering TEL courses (n7), management bodies (n1), technical staff (n2) and students (n6). We used both individual and focus group interviews (for the students).

Identification of the most relevant competences needed for both teachers and students to participate successfully in TEL courses. For this moment we selected nine papers (Goodyear, Salmon, Spector, Steeples, & Tickner, 2001; Tigelaar, et al., 2004) related with the identification of competences for online learning and identify the most referred competences.

This stage of collecting statements allowed us to understand what is considered to be aspects that can be used to promote more effective quality in a TEL course. In order to give coherence and validity to our study we decided to promote triangulation between the three steps presented above. Hence, for each statement retrieved in one moment we endeavored to find a correspondent statement in another step, therefore achieving some sort of validation since there were two different sources and techniques used. Then we transformed each validated statement into criteria.

5. Results

As mentioned above, for our *Framework* of *Reference* we decided to triangulate each statement retrieved in more than one step of the data collection stage so we could find similarities and, in some way, validate each statement choice. So, for example, if a statement is referred both in the interviews and in the competence identification steps, then it will be considered validated. Although we are at a preliminary phase of triangulating the statements collected in the three steps of the data collection phase it is possible to present a preliminary version of our reference framework with 28 criteria retrieved. In table 1 we present the preliminary criteria within each dimension, with a necessary associated description.

Table 1 - Quality framework for TEL - preliminary results

Criteria	Criteria descriptors
Dimension: expectations and perceptions	
Enhancement of academic success	Academic success is explicitly expressed and is directly linked to the use of TEL
Clarification of roles	Teacher and students know in advanced what is expected from them and what "the rules of the game" are
Enhancement of motivation	Teacher and students are more willing to pursue with their roles
Enhancement of participation	Students participate more in the teaching and learning process
Enhancement of satisfaction	Teacher and students feel more satisfied with their roles
Existence of communicational competences	There are communicative competences from both teacher and students
Existence of entrepreneurial competences	Both teacher and students embrace innovations and new trends
Existence of pedagogical competences	The teacher has pedagogical competences that allow him/her to use adequate strategies, integrate ICT and monitor each learner path
Existence of scientific competences	The teacher has scientific competences related with the taught subject
Existence of self-regulation competences	The students have self-regulation competences
Existence of technological competences	Both teacher and students have the necessary technological competences
Dimension: teaching and learning strategies	
Accuracy	TL strategies are accurate and respect the requirements involved
Diversity	TL strategies respond to the diversity of methods and student profiles
Effectiveness	TL strategies are effective and respond to their purpose fulfilling the proposed Learning Outcomes
Respect for ethics	Ethical principles are always respected
Inclusion of a constructivism approach	TL strategies used foster active learning and enhance the learning process
Strategies suitability	TL strategies are adequate for an online learning environment
Dimension: learning environment and resources	
Accessibility	The learning environment is always accessible and respects norms
Dimension: logistic and Support	
Adequacy of administrative resources	Online administrative resources are present and fulfill the requirements
Adequacy of human resources	There is human support when needed, such as tutors or instructional designers
Institutional recognition	The institution values the teacher and students work
Adequacy of pedagogical support	There is pedagogical support for teachers and students, such as training
Institutional regulation	Institutions evaluate the impact and the quality of the course
Adequacy of scientific resources	The institution gives access to the necessary scientific resources
Adequacy of technical resources	The institution gives access to the necessary tools and equipment
Adequacy of technical support	Technical support is always available for helping teacher and students

The triangulation of the results that emerged from the different data collection periods led us to a preliminary version of our *Framework of Reference* with 28 criteria that relate to the quality of TEL (table 1). All of these criteria have a correspondent reference that justified their choice (this reference can be found in the three stepss of the data collection stage already presented. For example, the importance of the presence of *Enhancement* of *academic success* criterion is suggested in both interview moments (students and teachers) and in Lee-Post suggested module for evaluating e-learning success (2009).

6. Conclusions

Although at a preliminary stage this version the *Framework of Reference* proposes 28 criteria that can be used for evaluating TEL quality. These criteria are referenced by practitioners (interviews) and researchers (literature review

and competences identification) and can be used under different contexts and realities. As mentioned in the previous section our purpose is to elaborate on the quality of TEL before shaping an evaluation module for our special context, therefore allowing other researchers to use our criteria framework for their own purpose. Further on in this research, indicators will be used to give form to each criterion and to transform our *Framework of Reference* into a module for evaluating TEL in the University of Aveiro, Portugal. The framework presented aims at not just being an assurance instrument, but also to help practitioners enhance their own teaching and learning practices. To do so, the five dimensions presented must be considered not just at the end of a course but also during and before the course. It is important to understand if the necessary requirements exist before the beginning of a TEL course. The evaluation conducted after must be aligned with the fulfillment of these requirements.

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