

A PROPOSED RESEARCH INSTRUMENT TO INVESTIGATE THE FEATURES OF DIGITAL LITERACY WITHIN THE SCOPE OF TEACHING PRACTICES

UMA PROPOSTA DE INSTRUMENTO DE PESQUISA PARA INVESTIGAR AS CARACTERÍSTICAS DO LETRAMENTO DIGITAL NO ÂMBITO DA PRÁTICA DOCENTE

UN INSTRUMENTO DE INVESTIGACIÓN PROPUESTO PARA INVESTIGAR LAS CARACTERÍSTICAS DE LA ALFABETIZACIÓN DIGITAL DENTRO DEL ALCANCE DE LA ENSEÑANZA A LA PRÁCTICA DOCENTE

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ABSTRACT: The result of part of a master's research entitled "Digital literacy in teaching practice: support for the integration of TDICs" (BELONI, 2019) is presented here, this work seeks to present a proposal for a questionnaire that details the articulation of digital literacy with TPACK, seeking to understand the social application of technologies according to their technological, pedagogical, content and context knowledge. As an instrument to identify the characteristics of teachers' digital literacy, a questionnaire was used. The results showed that the instrument is appropriate for the investigation of digital literacy in teaching practice. Increasingly, these professionals are required to appropriate TDICs in their practices. Thus, this research presents an instrument that can collaborate to better integrate them, since it increases the understanding of the social use of technologies in teaching practice.

KEYWORDS: TDIC. TPACK. Digital Literacy. Teaching practice. Quiz.

RESUMO: *Este artigo apresenta o resultado de parte de uma pesquisa de mestrado intitulada "Letramento digital na prática docente: apoio à integração das TDICs" (BELONI, 2019). Essa pesquisa busca apresentar a proposta de um questionário que detalha a articulação do letramento digital com o TPACK, buscando compreender a aplicação social das tecnologias de acordo com seus conhecimentos tecnológicos, pedagógicos, de conteúdo e de contexto. Como instrumento para identificar as características do letramento digital dos professores, usou-se um questionário. Os resultados mostraram que o instrumento é apropriado para a investigação do letramento digital na prática docente. Cada vez mais é exigido desses profissionais apropriação das TDICs em suas práticas. Assim, esta pesquisa apresenta um instrumento que pode colaborar para melhor integrá-las, uma vez que aumenta a compreensão do uso social das tecnologias na prática docente.*

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PALAVRAS-CHAVE: TDIC. TPACK. Letramento digital. Prática docente. Questionário.

RESUMEN: Se presenta aquí el resultado de parte de una investigación de maestría titulada “Alfabetización digital en la práctica docente: apoyo a la integración de las TDIC” (BELONI, 2019), este trabajo busca presentar una propuesta de cuestionario que detalla la articulación de la alfabetización digital con TPACK, buscando comprender la aplicación social de las tecnologías según su conocimiento tecnológico, pedagógico, de contenido y de contexto. Como instrumento para identificar las características de la alfabetización digital de los docentes se utilizó un cuestionario. Los resultados mostraron que el instrumento es apropiado para la investigación de la alfabetización digital en la práctica docente. Cada vez más, estos profesionales están obligados a apropiarse de las TDIC en sus prácticas. Así, esta investigación presenta un instrumento que puede colaborar para integrarlas mejor, ya que aumenta la comprensión del uso social de las tecnologías en la práctica docente.

PALABRAS CLAVE: TDIC. TPACK. Alfabetización digital. Práctica docente. Cuestionario.

Introduction

It is known that digital technologies alone do not have the potential for transformation, and for this, it is necessary to understand how the so-called information and knowledge society (BAGGIO, 2000; LOPES, 2010; VELANGA, 2014; WERTHEIN, 2000) has appropriated them in its various possibilities of applications. Digital literacy (DIAS; NOVAIS, 2009)⁴, in this respect, it is an important tool for understanding the different ways of appropriation of ICTs.

According to Valente (2007), the DTICs increasingly demand new skills from people and, therefore, the need to work on different literacies. For the author, launching new educational challenges in the sense that students and educators must have a greater familiarity with new digital resources is a way to bring the school community closer to this new reality, since the growth of technology increasingly impacts the school, which has the challenge of appropriating - in the sense of the word adapt(-e) or fit(-e) - the technology. To this end, teachers must be provided with reflections on digital literacy.

⁴ There is still no consensual definition for digital literacy. In Brazil, the concept that is closest to the objectives of this work is the one presented by Dias and Novais (2009). According to them, the appropriation of technologies in education is much more a social need than a technical or technological need.

We admit, here, the conception of teaching knowledge presented by Therrien (1995, p. 3): “[...] are characterized by originating in the daily practice of the profession, being validated by it, they can reflect both the dimension of instrumental reason that implies a know-how or know-act, such as skills and techniques that guide the posture of the subject, as the dimension of interactive reason that allows to suppose, judge, decide, modify and adapt, according to the constraints of complex situations”.

Assuming that the teacher is part of the information society, it is possible to understand from studies about teachers' knowledge⁵ – which allow us to understand what knowledge is necessary for teaching practice - how these individuals appropriate ICTs as pedagogical tools.

Knowing how to use digital literacy for education is a great opportunity to improve teaching. To do so, an important step is to understand the teacher's digital literacy and, based on that, integrate technologies to collaborate with teaching practice.

There are theoretical lines dedicated especially to understanding the knowledge needed to integrate ICTs with teaching knowledge. The TPACK (Technological Pedagogical Content Knowledge) stands out here, which seeks to detail the skills, attitudes, training, and knowledge that are articulated for the incorporation of the DTICs in the teaching practice, from the preparation of the classes to the interaction with other teachers and students.

Given the above, this paper seeks to develop a proposal for a questionnaire that details the articulation of digital literacy with TPACK, seeking to understand the social application of technologies according to their technological, pedagogical, content and contextual knowledge.

Articulation of digital literacy with TPACK

The researchers Mishra and Koehler (2006) elaborated a contribution to the recognized PCK (Pedagogical Content Knowledge) of Shulman (1987), an adaptation of the PCK for the integration of ICTs, which is widely used in training courses that aim to teach through ICTs. Although it was initially called TPCK, for pronunciation reasons, nowadays it is more common to use the acronym TPACK.

TPACK is adaptable for the analysis of formative models that propose research, investigation and reflection. Although the KPC in its initial formulation privileged individual aspects, nowadays the sociocultural contexts involved in the training process and the constant changes in teaching practice are greatly considered.

Testoni and Abib (2014, p. 04) explain that Shulman brought criticism to his own model, "in which he highlights the little emphasis on the action level, excessive positioning of the individual as a unit of analysis, forgetting the community of teachers, besides not considering affect, motivation or passion". Subsequently, Shulman and Shulman (2004) included context aspects to the PCK concept, balancing the importance of technical knowledge to other

⁵ The concept of teaching knowledge presented by Therrien (1995, p. 3) is admitted here: "[...] are characterized by originating in the daily practice of the profession, being validated by it, they can reflect both the dimension of instrumental reason that implies a know-how or know-act, such as skills and techniques that guide the posture of the subject, as the dimension of interactive reason.

sociocultural knowledge, exploring, for example, background knowledge, which includes technical knowledge, but also the capacity for judgment, improvisation, and intuition.

Digital literacy and the TPACK model are linked in the sense of the use of technology and social analysis. Therefore, they can be used in teacher training courses for the use of ICTs in teaching practice. They are approaches that do not ignore the sociocultural context.

As Figure 1 illustrates, TPACK is made up of the following triad:

Technological Knowledge (TK), which refers to knowing how to think and work with ICTs;

Content Knowledge (CK), which according to Shulman (1987), goes beyond knowing the subject of the discipline, including the ideas and theories, the main historical facts, the approaches used, understanding and clarity in the content to be taught. For Harris and Hofer (2011), limited knowledge brings serious consequences as students may absorb misconceptions about the subject.

Pedagogical Knowledge (PK), which is a generic form of knowledge, encompassing the entire teaching and learning process.

Besides knowing the content, it is necessary that the teacher knows how to plan the classes and the teaching strategies that will be applied, as well as the evaluation models. It is important that they know the learning theories and how best to adapt them in their classroom (CIBOTTO; OLIVEIRA, 2017).

These three pieces of knowledge (TK, CK, and PK) form the basis for the following intersections:

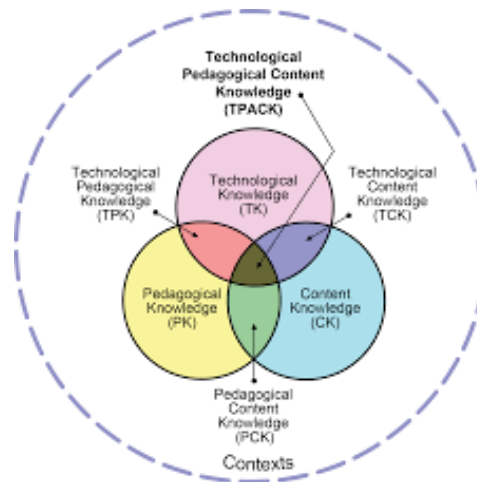
Technological Content Knowledge (TCK) - According to Sampaio and Coutinho (2012, p. 03), it is the "[...] knowing how to select the most appropriate technological resources to communicate a given curricular content." In this sense, having the content and technological domain to evaluate which resources are more adherent to the curricular objectives;

Pedagogical Content Knowledge (PCK);

Pedagogical Technological Knowledge (TPK), which is defined by Cibotto and Oliveira (2017, p. 07) as the digital literacy associated with the adaptation of ICTs to pedagogical projects: "[...] the teacher's way of using certain technologies to develop teaching and learning procedures";

Technological Pedagogical Content Knowledge (TPACK), which is a complement to PCK, given a specific situation: digital literacy for the integration of ICTs in the school context.

Figure 1 – TPACK Diagram



Source: Wikimedia Commons (2017)

At this point, it is worth noting that, according to Harris and Hofer (2011), being able to change is more relevant than the technical skill itself. If before it was relevant to know how to use an overhead projector, nowadays, in most cases, it will be more valid to know how to use the datashow in a presentation with slides. From this perspective, authors Ball *et al.* (2008) and Testoni and Abib (2014) explain that the changes made in Shulman's (2008) initial proposal are part of the development of KPC. Such changes are essential to overcome new problems faced by teachers, being the TPACK, therefore, a complement to the KPC.

Research instrument for data collection and analysis

To detail the ICT characteristics that make up the digital literacy of participating teachers, we used as instrument the questionnaire (Figure 2) adapted based on the studies of Marques et al. (2013), Bunz (2014) and Yurdakul (2012), which overlaps the social use of technology - digital literacy in the broad sense - to technical skills, for example. Thus, instead of assessing whether the teacher knows how to send and receive e-mails, the items address whether the teacher communicates with colleagues or students through e-mail.

Figure 2 – Digital Literacy Questionnaire

<p>Instruction: dear teacher, the questionnaire consists of 27 statements. Please rate the degree to which each statement represents your experience with technologies and choose only one alternative. The main purpose of the following questionnaire is to analyze how digital literacy contributes to your teaching practice: from lesson preparation to the classroom. Informed Consent Form can be found at: goo.gl/Q5o2jT, where the results will also be posted. e-mail (to send the results, optional):</p>		Absolutely no correspondence	Corresponds very little	Corresponds little	Moderately corresponds	It corresponds quite a lot	Strongly Corresponds	It absolutely corresponds
Q1	I use websites (blogs, news, forums) to update myself on the content of the subjects I teach.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q2	I use email to communicate with colleagues or students.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q3	I use video resources (YouTube, Vimeo, TED) to learn new content useful for my classes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q4	I use the Internet to prepare my classes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q5	I use platforms for classroom management (Google Classroom, Microsoft Classroom, Edmodo).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q6	I use videoconferencing tools (Hangouts, Skype, Adobe Connect) to communicate with colleagues or students.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q7	I use educational software (GeoGebra, Google Earth, games) to help me explain a topic.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Q8	My students frequently use cell phones in class.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q9	I use technologies to manage school tasks (posting of grades and absences, agendas, reminders).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q10	I use social networks (Facebook, Twitter, Instagram, LinkedIn, WhatsApp) to share teaching and learning proposals with colleagues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q11	At school, sometimes I have to solve small problems with technology: internet doesn't work, computer won't turn on.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q12	In my professional practice, I have incentives to use technologies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q13	I use office software (Microsoft Word, Excel, PowerPoint) in my professional activities (minutes of meetings, diary, reports, presentations).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q14	I use multimedia resources in the classroom through TVs, Datashow, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q15	I use the Internet at school during my classes to help me with certain content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q16	I create videos explaining my subject through technology.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q17	I write texts about the content of my subjects using technology.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q18	I use the Internet to answer students' questions about content in my classes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q19	I use digital books (PDF, MOBI, EPUB) to learn new content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q20	Having Internet available at school is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	important to do my job better at school.							
Q2 1	I develop tools to assess my students through technologies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q2 2	I encourage my students to develop content (presentations, videos, games, etc.) through technologies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q2 3	I have easy access to websites (blogs, news, forums).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q2 4	The use of technology (cell phone, tablet, computer) is part of my daily life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q2 5	I consume multimedia resources (movies, podcasts, music, etc.) through technologies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q2 6	I can send messages and files via e-mail.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q2 7	I can send messages and files via social networks (Facebook, Twitter, Instagram, LinkedIn, WhatsApp).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Source: Beloni (2019, p. 105-106)

This questionnaire has an estimated duration of 10 minutes, checking the agreement and intensity of responses according to the Likert scale: Absolutely no correspondence (value 1); corresponds very little (value 2); corresponds a little (value 3); moderately corresponds (value 4); corresponds quite a lot (value 5); corresponds strongly (value 6); and absolutely corresponds (value 7).

The choice for the seven-point scale was based on the arguments of Silva Junior and Costa (2014, p. 04), according to which "reliability is better in scales whose items are measured with more than 7 points, and decreases when the items have less than 5 points". To exemplify, suppose a 4-point scale: 1 - strongly disagree; 2 - partially disagree; 3 - partially agree; 4 - strongly agree, it is difficult to differentiate between answers 2 and 3, since agree or partially agree can be equivalent.

All items in the questionnaire refer to teachers' digital literacy. The descriptors presented in Table 1 were used to identify how each item of digital literacy can contribute to a training according to the TPACK model.

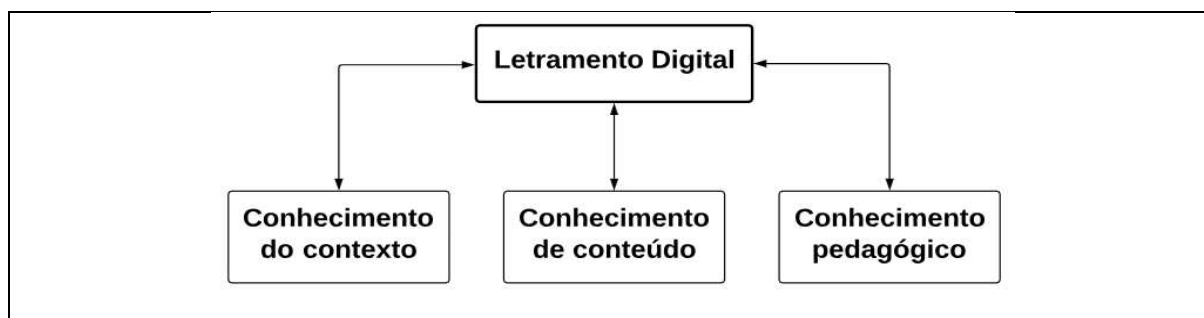
Table 1 - TPACK Descriptors

Category	Description	Item
Content knowledge	Use of the Internet to keep up-to-date on education and their subject, use of multimedia resources to learn new content and clarify doubts.	Q1, Q2, Q3, Q16, Q17, Q19, Q20
Technological knowledge	Solve small problems with technology and use it to communicate via e-mail, social networks, instant messaging, or multimedia resources.	Q23, Q24, Q25, Q26, Q27
Pedagogical knowledge	Use of resources for classroom and school management, use and production of multimedia resources with the purpose of helping in the understanding of the proposed themes.	Q4, Q5, Q7, Q10, Q14, Q15, Q18, Q21, Q22
Contextual knowledge	Items referring to the use of technology within the school context, use of technology by students, in school tasks (grade entry), difficulties or incentives for the use of technology.	Q6, Q8, Q9, Q11, Q12 Q13

Fonte: Beloni (2019, p. 58)

The items referring to the TPACK categories refer to how much digital literacy can favor the teacher's teaching practice from the KPC perspective, as in the case of the use of technologies that favor Content, Pedagogical, and Contextual Knowledge. Thus, the analysis is based on the articulation represented in the diagram below.

Figure 3 – Articulation of digital literacy with PCK knowledge⁶



Source: Beloni (2019, p. 68)

The diagram above was adapted from the TPACK and the PCK models, including the articulation of Digital Literacy with Contextual, Content, and Pedagogical Knowledge and, thus, constituting a basis for the analysis of the data collected by the questionnaire, since all questions refer to digital literacy. The items were categorized in order to identify the

⁶ Letramento digital = Digital literacy; Conhecimento do contexto = Contextual understanding; Conhecimento do conteúdo = Content understanding; Conhecimento pedagógico = Pedagogical understanding

characteristics of the teachers' Digital Literacy and, thus, highlight how they can favor the teaching practice in a broad perspective.

Questionnaire Validation

The validation of the questionnaire was carried out with two teachers from the school participating in the research and two expert teachers from the Federal University of São Paulo, in order to improve the questionnaire and thus,

[...] check if all questions were answered properly, if the answers given do not denote difficulties in understanding the questions, if the answers corresponding to the open questions are amenable to categorization and analysis, in short, everything that may imply the inadequacy of the questionnaire as a data collection instrument (GIL, 2002, p. 120).

One of the points considered in the validation of this instrument with the teachers of the participating school refers to the relevance of the knowledge produced by the questionnaire for the school, allowing the research objectives to be aligned with those of the institution.

The teachers of the participating school considered that the relevance was mainly because it contemplated a frequent use of technology beyond the classroom, while most research is usually restricted to the use of technology in the classroom.

At first, the purpose of the questionnaire was not explicit to the participating teachers, since they answered from the classroom perspective. After being reinforced that the questions were related to the teaching practice in a broad context (from lesson preparation to activity evaluation), the teachers recognized more meaning in the questionnaire. To correct this issue, a better detailing of the objective was included in the questionnaire instruction.

To ensure greater consistency of this instrument, in terms of basic statistics, we used Cronbach's index (1951), which allows us to estimate the correlation between answers and avoid random observation errors. Thus, a high reliability of the questionnaire was verified, with an alpha of 0.966 for the total of 27 items. The analysis thus performed aimed to verify the reliability of the questionnaire, according to Hora, Monteiro and Arica (2010, p. 06):

There is still confusion in the scientific literature between validity and reliability. Validity is related to the verification that an instrument really measures what it intends to measure (is the instrument valid for what purpose?).

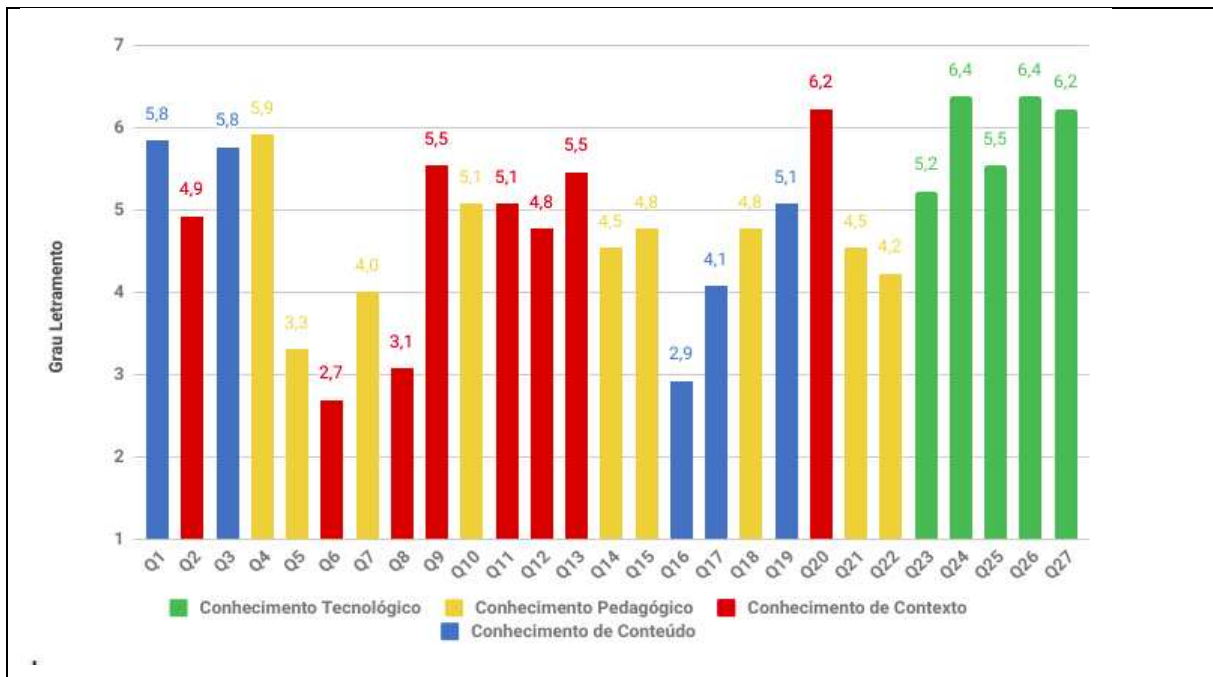
To obtain Cronbach's alpha, the software Statistical Package for the Social Sciences (IBM SPSS version 22) was used. Because all items showed good internal consistency, with the lowest alpha of 0.957 and the highest standard deviation of 2.580, the values were satisfactory, and therefore it was not necessary to exclude any item from the questionnaire. According to Maroco and Garcia-Marques (2006), the alpha above 0.9 shows high reliability.

With the validation of the instrument through discussion with two school teachers and two Unifesp specialist teachers, and once the adaptations were made for a better understanding of the questionnaire's objectives by the teachers, besides the reliability check, the questionnaire was considered valid and reliable for the proposed objective.

Results

The questionnaire was applied in a school on the outskirts of Diadema/SP, given to 25 teachers and answered by 13 of them. The graph below represents the simple average of each item, categorized according to the TPACK.

Graph 1 – TPACK per item⁷



Source: Beloni (2019, p. 70)

⁷ Letramento digital = Digital literacy; Conhecimento do contexto = Contextual understanding; Conhecimento do conteúdo = Content understanding; Conhecimento pedagógico = Pedagogical understanding; Conhecimento tecnológico = Technological understanding

The items related to the *Content understanding* category had a high rating, mainly driven by items Q1 - I use websites (blog, news, forums) to update myself about the content of the subjects I teach, and Q3 - I use video resources to learn new content useful for my classes, referring to the use of websites and video resources to learn new content.

The *Pedagogical Understanding* category presented item Q4 - I use the Internet to prepare my classes, with a high index, demonstrating that teachers seek to prepare the class through ICTs. Another highlight is item Q7 - I use educational software to help me explain a topic, referring to the use of educational software, which was below average, which may indicate problems in relation to teacher training for the use of educational software, and an opportunity for greater direction in teacher training.

Digital literacy related to *Contextual Understanding*, in general, presents items that are common in the teacher's personal day-to-day life. Item Q20 - Having the Internet available at school is important to better perform my job at school, had the highest score, demonstrating the importance given to the Internet at school by teachers. The low-scoring item, Q8 - My students frequently use cell phones in class, was expected in this research, since most teachers have students in elementary school, where cell phone use is less common, due to their young age.

Final remarks

The proposed questionnaire has the potentiality to overcome the temporal limitations of technologies, which change quickly and constantly, besides allowing the analysis of social practices involved in the use of ICTs that provide a greater longevity for the analysis. Since society has increasingly demanded a greater integration of ICTs in teaching practice, including specific situations of this context in the questionnaire can help to better integrate ICTs in education.

The instrument allows us to identify characteristics of the teachers' digital literacy. Based on the results obtained, it can be observed, for example, that the digital literacy of the participants was higher regarding the use of the Internet, specifically in communication through e-mail and use of social networks; and, also, that educational platforms present lower digital literacy.

In view of this, future studies can verify if the investment in connectivity in schools can collaborate more to the integration of ICTs, making comparisons with the current investments in laboratories with or without Internet, or also presenting the possibilities of Internet via Wi-

Fi. Moreover, they can offer data on the impact of its absence and the difficulties in using smartphones - increasingly present among teachers.

In this sense, we can consider that the current step towards the integration of ICTs is in the process of articulating technological knowledge with other knowledge, presenting teachers with ways to pedagogically use the existing technological knowledge, using, for example, email groups to promote discussions with students, sharing content, or new explanations about the subjects, promoting, in this way, greater articulation between technological knowledge with content, pedagogical, and contextual knowledge.

Therefore, the results of this research demonstrate that, for the integration of ICTs in school, there is no room for prescriptive solutions. This should happen in a joint process, respecting the teaching practice and the digital literacy possible and built by teachers, with the consideration of the individual and context-specific facilities and difficulties of each school. Thus, investigating the teacher's digital literacy proved to be an appropriate way to improve teaching practice, respecting its context.

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