The Impact of Innovative Practices of Performance in Universities: An Exploratory Study in Brazil

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Abstract

The use of new practices in educational environments has happened for some time and play a great impact in students’ and teachers’ development and behavior. Through an in-depth discussion under the light of the Brazilian reality, this article tried to evidence how these new educational practices impact on the institutional performance in higher education. This research covers a conceptual model composed by independent variables (practices of innovation on Education) and also dependent one (educational results, cost efficiency and personal satisfaction of the parties). To verify the conceptual model, the research was divided into two phases. On the first phase, we tried to identify to the light of specialized literature the innovation practices used on higher education institutions (HEI) and ways of measuring the performance of the institutions. On the second part of the study we tried to group the practices found through the cluster technique and, after that, we conducted a survey with specialists selected by technical and scientific criteria. We assessed that the impact of the practices is bigger when they are related to personal satisfaction of the participants, being followed by the educational results. Moreover, the most influential practices on institutional performance on higher education are associated to the use of Internet and mobile devices in the teaching and learning process, practices aiming to collaborative learning and pedagogical approach based on problems or projects. We conclude that this study presents relevant points and presents significant implications for educators and managers, as it may subside decision-making processes related to the implantation of new practices aiming to improve educational performance, besides pointing to new practices which can be very useful in different goals.

Keywords: Impact of innovative practices; Performance on results; Higher Education Institutions (HEI)/ Public Universities/ Brazil.

1. Introduction

We have been living in a world where technology is planted in all aspects of society, culminating in a new cultural and economic formation and directly impacting the society as a whole (CASTELLS, 2000; SINGH, 2005; WALLIS, 2005). This transformation allowed an increasing in our learning...
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capacity, providing means so this process occurs in any place at any moment (AHMAD, 2015; BECKERS, VOORDT and DEWULF, 2015; SIMONS, LINDEN and DUFFY, 2000). According to Pate (2016) and Eun Oh and Jace (2011), in face of this panorama, it has become the main focus of most HEI to prepare students to a technologically advanced society, by incorporating new technological devices and new pedagogical methods to their education and management procedures, which may become strong allies in teaching and learning activities, potentializing the construction of richer environments, whose main characteristics aim to promote more collaboration, communication and participation of the parties in the educational processes (MORAIS and RAMOS, 2014; VENKATESH, CROTEAU and RABAH, 2014; LÉVY, 1999).

By considering the Brazilian educational context it is possible to observe a situation which is similar to the pointed above, especially when it comes to the search of new and better practices in educational institutions (FAVRETTO and MORETTO, 2013). In face of this scenario, an empirical analysis is essential to understand how innovative and technological practices impact on the whole context of HEI in Brazil, and what is their real impact on the modernization process of these institutions. Some studies can be referred about the topic as, for example, Becker et al. (2017), McAleese et al. (2013), King and South (2017), UNESCO (2009) and Vieluf et al. (2012). However, their approaches do not make evident the impact of innovative practices on the performance of Brazilian HEI/Universities.

So, this research has as its goal to evaluate the impact of innovative practices on the performance of Higher Education Institutions / Universities to the light of the Brazilian experience. This analysis is marked by cutouts of theoretical references of the contemporary thought, which follow the determinants of well succeeded experiences and projects, to the light of the best practices of international experiences, based mainly on the methodological innovations and planning techniques which permeate the education. This new scenario favours the stimulus to the enhancement of more and more sophisticated and refined techniques of support to the building of models and methods of education. The rest of the paper is as follows: section 2 provides theoretical background followed by methodology in section 3. Section 4 provides results and discussion of the research. Section 5 provides verification of the conceptual model: results and underlying analysis. Section 5 provides implications to management practices on HEI. Section 6 presents the conclusion from the study followed by acknowledgements and references.

2. Theoretical Background

It is right that innovating on education is not a simple task, especially to the light of efficient and effective tools, methods, techniques and models useful for dealing with education. When considering this scenario, we realize that all the resources and new practices converge to the development of abilities which are considered essential to the 21st century, such as: capacity of researching and evaluating information; problem solving and development of new ideas, especially with the use of information and communication technologies (ICT) (LAAR et al., 2017). According to the OECD (2014), the definition of innovation which is more widely accepted comes from the Oslo Manual (OECD/EUROSTAT, 2005), which describes it as the implementation of a product (good or service) new or significantly improved. After some changes on this definition (OECD, 2014; WALDER, 2017) it can be applied in an education context, by considering innovation not only an inedit product, but a product which promotes improving on the educational service (products/services, processes, organization of activities and marketing techniques).

According to Gomez-Pablos, Pozo and Munoz-Repiso (2017), in this innovative process it is necessary a school which stimulates the students’ development through complex activities associated to their interests and abilities. In this scenario, it is up to the educators to provide dynamic environments where students are challenged to explore, create and comprehend new ways of solving problems and assimilate knowledge (AKHMETOVA, KIM and HARNISCH, 2014). For Shear (2011),
Kirstein and Kunz (2015) and Unina and Bearing (2016), this new teaching environment is formed by three foundations and perpasses a student centered approach, aiming a personalized way of teaching; learning beyond the classroom, allowing the student to be in touch with relevant subjects to the class almost every day; and, finally, the ICT as tools for supporting teaching processes, integrated in pedagogy as a way of backing up the learning goals increasing and deepening on these opportunities.

In face of this new panorama, identifying what must be measured in relation to the new practices is not something so simple, however, indicators related to innovation on the educational area might be related to different social and educational goals such as: results derived from innovative practices, cost efficiency and the personal satisfaction of the parties (OECD, 2014). In relation to these three indicators it is important to consider than once the results (SCHEERENS, LUYTEN and RAVENS, 2011), the cost efficiency (THANASSOULIS et al., 2011; ROBST, 2001) and teachers’ and students’ satisfaction (MAINARDES, ALVES and RAPOSO, 2014; DOUGLAS, DOUGLAS and BARNES, 2006; JAGER and JAN, 2016) have a primordial role on the process of interpreting educational quality, especially when monitoring aspects related to productivity and effectiveness on education.

3. Methodology

3.1 Conceptual Model

Figure 1 presents the conceptual model adopted on this study. During this section we examine the variables which compose the conceptual model (Figure 1), as well as the tested hypothesis for this study.

![Conceptual Model](image)

This study proposes a conceptual model in which innovative practices may influence in a greater or lesser extent the results of HEI’s performance when considering different social and educational results. Figure 1 presents the constructs identified for this study and will work as a framework for further discussions. As mentioned before, we realize that new resources and pedagogical practices have been used by part of HEI with the intent of developing different abilities which are primordial to the 21st century. So, it is essential to analyse how these new teaching practices...
impact on the performance of HEI in different contexts. Through the conceptual model proposed, and aiming to analyse the effects of innovative practices we elaborated the independent and dependent variables, as well as the hypothesis for this study:

**Independent Variables:** The independent variables were extracted from the literature and submitted to specialists for external validation. At the end, we could identify 193 practices, which were submitted to the Cluster statistical technique aiming to reduce this number without losing relevant information.

**Dependent Variables:** The dependent variables were extracted from the literature and submitted to specialists for external validation. Through the studies of this literature we could identify as a way of measuring the performance of HEI the following indicators: educational results derived from the innovative practice, efficiency of institutional costs and personal satisfaction of the related parties.

**Hypothesis:** The innovative practices will have a significant effect in greater or lesser degree in the performance of HEI in relation to the different educational and social results.

### 3.2 Data Collection and Sample

The population for this study was composed by specialists on education with knowledge and experience about the object of investigation. The authors investigated the impacts of innovative practices on the performance of Brazilian higher education institutions. The data was collected through a judgment matrix of scalar type - Likert. The research tool was elaborated based on the theoretical framework and has two segments. The first segment intends to obtain information related to the specialist’s profile as: highest education level, training area and professional experience. The second part of the research tool has the focus of inquiring, through a judgment matrix, the degree of impact of using the innovative practices in HEI, by a scale of one (1) to five (5), being one the lowest degree and five, the highest. We applied pre-tests to make the required adjustments before the definitive application, which include time of application, redundancy, complexity degree, amongst others. After that, we verified the validity and reliability degree. The external validity was assessed by specialists. For internal reliability of the questionnaire we used the Cronbach Alpha. Later, we selected the HEI, objects of research, through the General Index of Courses (GIC), located on the website of the National Institute of Studies and Researches (INEP). We selected Brazilian public and private higher education institutions. For selecting the specialists we used the CNPq/Lattes Platform basis (contacts). Finally, the questionnaires were sent over email and filled on the tool Google Forms. The research was applied during the months of November 2017 to February 2018. Of 1637 questionnaires sent, 5% were answered, which represents a significant sample, considering the exploratory nature of this study. To reduce the subjectivity of the results, we applied statistical techniques of Data Mining. These techniques are considered appropriate to the case. Then, we used Cluster grouping techniques. On the following section these procedures are detailed.

### 4. Verification of the Conceptual Model: Results and Underlying Analysis

The results and underlying analysis for this study are structured according to the following stages:

**First Phase:** Identification, to the light of literature, of Innovative Practices applied in HEI (Independent Variables) and of indicators to measure the performance of HEI (dependent variables).

**Second Phase:** Identification and analysis of the impact of Innovative Practices on the performance of Brazilian HEI.

**First Phase:** Identification, to the light of literature, of Innovative Practices applied in HEI (Independent Variables) and of indicators to measure the performance of HEI (dependent variables).

The first phase is related to the understanding of the problem and deepening on the subject proposed. It was divided in two steps, which are:
Step 1 - Bibliographical research, aiming to understand the key concepts about innovative educational practices in HEI and identify criterion to measure the performance of HEI’s results.

During this step, over 130 articles were researched. They were taken from the following basis: ACM, ScienceDirect, IEEE, Emerald, Google Scholar and Wiley InterScience. In this step we identified all the researches which could potentially contribute to the systematic review about the subject. To search for the studies we defined specific keywords as: HEI/Universities Management; Innovation in HEI/Universities; Metrics for Measuring Performance of HEI/Universities; Resources Management in HEI/Universities. We first predicted the possibility of modifying the keywords according to the necessities. As result we obtained a list with 193 innovative practices and three indicators for assessing HEI performance in different educational and social contexts, which are: educational results, cost efficiency and personal satisfaction of the parties.

Step 2 - Bibliographical research, aiming to understand the key concepts about the innovative educational practices in HEI and identify criterion to measure the performance of HEI’s results

During the study we identified a list with 193 practices to the light of a variety of articles published on the basis Emerald, Science Direct, amongst others. In face of the great number of practices found and aiming to compose the survey we looked for ways to reduce or group these practices. The technique adopted to do so was the grouping, or Cluster, which focuses on organizing it in an automatized way, based on the similarity of items, a great collection of data in a smaller group, without losing the coherence among them (BASHA and KALIYAMURTHIE, 2017; HAIR et al., 2009). For calculating the similarity among the practices we used the Euclidean distance, resource usually applied in situations like this study (HAIR et al., 2009). Along with the distance calculation and focusing on the grouping of practices we realized tests with some agglomerative methods. We obtained more satisfactory data, after a series of tests with the provided methods, with the Ward method, once its grouping seemed to be more consistent. Intending to provide a better description of the groupings identified, we used a resource called Word Clouds (Figure 2). This resource is commonly used, according to Heimerl et al. (2014), because of its simplicity and visual appeal, once it provides a general view of a set of texts presenting the highest frequency in which specific terms appear. The word cloud elaborated for this study is presented on Figure 2:

Figure 2: Clouds of words which are evident on the 11 groups of better practices
Based on the description of the practices contained on the groups and with the aid of the word clouds the grouping of innovative practices in HEI could be then characterized. Finally, as a result, we obtained 11 groups, presented below:

- **Group 1** – On the 26 grouped practices we identified as stronger terms the words: *Printing, Learning, Technology, Teaching, Internet and Mobile*. Then, looking for a more appropriate contextualization, we got to the definition for the group as: “Use of Internet and mobile devices in the teaching and learning process;”

- **Group 2** – The largest group, with 42 practices, was based on the word cloud composed by the following terms: *Develop, Student, Learning, Collaborative and Teaching*. We realize, from the terms found, a strong relation to collaborative activities. Therefore, the group was named as: “Adoption of practices aiming collaborative learning”;

- **Group 3** – Composed by 12 practices whose relevant terms were: *Student, Schemes, Support, Group, Discussion and Forums*. Due to the terms found we decided to name the group as: “Student support through discussion groups, forums etc.”;

- **Group 4** – The second largest group, with 32 practices, presented as most frequent terms: *Role, Scientific, Teaching, Learn and Professionalization*. Amongst the groups, this one presented a bigger diversity of practices, but, after observing the complete textual composition of them we realize a strong inclination to resources associated to professionalization and roleplay simulation. Thus, the name defined for this group was: “Roleplay simulation aiming the professionalization of students”;

- **Group 5** – One of the smallest groups, with eight practices, presented as relevant terms: *Problem, Research, Approach, Based, Project, Skill and Pedagogical*. Even though it did not present a great number of practices grouped, the identification of the terms enabled the definition of its name as “Pedagogical approach based on Problem, Project or Competences and Abilities”;

- **Group 6** – Containing 15 practices, it is composed by the following relevant terms: *Web, Map, Tool, Slides, Clickers, Databases e Online*, this group was focused on the term *Tool*. Therefore, its name was defined as “Use of tools as conceptual maps, mind maps, clickers, slides, etc.”;

- **Group 7** – Composed by 13 practices, it was formed by the terms: *Video, Teaching, Clips, Digital, Game, Strategies and Learning*. We opted by the definition of the group with main focus on the term *Digital*. Thus, the identification of the group was defined as “Use of digital strategies of teaching and learning as: videos, clips, games, etc.”;

- **Group 8** – With the intermediary value of 17 practices, this group was identified by the relevant terms: *Development, Action, Resource, Research, Sustainable and Digital*. Due to the difficulty of characterizing this group, we opted by the most distinguished term: *Sustainable*. So, the name of the group was defined as “Approach of actions or research focused on sustainable development”;

- **Group 9** – Is composed by 14 practices with the following terms: *System, Learning, Intelligent, Based, Adaptive, Web and Support*. For this group we opted by the term *Adaptive* as a focus. The name chosen was defined as “Use of intelligent web based learning systems”;

- **Group 10** – The smallest group, with only five practices and the terms *Massive, Courses, Mooc, Online, Discussion, Technology and Open*, was defined as “Use of Massive Open Online Courses (MOOC)”;

- **Group 11** – Finally, the last group is composed by nine practices and has the following relevant terms: *Education, Media, Social, Networking, Sites, Wiki, Web and Blogs*. For this group the focus was on the social media, which made we identify it as “Use of social media/networks (Wikis, Blogs, Facebook, etc.) as an educational resource”.

Second Phase: Identification and Analysis of impacts on the performance of Brazilian HEI

At this phase we tried to present and analyse the results obtained through the application of the survey sent to the specialists and answered by them. The survey was organized in matrices (Likert) with values varying between one (1) and five (5), being one (1) considered “very low” impact on the performance of HEI, and five (5) defines “very high” degree of impact of the innovative practice on the different HEI’s goals. From the specialists’ answers we tried to assess the performance of HEI in relation to the Educational Results ($\alpha = 0.77$), Cost Efficiency ($\alpha = 0.87$) and Personal Satisfaction of the Parties ($\alpha = 0.87$). It is important to highlight that the coefficient which measures the internal consistency of the questionnaire through the Cronbach Alpha ($\alpha$) for each practice is above $\alpha = 0.75$ ($p < 0.05$), which characterizes the questionnaire with the acceptable classification (TAVAKOL and DENNICK, 2011). At this phase, aiming to better understand the problem and deepen on the subject, we divided the results into four stages, which are:

Stage 1 – Significant differences among the innovative practices in relation to the different educational and social results

Through the results we then follow to the verification if there are significant differences among the innovative practices in relation to the different educational and social results. To clarify this hypothesis we used the Kruskal-Wallis test, a non parametric alternative to the one-way ANOVA, along with the Post-hoc test of Wilcoxon-Mann-Whitney to verify the average groups (MCCRUM-GARDNER, 2008). When the groups of innovative practices were associated to the educational results we obtained statistical significance among them ($H = 111.4, p < 0.01$). It was also possible to obtain similar results of statistical differentiation when considering personal satisfaction of the parties ($H = 53.29, p < 0.01$). However, it was not possible to assess significance when considered the impact of innovative practices associated to cost efficiency ($H = 11.978, p = NS$). Thus, by considering the existence of differences among the innovative practices we realize their partial support, once considered that cost efficiency did not present differentiation among the groups of practices. In this context, it is important to provide deeper analysis on the impacts of each practice on the different perspectives proposed. This analysis is justified once each practice has a different effect in each of the goals, which may subside the choice of managers according to the profile of their HEI.

Stage 2 - Direct impact of innovative practices on the educational results

Aiming to provide a better presentation of the specialists’ answers to each of the categories of the Likert scale which compose the survey we created a heatmap to each of the different educational and social results. The results obtained when considered the educational gains are presented on the Table 1.

Table 1: Intensity of the impact of innovative practices on the performance of HEI on the educational results
By considering the heatmap (Table 1) presented we realized that part of the specialists think that the innovative practices apply moderate to high impact of the innovative practices on the educational results of HEI. The practices which highlight the most for concentrating higher impact levels are: “VI1 - Use of Internet and mobile devices in the teaching and learning process (M = 3.74)”, “VI5 - Pedagogical approach based on Problems or Projects (M = 3.73)” and “VI2 - Adoption of practices aiming collaborative learning (M = 3.72)”. By considering this results we realize that they meet several studies related to innovation and positive gains on Education. Another important topic in relation to the practices is the collaborative nature they are associated to. When considering them as bigger parts of a whole, it is possible (YANG, TIAN e WU, 2016; NWAGWU, 2010; SO, 2016; TANG and HEW, 2017; JALENIAUSKIENI, 2016), with the use of apps available on the Internet, provide bigger opportunities to extend and improve the educational gains, especially when these practices are associated to group activities focused on the collaboration and interaction of the participants (WANG et al., 2017; BOWER, LEE and DALGARNO, 2016). Besides the gains, the results also show coherence in relation to advances that HEI must provide if they expect to be different in a globalized and competitive world such as ours (BECKER et al., 2017; KING and SOUTH, 2017).

Stage 2 - Direct impact of innovative practices in relation to cost efficiency on HEI

To answer to this question we considered the cost efficiency intrinsic to the application of the practices on HEI. This item was also assessed by a Likert scale with values from 1, considered “very low” and 5 considered “very high” degrees of impact. The results obtained are presented on the Table 2:

By considering the results presented (Table 2) for the impact of innovative practices in relation to the dependent variable of cost efficiency, we realize a similar situation to the results found for educational gains. However, there was a change on the order of practices, and the practice “VI1 - Use of Internet and mobile devices on the teaching and learning process (M = 3.22)” loses its first position when considering the number of answers associated to a high (4) or very high (5) impact. So, the practice “VI2 - Adoption of practices aiming collaborative learning (M = 3.15)” takes the position of
the practice with the highest impact. This high impact on cost efficiency may be explained once, even with popularization and decrease on the price of ICT, for many HEI it is something expensive and distant of the Brazilian reality to afford appropriate technical resources to provide Internet access and collaborative platforms (MARCHISOTTI, OLIVEIRA and LUKOSEVICIU, 2017; BAPTISTA, 2014). A similar situation may justify the change on the practice “VI10 - Use of Massive Online Open Courses (MOOC) (M = 3.05)” which presents a high frequency of answers associated to a high or very high impact in relation to cost efficiency, once the costs required to the implementation of an environment for this kind of course are very high (FISCHER et al., 2014).

Stage 4 - Direct impact of innovative practices in relation to personal satisfaction to the parties
Considering personal satisfaction of students and teachers is an extremely important factor to avoid school dropout and attract new students. It also reduces the insatisfaction, which may affect the teaching process (MAINARDES, ALVES and RAPOSO, 2014; IGNAT and CLIPA, 2012). The results obtained on this topic are presented on the Table 3:

Table 3: Intensity of the impact of innovative practices on the performance of HEI on personal satisfaction of the parties

By considering the impacts associated to personal satisfaction of the parties we verified a strong presence of answers related to “high” and “very high” impact. We highlight the strong signaling of the practice “VI1 - Use of Internet and mobile device on the teaching and learning process (M = 3.69)” as a propellant for personal satisfaction, once this practice obtained 75% of the answers associated to a high and very high impact on the performance of HEI. In addition to this practice, other practices stand out with high impact on the personal satisfaction with focus on collaboration among the parties, like: “VI5 - Pedagogical approach based on Problems or Projects (M= 3.74)” and “VI2 - Adoption of practices aiming collaborative learning (M= 3.67)” The results obtained indicate a higher impact than the other indicators (educational results and cost efficiency), which may be explained due to the fact that the traditional way of teaching - teacher centered - is considered old fashioned and claims for changes (KIRSTEIN and KUNZ, 2015; SHEAR, 2011). Besides that, educational environment which enable more interaction and technological challenges to teachers and students tend to arouse interest and increase involvement and satisfaction on the teaching and learning process (KANGAS et al., 2017; AL-SAMARRAIE et al., 2017).
5. Implications to Management Practices on HEI

From the specialists’ perception we realize that the innovative practices present a moderate to high degree of impact on the performance of HEI. In face of these results we expect that this work may be have practical utility for educators and managers of HEI, once the results show contribute to better understanding the educational environmental and are a strategic point to its development. Thereby, this study presents significant implications for educators and managers, as it may subside decision-making processes related to the implementation of new practices aiming to improve educational performance, besides pointing indicators of new practices which stand out in different goals, as educational and personal ones. For example, several combinations may be possible when considering different educational and social perspectives of HEI. By considering exclusively educational results there was higher impact when using practices associated to the use of Internet and mobile devices, followed by practices with a collaborative approach and problem-oriented ones. However, when considering only impacts associated to cost efficiency there was an inversion, and practices which should provide innovative collaborative environments, as the MOOCS, stand out, being followed by practices associated to Internet and mobile devices. Finally, when considering personal satisfaction of the parties we can see a substantial increase on the impact on HEI in relation to other indicators (educational results and cost efficiency), which may serve as a form of motivation for teachers and students, looking for a new driving force on educational activities. In face of this new scenario it becomes evident the importance of this study, once it was possible to elucidate a new point of view for managers and educators.

6. Conclusions

The main focus on this study was on the assessment of the impact of innovative practices on the performance of HEI, based on the Brazilian experience. The researches point to a lack of studies which consider the approach discussed here, which is the relation among “innovative educational practices” x “social and educational results” x “Brazilian experience”. In face of this scenario the relevance of this study becomes evident, as it elucidates a new point of view to managers and educators. Based on the results of this work we may conclude that:

- Innovative practices present impacts of lower and higher degree on HEI, when considered the indicators related to educational results, personal satisfaction and cost efficiency;
- The impact is higher when the practices are related to personal satisfaction of the parties, followed by the educational results;
- We could observe lower impacts for HEI when considered the costs of the implementation of the practices on HEI;
- The most influential practices on the performance of HEI were, respectively: “Use of Internet and mobile devices on the teaching and learning process”, “Adoption of practices aiming collaborative learning” and “Pedagogical approach based on Problems and Projects”;
- It was possible to observe significant differences among innovative practices when considering the indicators associated to the educational results and personal satisfaction. However, this difference could not be identified when considered the costs for the institution.

The results found show that the methodological processes adopted were appropriate for solving the problem proposed as as well as to the validation of the hypothesis. In other words, at the end of this study, we proved that the innovative practices influence on the performance of HEI, through different educational and social results. In face of this scenario, we understand that this research presented relevant points and significant implications for educators and managers, as it may subside in decision-making processes related to the implementation of new practices aiming to improve the educational performance, as well as pointing to new practices which stand out in different goals. However, it is important to point that, even though this study was an embracing study of practices, and statistical techniques were analysed and chosen based on
the experience of different specialists, this research is still subject to criticism. This statement is justified by the qualitative nature of the variable analysed and the high degree of subjectivity, which enables opening to questionings and uncertainty about the results obtained.

Finally, we suggest as future works: replication of the research, expanding the sample and including foreign specialists; adoption of other research methodologies and different statistical techniques aiming to confront the results; evaluation of the impact played by innovative practices on the performance of HEI considering a bigger roll of practices and ways for measuring the results; case studies aiming to assess - in real environment - the relations of influence identified on this work.

References


