LEARNING IN HIGHER EDUCATION OF THE XXI CENTURY: THE USE OF TECHNOLOGY HAS CHANGED THE SCENARIO OF LEARNING PROCESSES OR ONLY GAVE THE APPEARANCE OF MODERNITY?

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Abstract. It is considered in the context of this article the growing scientific development, fast and complex contemporary society, the profile of the students of the 21st century and, consequently, the demands of Higher Education arising from this reality. The objective of this study is to identify and analyze whether the use of ICT and the resources derived from them have resulted in effective changes in the formal scenario of the teaching and learning processes of Higher Education or only offer an appearance of updating. The research carried out is a systematic review of the literature, in which key words were searched in journals indexed with scientific databases relevant to the scientific community, which allowed the identification of practices related to the requirements prioritized in the analysis proposed from published articles in scientific. 62 articles were selected from a primary sample of 450 located from a systematic search process. We present the public that compose the main sample groups of the revised works, the percentage of intentional and occasional learning in them, the types of practices and resources most used and the resources most used for the formal learning processes in Higher Education. It is highlighted if the existence of practices related to the informational construction of knowledge is still present but demonstrating a strong tendency towards more formative practices of knowledge construction. The results showed a complex scenario of apparent transition, in which most of the research is quantitative, focused on the protagonism of the students (learning processes) and highlights the heterogeneity and update of technological resources to promote the teaching and learning processes of different contents, methodologies and strategies. Although informative practices and occasional learning outcomes are still present, the emphasis is placed on the predominance, on an ascending scale, of formative, intentional, and propositional practices. Also on a growing scale it is observed that the methodologies and strategies used, which use ICT, are promoting changes in the teaching and learning processes, since the traditional contents appear permeated or accompanied by several skills and competences identified as closer to the student of the 21st century.

Keywords: higher education; teaching and learning processes; technological resources; learning of skills; university students.

INTRODUCTION

The use of technology and the possibilities generated from them in the teaching and learning processes has played a crucial and important point for contemporary institutions of any level of education, including Higher Education Institutions (Davidson and Goldberg Rennie 2009; Morrison, 2013).

It should be noted that in the context of this research learning is understood as "the process that leads to individual learning" (Mussak, 2003, p.70), in which there is the intersection of innumerable variables that interfere in the construction of learning as a result, from the mechanisms of maturation of the organism, psychosocial factors, environmental conditions, among others to date and, mainly, the resources necessary to learn (Branz, Gleizal, 2014 and Kolb, 2014).

However, the World Conference on Higher Education, held by UNESCO in Paris (1998) in the late 1990s, pointed to a world university transformation in which the knowledge accumulated and increasingly shared by contemporary societies are part of the scope of expectations desired economic and social context. The application of ICTs to make teaching and learning contexts more suited to students' future demands, among other factors, are understood as recommending the promotion of desired changes.

On a broad spectrum, such changes refer to rapid and complex scientific growth, the characteristics of contemporary society (Van Krieken, 2013) and the profile of the student of the 21st century (Altbach, Arnold, King, 2014, Cox, 2014). The attributes seem to require the promotion of profound cultural, scientific, social and economic changes in Higher Education

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Institutions, forcing them to review theories, models, concepts, methodologies, strategies and practices; and, thus, to investigate, rethink and recreate the teaching and learning processes present in their contexts to meet the demands of the current context (Altbach, 2014, Stromquist, Monkman, 2014 and Webster, 2014).

Given the importance that Higher Education represents for nations, since it usually prepares individuals and professionals to take over the vast majority of functions that rely on technical and scientific knowledge in societies in all scientific areas and in most highly skilled labor activities , in addition to considering some recurrent points presented by teachers and students observed in the sample about the teaching and learning processes and how this is currently happening, we observed some deficiencies, such as the existence of educational practices that are traditionally informative (content), extremely formal and dichotomized in different disciplines or scientific areas, methodological practices that decontextualize the theoretical contents of their practical contexts, making the construction of knowledge and/or practices that do not enjoy, in essence, the close relation and affinity that the students of the century the XXI have with the resources coming from ICT, losing part of the potential advantage that they could be able to provide when better explored (Phillips; Schweisfurth, 2014; Stromquist; Monkman, 2014; Canney; Bielefeldt, 2015).

In view of this paradoxical context and the gaps observed, the objective is to identify and analyze whether the use of ICT and the resources derived from them have resulted in effective changes in the formal scenario of the teaching and learning processes of Higher Education or only offer an appearance of updating.

To end, tried to make a theoretical contribution through a systematic review of the literature, which we used keywords in relevant scientific bases that allowed us to identify the primary studies were related to the prioritized requirements in research and explained the issues of research. The review was based on articles published in journals indexed in scientific databases of recognized importance, taking into account the limits and scope of this type of study.

The results were obtained from a systematic review of 62 articles were randomly selected from a primary sample of 450 localized and 233 secondary items, dated from 2010 to 2015, located from the search process described in the methodology. We present the public that makes up the main sample groups of the papers reviewed, the percentage of intentional and occasional learning, the types of practices and resources most used and the resources most used for the formal learning processes in Higher Education. The existence of practices related to the informational construction of knowledge in the teaching and learning processes, even using ICT resources, is still present, but it shows a strong tendency towards more formative practices of knowledge construction.

These data point to a complex scenario of apparent transition, in which there is a predominance of predominantly quantitative research, presenting data mainly based on the student's point of view (learning processes). Such research highlights the heterogeneity of learning processes and updates the uses and resources derived from ICT, in order to promote learning based on contents, methodologies and strategies in an attempt to promote a desired training profile. Although informative practices and occasional learning outcomes are still present, the emphasis is placed on the predominance, on an ascending scale, of formative, intentional, and propositional practices. Also on a growing scale it is observed that the methodologies and strategies used, which use ICT, are promoting changes in the teaching and learning processes, since the traditional contents appear permeated or accompanied by several skills and competencies identified as closer to the profile of the student of the 21st century.

RESEARCH METHOD

In an attempt to achieve this purpose, we tried to make a theoretical contribution through a systematic review of the literature, which has the potential to provide an overview of the approximate kind with respect to certain fact and to present itself as a potentially useful basis for

understanding the theory (Liyanagunawardena; Adams; Williams, 2013; Lahti, Hätönen; Välimäki, 2014; Mertens, 2014; Clement, 2015).

The study investigated a sample of work on teaching and learning processes in higher education institutions in the following countries: South Africa, Andorra, Australia, Canada, the United States, Finland, Grenada, Netherlands, India. England, Malaysia, New Zealand, Singapore and Taiwan.

Figure 1 shows a graph that summarizes the methodology used in the article.

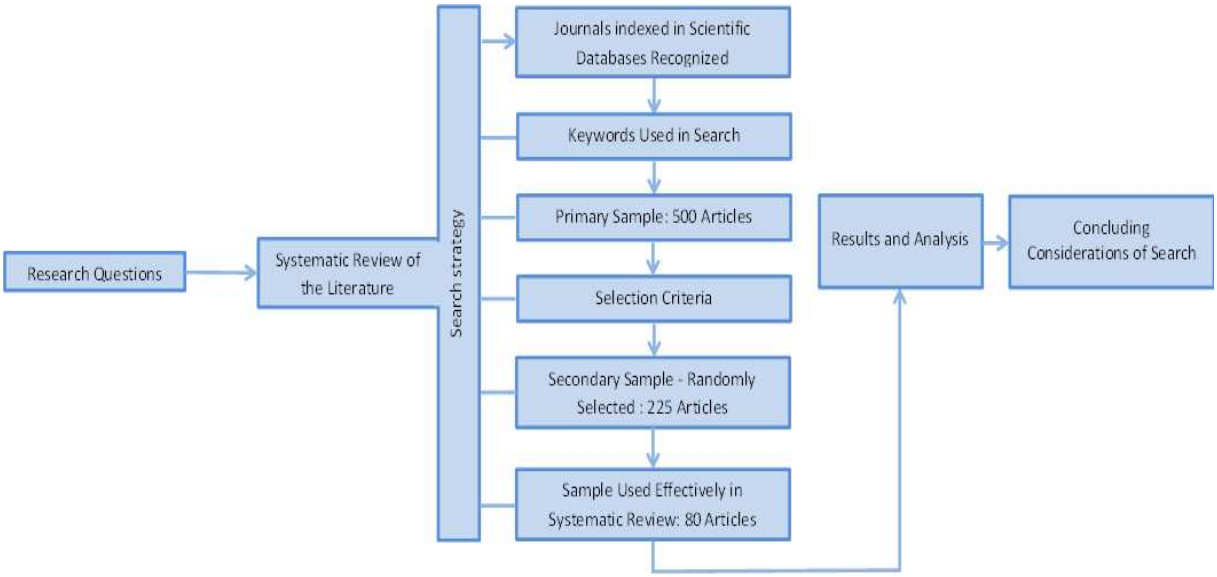


Fig. 1. Stages of Research Methodology.

The methodology of the research consisted of the following steps:

a) proposal of the research questions based on the objective of the study that served criteria of eligibility of the review criteria of the literature;
b) implementation of data search strategies: selection of scientifically indexed journals and followed the use of keywords, titles and abstracts adopting limits (controlled vocabulary / descriptors) that allowed the grouping of 450 primary articles on the subject under study, the boolean operators "OR", "AND" and "NOT". "OR" was used to search for articles that addressed one or another theme (sum), "AND" to search for articles on the two topics (intersection), and finally "NOT" to exclude a subject from the search, the Mendeley reference management program to operationalize this step, which allowed the localization and elimination of duplicate references in the final elaboration of the list of articles, and selected articles published in English, Portuguese and Spanish;
c) random selection of 233 articles using the simple random sampling technique (direct sampling method that assigned to each article the same probability of being selected). The Microsoft® Excel "random" function was used and it was classified the articles from the ascending order of the calculated random value;
d) effective research, presentation of results and analysis of the data of the 62 articles that constituted the effective sample group of the research (Dewa et al., 2014; Papamitsiou; Economides, 2014; Liñán; Fayolle, 2015, Zapata et al., 2015).

The choice of the systematic review of the literature was made due to the need to update a cumulative and systematic knowledge about how ICT resources have been used and exploited in the formal processes of teaching and learning in higher education, seeking to position themselves as a preliminary proposal that seeks to add approximate information about the subject to be investigated (Schmitt, 2011; Blatter; Haverland, 2012; Richey; Klein, 2014). Descriptive research, as in this case, can be understood as the researchers observe, record, analyze and correlate phenomena or facts, which is not the management of the object of research, nor the interference of the researcher; however, tries to identify the nature, frequency, relationships, characteristics,

causes and connections with other phenomena. In addition, descriptive studies, such as the present case, are primarily intended to describe the characteristics of a particular phenomenon, population or to establish relations between variables, based on four aspects: overview, recording, analysis and interpretation of current phenomena, aiming at understanding its functioning in the present, without necessarily analyzing causes and effects or attempting to interpret (Verd, 2004; Creswell, 2013; Miles; Huberman; Saldaña, 2013; Tesch, 2013; Corbin; Strauss, 2014; Mcmillan, Schumacher , 2014; Punch, 2013).

For data analysis, we chose a quantitative approach. Thus, we use statistical techniques, translating into numbers, data and information to classify them. Thus, we seek, given the limits of this type of sample survey, to generalize the results in approximate terms, exercising some control and a view of phenomena under observation (Sampiere, Collado, Lucio, 2013; Bernard, Bernard, 2012; Bryman, 2012; Creswell, 2013).

Research Questions

In pursuit of reaching the objective of the research, next five research questions were formulated:

- RQ1: What resources from ICTs have been most used in the formal learning processes of higher education in order to adapt them to the demands of the teaching and learning processes considered more suited to the demands of the students of the 21st century?
- RQ2: In their broad spectra, the contents, methodologies and strategies employed in higher education teaching and learning processes, which use more and more ICT resources in search of an optimization, continue to be used to inform students (factual, conceptual and/or methodologies with traditional methodologies and strategies based on the use of ICT resources) or are having their potential effectively applied in active teaching and learning methodologies with more formative bias (conceptual content, procedural, attitudinal + other skills/competences), being the latter considered the most adequate option to the demands of contemporary society?
- RQ3: Are the effective results (learning) observed from the teaching and learning processes using ICT resources in Higher Education being achieved intentionally and purposefully or are they mostly occasional?
- RQ4: Most of the research used to evaluate the practices related to teaching and learning processes that use ICT resources in Higher Education are quantitative or qualitative? What kind of analysis do the researchers achieve greater access and knowledge to carry out theoretical-conceptual analysis on the subject?
- RQ5: Are the ICT resources used in higher education teaching and learning processes more used in the search for the learning process (active teaching methodologies) or are they only used to facilitate traditional teaching processes?

It should be noted that these issues are interrelated and were investigated simultaneously.

Strategy of the Search

Here are described in detail the strategies used for the systematic review of the literature proposed in this paper.

Choice of Journals Indexed in Scientific Databases

In the first instance, if sought-meet some studies, amid the plethora of materials found on the subject, whose preliminary phase was important to collate basic terminology research.

Subsequently, in order to carry out this research, we opted to search the articles in indexed scientific journals, using the meta-search engines of the following international databases recognized by the academic community, in the respective proportions:

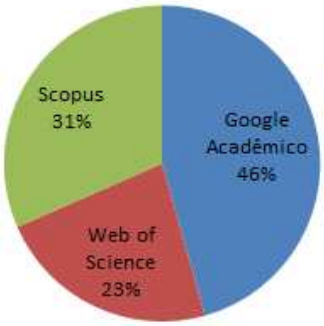


Fig. 2. Scientific Databases.

Conducting research took place from November 2015 to January 2016 and the articles used in the sample dated 2010-2015.

Search Using keywords

The terms used as keywords, titles and abstracts in this study were commonly found in the primary literature on the subject based on the research questions: "teaching" and / or / not "learning" and / or / or / not "learn" and / or / not "higher education" and / or / not "university" and / or / not "TICs" and / or / not "teaching methodologies" and / or / not "teaching strategies" and / or / not "learning strategies" and/or/not "formative" and/or/not "contents" and/or/not "traditional" and/or/not 2010 and/or/not 2011 and/or/not 2012 and/or/not 2013 and/or/not 2014 and/or/not 2015. For this search, the titles, abstracts and indexes, have been configured to locate files from keywords. Furthermore, they identified the most common terms in research questions, as well as alternative spellings and synonyms of the most common terms. With this type of search, we selected 450 articles that represented the primary survey sample.

Search Refinement

With the intention of ensuring the relevance of the work used as the sample for this search refinement between the articles located in step in the search step from keyword has been performed. At this stage, we used the following criteria for inclusion or exclusion of items:

Table 1 Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Language: English, Spanish and / or Portuguese	Language: all other (except English, Spanish and / or Portuguese)
Scientific Papers Published in Journals	other Types of Documents And/or Scientific Articles
Articles which Effectively Address Requirements for Prioritized one or More Research Questions	Articles that did not Show any Direct Connection with the Research Questions
Articles published in the period from 01/01/2010 to 31/12/2015	Articles dated in period outside the range 01/01/2010 to 31/12/2015
A copy of duplicate items	Copies of Duplicate Articles

For this research, we first considered the keywords and title of each item; then the summary and, where necessary, the content were also checked quickly. In addition, when two or more copies of an article were located by the reference software, only the most complete was included in the secondary sample. At the end of the refinement, it remains a secondary sample of 233 scientific papers.

A simple random sampling technique was used, which gave each article the same probability of being selected using the Microsoft® Excel "random" function and selected the 62 articles from the increasing order of calculated random value (Marginson, 2011; Lichtman, 2012; Sampieri; Collado, Lucio, 2013; Denscombe, 2014; Mertens, 2014).

Random Selection of Articles that Comprised the Final Sample Survey

From the secondary sample were chosen by random distribution of the 62 articles that comprised the final sample of the research, which were distributed as follows:

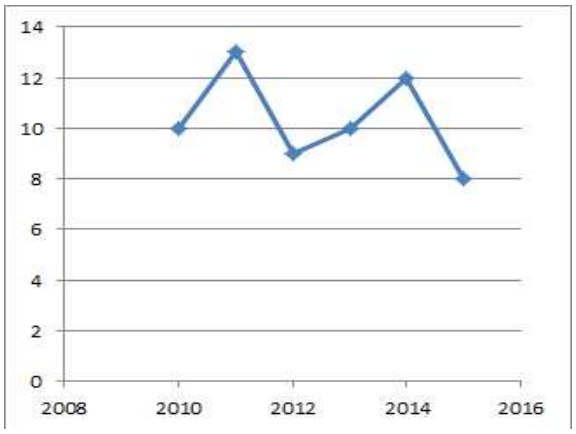


Fig. 3. Distribution of articles in the sample over time.

It was observed also in the sample the most researched scientific areas:

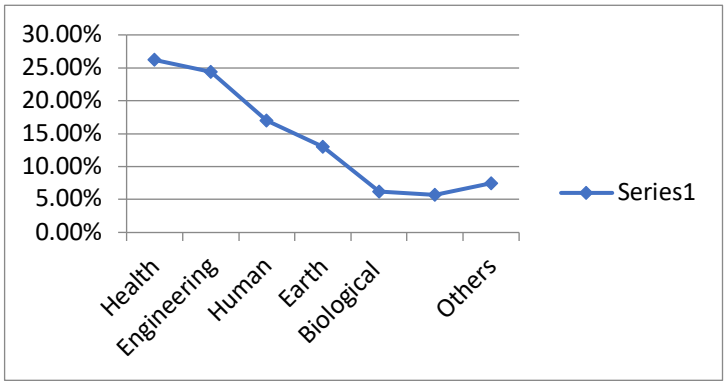


Fig. 4. Scientific areas that bring together the most relevant courses in the sample.

The vast majority of the work was carried out for or on various scientific areas simultaneously, followed by specific research in the area of health sciences and others, and some areas did not appear in the sample.

The agents of the teaching and learning processes of Higher Education observed in the sample were:

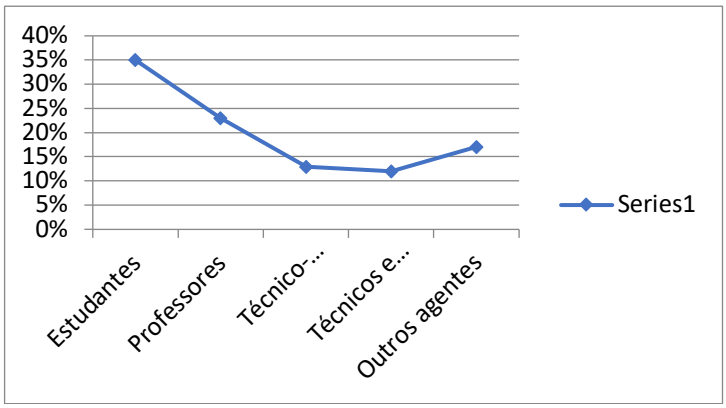


Fig. 5. Agents of the teaching and learning processes of Higher Education observed in the sample.

Threats to Validity

Even considering the complex context in which it operates research of different types and ratings were taken the following precautions in order to reduce threats to the validity of the research (Ding *et al.*, 2014; Munir; Moayyed; Petersen *et al.*, 2014; Paternoster *et al.*, 2014; Yang *et al.*, 2014):

- use of more than a scientific basis for search of scientific articles in an attempt to provide greater scope for research in the acquisition of the sample items;
- use of various central keywords and directly related to research questions aimed at ensuring greater accuracy of research;
- refinement based on clear selection criteria;
- randomization that is, at random, the articles for the composition of the final sample. The random method was used to be understood as one of the most reliable for undirected analysis, since it contributes to the examination is not or suffers less influence of strange, known or unknown variables;
- careful review in the works that made up the 62 articles of the final sample.
- attention to minimize or avoid biased analyzes that positive results may be considered or reported that the negative, which may also lead to an overestimation of the techniques used; was sought for grounding the choice of methodologies, references which provide comparisons of different methods, but they tend to be unbiased in its analysis.

RESULTS

The results were identified and analyzed from a predominantly quantitative review of the literature, with extensions to modest qualitative analyzes that were merged into a multimodal proposal, adding qualitative and quantitative techniques simultaneously.

The most important features observed in the sample, reported in the following paragraphs. The following results related to the use of technology in higher education courses were observed:

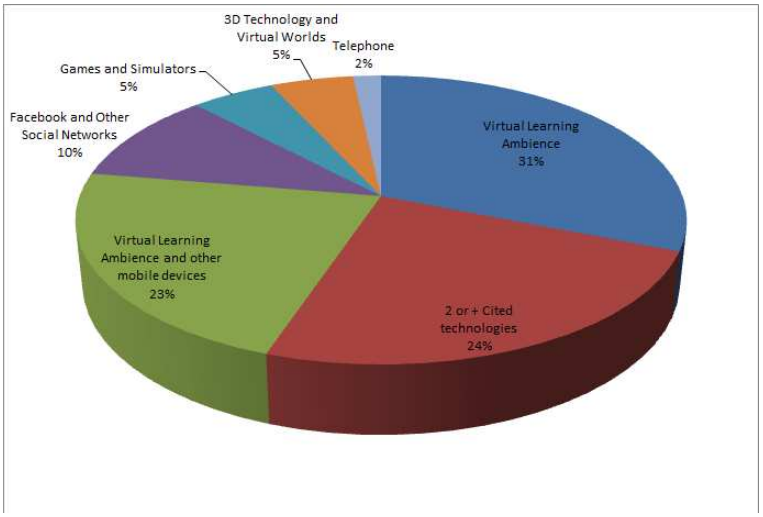


Fig. 6. Technological resources used in higher education - higher incidence in the sample.

The results observed in the sample evidenced a scenario of apparent transition in the technology of resource use in formal processes of learning of higher education, because although the prevalence of the Virtual Learning Environment (Fig. 4) is observed in the sample, spaces that are traditionally used in this context, have been increasingly exploited and adapted to meet the needs of the contemporary learning community, especially as regards the use of electronic methodologies, e-learning evaluation activities. The results numbers seem to point to a transition scenario in resource use technology in the formal learning processes of higher education, because although the prevalence of the Virtual Learning Environment, traditionally used in this context, is

observed in the sample, they demonstrate that they have been increasingly explored and adapted to meet the needs of the learning community. However, in addition to this increasingly adapted use, there is also an increase in the uses of the Virtual Learning Environment and other mobile devices, whose portability is much appreciated and the resources are well known by agents for teachers and students who already use for other purposes, due to the fact that they are used by students and teachers in other contexts, taking advantage of them now for formal learning. The main use of the Virtual Learning Environment, alone or combined with other elements, is followed by the use of social networks, especially Facebook, games and simulators, 3D technologies capabilities, semantic web, multilayer resources including virtual worlds and the effect, although small , more remote use of features, as is the case with the phone. The use of resources are used in practices in which content, methodologies and active learning strategies, with a predominantly formative bias.

The research was concerned with the explicit and effectively demonstrated intentionality of the results (learning) previously sought / evidenced in the articles of the sample, from the insertion of the resources coming from the TICs in an attempt to promote, with the support of them, but employing methodological, strategic innovations and forms of content also worries the way these resources have been used for formal learning processes in higher education:

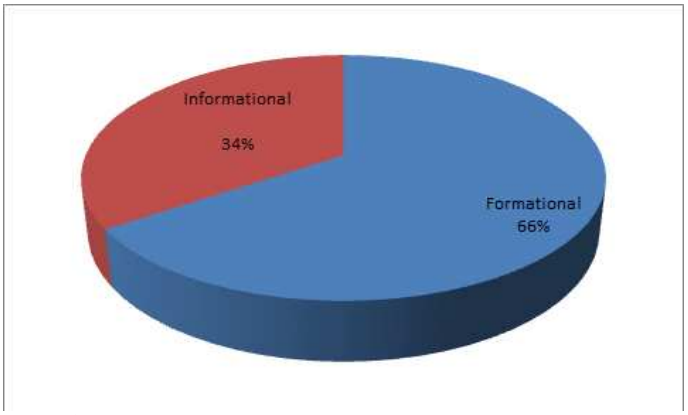


Fig. 7. Use the form of Technological Resources in Formal learning of Processes in Higher Education.

Reiterates that, although the results point to the majority of formational uses of technological resources, using the most appropriate methodologies for the context of the 21st century, there are still a significant number (34%), although minority, of proposals based on the use of information resources, the use of technology inform the student about facts, concepts and procedures, using the disguise of technology to perpetuate traditional learning practices.

Turning our attention to the more worked or focused skills in formal learning processes in higher education, we find the following data: support skills, increasingly sophisticated skills for ICT exploitation, content (including attitudes), motivation, self-learning, undeclared, self-confidence to learn, ethics, leadership, knowledge of adaptive learning techniques, language, learning by models, results, simulations, challenges, civility and sustainable development.

The results seem to point to a use also aiming to complement and complement the learning process, transcending without disregarding theoretical and scientific knowledge. We highlight here the name of support skills to refer to the sustainable development of multiple intelligences, attention, meta-learning, concentration, etc.; In this context, sustainable development is a technical terminology that indicates a development of skills and knowledge allowing students to learn continuously and sustainably, such as "learning to learn" and "adaptive learning".

It was investigated how the search for learning occurs (result) in the processes of formal learning in higher education. Whose observed and / or reported in the sample results showed the following uses:

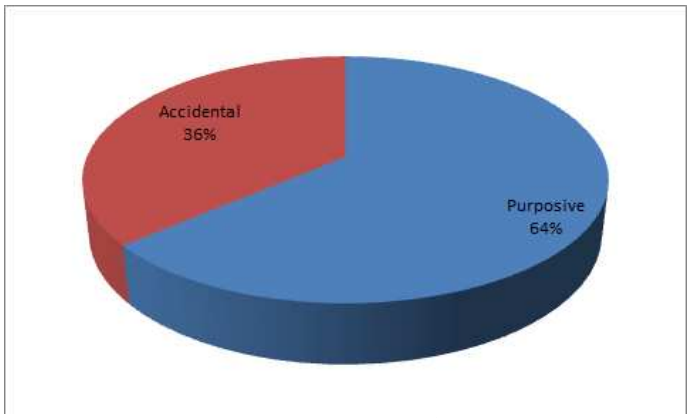


Fig. 8. Intentional results effectively obtained from the use of ICT in the formal processes of teaching and learning of Higher Education.

It is observed that the use of ICT resources in the formal processes of teaching and learning of Higher Education courses, for the most part, has a learning intention, aimed at specific purposes in the search for learning. However, the significant incidence (36%) of practices that still provide only occasional or incidental learning outcomes can not be neglected.

FINAL CONSIDERATIONS

It is observed that we are experiencing a moment of apparent transition regarding the use of technology resources in the formal processes of higher education, both from the point of view of the own resources, that although some characteristics like correspondence do not appear in the sample. and others as the phone brought a significant drop in its use as a resource for learning, still appear as most traditional AVA uses, however, with constantly updated versions, seemingly increasingly exploited and adapted to the needs of learning communities that use them. At the same time, the decline of some resources, we see the rise in the incomes of mobile technologies, which make up the m-learning, are widely used and appreciated by students continue to be accompanied by the more modest but not the least use of semantic web resources , multi-layers, social networks and 3D features (including virtual worlds).

The supposed transition seems to confirm the coexistence of the use of ICT resources to inform students, conveying factual, conceptual and procedural content to predominant training proposals, aiming to develop skills / competences that cover the above mentioned educational contents, including attitudes, skills and other necessary requirements for a training more appropriate to the context of the 21st century: fast, connected and mutant.

Moreover, it recognizes the existence of infinite unexplored possibilities in relation to the use of ICT resources in the formal processes of teaching and learning in higher education, especially in accordance with the incidence of punctual results, not planned but which were observed at the end of the actions reported in the work that compose the sample.

The research in the sample of this article focused on the observation of two or more scientific areas, at the same time as it allows to generalize practices of prospection or generalize the results for higher education as a whole; although the initiatives of observation of the phenomenon have been observed in specific scientific areas and indicated in the scope of the work.

Other issues that deserve relevance are the facts that most research is quantitative with large sample, even when it comes learning which is full of subjectivity phenomenon. Thus, it is believed that there is an open field for the proposition multimodal or qualitative research to further compliance with other elements that can intervene in this context, providing improved learning processes in higher education; however, it is recognized the possibility of generalizations and results supporting and enabling empirical knowledge on the subject under consideration.

Most of the sample surveys turn their attention to the views of the students, it is believed that this fact is given by the coexistence of the predominant understanding of their role in relation to the learning process; as well as recommend the contemporary theories that support such proposals and methodologies used in the learning process in Higher Education.

It is important to seek the constant evolution of exceptions - in the sense of permanently migrating from the use of informational models to training models aimed at the active construction of knowledge, enabling the effective preparation of professionals and an integral training appropriate to the needs. of the students of the 21st century. Otherwise, the use of ICT resources in formal teaching processes risks masking traditional practices or leaving them with the appearance of modernity.

LIMITATIONS AND RECOMMENDATIONS

It is recognized that the use of scientific articles published in journals is a stratified sample of the universe of relevant publications on formal learning in Higher Education, which after the systematic selection, allow more generalizations geared to this particular context. It is recommended, however, to perform other jobs which also consider documents and / or instruments that can further increase the amplitude of the search and, therefore, allow increasingly broad generalizations.

To implement this work, it was decided to carry out a descriptive, seeking to enable the listing and sort data without therefore have the intent to disprove or prove exploratory hypotheses, making room for a new explanatory research, based on experimentation.

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