

Influence of Digital Transformation on Teaching Practices

Completed Research

Marcelo Amorim

Fundação Getúlio Vargas
amorim.marcelo@yahoo.com.br

Alberto Luiz Albertin

Fundação Getúlio Vargas
albertin@fgv.br

Fernando de Souza Meirelles

Fundação Getúlio Vargas
fernando.meirelles@fgv.br

Maria Alexandra V. C. da Cunha

Fundação Getúlio Vargas
alexandra.cunha@fgv.br

Abstract

Information technology usage has transformed education systems with significant impacts to academic life and to the reorganization of the educational environment. Therefore, it is essential to understand the benefits arising from the adoption of new effective teaching practices connected to the digital world. In fact, such transformations are increasingly occurring and having impacts beyond institutional barriers. However, it is not completely clear whether information technology has truly transformed teaching practices. The purpose of this research is to investigate the changes in teaching practices motivated by information technology based on scholars' experiences. This study proposes qualitative/interpretive research through a case study with in-depth interviews, document analyses and field observations. The data confirmed that the motivation and transformation of teaching practices using information technology requires more innovative actions to ensure that technology is efficient and intensively used in new teaching methods.

Keywords

Education, information technology, teaching practice and scholars.

Introduction

According to a well-known study on information technology (IT) in education in Brazil, TIC Educação (2016) (TIC – Technology, Information and Communication), 95% of undergraduate students and 91% of undergraduate scholars use digital platforms for school activities, thus indicating the real growth of college activities inserted into the digital environment (cetic.br, 2016). In association with some advantages perceived by scholars, digital platforms are used as an important tool for activities and administration to access digital content (Camilleri & Camilleri, 2017). Alongside IT's inclusion in school activities, new attributes allow scholars to develop multiple teaching practices and foster knowledge building (Bhuasiri *et al.*, 2012). As a result, scholars are increasingly committed to adopting IT resources, especially younger ones (Camilleri & Camilleri, 2017).

In addition to IT usage in education, Bhuasiri *et al.* (2012) and Franco, Braga and Rodrigues (2011) state that content interaction between transmission paths and exposure in class still depend on better scholar qualifications and more engagement from management. As stated, the concept of IT as an educational solution has not been widely explored by managers in educational institutions, which causes deficiencies in usage and adoption (Keengwe, Onchwari & Agamba, 2013; Camilleri & Camilleri, 2017).

Therefore, this paper aims to identify whether there has been a significant change in teaching practices due to the use of digital media and platforms by scholars in undergraduate courses. Specifically, this research proposes to (i) identify scholars' knowledge about technology in education, (ii) identify links between IT developments and pedagogical processes, and (iii) identify the influences of digital media and platforms in institutions. Considering the new academic demands of IT, motivated by a new generation of students and scholars, the debates about IT usage in education have been gaining importance in recent

years (Valente, 1999). Therefore, this research intends to investigate the following question: what influence does IT usage have on teaching practices in relation to developing lectures and expositions in class for undergraduate courses?

The results of this research should discover how teaching practices have been transformed by IT usage. Moreover, they should be useful to faculty as a reference for future research by providing information about the benefits and concerns regarding improving activities using IT and being used by university managers for strategic education plans.

Literature Review

The introduction of IT usage into education allows for the teaching practice to be disconnected from the institution's time and space limits and adapt to the needs of students and scholars as long as it remains aligned with educational guidelines and rules. To ensure its alignment with current rules, teaching practices must be developed along three axes: objective, methodological and content (Araújo & Neto, 2010). For efficient pedagogical practices, the pedagogical objectives should be defined according to the environment and consist of systematic actions in order to achieve pre-established goals (Libâneo, 2013). Considering the current status of IT usage in education, Albertin and Albertin (2014) add that strategies related to use of information communication technology (ICT) in education must change the school curriculum, change teaching practices and must be present in all courses within the educational institution. To study the connection between IT and pedagogical strategy development focused on scholars, this research follows a theoretical model based on education components that was developed by Albertin and Albertin (2014) and is structured by the pedagogical strategy (teaching practice), technologies (IT) and content.

Current Technology Analysis, Relationship between Teaching Practice and Technology and Introduction of Technology to Education.

The introduction of IT into modern society has changed the conceptions of communication and behavior and influenced human relations in social and corporate environments. Given such growth, virtual education systems have created new opportunities to follow trends and meet the students' and scholars' demands in the educational environment. Considering these opportunities in the digital era, Schlemmer (2001) conducted a study about the beginning of online education in Brazil, which shows considerable growth in the late 1990s. Similarly, other studies also show an increasing use of IT over the same period. (Bhuasiri *et al.*, 2012; Whitaker, New and Ireland 2016).

The IT introduction into education has raised debates on many issues, such as contrary opinions about the quality of IT adoption and its functionalities (Persico, Manca & Pozzi, 2013; Henderson *et al.*, 2015) and the difficulties in introducing proper course quality for scholars based on IT systems or platforms (Almeida & Silva, 2014). These debates highlight misleading IT usage applied only to computerize the existing instructional process and the lack of distinctive pedagogical strategies for IT usage (Valente, 1999). Moreover, brings forward the lack of support from institutional managers to stimulate technology adoption in institutions (Valente, 1999; Schiller, 2003).

Despite critical views, several researchers relate the development of virtual learning systems with high adoption rates by students and scholars. This relationship occurs through IT and collaborative practices and is based on systems that are capable of improving students' motivation and performance (Wu, Pan & Yuan, 2016; Stoddart, 2015). According to these assumptions, Lee *et al.* (2005) positively describe scholars' commitment to the application and frequent usage of IT in face-to-face or virtual classes. Furthermore, Henderson *et al.* (2015) and Camilleri, M.A. and Camilleri, A.C. (2017) reinforce that IT has been recognized as an important path for changing and rebuilding educational systems.

Facing such restructuring of the educational system, the e-learning concept represents the technology available for education, the causes and the results of changes. Even so, considering these advantages, the evolution of the interactions and communication in virtual teaching processes depend on machines and on the people involved in such processes (Franco, Braga & Rodrigues, 2011).

For that reason, the advantages offered by e-learning systems are associated with communication dynamics and the abilities to provide online teaching content and assessments with synchronous or asynchronous timing between the teacher-student, student-student and tutor-student-teacher (Lau *et*

al., 2014; Stoddart, 2015). Therefore, learning management systems (LMS) were developed due to the growth of IT usage in education and the demand for online and face-to-face courses (Oliveira, Cunha & Nakayama, 2016) that allowed for interactions to occur through multimedia tools and internet assistance between students, teachers and tutors (Bhuasiri *et al.*, 2012; Franco, Braga & Rodrigues, 2011; Bhuasiri *et al.*, 2012; Oliveira, Cunha & Nakayama, 2016).

In addition, the literature emphasizes that IT usage has provided new opportunities for education fields and impacts on teaching practice satisfaction, student performance outcomes and learning preferences (Stoddart, 2015). However, few studies have investigated if the reconfiguration of courses occurred through IT usage and distance learning with solid effects on teaching practices (Wang *et al.*, 2013). The teaching practice structure described by Franco, Braga and Rodrigues (2011) was defined as artisanal work built through life experiences and actions. However, the elaboration of sophisticated content using technology is unable to overcome some barriers in traditional teaching methods due to scholars' life experiences and biases (Carvalho, Nevado & Menezes, 2007).

As stated by Whitaker, New and Ireland (2016), the first course supported by digital tools occurred at the University of New Jersey Institute of Technology in 1986. It was a virtual classroom created and accessed by computers from the university campus. The software allowed for limited teaching practices, such as group discussions, exchanges of individual messages and the transmission of documents. The second period that represents the connection of teaching practices and technology occurred between 1994 and 1996 and includes access to videos from classes that are added to the system. In the third period, 1997–2000, several undergraduate disciplines and certification programs began to use the system, with remote access for students residing distant from the university. The fourth and last period runs from the beginning of the 2000s to the present. It includes how the spread of the internet, which is allied to its low costs, has impacted the usage of videos, data links, and published contents, thereby representing a new era for education on the internet.

Due to these changes in teaching practices, scholars have absorbed new teaching methods that became naturally inherent to its function, such as online discussions, task submissions, collaborative study, Web usage for research, and the use of videos and PowerPoint (Kearns, 2016).

Methodology

The epistemological composition axis relies on the interactionist/constructivist conception, which converges with a qualitative approach through a case of study in conjunction with investigative and analytical characteristics (Silva *et al.*, 2014). In that case, conducting an interpretive analysis of a specific group requires systematization and data recording, validity, reliability, and performance parameters (Silva *et al.*, 2014; Eisenhardt, 1989).

The data were gathered during in-depth face-to-face interviews lasting on average two hours that were supported by a script of eighteen semi-structured questions, documents collected from course syllabi and observations of nine scholars' working routines (seven in the classroom and two in laboratories). The questions focused on scholars' IT usage (IT experiences, expertise, etc.) and school conditions affecting their IT usage. Informed consent was obtained from all scholars regarding the anonymous recording, transcription and analysis of the interviews. All interviews were conducted by Marcelo Amorim, a researcher in this study.

The twenty scholars selected who lectured in undergraduate courses at public and private universities. Moreover, scholars were chosen independently of their knowledge about IT, as shown in table 1. It is worth emphasizing that this research aims to investigate the use and influence of IT on teaching practices and not study groups that use the most or the fewest digital tools in lecture development. For that reason, subjects were chosen randomly. In addition, this research was conducted in São Paulo at five institutions (one public and four private) located in the central city where access to information and technology is more structured than other regions of the state or country.

Scholar	Gender	Experience	Subject	Institution	Level of IT usage
P1	M	7 years	Marketing Management	Public	Medium/Low
P2	M	8 years	Market Analysis	Public	Medium / Low
P3	M	15 years	Process Modeling	Public	Medium
P4	M	12 years	IT Management	Private	High
P5	F	20 years	Urban Ecology	Private	High
P6	M	20 years	Physics	Private	Medium / High
P7	M	7 years	Systems	Private	High
P8	F	14 years	Communication	Public	Medium / High
P9	M	17 years	Research Methodology	Private/Public	Medium / High
P10	M	20 years	Sociology	Public	Medium
P11	M	15 years	Mathematics	Public	High
P12	F	3 years	Mathematics	Private	Medium
P13	M	10 years	Science	Private/Public	Medium
P14	F	12 years	Administration	Private	Medium
P15	M	2 years	Physical Education	Private	Low
P16	M	8 years	Computer Systems	Private	High
P17	M	27 years	Law	Private	Medium
P18	M	13 years	Process Engineering	Private	Medium
P19	F	4 years	Law	Private	Low
P20	F	10 years	Information, Society and Communication	Public	Medium / High

Table 1: Scholar's Profile

Data Processing

The transcribed interviews were divided into individual and condensed units, which preserved their main content. Since most of the questions reached saturation when responses became repetitive, the researchers decided to stop including more scholars in the research. Each interview was divided into smaller paragraphs based on the most relevant information and was cross-checked with documents and face-to-face observations in the classroom and the laboratory. The collected data were later assembled according to the characteristics of each category and indicator based on the theoretical model created by Valente (1999), which addresses the conceptualization of education and IT outcomes.

According to theoretical model of the meaning of informatics applied in education that was developed by Valente (1999) and adapted by Silva (2008), two central themes based on the human dimension and the design dimension were selected for data analysis and were followed by subtopics and their respective contexts.

Core Theme 1: Efficient teaching tools. Subthemes: efficient teaching tools, college status, reducing negative attrition rates and planning and policy.

Core Theme 2: Adaption to reality. Subthemes: access and improvement, usage and needs, and scholars' training.

To develop a theoretical base about IT usage, Valente (1999) states that, "the task of improving our educational system, dynamic and complex, requires action from multiple dimensions and fundamental decisions, safe and creative". This study by Valente (1999) is one of the most relevant in the education field in Brazil, which very closely associates the educational environment to IT usage. The main topic of Valente's study is regarding the usefulness and ways of changing a school's perception based on IT. It is a profound review on schools' and scholars' issues of the misuse of IT, which covers all topics that are shown in table 2 (first column). Recent studies have been connecting their research to the adoption instead of the usage of IT with a specific focus on schools, students or scholars separately. In that case, Valente's study is a perfect match of this research focused on IT usage, compared to studies that fail to link IT use and teaching practices.

These dimensions were examined in a later evaluative study by De Smet *et al.* (2016), who connected the design, implementation and influence of IT usage as "the availability of a reliable and accessible ICT

infrastructure, the quality of technical and pedagogical support, scholar professional development and the mastery of scholar Information and Communication Technology competencies”. Additionally, the work of Albertin and Albertin (2014), Stoddart (2015) and Kearns (2016) helps to develop this more embracing perspective on our results’ discussion.

Analysis and Results Discussion

The scholars’ assessments and dissemination of IT knowledge are important because they provide different points of view and because they identify different problems and their characteristics (Persico, Manca & Pozzi, 2013). The research data show that motivations are connected to institutions’ realities, which are linked to scholars’ engagement with IT usage in teaching practices. Table (2) and figure (1) associate the theoretical model with the key findings gathered from data.

Theoretical Model	Core Issues	Current Use of IT in Education System	Key Findings
Planning and Policy	College Management	Low – Most use in administrative ways.	Low engagement with current issues on IT usage for teaching practices.
College Status	Infrastructure	Very Good - Availability and access to technologies.	Scholars do not report a substantial problem on that issue.
Access and Improvement	Training	Low - It is not available specifically for IT.	Training and mandatory use of IT in teaching practices is not imposed by institutions.
Efficient Teaching Tools	Scholar's IT Knowledge	Average - Knowledge on IT usage is from daily life.	Use of Available and Easily Accessible Learning Tools (does not require advanced IT knowledge from scholars).
Reducing Negative Attrition Rates	Changes in Teaching Practice	Very Low - Many barriers to changes (ex: work load).	Increasing competition for students’ attentions with social media and devices in the classroom. Changes in teaching methods directly influence the use of IT in teaching practices.
Usage and Needs	Effective use in Developing Lectures	Very Low - It uses only a few tools from the marketplace, and very few tools have been developed for education.	Difficult to assess the results of IT usage for teaching practices connected to students’ motivations and assessments.

Table 2: Supportive Theory for Analysis and Results Discussion Based on Valente (1999) and De Smet et al. (2016)

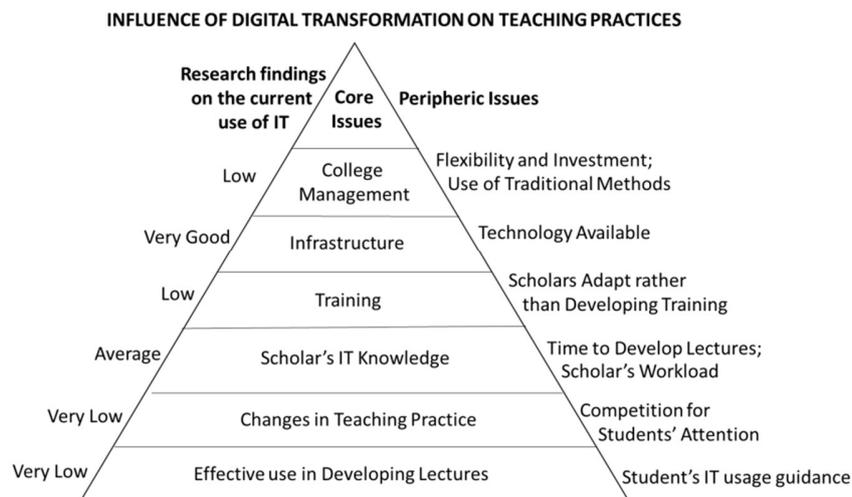


Figure 1: Current View of Scholars on Using IT in Education

Training and Mandatory use of IT in Teaching Practices Imposed by Institutions.

All 20 scholars reported a complete lack of pedagogical training or improvement policy focused on IT. However, the scholars claim that their institutions, in general, did not curb or forbid the use of technology in the classroom. By contrast, Stoddart (2015) and Bhuasiri *et al.* (2012) state that institutions encourage the inclusion of technology in addition to traditional educational tools, which receives strong support and commitment from the scholars. However, according to reports from ten scholars.

P1 stated that (...) "our college has never imposed the use of technologies". P5 stated that (...) if "this idea was implemented, we would be Google for education, but our college did not impose it. Even so, 90% of scholars incorporated the idea". P11 stated that (...) "some scholars engaged, and others found themselves slightly lost; some scholars had to leave the college for not adapting themselves. (...) I would say technology embraced our college".

The lack of continuous training and being open to more flexible practices are reported as the most relevant issues connected to low IT usage in education, innovations and development (Sergis *et al.*, 2014). Developing digital courses does not have to be compulsory as gradual integration can motivate scholars to adapt themselves and to avoid rejection (Kearns, 2016). The main concern of scholars is the increased workload. Thus, the initial IT usage should occur during lecture development and, above all, should be easy to manage. Otherwise, it should create barriers and demotivate scholars (De Smet *et al.*, 2016)

Use of Available and Easily Accessible Learning Tools (does not require advanced IT knowledge from scholars).

The data show that video usage is modestly growing as support for face-to-face lectures. The data show that 14 out of 20 scholars had used videos in the classroom and considered videos as a reinforcement for students' understandings and motivations.

In contrast to video usage in lecture development, the uses of other digital technologies are inconsistent or unrecognized. At the moment, the scholars were asked why students use Wikipedia as their main search tool, and many did not know how to respond. However, when we addressed the fact that the scholars do not provide alternative sources for students in the scope of their course, the question became more understandable. A simple website indication would be a motivating factor for students and would certainly configure the use of technology in the classroom. De Smet *et al.* (2016) state that a learning management system is a constructive way to involve students in IT applications, and it enhances motivations. In this sense, scholars reported the following:

P17 stated that (...) "I do not just use Power Point (PPT) as a substitute for the traditional whiteboard; I incorporate videos and links, so my lecture does not look like the same traditional way". P6 stated that (...) "I use some visual elements now that help me to exemplify what I am explaining from the content".

Consequently, Valente (1995) concludes that IT must be used to enrich learning environments by helping students to process knowledge and states that the concept of "computer literacy" must be eliminated. As such, students should interact with IT beyond just as a didactic tool. Therefore, establishing and defining technology for education was a great challenge for all scholars. The definition of IT in education for 16 out of 20 scholars is connected to its availability and accessibility in the market. In such a context, most scholars have reported the importance of defining technology in education to make better use of it.

P10 stated that (...) "The classroom tends to reflect what the real world is, linked to the current technology usage. Today, the lecture related to statistics uses Excel because Excel is the standard market working tool; the classroom is reproducing what is widely available and what is used as standard, but what is the concept behind of it?". P3 stated that (...) "we have little technology here at school (...), but we must define what technology is in education, what kind of technology are we talking about?" P14 stated that (...) "we do not give the right names to the things we use. Rather than defining them, we should know to what degree we are taking advantage of it".

For example, the proportion of IT usage in the classroom could not be found in documents collected from syllabi or subjects' programs. The uses of IT in classrooms have been confused with its administrative functions, which is then often adopted by scholars in the same way rather than being used as instruments of connectivity to the digital world (Stoddart, 2015). In addition, Valente (1995) stressed that by

understanding technological resources as a new way of representing knowledge, resizing existing knowledge and reshaping traditional concepts, the understanding of new ideas and values will arise.

Increasing Competition for Student's Attention with Social Media and Devices in the Classroom.

This category became very relevant issue inside the institutions. During the present research, two main questions were raised concerning classroom management integrated to IT: (i) to what extent has IT become a problem and (ii) how could it be changed to a solution?

First, 15 out of 20 scholars considered it difficult to solve the distraction problem that is due to IT usage in classrooms. Conversely, our observations in classrooms and laboratories showed that the use of IT was just adapted to the existing practices, contents and exposure without an effective or complete adaptation to the teaching methods. By analyzing courses' documents, such as lesson plans and syllabi (scope), it became clear that there was no inclusion of IT elements or teaching methods different from the traditional ones. We realized that in many cases, IT merely represented an adaptation to what already existed. Facing such a resistance to change, Valente (1999) considers that "although everything indicates that schools should be adjusted to adapt to the new era, how much it should change is still controversial".

P2 stated that (...) "technology has several times stagnated productivity in the classroom". P12 stated that (...) "sometimes I give a lecture, and most of the students are entertained with other things on their computers, ex: social media, and in that case competing with my attention".

Valente (1999) states that institutions often only computerize their traditional courses, but they do not make effective changes by adopting better IT quality. Similarly, Albertin and Albertin (2014) understands that changes to introduce IT usage must occur across all pillars of education in order to be effective.

In contrast, 10 out of 20 scholars reported no issues on using multimedia resources in classrooms as long as IT usage is directed to classrooms rather than just monitored. In that case, it is essential to teach students to correctly use IT in classrooms to comply with the rules, goals and challenges. We observed that in institutions providing effective changes to teaching methods, the use of technology became inherent to project development and went beyond the traditional system. In other words, changing the teaching methods directly and deeply influenced IT usage in classrooms.

P5 stated that (...) "we take our students as protagonists in our lectures, we use the PBL method (problem-based learning), this method is based on problem solving and hands-on". P9 stated that (...) "we do not compete with social media (...), we do not have this type of dispute because we think technology is already inherent in our day-to-day" lives. P3 stated that (...) "students have to be trained to use technology, we are in a learning process, especially scholars".

Changes in Teaching Methods Directly Influence the Use of IT in Teaching Practices.

As previously mentioned, effective changes to teaching methods give scholars important opportunities to demystify the difficulties and introduce IT for lecture development (Albertin & Albertin, 2014). However, all scholars reported that developing teaching methods in a digital format demands much extra time and dedication, thereby impacting the cost-benefit exchange. Moreover, 12 out of 20 scholars said they were able to associate the guidelines developed in pedagogical plans with the benefits gained in classrooms. Thus, for many scholars, it is worth creating new methods, although it requires extra work. By assessing these traditional disruptions, the scholars stated the following.

P6 stated that (...) "some scholars use technology in the same traditional working way; this is not effectively a changing method, which could bring more results". P19 stated that (...) "scholars think that everything will be ready. On the contrary, the reverse classroom gives a lot more work; it is very stimulating. My use of IT is necessary because I must be much more aware to make it work and use many things from outside the classroom that IT provides". P7 stated that (...) "I was very resistant to change teaching methods, but now I work with this system using IT at our school, and it is impossible to go back. It is impossible not to think about doing something different because I have now seen that it works".

However, 8 out of 20 scholars believed the costs and time demanded to develop new methodologies were

not rewarded with improvements to students' motivations or assessments. These scholars were not opposed to changing teaching methods or including technology in the classroom, yet they were concerned with the spending time to develop something new. The interviewed scholars stated the following.

P11 stated that (...) "imagine the pre-lesson time that would be required of us for creating new mechanisms to deliberate over all lectures". P2 stated that (...) "is it worth using technology if I cannot request to use it the same way". P1 stated that (...) "I have to stop to seek a new platform and record videos to enclose in my lecture: it takes too much time. I am talking about the best of technology usage in classroom. What is the benefit I am going to have about it? If at the end of the day, I cannot change effectively, there is no tangible benefit to this breakthrough".

In fact, all scholars believed that the content should be aligned to IT usage and teaching practices. However, 4 out of 20 scholars concluded that the content should be applied in a traditional way to encourage critical thinking. In that context, Valente (1999) stresses the criticism that "complex contents are fragmented, categorized, hierarchized, and must be delivered in an increasing complexity order, within a predetermined period. The scholar, therefore, must meet these standards and ensure the content is being passed to students in a precise, objective and equitable manner" (Valente, 1999, p.35). As justified by this group of scholars, traditional teaching practices also achieve results.

P1 stated that (...) "I have taken off PPT (Power Point) to encourage reading because students want to have subject content in slides; this is an absurd reductionism. Students fail to read the complete content, to only use the summary exposed on PPT". P11 stated that (...) "we must have a content scale and not only technology".

As a result, based on the interviews and field observations, it is evident that the subject is irrelevant when considering the challenges in using IT, which is also stated by Hinostroza *et al.* (2011) and Kearns (2016). According to all scholars, the use of IT is inherent to the subjects that were investigated herein. Even scholars who do not use IT very often in the classroom agree with the potential of IT or social media in teaching practice.

P2 stated that (...) "It is the nature of my lecture that I have to use software, and when I have the possibility or not of using it, I will use it because it is natural". P3 stated that (...) "I give lectures about information and society, which requires much text reading: this can be very annoying. To improve my lectures, I use videos and music, to expose important points of my lecture, besides reading, obviously".

The analyzed documents show that IT is present in lecture planning, although it is not so clear. In addition to using external sources, scholars also prepare databases and other resources to be analyzed in class. In this sense, IT already transforms teaching practices and their development, although in a slow and restrained form. Some scholars do not fully realize that technology is inherent in some lecture procedures, and IT is a part of the students' and scholars' daily lives (De Smet *et al.*, 2016; Kearns, 2016; Hinostroza *et al.*, 2011)

Results of IT Usage for Teaching Practice in Relation to Student Motivation and Assessment.

The results regarding IT's influence on the teaching practice show changes in students' motivations, although all scholars agree that if IT is used correctly it may be different. For that reason, how to assess students' learning and motivations became the main issue raised by all scholars, and there is no consensus or direction indicating how to assess students' performance correctly (Araujo & Neto, 2010). Moreover, IT has not provided an efficient solution according to scholars' statements.

P3 stated that (...) "technology is not effective in relation to results because we are looking at adopting, but in the wrong direction". P4 stated that (...) "scholars use technology and expect different results in the classroom, but they are actually not doing anything different from what already exists for a long time, so the results do not come as expected".

These important points rely on some questions. What is used in classroom? How is it used? What result is expected? As explained by one of the scholars, P1, "using IT for the same traditional teaching practice and expecting different results is not effective because simple IT adaption does not bring results". Additionally, P9 stated that "In this way, when results do not emerge, it tends to marginalize the use of

IT instead of reviewing current practices in the classroom”. Valente (1999) makes an interesting observation regarding the tendency to seek all solutions in IT: “It means that pedagogical change we intend to have, cannot be solved with a magical solution by buying sophisticated equipment (...) if such changes are not attacked with all resources and energy that we educators have, we take the risk of having ourselves working in an obsolete environment and in disarray with modern society” (Valente, 1999, p. 42).

Conclusion

Based on the current technology available in the institutions analyzed in this research and supported by the scholars’ perspectives, the aim of this research was to detect the influences of technology on teaching practices and how information technology modifies the development and pedagogical planning within institutions. Although information technology is present in the current development of teaching practices, it is still recognized as instrumental support, thus making it difficult to use it and exploit its full potential. It is essential to assess to what degree scholars are engaging with digital technology. Most universities are clearly not confronting the demands for extensive and creative use of digital technology in teaching practices.

This research suggests that effective changes in teaching methods directly influence more advanced use of IT, further requiring innovative policies and investments in new teaching practices different from traditional ones. It is understood that by incorporating IT into existing traditional teaching practices, IT does not influence lecture exposition in a concise way. Instead, IT works just as another tool adapted for instructional practices focused on content distribution, based on interactivity and problem solving in classroom and laboratory. Certainly, to use IT effectively in education requires more intense digital inclusion for everyone involved in pedagogical planning. In that case, IT should not be used as a simple tool on a daily basis. On the contrary, it should be used to make day-by-day differences for students and scholars. It is extremely important to learn to use the available tools considering different perspectives. These findings support the argument that IT usage should be configurable by course developers to enable better teaching practices and course content rather than just being adapted to current practices, thereby improving scholars’ and students’ learning experiences.

Figure (1) shows the issues that institutions should address in their efforts, in addition to improving the educational environment at all levels and for everyone involved. Nonetheless, trying to fix only one or a few issues does not provide satisfactory results. In that case, institutions that invested in and solved most of these issues gained more commitments from scholars and students, thereby creating an enjoyable environment for studying and developing knowledge by exchanging experiences and ideas. Finally, to address the research gaps in the future, analyzing and understanding exactly what technology means for education and defining its levels of use shall help the academic community and managers of educational institutions to define the pedagogical strategies centered on innovating teaching methods and making more appropriate use of information technology.

REFERENCES

- Albertin, A., and Albertin, R. M. M. 2014. “Avaliação de educação com base nas suas dimensões e componentes: uma análise da avaliação oficial da Pós-Graduação no Brasil”, *Business and Management Review* (13:3), pp. 301-319.
- Almeida, M.E.B., and Silva, K.A.G. 2014. “Formação de professores a distância e as perspectivas de articulação entre teoria e prática por meio de ambientes on-line”, *Educar em Revista* (4:1), pp. 129-148.
- Araújo, M.E., and Neto, O.D.J. 2010. “Um novo modelo de design instrucional baseado no ILDF – Integrative Learning Design Framework para a aprendizagem online”, *Educação, Informação e Tecnologia* (3:1), pp. 68-83.
- Bhuasiri, W., Xaymoungkhoun, O., Zo, H., Rho, J.J., and Ciganek, P.A. 2012. “Critical success for e-learning in developing countries: A comparative analysis between ICT experts and faculty”, *Computers & Education* (58:1), pp. 843-855.
- Camilleri, M.A., and Camilleri, A.C. 2017. “Digital learning resources and ubiquitous technologies in education”, *Technology, Knowledge and Learning* (22:1), pp. 65-82.
- Carvalho, S.J.M., Nevado, A.R., and Menezes, S.C. 2007. “Arquiteturas pedagógicas para a educação a

- distância: concepções e suporte telemático”, *Anais – XVI Simpósio Brasileiro de Informática na Educação* (1:1), pp. 362-372.
- De Smet, C., Valcke, M., Schellens, T., De Wever, B., and Vanderlinde, R. 2016. “A qualitative study on learning and teaching with learning paths in a learning management system. *Journal of Social Science Education*”, (15:1), 27–37. <https://doi.org/10.4119/UNIBI/jsse-v15-i1-1460>
- Eisenhardt, M.K. 1989. “Building Theories from Case Study Research”. *The Academy of Management Review* (14:4), pp. 532-550.
- Franco, R.H.R.L; Braga, B.D., and Rodrigues, A. 2011. *Ead Virtual. Entre a teoria e prática*, São Paulo: Edições 2.
- Henderson, M., Selwyn, N., Finger, G., and Aston, R. 2015. “Student’s everyday engagement with digital technology in university: Exploring patterns of use and ‘usefulness’”. *Journal of Higher Education Policy and Management* (37:3), pp. 308-319.
- Hinostroza, H., Christian, L., Brun, M., and Matamala, C. 2011. “Teaching and learning activities in Chilean classrooms: Is ICT making difference?”. *Computers & Education* (57:1), pp. 1358 – 1367.
- Kearns, R.L. 2016. “The experience of teaching online and its impact on faculty innovation across delivery methods”. *Internet and Higher Education* (31:2), pp. 71-78.
- Keengwe, J., Onchwari, G. and Agamba, G. 2013. “Promoting effective e-learning practices through the constructivist pedagogy”. *Education, Information & Technology* (19:4), pp. 887-898.
- Lau, H.W.R., Yen, Y.N., Li, F. and Wah, B. 2014. “Recent development in multimedia e-learning Technologies”. *World Wide Web* (17:1), pp. 189-198.
- Lee, O.K.M., Cheng, M.K.C. and Chen, Z. 2005. “Acceptance of internet-based learning medium: The role of extrinsic and intrinsic motivation”. *Information & Management* (42:1) pp. 1095-1104.
- Libâneo, J.C. 2013. *Organização e Gestão da Escola. Teoria e Prática*, São Paulo: Edições 6.
- Oliveira, C.P., Cunha, A.C.J.C., and Nakayama, K.M. 2016. “Learning management systems (LMS) and e-learning management: an integrative review and research agenda”. *Journal of Information System and Technology Management* (13:2), pp. 157-180.
- Persico, D., Manca, S., and Pozzi, F. 2013. “Adapting the technology acceptance model to evaluate the innovative potential of e-learning systems”. *Computers in Human Behavior* (30:1), pp. 614-622.
- Sergis, S., Sholla, I., Zervas, P., and Sampson, G.D. 2014. “Supporting School ICT uptake: The ask school ICT Competence Management System”. *IMCL - International Conference on Interactive Mobile Communication Technologies and Learning*, pp. 359-363.
- Silva, F.G., Yoshitake, M., França, M.S., and Vasconcelos, L.Y. 2014. “Método de estudo de caso como estratégia construtivista de ensino: proposta de aplicação nos cursos de Administração e Contabilidade de Custos”. *FAE – Curitiba* (17:1), pp.126-143.
- Silva, G.M. 2008. “O uso do computador na educação, aliada a softwares educativos no auxílio ao ensino e aprendizagem”, *Educação pública. ISSN: 1984-6290*. Available in: <<http://educacaopublica.rj.gov.br/biblioteca/tecnologia/0021>> acesso em: 13/10/2017.
- Schlemmer, E. 2001. “Projetos de aprendizagem baseados em problemas: uma metodologia internacionalista/construtivista para formação de comunidades em Ambientes Virtuais de Aprendizagem”. *Revista Digital da CVA* (1:2), pp. 10-19.
- Schiller, John. 2003. “Working with ICT: Perceptions of Australian principals”. *Journal of Educational Administration* (41:2), pp. 171-185.
- Stoddart, P. 2015. “Using educational technology as an institutional teaching and learning improvement strategy”. *Journal of Higher Education Policy and Management* (37:5), pp. 586-596.
- Valente, J.A. 1995. “Informática na educação: confrontar ou transformar a escola”. *Perspectiva* (13:24), pp. 41-49.
- Valente, J.A. 1999. *O computador na sociedade do conhecimento*. Oea_Nied/Unicamp, São Paulo.
- Wang, J., Doll, J.W., Deng, X., Park, K., and Yang, M.G. 2013. “The impact of faculty perceived reconfigurability of learning management systems on effective teaching practices”. *Computers and Education* (61:23), pp. 146-157.
- Whitaker, J., New, R.J., and Ireland, D.R. 2016. “MOOCs and the online delivery of business education: What’s new? What’s not? What’s now?” *Academy of Management Learning and Education* (15:2), pp. 345-365.
- Wu, J.C.Y., Pan, C.I., and Yuan, C.H. 2016. “Attitudes towards the use of information and communication technology in management education”. *Behavior and Information Technology* (36:3), pp. 243-254. <http://www.cetic.br/pesquisa/domicilios/indicadores>, accessed on May 2, 2018.