

The development of a theoretical-practical model for the identification of teaching competencies in Brazilian public innovative universities

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Abstract

This investigation aims to categorize and identify the general teaching competencies that professors who work in a Brazilian public innovative university should develop. It employs the Delphi Panel method, which allows a consensus of opinions to be reached by a group of experts. This study had eight expert participants from different fields of study. They engaged answering five rounds of instruments, that were sent them by email. After analyzing the competencies, the experts suggested agglutination between some categories and some eliminations. As a result, the competences were summarized in six categories: Digital, Internalized, Externalized, Teaching Knowledge, Technical, and Innovative. This research will serve as theoretical support for the elaboration of a theoretical-practical model for the identification of teaching competencies to work in Brazilian public innovative universities.

Keywords: Teaching competencies, Innovative universities, Delphi Panel, Brazilian public universities

1. Introduction

Competence is an indispensable element to add organizational value and to contribute to the success of tasks performance; it is important to develop knowledge management. Observing the skills of each employee allows the organization to build a career plan. This contributes to reducing employee turnover,

as they will feel more motivated to develop in the organization.

For Drucker (2002, p. 13, our translation), "[t]here is only one satisfactory definition of management, whether we speak of a company, a public agency or a non-profit organization: making human resources productive". Boyatzis (2004), states that the individual who knows what to do, when to do, and how to do it has a chance of obtaining better results. Professional competence in universities involves the professors' ability to articulate theoretical knowledge to their professional practice, taking into account their professional and personal experiences. This ability is developed during teacher education, which is later expanded with continuing training (Malaco, 2007). This study of the skills required in teaching, according to Vasconcelos (2010), enables professors to understand their roles and responsibilities in the teaching-learning process.

Having this in mind, this article describes an investigation that aims to categorize and identify the competencies of professors who work in Brazilian public innovative universities. The article is organized into five sections in the following fashion. Following this introduction, which describes the theme, it provides a theoretical framework on competencies and a list of competencies that a professor should have throughout his academic career, according to the integrative review of literature. In the sequence, it describes the method, followed by the results and discussion section. Finally, it presents some final considerations of the study.

2. Theoretical Framework

This section presents the results of an integrative literature review, which is a method to synthesize results obtained in research on a topic or issue, in a systematic, orderly and comprehensive manner (Ercole, Melo & Alcoforado, 2014). The integrative review allows the simultaneous inclusion of experimental and non-experimental research, providing a more complete understanding of the topic, combining studies with different methodologies.

In order to carry out this integrative literature review, a search was conducted based on online databases with characteristics of internationalization and interdisciplinarity. Moreover, another criterion was the selection of databases with the highest number of peer-reviewed publications. Therefore, the review was conducted employing Scopus, Web of Science, and Education Resources Information Center.

The descriptors used in the search were "innovative university", "competence", and "human capital". They were employed in combinations of two descriptors, and searched in the articles' titles, abstracts and keywords. The first filter was related to the type of document ("Article" and "Review") and the second filter referred to the language ("English" or "Spanish"), without time restriction. The search revealed a total of 255 articles. The reading of these abstracts demonstrated that 40 articles adhere to the theme under study. Additionally, in the course of the research, other articles were added.

2.1 Competence: definition and purpose

The word competence, according to Cardoso, Riccio and Albuquerque (2009, p. 366, our translation), "originates from the word *competentia*, from Latin, which means the quality of those who are able to appreciate and resolve a certain matter, to do a certain thing, with capacity, skill, aptitude and suitability".

Studies on Competence were prominent in the United States in the 1970s. They started with McClelland (1973), who published the paper “Testing for Competence rather than Intelligence”. It was the beginning of the movement on skills in the world of work. McClelland (1973) defines competence as an underlying characteristic of a person who is related to superior performance, in performing a task or in a certain situation. Several authors have provided definitions for competence.

Fleury and Fleury (2011) expand the discussion on competence. They define it as a set of knowledge, skills, and attitudes that justify high performance, where an assumption is made that the best performances are based on intelligence and personality of people. In this approach, competence is considered as a stock of resources that the individual holds. For the authors, the assessment of individual competencies is performed in relation to the set of tasks of the position or position occupied by a person (Fleury & Fleury, 2011).

Fava (2017, p. 344, our translation) understands competence as “the junction of conceptual contents with procedural sets that produce know-how, crucial to the development”. The combination of procedural content with attitudinal content generates knowledge and the disposition to act. Assembling the attitudinal and conceptual contents, a person conquers the knowledge of being and coexisting.

Dutra (2017) defines competence as a mobilization of knowledge and experiences to meet the demands and requirements of certain contexts, marked mostly by work relationships, company culture, unforeseen circumstances, and time and resource limitations.

Regarding the specific context of this investigation, the universities, authors have provided definitions for the necessary competence to be a professor: the teaching competence. According to Masetto (2003), teaching competence in a university context consists of the construction of knowledge for a changing world. For the author, the professor needs: to combine imagination and action, to search and work with new information, to use computer resources to communicate nationally and internationally, and to have the ability to build or reconstruct knowledge.

The sense of teaching competence reveals a know-how, added to theoretical knowledge, presenting skills to build such knowledge in attitudes or actions that facilitate the conduct of the teaching-learning process (Nimtz & Ciampone, 2006). Competence can be understood as the core of teaching, occupying the centrality for the success of teaching activities (Pinhel & Kurcgant, 2007).

Corrocher, Cusmano and Morrison (2009) and Pina and Tether (2016) state that innovative universities are facing challenges to produce innovations and increase their national and international impact. The most valuable assets of innovative universities are the knowledge and skills incorporated in the teaching human capital. The challenges encountered can be derived from the needs of their students, that usually cannot be met with a single course. Knowledge management aims to create knowledge and stimulate innovation, allowing the knowledge of an organization to be located, shared, formalized, improved and developed. In this way, environments are created that support knowledge sharing, the creation of innovation as well as new teaching skills.

From the above, it is possible to observe that there is no consensus on the definition of competence and there are some aspects of divergence among them. This means that the theme, both in business and academic circles, covers different concepts and dimensions, constituting a range of unconnected knowledge (Bernhardt et. al., 2005). Bearing this in mind, the next subsection presents a menu of competencies, which

was built based on the review of literature.

2.2 Menu of Competencies

The menu of competencies was generated from the integrative literature review and other complementary readings. The competencies a professor should have during his academic career are displayed in Table 1, along with their respective authors and year of publication.

Table 1. List of competencies with their respective authors and year

Competencies	Authors (publication)
Communicative	Lowman (2004), Greenhill (2010)
Cognitive domain	Resende (2000), Davies, Fidler and Gorbis (2011), Moore and Kearsley (2013)
Technical domain	Lima and Rocha (2012)
Facilitator (mediator)	Berge (1995), Collins and Berge (1996), Kemshal-Bell (2001), Palloff and Pratt (2002), Souza, Couto, Oliveira (2012), Moran (2013);
Knowing how to use technology	Perrenoud (1999), Zabalza (2003), Masetto (2003)
Knowing digital media	Berge (1995), Collins and Berge (1996), Kemshal-Bell (2001), Palloff and Pratt (2002), Davies, Fidler and Gorbis (2011), Stallivieri (2016)
Digital literacy	Berge (1995), Collins and Berge (1996), Kemshal-Bell (2001), Palloff and Pratt (2002), Greenhill (2010)
Using new technologies	Perrenoud (1999), Zabalza (2003), Whale (2006), Kemshal Bel (2001), Stallivieri (2016)
Analyze and evaluate systems	World Economic Forum (2018)
Having the ability to navigate complex environments	Nadai (2006)
Mastering design and programming (of technology)	World Economic Forum (2018)
Having computational, technological and digital thinking	Davies, Fidler and Gorbis (2011), World Economic Forum (2018)
Knowing tutorials (computer programs, apps, software)	Garcia et al. (2011)
Being clear in the organization of ideas	Davies, Fidler and Gorbis (2011), Moore and Kearsley (2013)
Having coherence of thoughts	Davies, Fidler and Gorbis (2011)
Differentiating teaching and learning styles	Stallivieri (2016)

Managing cognitive load	Cheetham and Chivers (1996), Paiva (2007), Davies, Fidler and Gorbis (2011), Greenhill (2010)
Organizing and directing learning situations	Perrenoud (1999)
Having analytical thinking	World Economic Forum (2018)
Having critical thinking	World Economic Forum (2018)
Reasoning logically	Davies, Fidler and Gorbis (2011), World Economic Forum (2018)
Solving complex problems	World Economic Forum (2018)
Knowing how to work with Transdisciplinarity	Davies, Fidler and Gorbis (2011)
Accessible	Lowman (2004)
Adaptable	Davies, Fidler and Gorbis (2011)
Friendly	Lowman (2004)
Attentive	Lowman (2004)
Having self-esteem	Annan (2014)
Collaborative	Friedman (1999), Korthagen (2004), Pan et al. (2009), Delaney et al. (2010), Greenhill (2010)
Understanding	Lowman (2004)
Available	Lowman (2004)
Having disposition	Pan et al (2009)
Fun	Lowman (2004)
Empathetic	Friedman (1999), Korthagen (2004), Pan et al. (2009), Delaney et al. (2010)
Encouraging	Lowman (2004)
Engaged	Francis (2011)
Enthusiastic	Lowman (2004)
Engaging	Lowman (2004)
Inspiring	Lowman (2004)
Emotional intelligence	World Economic Forum (2018)
Fair	Lowman (2004)
Motivated	Lowman (2004), Friedman (1999), Korthagen (2004), Pan et al. (2009), Delaney et al. (2010)
Patient	Lowman (2004)
Helpful	Lowman (2004)
Resilient	Annan (2014)
Respectful	Lowman (2004)
Nice	Lowman (2004)
Having social support (non-verbal)	Konrath, Tarouco and Behar (2009)

communication)	
Living with interculturalism (interaction between cultures in a reciprocal way)	Davies, Fidler and Gorbis (2011)
Living in society	Resende (2000)
Establishing cross-cultural relationships (relationships or exchanges among cultures)	Davies, Fidler and Gorbis (2011)
Respectful to diversity	Annan (2014)
Working in a network	Annan (2014)
Taking risks and challenges	Zabalza (2009)
Being aware of new opportunities	Annan (2014)
Facing the ethical duties and dilemmas of teaching	Cheetham and Chivers (1996), Paiva (2007)
Having academic engagement with students	Davies, Fidler and Gorbis (2011)
Having professionalism	Annan (2014)
Having political civility	Resende (2000), Paiva (2007)
Managing his/her own academic training	Perrenoud (1999)
Learning strategies	World Economic Forum (2018)
Social intelligence	Resende (2000), Davies, Fidler and Gorbis (2011)
Leadership	Resende (2000)
Being academically disciplined	MPE BRASIL (2014)
Dealing with social influence	World Economic Forum (2018)
Responsible	Annan (2014)
Having initiative	World Economic Forum (2018)
Continuous improvement (continuous learning)	Dziekaniak (2011), World Economic Forum (2018)
Having teaching knowledge	Cheetham and Chivers (1996), Masetto (2003), Paiva (2007), Konrath, Tarouco and Behar (2009)
Having knowledge of the market	BURCH (2005)
Having knowledge of teaching roles and functions	Masetto (2003), Konrath, Tarouco and Behar (2009)
Identifying problems	MPE BRASIL (2014)
Having a worldview	Annan (2014)
Improving learning progression	Perrenoud (1999)
Have management (time, activities, ...)	Berge (1995), Collins and Berge (1996), Kemshal-Bell (2001), Palloff and Pratt (2002)
Being didactic	Friedman (1999), Resende (2000), Korthagen (2004), Pan et al. (2009), Konrath, Tarouco and

	Behar (2009), Delaney et al. (2010)
Thinking ahead of the time (future)	Aloise-Young, Graham and Hansen (1994)
Knowing how to do	Le Boterf (2003), Leme (2005), Mendes (2012), Bitencourt (2005), Fava (2017)
Master the content	Nogueira, Casa Nova and Carvalho (2012)
Being functional (practical)	Cheetham and Chivers (1996), Paiva (2007)
Being methodological	Resende (2000), Zabalza (2003)
Participate in academic administration	Perrenoud (1999)
Being a researcher	Pachane and Pereira (2004)
Having self-management	Berestova (2009)
Talent	Martín-de-Castro (2011)
Flexible	Moore and Kearsley (2013)
Creative	Moran (2013)
Innovative thinking	World Economic Forum (2018)
Integrative thinking	Davies, Fidler and Gorbis (2011)
Problem solving	Hargreaves (2004), World Economic Forum (2018)
Having a digital role (understand, use and learn digital technologies)	Garcia et al. (2011)
Having the ability to learn to learn	Hargreaves (2004)
Being able to analyze data	Davies, Fidler and Gorbis (2011)
Having the ability to collaborate	Perrenoud (1999), Annan (2014)
Ability to work in network	Davies, Fidler and Gorbis (2011)
Curiosity	Moran (2013)
Systemic view	Rosenau and Trevisan (2007)
Being able to observe	Perrenoud (1999)
Proficiency in a foreign language (writing, speaking, listening, and reading)	Stallivieri (2016), Van Der Werf (2018)

The general competencies, indicated by the literature, reveal what a teacher should “be” or “have” throughout his academic career. These competencies must be aligned with institutional demands. The professor must be prepared for a world where instantaneousness can bring information both fast and uncertain, leaving the professor to filter, select and expand knowledge.

3. Materials and Methods

The objective of this investigation is to categorize and identify the competencies of professors who work in Brazilian public innovative universities. In order to fulfil this objective, the Delphi Panel method was employed.

The Delphi Panel is defined as “a method to structure a collective communication process, so that it

is effective, by allowing a group of individuals, as a whole, to deal with a complex problem” (Linstone & Turoff, 2002, p. 3, our translation). Its objective is to obtain consensus of the opinion of a group of experts in an objective way through a series of rounds, questionnaires and feedback. Delphi is a research technique widely used in several areas of knowledge, such as economics, business, social sciences, and education. Its main advantage is obtaining consensus in face of a given reality (Marques & Freitas, 2018). In the present work, due to the pandemic, the research was carried out via Internet, where the specialists accessed the menu of skills shared by Google Drive, and present their contributions and considerations within a week.

The Delphi Panel is characterized by respecting the anonymity and heterogeneity of specialists. The specialists may be from different areas of training, as their contributions will be diversified, depending on the worldview (Skulmoski, Hartman & Krahn, 2007). It is also necessary to respect seven steps to guarantee the success of the process; they are described in the sequence.

Step one: Choosing a Mediator/Facilitator. The literature recommends using a mediator, other than the researcher himself, due to the neutrality stance in relation to the objectives and results of the project. The mediator/facilitator must be familiar with investigative research, data collection and treatment (Haughey, 2010). However, in this research, the mediator/facilitator was the main researcher due to her academic background and the reliable experience with research, data collection and analysis.

Step two: Defining the objectives. What is the problem or subject that do you want to understand? It is crucial to provide a clear and comprehensive definition to ensure that the experts understand exactly what is being commented on. The objective, in this research, is to identify the general competencies of teachers to work in Brazilian public innovative universities.

Step three: Selecting the specialists. The selection of specialists is essential, and, according to Powell (2003), heterogeneous groups tend to produce solutions of higher quality and acceptance. It is important that the panel is balanced between impartiality and interest in the subject and that it is varied in terms of experience, areas of expertise and perspectives in relation to the problem. The chosen experts must be committed to the whole process and must belong to the context of Brazilian public innovative universities, which are committed and involved with innovation. It is also relevant to provide the specialists with detailed information on what the study consists of and what will be demanded from them until the final round of the panel (Marques & Freitas, 2018).

Step four: Inviting the specialists. An initial invitation letter should be sent to specialists via e-mail, with details of the study and inquiring their availability to participate in the Delphi Panel. Twenty e-mails were sent, and five initial acceptances were obtained. One week after the first invitation, the same e-mail was resent to those who had not yet replied the previous e-mail. This resulted in three more participants. As a result, a total of eight specialists accepted to be part in this investigation. They have the following academic background: computer science; publicity and advertising, business and marketing, psychology, and business and social communication.

Step five: Applying the instrument. The specialists, anonymously and individually, answered the instrument. Once the specialists had been defined, a Skype meeting was scheduled to explain the purpose of Delphi and how they would make contributions in the instrument, which was sent in spreadsheet format, as shown in Figure 1.

	A	B	C	D	E	F	G	H
1	Mark an X							
2	Category of the competencies	Meaning on the teaching context	Totally agree	Partially agree	Indifferent	Partially disagree	Totally disagree	If you disagree, copy it and paste in this column and in the appropriate Subcategory
3								
4								

Figure 1. Delphi panel layout applied to specialists

The application of the online questionnaire minimized the time for conducting the research and data tabulation. It also allowed a faster feedback, avoiding the loss of the specialists’ interest. Responses were consolidated and distributed to specialists. These steps (rounds) are repeated until consensus is reached on the solution.

The forwarded spreadsheet presented nine columns (Figure 1), with the first column presenting the categories of competencies: Distance Learning, Technological; Cognitive, Emotional, Social; Attitudinal, Behavioral; Teaching Knowledge; Techniques and Innovators. The second column presents the definition or meaning of the teaching competence that must be analyzed. The third column shows the competencies to be analyzed, which can be classified in any category, according to the reflections made by the specialists. In the sequence, from the fourth to the eight columns, the levels of agreement are presented, starting from left to right in the following order: totally agree, partially agree, indifferent, partially disagree, totally disagree.

The specialist should evaluate the competence and mark an "X" in one of the five levels of agreement. After this procedure, if the specialist chooses to check "partially disagree" or "totally disagree", s/he should copy and paste the competency in the 9th column, indicating the place where s/he thinks the competence belongs. Whenever the specialist indicates a disagreement, that competence will go to another category, with nine options, and it may be in more than one category, if necessary.

Step six: Achieving a consensus on the rounds. A round is each of the successive questionnaires/instruments presented to the group to be evaluated. The question of the rounds of instruments ends when the levels of stability and consensus in the answers are reached. There is consensus, in general terms, when there is low divergence in the distribution of responses to a given item (Osborne et. al., 2003). The absence of new contributions and little change in the panel's responses between rounds is an indication of its closure. This research ended the process after five rounds. To illustrate, the Delphi Panel cycle process, Figure 2 shows the overview from the beginning to the end of the five cycles.

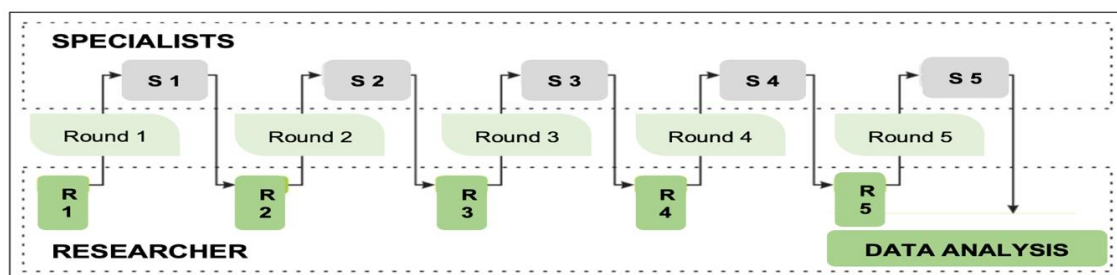


Figure 2. Overview of the Delphi Panel Process

- S = The week the specialists reflect about and answered the instrument.
- R = The moment that the researcher prepared the instrument for next round.

Step seven: Analyzing the data. Some authors, such as Cunha (2007) and Marques and Freitas (2018), use statistical tests to look for relationships between responses and between responses from subgroups of specialists. This investigation employed the graphical representation of columns, which, according to Loch (2006), is a graph elaborated from the Cartesian plane; it is simple and excellent to use when comparing variables.

4. Results and Discussion

To start with, the specialists suggested to combine the Distance Learning Competence and the Technological Competence categories into the Digital Competence category. Therefore, the competencies that were categorized as Digital, according to the experts, are the following: having management (time, activities); communicative; having cognitive domain; having technical mastery; being a facilitator (mediator); using digital technologies and media; having social support (non-verbal communication); having digital literacy (chat, blog, email, forum); using new technologies; analyzing and evaluating systems; having the ability to navigate complex environments; mastering design and programming (of technology); having computational, technological and digital thinking; working in a network; and knowing tutorials (computer programs, Apps, software).

As displayed in Figure 3, there is a consensus in both categories. Regarding Distance Education, 75% of the specialists totally agree and 25% partially agree. In relation to Technological, 87.5% of the specialists totally agree and 12.5% partially agree.

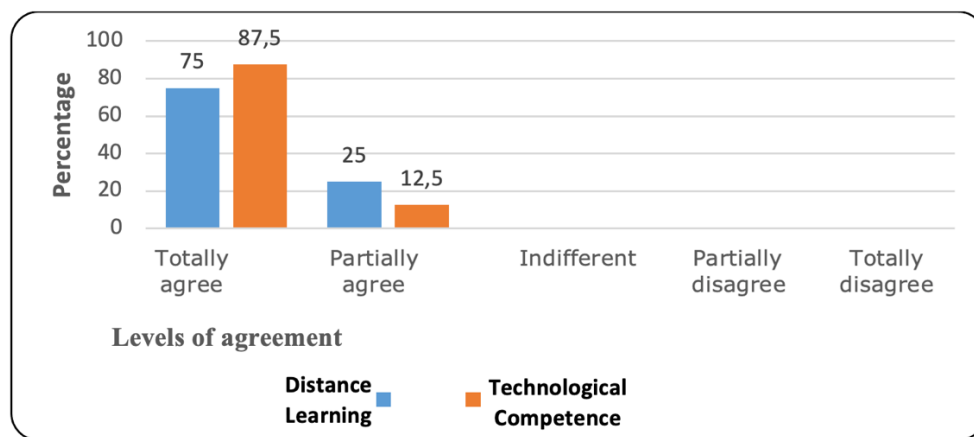


Figure 3. Experts’ level of agreement on the categories Distance Learning and Technological

Concerning the categories of Cognitive Competence, Emotional Competence, and Social Competence, the specialists suggested that the three could be grouped as Internalized Competence. Thus, the competencies that were categorized as Internalized, according to the experts, are the following: having clarity in the organization of ideas; having coherence of thoughts; differentiating teaching and learning styles; managing cognitive load; organizing and directing learning situations; thinking ahead of the time (future); having analytical thinking; having critical thinking; having innovative thinking; reasoning logically; solving complex problems; knowing how to work with transdisciplinarity; being accessible;

being adaptable; being friendly; being considerate; being a collaborator; being understanding; being available; having disposition; being funny; empathizing; being engaged; being funny; having enthusiasm; being engaging; having flexibility; being inspiring; having emotional intelligence; being fair; being motivated; being patient; being helpful; having resilience; being respectful; being nice; living with interculturalism (interaction between cultures in a reciprocal way); having political civility; coexisting in society; establishing cross-cultural relationships (relationships or exchanges between cultures); and respecting diversity.

Figure 4 shows experts' level of agreement on the three categories. For the Cognitive Competence, 75% of the experts totally agree, 12.5% partially agree and 12.5% partially disagree. With reference to the Emotional Competencies, 75% of the experts totally agree, 12.5% partially agree and 12.5% are indifferent. Finally, for the Social Competence 87.5% of the experts totally agree and 12.5% of them are indifferent.

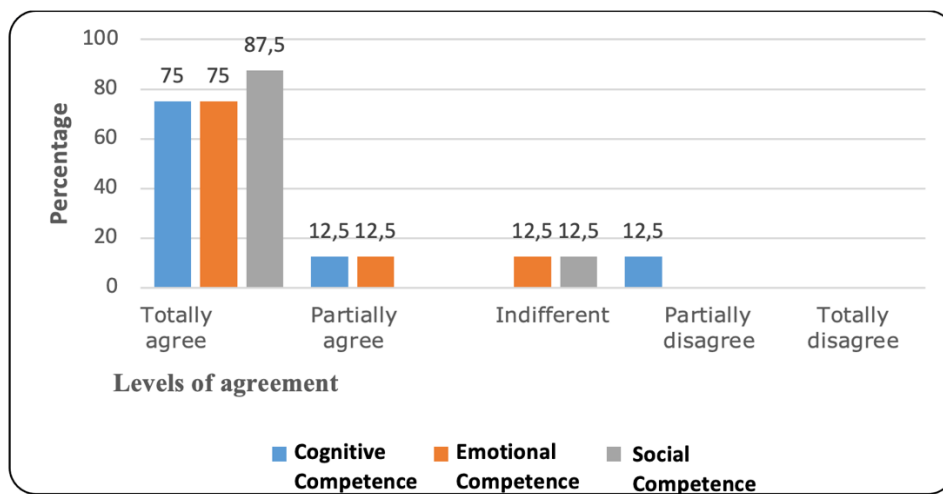


Figure 4. Experts' level of agreement on the categories Cognitive Competence, Emotional Competence, and Social Competence

In the sequence, the specialists suggested to combine the Behavioral Competence and the Attitudinal Competence categories into a category called Externalized Competence. The competencies that were categorized as Externalized, according to the experts are: taking risks and challenges; being aware of new opportunities; being academically disciplined; facing the duties and ethical dilemmas of teaching; having academic engagement with students; having professionalism; knowing how to do; managing his/her own academic training; having learning strategies; having social intelligence; having leadership; dealing with social influence; being responsible; and having initiative.

Figure 5 displays the suitable consensus among the specialists in both categories. For the Behavioral category, 75% of the experts totally agree and 25% partially agree; while for the Attitudinal category 87.5% of the experts totally agree and 12.5% are indifferent.

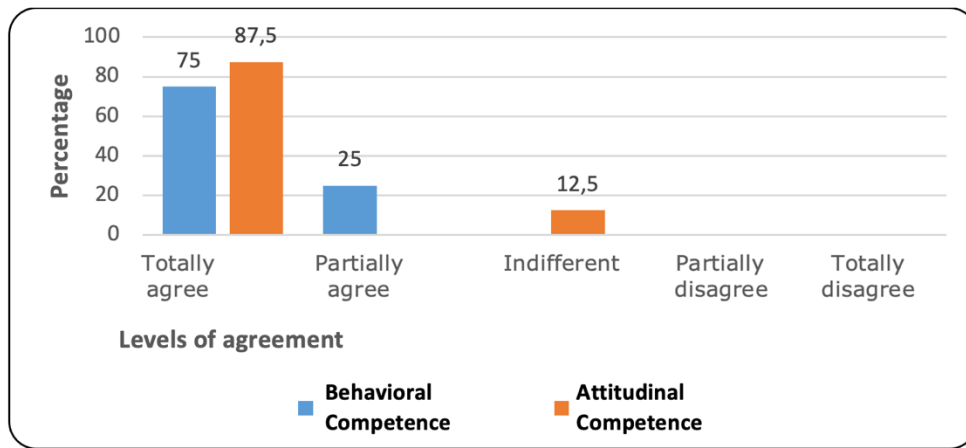


Figure 5. Experts' level of agreement on the categories Behavioral Competence and Attitudinal Competence

Similarly, Figure 6 also demonstrates the specialists' consensus, this time regarding the Teaching Knowledge category: 75% of the experts totally agree, 12.5% partially agree and 12.5 partially disagree. However, for this category, they did not suggest any grouping with other category. The competencies that were categorized as Teaching Knowledge, according to the experts, are the following: continually improving (continuous learning); having teaching knowledge; having knowledge of the market; having knowledge of teaching roles and functions; identifying problems; and having a worldview.

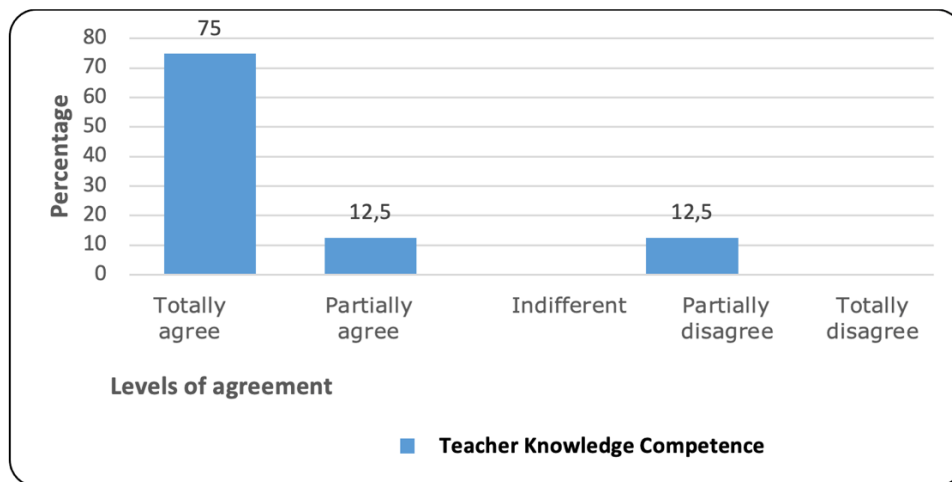


Figure 6. Experts' level of agreement on the Teacher Knowledge Competence category

Analogously to the former category, the Technical Competence category was not grouped to any other category. The experts arrived to a consensus with 75% of them totally agreeing and 25% partially agreeing (Figure 7). The competencies that were categorized as Technical Competence, considering the experts' suggestions, are as follows: managing the progression of learning; didactic-pedagogical; having content domain; being functional (practical); being methodological; participating in academic administration; being a researcher; and having language proficiency.

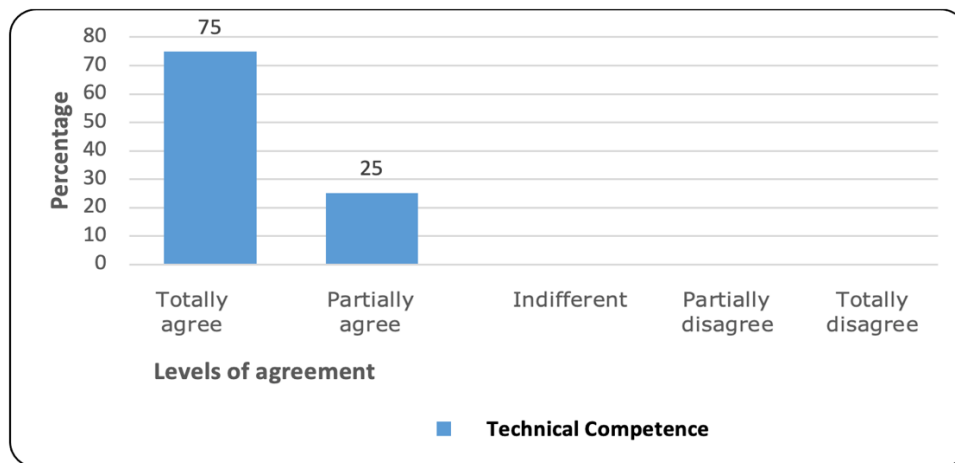


Figure 7. Experts’ level of agreement on the Technical Competence category

Again, no further modifications concerning grouping of categories were suggested for the category of Innovative Competence. As exhibited in Figure 8, consensus was reached among the experts with 75% of them totally agreeing, 12.5% partially agreeing and 12.5% being indifferent. The following competencies were categorized under the Innovative Competence category, according to the experts’ suggestions: having self-esteem; having self-management; having talent; having creativity; and having networking.

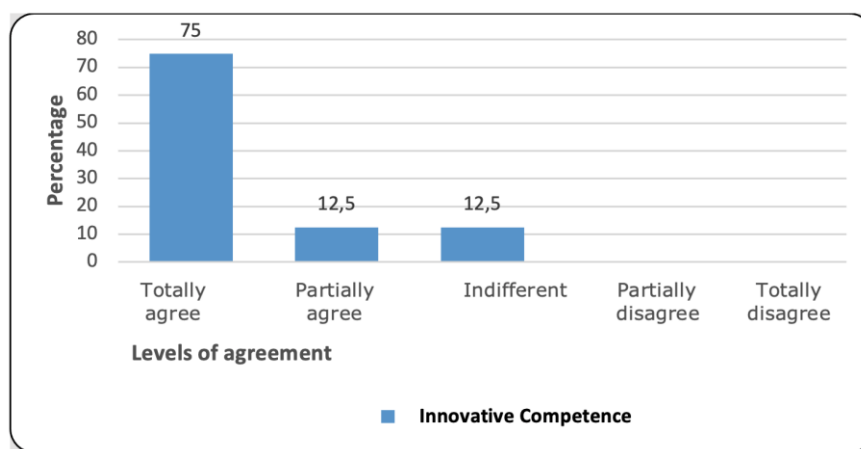


Figure 8. Experts’ level of agreement on the Innovative Competence category

From the fourth to the fifth rounds, the minimum 80% consensus index was reached for all categories, since minimal inferences were made in the instrument. However, unanimously, the experts pointed out the need to remove the following skills: “being funny”, for not being in the context of the study and for not falling into any of the ten categories; “having management skills”, because there is another competence with the same meaning (“having self-management”); and “competency management process”, because it represents an “organizational competence”, which is not the focus of the research. Moreover, they suggested the modification of the naming of the “Proficiency in a foreign language (writing, speaking, listening, and reading)” competence to simply “Proficiency in a foreign language”, eliminating the specificities of the language skills.

Figure 9 shows the final result after all the rounds of the Delphi Panel with the agglutinations suggested by the experts. The Figure represents the professor in the center with the six categories of competencies: digital, internalized, externalized, teaching knowledge, technical and innovative. These competencies are inserted in the context of the knowledge triangle: teaching, research and innovation (represented in blue gradient). Additionally, in the external part (represented in orange), there is a theoretical contribution by four pillars: knowledge society; knowledge-intensive organizations; innovative Brazilian universities; and teaching human capital.

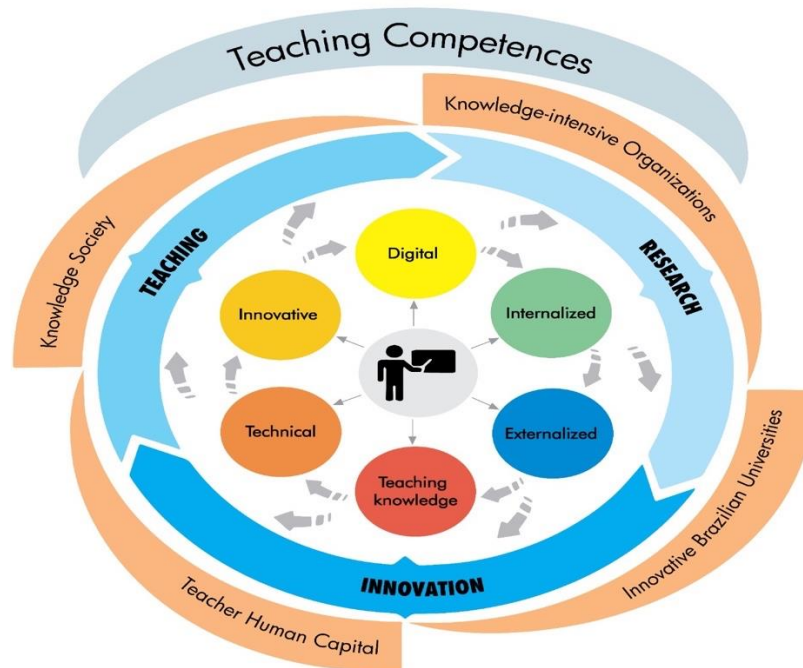


Figure 9. The six categories of Teaching Competencies

These results reveal that the categories and competencies, evaluated by Brazilian specialists, having in mind a teaching staff to work in a Brazilian public innovative university, are aligned with the reasoning of authors from other parts of the world. To exemplify, Baek et. al. (2020) have built a framework of teaching competency for professors in the future society, based on theoretical arguments. They suggest eight competencies organized into three categories: Change Responding Competency (active adaptation, field affinity); Innovation Promotion Competency (organization value realization, active participation); and Instructional Competency (instructional design, content knowledge, pedagogical knowledge, technological knowledge).

Moreover, the categories Digital Competence, Innovative Competence, and Technical Competence represent a shift on teaching skills. In this era of ubiquitous learning, teachers have to be able to select, organize, and mediate knowledge rather than transmitting. In this light of thought, Huda et. al. (2017) highlight the importance of exploring the adapting teaching competencies in the Big Data era. When discussing the development of technology skills, the authors state that "performing the professional standard in such activities to promote the improvement of knowledge, skills and competence becomes one of the main ultimate factors which affect the teaching process" (Huda et. al., 2017, p. 78, our translation).

Finally, the organization of the competencies into these categories reveals that the teacher education

programs need to take these results into account when building curricula, having in mind the formation of teachers for the new technological era. A study conducted by Bhargava and Pathy (2011) on the perception of student teachers about what would be the ideal teaching competencies revealed that technology savvy was not placed among the higher rank of competencies. The authors emphasize that "[t]eachers have to be technology savvy so that modern technology can find entrance in classroom and can be exploited for the benefit of the learners" (Bhargava and Pathy, 2011, p. 80, our translation). Therefore, it is necessary to rethink the curricula of teacher education programs.

5. Final Considerations

This article reports the first part of a large research that aims to categorize and identify the competencies of professors who work in Brazilian public innovative universities. After the application of five rounds of the Delphi Panel Method, the specialist participants arrived to the minimum 80% consensus index and grouped ninety competencies as subcategories of analysis into the following six categories of competencies: digital, internalized, externalized, teaching knowledge, technical, and innovative. These categories are supposed to represent the competencies that a professor has to develop in order to work at an innovative university.

These results will be used for the next stages of this research. On the second stage, these ninety competencies with their respective categories will be tested with specialists from Brazilian public innovative universities, who are the specialists involved directly or indirectly with teaching and innovation. On the third stage, after receiving professors' answers, 60 propositions will be elaborated and stratified into six categories with ten propositions each. The competencies that present the highest percentage of importance will serve as a central theme in the elaboration of each proposition, which represent everyday teaching situations.

The 60 propositions will constitute a model, which aims to identify the teaching competencies to work in a Brazilian public innovative university. The proposed model is intended to facilitate the academic management process, providing ways to map and diagnose which are the strong competencies and/or weaknesses of the teaching staff of an institution, so that the appropriate guidance could be developed, according to the institutions' authentic needs.

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