

Digital technologies, teacher training and teaching practices*

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Abstract

This article presents the research results involving teacher training in the era of cyberculture and its interrelation with knowledge, skills and attitudes by teachers in an educational context influenced by the use of Digital Technologies (DTs). The discussion advanced here results from a qualitative investigation, consisting of a case study, with data collected from semi-structured interviews with teachers of courses with a hybrid approach, in the setting of a non-profit university in the south of Brazil. To analyze the data, we used a methodology associated to discourse textual analysis. This investigation provided an understanding of the competencies evidenced by teachers who engage in good teaching practices with DTs, resulting in elements that allow us to reflect on planning educational actions in the scope of the academic/professional development of working professors. Four major competencies were identified as the object of reflection: digital fluency, teaching practice, planning and pedagogical intervention. In this article, we discuss the developments of digital fluency, for understanding its contribution to teachers that wish to use/create teaching practices with DTs, based on their experiences and those of their peers. The subjects interviewed in this study demonstrated a heightened level of familiarity regarding the use of technologies, but had limited training with respect to their didactic-methodological aspects. The results provided us with indicators to reflect on the organization of strategically-prepared training spaces so that the faculty can experiment, test, discuss and exchange experiences regarding teaching activities to include in their practices with the use of DTs.

Keywords

Digital technologies - Teacher training - Teaching practices.

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DOI: <http://dx.doi.org/10.1590/S1678-4634201945180201>

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Introduction

In contemporary times, digital technologies have a prominence that impacts, adjusts, and even defines the outlines of a new concept of society. This context is characterized by a break from the on-site paradigm, that in which we were formally prepared to complete everyday and professional activities, in favor of the overlapping/complementarity of virtual space (cyberspace). In this new landscape, we have to relearn and reevaluate our notions related to training and education.

In this article, we provide an overview of the issue of complexity, emphasizing the need for us to reflect on issues related to the use of Digital Technologies (DTs) in teacher practices, avoiding simplifications and the reductionism with which this relation is frequently treated in the context of teacher training.

The present investigation occurred in the context of the research group ARGOS², a component of a wide-ranging project that aims to investigate the implications and possibilities presented by *cyberculture* and the use of DTs in teacher training. The larger project, which guides the group's actions, was divided into subprojects, in which the set of investigations occurs in a chain-like, interdependent fashion; in other words, the results of one study provide elements for the following study. The group aims to identify elements to support the necessary discussion of teacher training, whether on the undergraduate, graduate or continuing education level, in light of the emerging context created by *cyberculture*. This article discusses one of the results obtained in this web of investigations carried out by members of the group.

A study was carried out to investigate what competencies (knowledge, skills and attitudes) a professor has when engaging in good practices with the pedagogical use of DTs. The goal of this research was guided by the perspective of pursuing indicators in training these teachers that would help them develop significant practices. This issue is usually addressed as identifying a teacher's profile to complete a determined activity and, in this study, we aim to broaden the discussion in order to determine what effectively constitutes this profile. In other words, by broadening this discussion, we provide elements for reflections and possible actions that lead to discussions, from the theoretical field to the operational field, producing elements for program chairs and educational administrators to align their pedagogical proposal with the inherent demands of teaching the era of *cyberculture*.

In this sense, the main objective of this study is to contribute to the ongoing need to reflect on teacher training in times of *cyberculture* and its interrelation with knowledge, skills and attitudes for professors working in an educational setting that is increasingly impacted by the use of Digital Technologies.

What is the turning point for us to change teacher training and adapt it to the needs emerging in *cyberculture*?

Given this context, we associate the results with the path taken in the aforementioned research in order to contribute to the discussion on contemporary teacher training. In our

2 - ARGOS - Interdisciplinary Research Group in Digital Technologies and Distance Education - College of Humanities/Graduate Program in Education - PUCRS. Available at: <<http://dgp.cnpq.br/dgp/espelhogrupo/1961885168367047>>.

view, the teacher training process needs to be revisited in order to contemplate the new elements that have emerged with the inclusion of DTs in the academic context.

The answer to our inquiry involves a critical review of teacher training, of preserving an epistemic space related to the foundations of educator training and to the inclusion of new aspects presented by modern times in *cyberculture*, claimed in a study by Lévy (1999). The evolution of technology enables us to see the change from mere information receivers to authors. Consequently, considering alternatives in teacher training becomes challenging, since we are immersed in this reality, which frequently does not allow us to visualize alternatives. We are used to taking the perspective in which we were trained, based on the views ingrained by this training, by a praxis associated to a non-digital context, and reflections presented by various authors, such as Lévy (1999); Demo (2000); Silva (2000; 2003); Primo (2002); Kenski (2002).

This context results from the technological evolution of the past two centuries. Santaella (2011) claims that most inventions include technologies that enhance the human capacity for language production. This is because “it is through language that man becomes a subject and acquires cultural significance” (SANTAELLA, 2001, p. 91). We increasingly observe that new ways to communicate emerge. Consequently, the way we perceive the world, time, spaces, feelings and the way we live and relate to one another has also changed. Over the years, one discovery strengthens the next one and always in order to maximize man’s intelligence and capacity to evolve and reinvent himself.

We usually begin with the premise that our students master DTs and they connect easily with virtual spaces outside of school, bringing their habits and behaviors to school. This has been a point of reflection in contemporary studies regarding the teaching process. Teaching and learning, in these circumstances, means projecting towards a new context in partnership with the students themselves, who come to school with a large amount of baggage of digital knowledge. However, with so much information, they need the professor to guide and challenge them in their comprehensive development as human beings.

Given this context, the present paper is organized in the following way: the next section presents the method used in this study and the results. Next, the theoretical foundation that supports it is addressed in a way that dialogues with the findings of this research. Lastly, the final reflections of the study are presented.

Method

This investigation is characterized as a case study, with a qualitative and quantitative approach, carried out at PUCRS, focusing on the professors who teach hybrid courses. However, in this article, we only present the results from the qualitative aspect of this investigation.

We started by collecting data from Proacad³ of professors who created or adapted teaching resources associated to DTs, which are characterized as good practices. The good practices considered here are those in which students evaluated the courses as positive, and having contributed to their learning (SACRISTÁN, 1999; GÓMEZ, 1998). This information was collected every semester through professor evaluations⁴, carried out by the institution.

3 - Office of the Academic Vice President.

4 - This evaluation occurs at the end of the semester and uses a digital instrument (questionnaire) sent by email through a link (address) to students

Proacad categorizes and analyzes this information and, based on this, they can inform us of those professors with the preferred profile for this research.

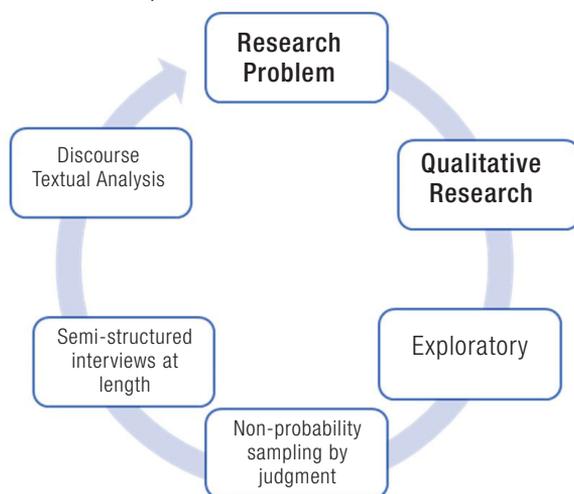
From this perspective, the script of the data collection was subject to content validation, which is a subjective, but systematic evaluation, in which the researcher, or another person, examines whether the items in the instrument adequately involve the domain of the construct measured (MALHOTRA, 2006). As such, in this study, the content validation was carried out by multidisciplinary specialists (a pedagogue, a psychologist and an educational administrator) with the objective of analyzing the alignment of the instrument with the theoretical assumptions.

Subsequently, semi-structured interviews were carried out at length, using a direct approach⁵ with the professors, and the program *Audacity*⁶ to record the information. The invitation to participate in the research was sent via e-mail to the professors indicated by Proacad. The data collection took place in the month of September of 2014. The sample used for the study was 8 professors⁷, indicated by means of non-probability sampling by judgment⁸.

The data collected in the interviews were analyzed and categorized to identify the characteristics regarding the Competencies (Knowledge, Skills and Attitudes - KSA) that these professors developed. As such, we used the Discourse Textual Analysis (MORAES; GALIAZZI, 2006) to complete the data analysis.

With the purpose of explaining the use of data collection instruments in the research, according to Figure 1, an outline is presented that illustrates the path of the study.

Figure 1 - Design of the Research procedures



Source: Created by the authors.

of all courses. This information is completed and collected anonymously, without identifying the students, only the class associated to the course.

5- Interview with an open, direct and individual script.

6- *Audacity*: Free software for recording and editing audio - Available at: <<http://audacity.sourceforge.net>>.

7- The initial sample for the study was 12 professors and the answers from 8 professors were used, since they were very similar. The data were collected, coded and analyzed systematically up to theoretical saturation.

8- According to Malhotra (2006, p. 325), this is the sampling technique that does not use random selection; it trusts the personal judgment of the researcher.

Theoretical foundation and results

This investigation enabled an analysis of which competencies the professors who teach hybrid courses at PUCRS developed in relation to using technology resources in the teaching and learning process, which permeate the hybrid model. Four major competencies were identified⁹ as the object of reflection: digital fluency, teaching practice, planning and pedagogical mediation.

In this article, the digital fluency competency is presented, according to Table 1.

Table 1 - Summary of the digital fluency competency

Competency	Keywords	Abstract
Digital fluency	<ul style="list-style-type: none"> - On-site/Virtual Integration; - Technological ambiance/familiarity; - Cyberculture; - Constant upgrading. 	<p>It refers to the use of technology resources in an integrated way, in which the professor uses devices and produces content/material through them in a critical, reflective and creative way. This way, the more contact users have with these tools, the more familiarity they acquire and, consequently, the potential for use increases. As such, it is necessary to constantly upgrade to keep up with the changes provoked by the technological advances that modify our society.</p>

Source: Created by the authors.

We do not intend to generalize these findings, but provide indicators to be worked on in teacher training.

In a society in which information and communication are the main gears that move relations in the world, permeated by technological evolutions, the development of competencies in teacher training deserves special attention.

Veen and Vrakking (2009) claim that the contemporary social context, impacted by the massive use of DTs, is driven by constant changes, requiring the professional to solve increasingly complex problem-situations. This is because the problems that we face today, in different areas of knowledge, cannot be solved with knowledge from a single area. Hence, we must have an interdisciplinary view and transdisciplinary understanding of how to organize the solution. How do we do this? By educating people to solve complex problems according to a plurality of contexts.

In other words, the role of a professor, considered a transmitter of information, in the current context, no longer makes sense, because there are other needs. Therefore, teacher training, whether initial or continuing, requires a combination of needs from the social context with teaching practices. It is a combination that involves competencies related to the use of DTs.

9- The competencies identified in this study emerged from the researchers' perspective on a portion of reality; this does not mean that there cannot be others.

[...] competence represents the result of a dialogue between the skills and abilities that we have, which we activate in order to search for a new level of balance when we are imbalanced, since there is a transformation to be processed (ALLESSANDRINI, 2002, p. 164-165)¹⁰.

The studies by Perrenoud (1999), whose theoretical foundation is guided by the work of Jean Piaget, provide a constructivist view¹¹ of the approach to the concept of competence. As such, Perrenoud (2002) defines a competence as:

[...] the ability to face a family of analogous situations, mobilizing multiple cognitive resources correctly, quickly, appropriately and creatively: knowledge, capabilities, microcompetencies, information, values, attitudes, patterns of perception, evaluation and reasoning. (PERRENOUD, 2002, p. 19)¹².

In studies by Le Boterf (2003), which addresses professional competencies, the term is analyzed as a mobilization of resources, that is, knowing how to administrate, how to manage a problem-situation, which is in line with what Alessandrini (2002) defines as:

[...] a capacity to understand a determined situation and react appropriately to it, in other words, establishing an evaluation of this situation in a proportionally fitting way with respect to the need it suggests in order to work in the best way possible (ALLESSANDRINI, 2002, p. 164)¹³.

According to Zabala and Arnau (2010), the concept of competence is introduced to provoke changes in the contemporary educational stance, since the term is treated as a process of:

[...] effective intervention in different areas of life, through actions in which components of attitudes, procedures and concepts are mobilized, at the same time and in an interrelated way (ZABALA; ARNAU, 2010, p. 11)¹⁴.

In this study, we chose to consider competencies as a set of elements composed of Knowledge, Skills and Attitudes (KSA), according to Figure 2. We understand that “this set is structured in a determined context with the purpose of solving a problem, to deal with a new situation” (BEHAR et al., 2013, p. 23).

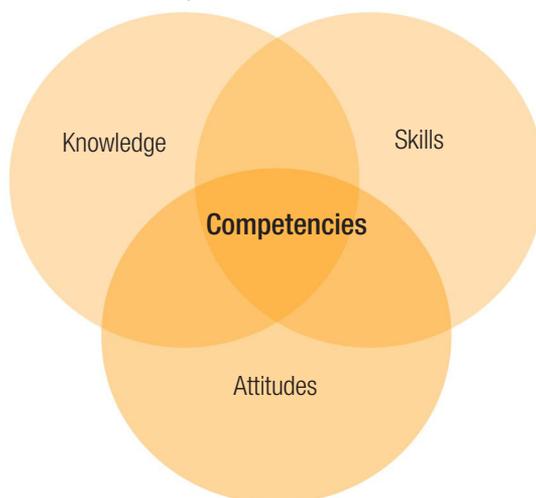
10- Translated from the original: [...] competência representa o resultado do diálogo entre habilidades e aptidões que possuímos, as quais acionamos para buscar um novo patamar de equilíbrio quando entramos em desequilíbrio, pois há uma transformação a ser processada.

11- “Constructivism is, therefore, an idea, rather, a theory, a kind of knowledge or a movement of thought that emerges from the advancement of the sciences and Philosophy. A theory that enables us to interpret the world in which we live. In the case of PIAGET, the world of knowledge: its genesis and its development.” (BECKER, 1994, p. 89)

12- Translated from the original: [...] a aptidão para enfrentar uma família de situações análogas, mobilizando de uma forma correta, rápida, pertinente e criativa, múltiplos recursos cognitivos: saberes, capacidades, microcompetências, informações, valores, atitudes, esquemas de percepção, de avaliação e de raciocínio.

13- Translated from the original: [...] capacidade de compreender uma determinada situação e reagir adequadamente frente a ela, ou seja, estabelecendo uma avaliação dessa situação de forma proporcionalmente justa para com a necessidade que ela sugerir a fim de atuar da melhor maneira possível.

14- Translated from the original: [...] intervenção eficaz nos diferentes âmbitos da vida, mediante ações nas quais se mobilizam, ao mesmo tempo e de maneira inter-relacionada, componentes atitudinais, procedimentais e conceituais.

Figure 2 - The formative elements of competence

Source: Behar et al. (2013, p. 26).

The first important element that characterizes a competence is knowledge, which Zabala and Arnau (2010) claim is a basis for qualifying an educational action. Regarding the process of building knowledge, we consider the constructivist focus of Piaget, since we believe that building knowledge occurs through interactions between the subject, the environment and his structures. Hence, “the acquisition of knowledge depends as much on the cognitive structures of the subject, as his relation - subject - with the object” (BEHAR et al., 2013, p. 27).

The challenge is precisely to transform information into knowledge at a time in which access to information is increasingly facilitated by the advancement of services that the internet provides, using technology devices.

The second element that constitutes competence is skill, which assumes a practical, technical or procedural nature related to the application of knowledge. From the perspective of Moretto (2002), skills are associated to know-how. Demo (1995) defines know-how as knowledge associated to argumentation; while the term how is associated to training, to the process. Therefore, a skill can be developed according to the sociocultural and cognitive context of the subject, through cognitive, motor and technical processes.

The third element is attitude, which is related to ways of being and acting, affinities, emotions and feelings. According to Lambert and Lambert (1996, p. 77): “[...] an attitude is an organized and consistent manner of thinking, feeling, and reacting to objects, people, groups, social issues or, more generally, any event in the environment”.

Therefore, the data were analyzed from the perspective of the elements that constitute a competence - knowledge, skills and attitudes, according to Table 2.

We call digital fluency the competence identified in this study that is related to the pedagogical use of technology resources to perform on-site and virtual activities, defined by a familiarity with using these resources and their repercussion in professor planning. In

other words, the more digital fluency the professor develops, the easier it will be for him to make associations between his practices and an eventual digital version.

According to Perrenoud (2002), it is through experiences that teaching and learning processes are set in motion, since the professor and student evaluate the actions that were significant due to their involvement and depth.

Table 2 - Description of the elements of the digital fluency competency

Competency - digital fluency	
Knowledge	Theoretical and technological knowledge about the tools.
Skills	Explore, pursue, select, produce and adapt.
Attitudes	To have initiative to pursue innovations and always be up to date.

Source: Adapted from Behar (2013, p. 166).

Technology has always been part of everyday life in school and its pedagogical use depended on the professor. In other words, whoever creates strategies, practices and teachings for using a resource is the professor. These reflections are in line with what Prensky (2001; 2010), Alessandrini (2002), and Giraffa (2013) discuss regarding the context of society and the stance of the professor given the changes that occur due to our own evolution.

The research results show in the professor discussions that familiarity with technologies come from their frequent, continuous and daily use. This is because:

[...] these tools are not just a complement added to human activities, but transform them and, at the same time, define the evolving paths of individuals, whose skills adapt to the tools in use and to the social practices generated by them (LALUEZA; CRESPO; CAMPS, 2010, p. 47)¹⁵.

Therefore, it is not enough to invest only in training courses to use a specific technology; it is also necessary to invest in training for the educational use of technology resources. The need for this training was evidenced in the discussions with the subjects investigated, which can be exemplified in one passage of one of the interviews when discussing teacher training in the institution:

[...] First, teach me to understand which pedagogical resource works better. Teach me what to do when a student spends class after class using Facebook. Do I remove the student from the classroom? Do I ignore it because it is his responsibility? Is that what it is? So, discuss these

15 - Translated from the original: [...] as ferramentas não são apenas um complemento acrescentado à atividade humana, mas a transformam e, ao mesmo tempo, definem as trajetórias evolutivas dos indivíduos, cujas habilidades se adaptam às ferramentas em uso e às práticas sociais por elas geradas.

things with us first, because the content, we already master. If I hadn't mastered it, I wouldn't be here. But being an educator is not like being an instructor, it is not like being a trainer; it's different¹⁶.

Hence, we need to strategically create thought-out spaces where the faculty can experiment with, test, discuss and exchange experiences regarding teaching possibilities. In other words, provide the technological ambiance that will help the professor consider alternatives to include in their practices using DTs, in line with what Perrenoud (2012) presents as a possibility of developing competence.

Therefore, there is a need to advance in teacher training actions beyond simple instrumentation in using technology resources. The concern is on a teaching level, because the challenge of the professor is to consider possibilities in use, since we are used to an education with little interaction, as discussed by authors such as Gabriel (2013), Kenski (2012) and Prensky (2010)

The word *ambiance* is used in concepts of architecture to define an adaptation to a physical, and at the same time, aesthetic and psychological environment, planned for human intervention. Hence, the discussion of teacher training cannot be shallow in the sense of only looking at current concepts, without making the proper interconnections. In the present study, the concept of *ambiance* is assumed as a physical or virtual space, which aims to integrate the set of on-site interactions to the virtual possibilities, that is, to intentionally offer a space so that actions can take place.

According to Lalueza, Crespo and Camps (2010):

Individuals are built according to the object of their activity and the devices that mediate them. We can thus understand technological changes as transformations of the devices that mediate the activity that they promote. At the same time, they are influenced by transformations in individuals and by the objects of this activity. (LALUEZA; CRESPO; CAMPS, 2010, p. 49)¹⁷.

Therefore, it is worth seeing technologies as a cultural tool. The level of familiarity is related to how some use devices and they differ due to their level of experience. When questioned about whether there were any educational changes in the concept of hybrid classes, the research subjects made clear that technology was already being used in the on-site modality and was only newly adopted in the virtual space.

We observed, in the interviews, that familiarity with the use of technology resources makes the professor concentrate their concern on the educational possibilities of pedagogical use and not primarily technical issues related to the resource. This is because the greater the professor's fluency regarding the use of a resource, the greater

16- Translated from the original: [...] Me ensina primeiro a entender qual é o recurso pedagógico que funciona melhor, me ensina o que eu faço quando um aluno passa aula pós aula usando o Facebook, eu tiro o aluno da sala? Eu ignoro porque a responsabilidade é dele? Será que é isso? Então discutem essas coisas com a gente primeiro, porque o conteúdo a gente domina, se eu não dominasse eu não estava aqui. Mas o ser educador, não é ser um instrutor, não é ser um treinador, é diferente.

17- Translated from the original: O indivíduo se constrói em função do objeto da sua atividade e dos artefatos que a mediam. Podemos, assim, entender as mudanças tecnológicas como transformações dos artefatos que medeiam à atividade que promovem e, ao mesmo tempo, são influenciados pelas transformações nos indivíduos e pelos objetos dessa atividade.

peace of mind they demonstrate to create possibilities for use in their teaching practice. If we apply this to DTs, we can talk about the digital fluency of the professor regarding the choice and use of DTs, as well as the use of various devices, such as tablets, smartphones and other devices.

Thus, the subjects interviewed in the study demonstrated a distinguished level of familiarity regarding the use of technologies, but indicated limitations regarding their application on a teaching level. The reflection we have presented is related to the need for us to advance in the discussion on the use of technologies and teaching strategies¹⁸. This is a key aspect to be discussed in teacher training today. The more opportunities the teachers have to reflect on and exchange experiences, related to the use of technology resources, the more opportunities they will have to develop teaching plans related to their use and to plan/organize their classes with the possibilities offered by DTs (GABRIEL, 2013; KENSKI, 2012; MORAN, 2012; PRENSKI, 2010).

When questioned on how technology has been helping in the classroom, the subjects reported that the frequent use of devices and their possibilities helped them connect the teaching and learning processes. In addition to reflecting on their own experiences, they incorporated new options in their teaching activities.

The professor is faced with actions, ideas formed by attitudes not immediately visible, an understanding of which requires learning to be perceived and captured, so that they can be included in the real context of their practice (TOZETTO; GOMES, 2009, p. 189)¹⁹.

Hence, it is not a linear definition. The concept of competence presented by Perrenoud (2000, 2002) is located in the context of a systemic view that is in constant movement. Therefore, depending on the situation that the professor is facing, they should be able to choose the procedure that best applies to get a better result.

From the perspective of Alessandrini (2002), competencies are developed continuously and gradually, since:

[...] this process occurs according to an interior dialogue, represented by intrapersonal relations, as well as by interpersonal relations, which imply social inclusion and responsibility (ALLESSANDRINI, 2002, p. 166)²⁰.

In this sense, the KSA elements, listed in Table 2, which present the characteristics of the digital fluency competence, were identified in the discussions with the subjects interviewed based on the relations that they establish, given the complex situations that are presented daily and how they are resolved. They reported that conversations

18- By educational strategy, we understand the concept of a set of decisions and actions - intelligent and creative - to promote the accomplishment of objectives proposed and to provide the best results. (SILVA, 2003, p. 74).

19- Translated from the original: O que aparece diante do professor são ações, ideias formadas por atitudes não imediatamente visíveis, cuja compreensão exige aprendizagens para serem percebidas, captadas, para que possam ser inseridas no contexto real da sua prática.

20- Translated from the original: [...] esse processo ocorre a partir de um diálogo interior, representado pelas relações intrapessoais, assim como pelas relações interpessoais, as quais implicam inserção e responsabilidade social.

with another colleagues, regarding the use of technologies in the classroom, enabled an exchange of knowledge. They also indicated situations for learning about resources that facilitated their teaching practices, as evidenced by one passage in a discussion with one of the subjects interviewed.

What I do a lot is talk to colleagues who I know have good practices. [...] I talk a lot with colleagues, who I know are colleagues that are concerned with these things as well, so I learn a lot this way about basic things. These days I learned with a colleague that: - Did you know that now there is a tool that enables students to code collaboratively? - Really? I don't know... - Oh, that's cool, I didn't know! Then we sat down for fifteen minutes, OK cool... So, I will try to adjust it to what I am doing here! And she said: - Go, test it, and see if it will work or not. So, we do a lot of experimenting this way, we hear someone who saw that it worked, you know? One colleague said one day: - Oh, I have *Audacity*, which is a software that such and such! Wow, I did not know that! Always preparing texts to give feedback and now I have the opportunity to record a podcast²¹.

It is much more than mechanical learning since one of the fundamental characteristics of competencies is the capacity to work in new contexts and situations. We believe that we can create circumstances, that is, a set of strategies so that the subject can develop competencies related to something. Necessarily, the set of strategies defined for someone or for some group, which is brought together by affinities or necessities, can be replicated and offer identical results in another context. This assumes a customized approach that takes into consideration real situations in the everyday life of teachers' activities (ZABALA; ARNAU, 2010).

The knowledge element, if well-connected, enables a teacher to learn about tools and their potential. Therefore, taking into consideration the good teaching practices that are implemented by professors who aim to, at the same time, keep up with the demands of society, is an alternative, since teachers reported that contact with other colleagues enabled them to learn about the potential of resources quickly and in context.

In relation to the element of skill, which is related to doing, we noted that professors incorporated, into their teaching practices, resources that they had not previously explored or had not seen their purpose. One of those interviewed reported that, upon hearing tips on resources by colleagues, they aimed to understand and use them in some way. Another professor said:

21- Translated from the original: O que eu faço muito é conversar com colegas que eu sei que têm boas práticas. [...] Eu converso muito com colegas, que eu sei que são colegas que se preocupam com essas coisas também, então eu aprendo muito assim de coisas básicas. Esses dias eu aprendi com uma colega que: - Tu sabias que agora tem a ferramenta tal que permite que os alunos façam código colaborativo? - É? não sei... - Oh, que legal, não sabia! Daí a gente sentou quinze minutos, ah tá legal... ta, vou tentar ajustar no que estou fazendo aqui! E ela: - Vai, testa, e vê se vai dar certo ou não. Então a gente faz muito na experimentação assim, escuta alguém que viu que deu certo né? Uma colega um dia desses: - ah eu tenho Audacity que é um software que tal e tal! Nossa eu não sabia que tinha! Sempre fazendo textos para realizar o feedback e agora tenho a possibilidade de gravar um podcast.

I look for it, I learn, I ask for help from one, from another. [...] I think it is necessary because I strive or try to make my classes more interesting. And I see that, when I include new tools, I enhance learning²².

Coll and Monereo (2010, p. 28) claim that, in this day and age, “we have begun to understand the importance of competencies from a collective perspective instead of an individual one”. Ideas that Perrenoud (2002) addresses as urgent actions “[...] to create the basis for a didactic transposition based on the effective practices of a large number of professors, respecting the diversity of working conditions of the profession” (PERRENOUD, 2002, p. 18).

The element of attitude became evident in reports of constantly searching for innovations and upgrades. One professor said: “[...] I don’t take the course, but I end up learning! I was talking to a colleague, like, I’m going to someone’s class: have you used this thing? Yes, OK, tell me how it works!”. Another professor reported: “[...] I am curious, I like to hear other people’s experiences that have worked. I always think about the possibility that...maybe I can use this too?”.

In this sense, the path each subject finds to activate tools is specific to each person. This is because decision-making is guided by experiences and by elements that involve a competence. However, any competence will manifest in a subject’s action, because it is through action that we can identify how tools are used. We observe that teacher training still needs to be mobilized in the sense of connecting theory with practice, and vice versa, to prepare increasingly trained professors in a connected society²³.

Hence, considering teacher training to develop competencies involves thinking about the mechanisms that aid in the development process that takes place throughout life, since we are constantly learning. We need to advance in the sense of mobilizing KSA elements in initial and continuing education so that subjects can autonomously develop connections between the elements in pedagogical actions, according to Figure 3, which explains the result of the data analysis on the digital fluency competence.

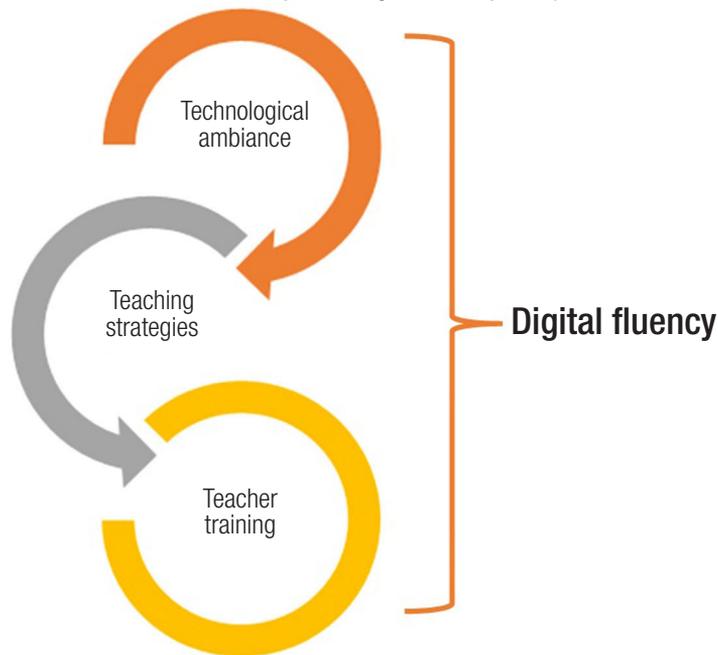
We can see that the development of competences is a complex and continuous process and, therefore, it is necessary to reflect on our own way of learning and developing knowledge so that, in fact, the didactic change can occur. The technological context has greatly changed. However, methodological issues are still an ongoing issue, regarding DTs, and naturally, this is reflected in the training processes for teachers.

Final reflections

The results of this study provided us with elements so that we can reflect on the teacher competencies that schools require in this challenging context of digital

22- Translated from the original: Eu vou correndo atrás, vou aprendendo, peço ajuda para um, para outro. [...] acho necessário porque eu procuro ou tento que as minhas aulas sejam cada vez mais interessantes. E percebo que, quando incorporo recursos novos, potencializo mais o aprendizado.

23- “The expression connected society translates to the current situation in which everything is on the internet: data about behaviors, networks of relations between people and businesses/institutions, opinions, most searched topics or those generating the most interest at the time, market trends, news about world events, as well as in small locations, safety, services, etc. Mobile devices (cellular phones, laptops, netbooks, tablets) and ubiquitous computation strengthen this perspective. Therefore, there is a convergence between in-person and virtual lives”. (BEHAR et al., 2013, p. 39).

Figure 3 – Outline of the result of the analysis of digital fluency competence

Source: Created by the authors.

communication and information. The concept of *cyberculture*, in which we are immersed, includes the set of technology devices, that is, Digital Technologies, which we use to access, produce and share information and, consequently, communicate with the world, taking into consideration aspects inherent in culture: people, the environment and their interrelations.

In *cyberculture*, the opportunities for connections between people and information take place mediated/supported by technology devices connected to the internet. This is the major difference: it is not the digital devices that enable the establishment of the digital culture that surrounds us; the connection itself is what offers the challenges and opportunities that destabilize us and enable us to reevaluate and consider new practices.

To teach using DTs presumes a professor with an unconventional attitude. Contemporary professors use technology devices to organize their classes, communicate, and do research; in other words, they are technology users on some level. However, it is worth noting that the fact that professors use technology does not guarantee didactic transposition. A study by Cerutti (2013) points out that didactic transposition is not immediate. That is, the fact that a professor is a user of Digital Technologies does not guarantee that he will make pedagogical use of this knowledge with students.

From this perspective, studies on the pedagogical use of DTs as competencies are fundamental to help institutions in their teacher training programs, in the sense of providing desirable indicators in the teacher profile regarding developing innovative activities in their classes.

The present study showed that professors who developed the digital fluency competence modified their teaching practices, using DTs, because they created alternatives for use based on their experiences and those of their peers. We see that progress occurs on a didactic level and instrumentation for using technologies is not the main focus in discussions of teacher training, but to concentrate on creating and/or adapting practices supported by DTs.

The difference is the way in which the professor uses these technology resources. Hence, we see indications that the focus of teacher training should take into consideration intentional environments that favor the development of competencies through experiences by the professors themselves. The research subjects reported that the teaching strategies used are ideas that came from conversations with colleagues in informal moments and not from specific training.

Instrumentation is important and necessary. However, training needs to take place on a didactic level expressed in practices. It is necessary to understand the context of society and what the technological changes are provoking, in the current context, so that we can monitor, at the same time, what we are doing in and out of the classroom and try to approximate these habits as a support for studying and learning.

Organizing teacher training to meet the needs of schools according to the questions and desires of parents, administrators and students is a stimulating challenge. However, we should take caution to prevent the discussion from being focused on developing only digital fluency, and not become hostages of technology trends, adapting and using devices to demonstrate being up to date.

We always make use of some kind of technology to organize our classes. DTs present us with possibilities beyond those that we usually have. The ease with which knowledge networks are built presents us with possibilities of doing more and better, in virtual and on-site spaces; at least, that is what we expect.

We understand that the context of *cyberculture* goes beyond merely using, selecting and acquiring competencies to use DTs. It increasingly leads us to the origins and the essence of professor training. This is the most relevant point, that we have to continue thinking about, making and pursuing improvements in the educational process, with the professor being the central element.

References

ALLESSANDRINI, Cristina Dias. O desenvolvimento de competências e a participação pessoal na construção de um novo modelo educacional. In: PERRENOUD, Philippe; THURLER, Monica Gather. **As competências para ensinar no século XXI, a formação dos professores e o desafio da avaliação**. Porto Alegre: Artmed, 2002. p. 157-176.

BECKER, Fernando. O que é o construtivismo?. **Ideias**, São Paulo, n. 20, p. 87-93, 1994.

BEHAR, Patrícia Alejandra (Org.). **Competências em educação a distância**. Porto Alegre: Penso 2013.

CERUTTI, Elisabete. **Concepções do aluno em relação à docência nos cursos de licenciatura em tempos de cibercultura**. 2013. Tese (Doutorado em Educação) – Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), Porto Alegre, 2013.

COLL, César; MONEREO, Carles. **Psicologia da educação virtual: aprender e ensinar com as tecnologias da informação e da comunicação**. Porto Alegre: Artmed, 2010.

DEMO, Pedro. **Metodologia científica em ciências sociais**. São Paulo: Atlas, 1995.

DEMO, Pedro. Teleducação e aprendizagem: busca da qualidade educativa da teleducação. In: PRETI, Oreste (Org.). **Educação a distância: construindo significados**. Cuiabá: NEAD/IE_UFMT. Brasília, DF: Plano, 2000. p. 147-153.

GABRIEL, Martha. **Educar: a @evolução digital na educação**. São Paulo: Saraiva, 2013.

GIRAFFA, Lucia M. M. Jornada nas escol@s: a nova geração de professores e alunos. **Tecnologias, Sociedade e Conhecimento**, Campinas, v, 1, n. 1, p. 100-118, nov. 2013. Disponível em: <<http://www.nied.unicamp.br/ojs/index.php/tsc/article/view/112/100>>. Acesso em: 27 nov. 2016.

GÓMEZ, A. I. Pérez. Ensino para a compreensão. In: SACRISTÁN, J. Gimeno; GÓMEZ, A. I. Pérez. **Compreender e transformar o ensino**. 4. ed. Porto Alegre: Artmed, 1998. p. 67-98.

KENSKI, Vani M. Processos de interação e comunicação no ensino mediados pelas tecnologias. In: ROSA, Dalva E. G.; SOUZA, Vanilton C. de (Org.). **Didática e práticas de ensino: interfaces com diferentes saberes e lugares formativos**. Rio de Janeiro: DP&A, 2002. p. 254-264.

LALUEZA, José Luis; CRESPO, Isabel; CAMPS, Silvia. As tecnologias da informação e da comunicação e os processos de desenvolvimento e socialização. In: COLL, César; MONEREO, Charles. **Psicologia da educação virtual: aprender e ensinar com as tecnologias da informação e da comunicação**. Porto Alegre: Artmed, 2010. p. 47-65.

LAMBERT, William W.; LAMBERT, Wallace E. **Psicologia social**. Rio de Janeiro: Zahar, 1996.

LE BOTERF, Guy. **Desenvolvendo a competência dos profissionais**. Porto Alegre: Artmed, 2003.

LÉVY, Pierre. **Cibercultura**. São Paulo: 34, 1999.

MALHOTRA, Naresh K. **Pesquisa de marketing: uma orientação aplicada**. 4. ed. Porto Alegre: Bookman, 2006.

MORAES, Roque; GALIAZZI, Maria do Carmo. Análise textual discursiva: processo reconstrutivo de múltiplas faces. **Ciência & Educação**, Bauru, v. 12, n. 1, p. 117-128, abr. 2006. Disponível em: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-73132006000100009&lng=en&nrm=iso>. Acesso em: 21 set. 2018.

MORAM, José Manuel. **A educação que desejamos: novos desafios e como chegar lá**. 5. ed. Campinas: Papirus, 2012.

MORETTO, Vasco P. **Construtivismo, a produção do conhecimento em aula**. 3. ed. Rio de Janeiro: DP&A, 2002.

PERRENOUD, Philippe. **Construir as competências desde a escola**. Porto Alegre: Artmed, 1999.

PERRENOUD, Philippe. **10 novas competências para ensinar**. Porto Alegre: Artmed, 2000.

PERRENOUD, Philippe; THURLER, Monica Gather. **As competências para ensinar no século XXI a formação dos professores e o desafio da avaliação**. Porto Alegre, Artmed, 2002.

PRENSKY, Marc. **Não me atrapalhe, mãe – Eu estou aprendendo!** São Paulo: Phorte, 2010.

PRENSKY, Marc. **Nativos digitais, imigrantes digitais**. [S. l.: s. n.], 2001. Disponível em: <<https://docs.google.com/document/d/1XXFbstvPZIT6Bibw03JSsMmdDknwjNcTYm7j1a0noxY/edit>>. Acesso em: 27 nov. 2016.

PRIMO, Alex. Quão interativo é o hipertexto? Da interface potencial à escrita coletiva. In: COMPOS: ENCONTRO DA ASSOCIAÇÃO NACIONAL DE PÓS-GRADUAÇÃO EM COMUNICAÇÃO, 11., 2002, Rio de Janeiro. **Anais...** Rio de Janeiro: UFRJ, 2002. p. 1-16.

SACRISTÁN, J. Gimeno. **Poderes instáveis em educação**. Porto Alegre: Artmed Sul, 1999.

SANTAELLA, Lucia. **Linguagens líquidas na era da mobilidade**. 2. ed. São Paulo, Paulus, 2011.

SILVA, Marco (Org). **Educação online**. São Paulo: Loyola, 2003.

SILVA, Marco. **Sala de aula interativa**. Rio de Janeiro: Quartet, 2000.

TOZETTO, Susana Soares; GOMES, Thaís de Sá. A prática pedagógica na formação docente. **Reflexão e Ação**, Santa Cruz do Sul, v. 17, n. 2, p. 181-196, 2009. Disponível em: <<http://online.unisc.br/seer/index.php/reflex/article/view/1150/834>>. Acesso em: 19 nov. 2016.

VEEN, Wim; VRAKING, Ben. **Homo Zappiens: educando na era digital**. Porto Alegre: Artmed, 2009.

ZABALA, Antoni; ARNAU, Laia. **Como aprender e ensinar competências**. Porto Alegre: Artmed, 2010.

*Received on May 18, 2017
Revisions on February 20, 2018
Approved on April 3, 2018*

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