

THE CREATION OF KNOWLEDGE FOR THE USE OF TECHNOLOGIES IN THE CONTEXT OF TEACHING PERFORMANCE

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ABSTRACT

This study aimed to analyze the process of teachers' knowledge of creation of the Department of directors of a public institution of higher education in the use of technologies in their teaching activities. The survey was conducted through case study of the sectional type of qualitative nature. For data collection was developed structured questionnaire with 27 statements about the knowledge conversion processes, in Likert format of 4 points. Data analysis indicated that knowledge creation is configured as a process that begins at the individual, but that is established in social interactions. Technologies become a facilitator mechanism in teacher's work bearing the same to interact best in class. However, this requires familiarity and responsiveness of teachers in relation to technologies in education, otherwise, this innovation will not represent gains for the participants of this process.

Keywords: Higher Education, Knowledge management, socialization, externalization, internalization

1. INTRODUCTION

Knowledge creation is the focus of studies in different working environments, for example, in the military context (Gauvin, Roy, & Ferland, 2005), in the production of scientific knowledge (Lambiotte & Panzarasa, 2009), organizations (Nonaka, 1991; Nonaka; Toyama, & Konno, 2000), inter-organizations (Ahmadjian, 2008), industry (Ishikura, 2008), among others. The University, seen as an enabling environment for the development of knowledge, has always been the focus of studies in the fields of Education, Psychology, Sociology and Philosophy. However, when contextualized as a workplace of different professionals, it goes also to be regarded as Directors of the object of study. Seen as an undertaking within the normal patterns of corporate activities and being inserted in the knowledge economy, the university seeks to create value through goods - procedural innovations, for example - and services - participation in events, among others (Scharf, 2008).

It is in this context that the teacher's work is presented as a rich field of meanings for the analysis of theories related to the creation of knowledge. Even before the pedagogical relations that arise in this context, teaching is, first of all, exercise of the profession, with its specific field of knowledge.

As the vast majority of professional fields, teaching also is influenced by the technological development, changing the skills and the teacher's own work dynamics in different areas. In the survey, teachers are urged to use new software and statistical technologies, new procedures for data collection and analysis and submission processes and evaluation of scientific articles, more and more elaborate. The scope of university extension presents new demands for community approach to the technologies developed at the university itself. Teaching, although very rooted to their traditions, increasingly it is subject to changes due to the introduction of technology in the classroom.

Despite the indivisibility of teaching, research and extension, expressed by Article 207 of the 1988 Constitution (Constituição, 1988), education is core activity of teaching. You can not refer to someone as a teacher, if it does not exercise teaching activities. It is in this context that the present study aims to examine how teachers of the Department of Directors of a Public Institution of Higher Education, create the knowledge to use technology in their teaching activities.

The research problem of this study relates to the question of how teachers of the Department of Administration of a particular educational institution develop the knowledge to use technology in the classroom, from the point of view of the teachers themselves.

This study aimed to analyze the process of teachers' knowledge of creation of the Department of directors of a public institution of higher education in the use of technologies in their teaching activities.

2. TECHNOLOGIES AND TEACHING ACTIVITIES

Much of the current publications, at some point in their theorizing, mentions technological development. To Alarcão (2005) we operate in an open, global society, the so-called information society, where the various media have great power and influence, steeped in values and intentions. For Castells (2007) we are experiencing a concentrated technological revolution in information technology that introduces a pattern of discontinuity in the material foundations of the economy, society and culture similar to the Industrial Revolution of the eighteenth century. According to the author, information technology is to the revolution what new energy sources were to the industrial revolutions. The current revolution depends essentially new knowledge and information, but its centrality is in the "application of that knowledge and processing devices/communication of information in a cumulative feedback loop between innovation and its use" (Castells, 2007, p. 69). An increasingly rapid cycle in the new technological paradigm, expanded as users appropriated from these technologies and redefine.

In this context, technology can be conceived as the material and social arrangements that involve physical and organizational processes, referred to apply scientific knowledge (Oliveira, 2001). Among the existing technologies, the converged set of technologies in microelectronics, computing (hardware and software), telecommunications, broadcasting and electronic can be considered as information technologies (Castells, 2007). To Kenski (2003) the social changes resulting from the trivialization of the use of and access to information technologies reach all institutions and all social spaces. These changes are reflected on the traditional ways of thinking and doing education. Technological development poses challenges to the educational process by changing its spaces, times and roles. The teacher is replaced by a range of technological devices at their disposal to use in teaching, passing to interfere as much in the aftermath of pedagogical action, as in the duties of his profession, requiring new professional skills.

In this context, teachers make their daily decisions about using technology in their work practice, amid the pressure of society, that these are used by modernizing teaching. However, teachers need time and opportunity to become familiar with new technologies, including the possibilities and limits they impose, "so that, in practice, make their conscious choices about the use of the most appropriate ways to teaching a certain knowledge at a certain level of complexity to a specific group of students and available in time" (Kenski, 2003, p. 49). However, it is the question: how the teacher develops the knowledge to use technology in the classroom?

3. KNOWLEDGE CREATION

Based on the analysis of Western philosophy, Nonaka and Takeuchi (1997) inaugurated the theory of knowledge creation through the conversion process between tacit and explicit knowledge. To the authors knowledge is more

comprehensive than information. It involves beliefs, intentions and the context to which it is linked. It is related to human activities and is created in social interaction between people.

In its epistemological dimension, knowledge is always created by individuals, and may be extended at the level of group, organizational and inter-organizational. As for the epistemological dimension, Nonaka and Takeuchi (1997) analyze knowledge as tacit and explicit. The tacit dimension refers to the personal, specific knowledge context, difficult to formalize. Explicit knowledge, on the other hand, refers to that which can be encoded, transmitted in formal language.

Despite the importance of this epistemological dimension to understanding the theory of knowledge creation, the authors emphasize that knowledge is something unique happens in the interaction between explicit and tacit aspects in a continuous conversion process leading to the creation of new knowledge. Thus, the knowledge could be created through four different processes of conversion between tacit and explicit knowledge: socialization, externalization, combination and internalization, known by the acronym SECI (Vorakulpipat, 2008; Nielsen, 2006; Popadiuk, & Ricciardi, 2011).

It is called socialization to the conversion of tacit knowledge into new tacit knowledge. For Nonaka and Takeuchi (1997, p. 69) it is an "experience sharing process and, from there, the creation of tacit knowledge, as mental models or shared skills." Socialization is therefore a process of learning through imitation, observation, practice, experience and face to face communication.

For the authors, knowledge can also be created through a process of externalization, ie the conversion of tacit knowledge into explicit the individual through metaphors, analogies, models, concepts or hypotheses. This process can be triggered through dialogue and collective reflection that help individuals to materialize through the symbolic language, their ideas and reflections (Nonaka & Takeuchi, 1997).

A third form of knowledge creation is through the explicit knowledge conversion process in new explicit knowledge, called combination. For the authors, it is a process of systemizing concepts into a knowledge system that involves the reconfiguration of documents and information by sorting, adding, categorization (Nonaka & Takeuchi, 1997).

Finally, the authors call the Internalization, knowledge created from the explicit knowledge conversion process in new tacit knowledge in the individual. Refers to learning by doing, where the individual changes or acquire new mental models. Importantly, however, that the authors understand these four processes as members of a continuous flow of knowledge conversion that occurs in organizations in a spiral.

Studies of Nonaka and Takeuchi (1997) led to other perspectives on the creation of knowledge by expanding its model. The environment where knowledge is created called "*ba*" in the search Nonaka et al. (2000) emerges as the focus of different research. Analyzing the dynamics of the company's capacity for innovation, Lam (1998) considers the process of knowledge creation as well as their environment, but taking into account the formal education systems, labor market and the organizational structure of the company. For the author, all these aspects have an influence on the type of learning that develops the organization and its capacity for innovation.

Different analysis focuses presented above are significant from the understanding of the more intrinsic phenomena, ie the knowledge conversion processes leading to the creation of new knowledge. Once identified, new research into their environment or even on the external aspects of the organization become effective in understanding the macro phenomenon.

Based on the review of Easterby-Smith, Crossan and Nicolini (2000) estimate that 70% of the publications in knowledge management focus in the design of information technology. Commonly, the focus of these studies is the technology itself, the development of technological bases and databases (Sambamurthy, & Subramani, 2005). However, it is observed on the latest research focus on the possibilities that these technologies represent in the process of collection, storage and distribution of knowledge in organizations (Brito, Vanzin, Ferasso, & Saldanha, 2010; Kuo, & Ye, 2010; Chen, 2011; Hayes, 2011; Kuo, & Lee, 2011; Prado, Longo-Somoza, & Fisher 2013; Singh, Singh, & Sharma, 2013).

Hayes (2011) analysis of technologies in knowledge management studies still need to advance the relational approach. In this aspect, knowledge is not understood only as what is digitized, stored and therefore exchangeable. Even Web 2.0 technologies themselves with their potential for information sharing, still have only a static picture

of what was outsourced by someone at some point without, however, able to absorb all the dynamics of socio-historical context.

4. METHODOLOGY

This study is characterized as a case study of the sectional type (Minayo, Deslandes, Neto, & Gomes, 2002). It is an empirical investigation, a method that encompasses everything - planning, data collection and analysis techniques of the same (Yin, 2005). Qualitative (Godoy, 1995 p.58), it involves obtaining descriptive data about people, places and interactive processes by direct contact with the researcher studied the situation, trying to understand the phenomena from the perspective of the subject ", ie the participants study.

Regarding the execution of the survey, the type of exploratory qualitative study, as highlighted Bruyne, Herman and Cshouthete (1977), leads the researcher to develop clearer concepts, establishing priorities. It refers to the Department of Administration, a public institution of Brazilian Higher Education. The Department was chosen due to the homogeneity of individuals with regard to their basic training, that does not include the educational or training technology. Teachers are trained in Bachelor courses and became teachers from practice. In some cases, knowledge of the teaching-learning process were acquired through participation in the Graduate courses, focusing on Higher Education Methodology. There are 26 teachers, and 19 responded to the survey.

Survey data were collected over a certain period, so this is a cross-section with longitudinal perspective (Triviños, 2006). The research of the structure had the initial foundation some research questions, emphasizing that for qualitative studies they represent its essence and the starting point for its development (Minayo et al, 2002).

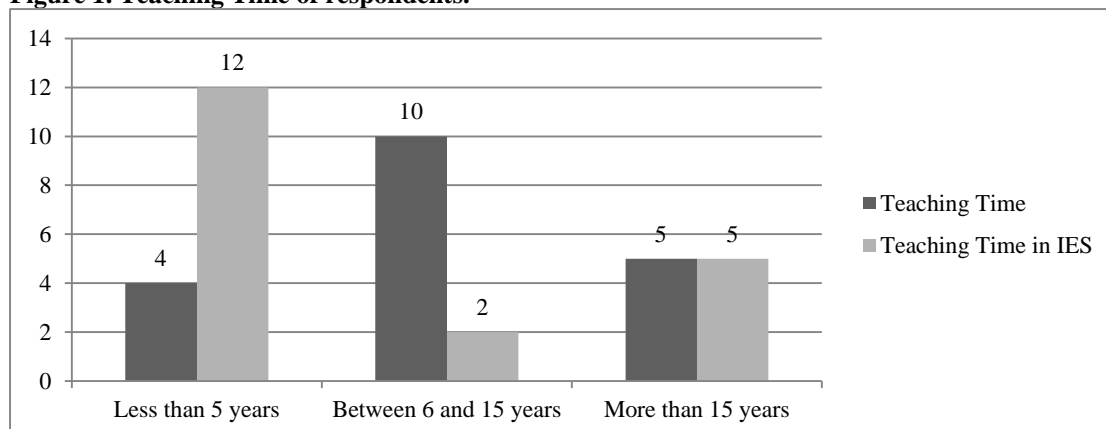
For data collection was developed structured questionnaire divided into two parts. At first, information was collected from the profile of the subject: teaching experience, teaching in the institution, teaching mode in which it operates. The second part of the questionnaire included 27 statements about the knowledge conversion processes adapted from Huang and Wang (2002). Such assertions were presented to in a Likert 4-point scale, where the subjects evaluated the statements between: Disagree, Somewhat disagree, partially agree and I totally agree.

After conducting a pre-test and the necessary adaptations to better understand the terms, the questionnaire was made available to the focus group, through electronic form, developed in Google Docs and is available from the 15th of April and 5th May 2013.

5. ANALYSIS OF THE RESULTS

The questionnaire was answered by 19 teachers. As can be seen in Figure 1, most teachers (12 responses, 63%) work in the institution less than five years. This demonstrates that most of the group is in the process of adapting the system adopted in the institution. However, this is an experienced group in teaching at the college level. 79% (15 responses) of teachers work at the university level for more than six years.

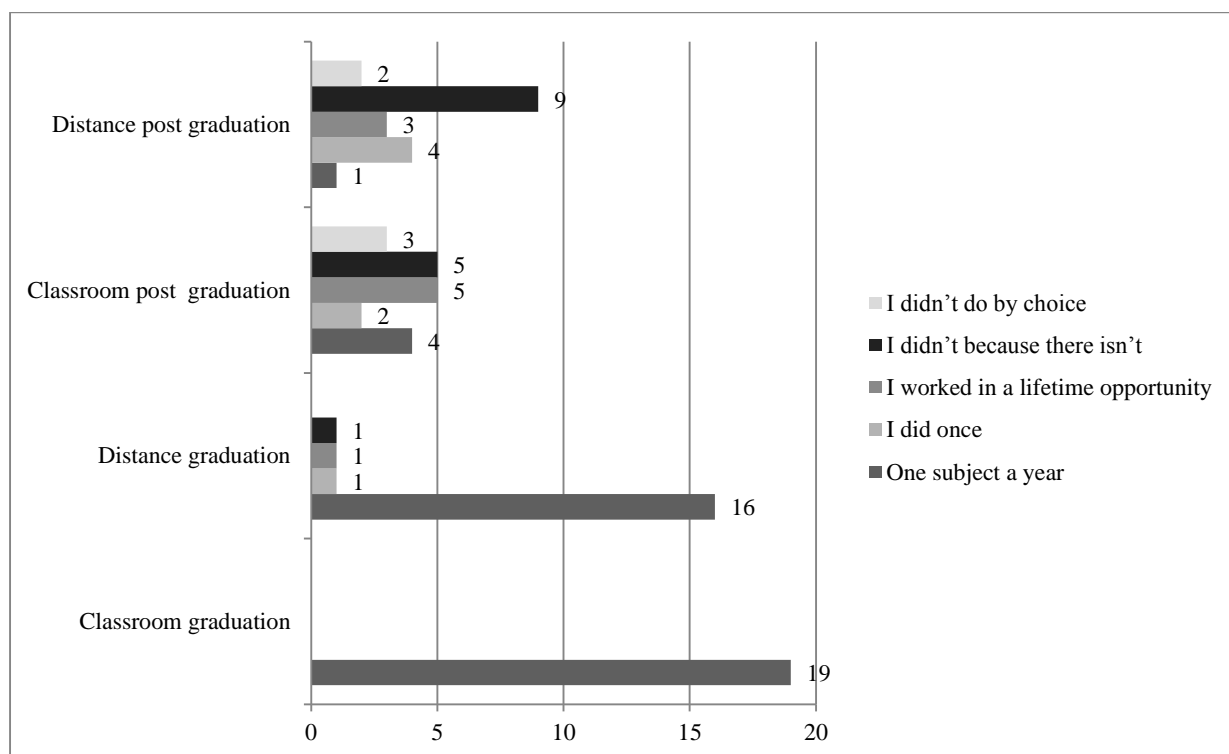
Figure 1. Teaching Time of respondents.



Source: Empirical research data

The Figure 2 shows the profile of activity of the teachers who participated in the survey. You can see that there is a basis in common among the group of teachers: the context of campus undergraduate. All work in the campus undergraduate and the majority (16 respondents, 84%) also operates in undergraduate distance each semester.

Figure 2. The respondent’s performance level.

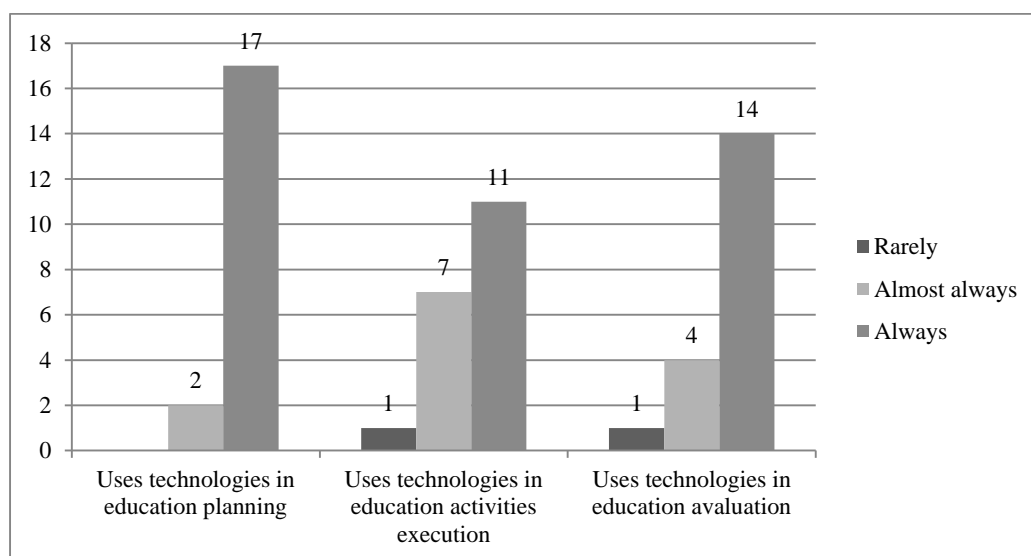


Source: empirical research data

There is greater diversity of positions in relation to the activities in post-graduate courses. Some teachers work regularly in attendance postgraduate courses or distance. Of these, 26% work in at least one course every semester (5 respondents), 32% work in a discipline per year (6 respondents) and 42% worked only once (8 respondents). 74% of teachers (14 respondents) did not act in graduate context for lack of opportunity and 26% by choice (5 respondents).

The subjects were asked about the use of technology in three stages of work in teaching: planning, execution and evaluation, as can be seen in Figure 3:

Figure 3. Use of technologies by the interviewees.



Source: empirical research data

Can be identified in Figure 3, the use of technology was significant in the three stages of the work, and therefore the study group develops strategies of knowledge creation to the use of technology in education, which shall be analyzed below.

As mentioned earlier, to analyze the process of creating knowledge of research participants, they were used 27 statements about the conversion processes of knowledge, adapted from Huang and Wang (2002). For analysis, the discordant and concordant responses have been grouped together, allowing greater understanding of the profile of the subject as the different knowledge conversion processes, as shown in Tables 1 to 4.

Among the assertions related to the socialization process shown in Table 1, highlight the unanimity of respondents to point out that observe closely the experience of colleagues in regard to the use of technology (12.5%), as well as the experience of students, trying to identify possibilities for use of these technologies in education (12.5%). For Nonaka and Takeuchi (1997), the socialization process also occurs among those who develop their products and customers in an endless process of tacit knowledge sharing and new ideas for product improvement. Although not a typical production and marketing process, the teacher-student relationship can be benefited by the continual exchange of ideas as well as their own teaching process.

Among the discordant responses, the highest incidence was found in the statement that indicates that the teacher shares his difficulty with the technologies with the students (2.6%). This could indicate some remnants of the teacher's idea as the holder of knowledge in the classroom (Fontana, & Silva, 2009). As students are part of the teacher's working environment, a receptive posture and the recognition of the difficulties could open new avenues for socialization processes, and knowledge creation.

Table 1. Attributes of the socialization process

Assertions regarding:	Number of Consenting Replies	
	N	%
Socialization		
I try to find out the opinions of others, their thoughts and practices on the use of technology.	16	84.2
Actively share my experience with others in relation to the use of technology in education.	17	89.5
Always observe the experience of colleagues in relation to the use of technology in education.	17	89.5
When I watch a class of a colleague, lecture and /or presentations, watch closely the experience of others with regard to the use of technology in education.	19	100.0
I often encourage others to express their thoughts regarding the use of technology in education.	17	89.5
Observe students' experience with the technologies seeking to identify possibilities for use in teaching.	19	100.0
Share with students my difficulties with technology in the classroom.	15	78.9
Accompany the intervention of students on educational technologies in order to learn how to solve problems.	17	89.5

Source: empirical research data

With regard to the externalization process, the greater agreement among respondents was found in the statement: "I help others to clearly express what they have in mind, encouraging them to continue what they are saying" (14.3% as Table 2). As pointed out by Nonaka and Takeuchi (1997), the process of externalization involves the articulation of tacit knowledge through dialogue and reflection. In this sense, open attitude to dialogue and listening to others is an important sign of externalization of knowledge. Another factor that aroused great agreement (13.5%), is the attitude of using metaphors, analogies, sounds or images to explain an abstract concept. Although this action may be considered as intrinsic to the educational process, it is not natural. The teacher must make an effort of reflection and understanding of the concept, as well as the reality that surrounds him, that can be used analogies or metaphors in the knowledge transfer process.

Table 2. Attributes of Externalization process

Assertions regarding:	Number of Consenting Replies	
	N	%
Externalization		
I often use examples or analogies to help explain teaching practices through the use of technology to my colleagues.	16	84.2
Create tutorials, manuals or handouts to help students and / or colleagues to understand step by step the use of technologies that are embedded in teaching.	10	52.6
Describe professional or technical terms with colloquial language to aid communication in the staff or students.	16	84.2
When I have to explain abstract concepts, I try to illustrate through images, sounds, analogies or metaphors.	18	94.7
Help others to clearly express what they have in mind, encouraging them to continue what they're saying.	19	100.0
My educational planning is always detailed expressing the goal of every educational technology and the expected results.	16	84.2
Record the actions taken through the teaching technologies and their results for later reference.	14	73.7

Source: empirical research data

Still on the externalization process, there was greater disagreement among respondents with regard to the creation of tutorials, manuals or handouts to help students and/or colleagues to understand step by step the use of technologies that are embedded in education (6.8%). Like most teachers are involved in distance learning courses (84%), it was expected that there would be no disagreement in this regard, because in this context, teachers need to prepare materials in a clear and self-explanatory way, detailing also, the very technology used to solve problems.

Table 3: Combination Process Attributes

Assertions regarding:	Number of Consenting Replies	
	N	%
Combination		
I try to reevaluate the actions in the classroom with the use of learning technologies after practical experiences.	19	100.0
I change the tutorials, manuals or handouts that I use in class one semester to the next, always evaluating the results.	19	100.0
When I attend an event, class or lecture, I have the habit to organize and make summary of what happened.	16	84.2
I like to collect new information and make a new connection expertise with materials that have already been prepared for use in the classroom.	19	100.0
I share my stuff with colleagues in search of new ideas.	15	78.9
Contribute with colleagues through review of work, suggestions, and/or property sharing.	16	84.2

Source: empirical research data

The answers for the combination process shown in Table 3, pointed to a reflective attitude of the subjects through the evaluation of the actions, materials used and reconstruction of the links between new ideas and knowledge already established. However, there was disagreement as to the attitude to share the materials with colleagues (3.5%). It is possible to infer that the combination of knowledge of processes in the group surveyed are more

related to individual processes of reflection that a process of collective reflection. However, further research is needed for a deeper understanding of the context.

Table 4: Attributes of the internalization process

Assertions regarding:	Number of Consenting Replies	
	N	%
Internalization		
After hearing a new idea or concept on the use of technology in teaching, I try to compare it with my experience to help me understand the meaning.	16	84.2
I understand better the thoughts of others repeating what they said through analogies.	15	78.9
I am seeking colleagues when I doubt if what I understood about some technology is real, feasible or possible.	17	89.5
Always after watching a lecture, class or training on the use of technology, I reflect on my practice and how can I improve it based on new ideas learned.	19	100.0
When I explain some aspect related to technology, I ask the other person must be repeated to be sure he understands exactly what I mean.	16	84.2
When I communicate with my initiatives technologies in teaching colleagues or students, I give some time to think about what we just discussed.	17	89.5

Source: empirical research data

Among the statements dealing with the internalization process shown in Table 4, there was greater agreement on the statement: "Always after watching a lecture, class or training on the use of technology, I reflect on my practice and how can I improve it based the learned new ideas "(16.7%). For Nonaka and Takeuchi (1997), this is a process of incorporating knowledge produced through the experience of socialization, externalization or blending in a new tacit knowledge of the individual.

Table 5: Knowledge conversion process attributes SECI

Size of the SECI	Dissenting Consenting	
	N	%
Socialization	137	100.0
Externalization	109	82.0
Combination	104	91.2
Internalization	100	87.7

Source: empirical research data

The grouping of answers proportionally to the assertions number of each of knowledge conversion process allowed for an examination of the general context of the study group, as shown in Table 5. It is possible to infer that the combination is knowledge conversion process with the highest incidence in the analyzed group (91.2%). You can also identify which forms of externalization of knowledge expressed in the assertive research showed the lowest adherence group. However, it should be noted, however, that the percentage difference between the four processes is very low pointing to a balance between them. For a deeper understanding would be necessary to carry out a qualitative study, where subjects could express their forms of knowledge creation, from the practice itself.

6. CONCLUSION

This study aimed to analyze the process of teachers' knowledge of creation of the Department of directors of a public institution of higher education in the use of technologies in their teaching activities. The analysis of the data leads to the realization that, also in the context studied, knowledge creation is configured as a process that begins at the individual, but that is established in social interactions (Nonaka & Takeuchi, 1997). The individual reflection appears in the socialization processes, externalization, combination and internalization. There is a restlessness that begins on the individual and what is outsourced and socialized with the group provoking new thinking processes.

You can identify the study group, socialization processes and externalization among peers, but also in its relations with students. This is an interesting move that may lead to the definitive break of the superiority relationship between teachers and students in the classroom (Fontana, & Silva, 2009). The use of technology in the classroom can be considered as a possible opening to this exchange of knowledge, however, may represent an uncomfortable territory for teachers holding position not share their difficulties with students as been observed in the data.

The survey results showed no particularities of knowledge creation with respect to the use of technology in education. However, it is important to realize that there is a movement among the faculty for learning and discussion of the theme of technology. It would investigate, however, if this movement is subsidized by the leaders of the group and the institution as a whole.

The tendency of respondents to agree with those used assertions may represent a limitation of research in the choice of terminology and expressions used. Future research could deepen this phenomenon, trying to identify the meaning attributed by the subjects to the different knowledge conversion processes in your practice.

The research contributed to the improvement of teaching practices in the use of technology in education, breaking the relationship of superiority between students and teachers. Technologies become a facilitator mechanism in teacher's work bearing the same to interact best in class. However, this requires familiarity and responsiveness of teachers in relation to technologies in education otherwise, this innovation will not represent gains for the participants of this process.

It would be relevant, future studies address the issue of how teachers create the knowledge to use technology in their teaching activities in other areas of knowledge, in other institutions, in other regions of Brazil and the world, and make a comparison results.

It would be also important to extrapolate the perspective of the study, the study look under the vision of the student, community and director (maintainer).

To analyze the perception of students regarding the use of these technologies and the improvement in the process of transfer/acquisition of knowledge

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