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EDITORIAL

Mathematics Education and Digital Technologies: how are media, artifacts, instruments, tools and technological means presented?

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It is not uncommon in Mathematics Education research for the term "Digital Technologies (DT)" to be considered as "media", "artifacts", "instruments", "tools", as well as "means", in order to provoke debates and reflections on their meanings. In Rosa, Bairral and Amaral (2015), theoretical discussions are already presented in different chapters that bring considerations regarding DT within the scope of brazilian Mathematics Education, specifically, according to studies by the Working Group (GT) 06 of the SBEM (Brazilian Society of Mathematics Education), called "Mathematics Education, Digital Technologies and Distance Education".

In the meantime, the term "media" is very much in evidence and takes on a DT connotation that seeks to elevate the latter idea to a cognitive level that reinforces the participation of these technologies in the knowledge production process. This elevation is discussed by Borba & Villarreal (2005) and, in our view, can be linked to what McLuhan (1996, p.7) tells us in relation to this, that is,

> the medium is the message. This is merely to say that the personal and social consequences of any medium — that is, of any extension of ourselves — result from the new scale that is introduced into our affairs by each extension of ourselves, or by any new technology.

The “Artifacts", in turn, take on different perspectives: one, coming from the concept of activity, through its theory highlighted by Vygotsky and Leontiev, focuses on the discussion of mediation by artifacts and cultural instruments and overrides the idea that the human act is the response to a stimulus, since this is constituted as an action mediated by a cultural component. Artifacts, then, are part of human activity and are oriented towards an object. They are also assumed to be collective and long-lasting. Human activity is structured, that is, organized in both a formal and informal way, encompassing in its organization the subject, the object and the artifact or mediating sign. The subject is the agent whose behavior is to be analyzed; the mediating artifacts are objects (material or ideal) used by the subject to achieve a result. Later, based on these concepts and continuing with original ideas, Engeström (1987) advances in theoretical terms and proposes a triangular-shaped systemic structure (model) to represent Activity Theory (AT), which serves for analysis in a sense that involves the cultural context. Thus, the artifact, through the lens of these theorists, is considered to be what mediates the relationship between human beings and the world.

In the field of Mathematics Education, another perspective was proposed by Souto (2013) and endorsed by Souto & Borba (2018) and other Brazilian researchers. This perspective is also based on activity theory but, at the same time, dialogues with the vision of technologies discussed by Borba & Villarreal (2005). In it, the artifacts are not fixed, they move between the "vertices" of the triangular representation presented by Engeström (1987), suggesting a sharing of roles between the technological actors. In this movement, there is an anthropomorphization of technologies, with no limits that specify how far the role of one or the other goes at any given moment. Thus, this perspective reinterprets the role of artifacts beyond the idea of AT mediation, considering them as part of the collective that has agency and dialectically transforms itself and the way of producing mathematics.

A third perspective comes from Rabardel (1995), who identifies the "artifact" as something material or symbolic that has been produced for the subject or for others and carries with it schemes for use by the subject, that is, either the subject seeks to discover the functions and deviations in the action carried out with the artifact, which is called instrumentalization, or as the subject gets to know the artifact, it undergoes transformations caused by the accommodation, coordination and reciprocal assimilation of the constituted schemes, a process called instrumentation. In this way, this theoretical perspective advocates the possibility of artifacts being transformed into "instruments" depending on the actions inferred from them in terms of instrumentalization or instrumentation.

Also, "tools", generally speaking in the field of technology, is a term used to refer to technological tools. According to Tolmasquim (1989), this term makes direct reference to another term, technology, since both technology and technique are words whose origin is linked in both cases to techné, a greek word that comes from one of the variables of a verb meaning to manufacture, produce, build, and technos meaning tool, instrument, utensil. In this sense, and given the meaning of the word tool in Portuguese, any instrument that is used to carry out a job, to achieve an end, is also technological. A saucepan, for example, is taken as a technology of an era and is also considered a tool for cooking. In the case of Digital Technologies, the term "technological tool" has become popular to refer to any digital object or environment whose purpose is to complete a task, action and/or manufacture something. In Mathematics Education, the expression digital tool, as well as technological tool, was used to identify the use of Digital Technologies to complete a task, whether it was solving a problem, constructing a graph, performing calculations, or any similar actions that relied on "tools" to aid mathematical learning. In this way, the speed with which an action is carried out is considered and sometimes contested in the educational sphere.

In this vein, according to Heidegger (1977), from the old doctrine, if we want to understand what technologies really are and, in our case, Digital Technologies, in other words, if we want to investigate the essence of technologies, we need to start from the conception that "a thing is considered to be what the thing is". So we ask the question about technology when we ask what it is. People are generally familiar with the two statements that initially answer our question. "One says: technology is a means to an end. The other says: technology is a human activity" (Heidegger, 1977, p. 4).

In both cases, in our view, the statements go together, because we understand that finding ends and producing or using the means to achieve them is a human activity. From this perspective, Heidegger (1977, pp. 4-5) states

> the manufacture and utilization of equipment, tools, and machines, the manufactured and used things themselves, and the needs and ends that they serve, all belong to what technology is. The whole complex of these contrivances is technology. Technology

> itself is a contrivance, or, in Latin, an *instrumentum*.

According to the understanding of technology as a means and a human activity, the instrumental and anthropological definition of technology is accepted and evidenced. Hardly anyone would disagree that this is correct. Furthermore, the idea of the media as the means responsible for mediating the relationship between human beings and the world is equally intertwined in this perspective, as is the concept of a tool as a means of carrying out a human activity.

However, Heidegger (1977, p. 5) points out

> the instrumental definition of technology is indeed so uncannily correct that it even holds for modern technology, of which, in other respects, we maintain with some justification that it is, in contrast to the older handwork technology, something completely different and therefore new.

In other words, since all types of technology are, in principle, a means to an end, so is modern technology. Motorized planes with turbines and generators, as well as jet planes and high-frequency devices, radar stations, computers, cell phones, stoves, saucepans and wind vane are all technologies that, from a broad perspective, can be considered means to an end. However, according to Heidegger (1977, p. 5),"Everything depends on our manipulating technology in the proper manner as a means. We will, as we say, "get" technology "spiritually in hand." We will master it".

In the case of DT being understood as "means", or technological means, they express the conception attributed to "means of revelation" which, according to Rosa (2023a), are means of creating ideas and, in this sense, they are not means to an end, they are not only human activity, even if it can be understood that creating these ideas is an end and/or only a human activity. They are environments, locuses, in other words, they become "a resource connected to 'being', in such a way as to constitute itself as a body (cyborg) that manifests itself and suggests cognitive flows, which reveal themselves and show new thoughts, new ways of acting, creating, forming images, imagining" (Rosa, 2023a, p.146). These are flows in an open and creative continuum and not as a structuring technique for mastering technology or to aid programmed thinking. For the author, they are means of showing, removing the veil, presenting/creating images, imagining, revealing actions, situations, visions, utopias, enchantments... From this perspective, there is more to technique, but the perception of what, as the primacy of knowledge, can be experienced and not simply used.

We understand that the different perspectives on Digital Technologies in Mathematics Education are sometimes confused, cross, collide, permeate, clash, fight, affect, caress, converge, diverge, dissonate, consonate, confluence... in fluid movements of coming and going that elevate the scientific debate and the way in which the understanding of them assumes, in the same way, the conceptions of teaching, learning and training in Mathematics Education.

Rosa, Bairral, Gitirana and Borba (2018) have already shared Brazilian conceptions of using, working with and experimenting with technologies in mathematics education. In this study, they discussed collaborative learning with computers and the exploration of collaboration as a principle for cognitive mathematical development. They also discussed characteristics of the design of digital resources for mathematics education, the use of touchscreen devices in mathematical activities and the nature of embodied cognition in mathematics learning, as well as the theoretical construct human-beings-with-media, which

highlights the importance of media in the production of mathematical knowledge, and initial and continuing training with mathematics teachers who experience these technologies in the classroom and/or through distance education, from the perspective of Cyberformation. The discussion showed a diversity within the different theoretical ideas that support Brazilian research into mathematics education with digital technologies; however, there is one point in common: everyone seems to seek to affirm, or readily affirm, that mathematics may be changing as different technologies become present in educational/training spaces. They claim that mathematics is changing as tactile technology, mobile technology or different ways of using and experimenting with the Internet are present in the production/construction/constitution of knowledge by students or teachers, or by collectives involving both. Mathematics from this perspective should not be considered as a result, but as a process, that is, a mathematics in change, in action, in movement. In this sense, the roots of this mathematics in ethnomathematics investigation have strongly emphasized the notion that it changes as cultural groups differ. Thus, Rosa, Bairral, Gitirana and Borba (2018) show, through their different theories, the mathematical process changing as technologies differ, as well as their conceptions of technologies.

There are arguments that exist technical differences between the conceptions of digital technologies in Mathematics Education, although they are also understood in this field as any set of technologies that make it possible to transform languages into binary codes. Likewise, as discussed, the definition of media in Mathematics Education goes beyond what is understood in communication as media, that is, means of communication (usually mass media) that have the role of sharing information. Also, the definition of artifacts, instruments and means is not based on common sense or classic definitions, although sometimes they are understood in dichotomous perspectives that can lead to a view that sees all Digital Technologies as enhancing tools, auxiliary instruments or complementary artifacts.

We admit that this view can occur, but we evidently assume that it is not unique, since in this thematic dossier "Mosaic of Research in Mathematics Education with Digital Technologies, Distance Education and Hybrid Teaching" of the GT, for example, we find a different but contemporary view of the conceptions of Digital Technologies in Mathematics Education highlighted here. In it, Digital Technologies, as media, artifacts, instruments, tools and means are merged in the purpose of educating mathematically and educating through mathematics (Rosa & Giraldo, 2023), broadly encompassing structural issues, but, at other times, cultural, social, emotional and of invention as something dynamic, fluid that aims at the educational experience and effect.

Sometimes they are considered extensions of the body, of the senses, in line with McLuhan's (1964) ideas and the arguments pondered by Rosa (2008), Souto (2013), Souto & Borba (2018), Borba, Souto & Canedo Jr. (2022); Cunha, Borba & Souto (2022), that there is agency in the involvement with DT. Even with different interpretative strands on some points, we can emphasize that there is a reinterpretation of the condition that DT occupy. Or expanding the possibilities of understanding what DT can reveal when thinking based on mathematics, as seen in Rosa (2023b), when he deals with Cinema via streaming as a possible means for these possibilities.

In this form of presentation, specifically in highlighting "extensions of the body, of our senses", we also identify the participation of the (biological) human being as an amalgam. To exemplify this view, in a very unique way, we also turn to music and sports. It's possible that they don't have in-depth theoretical knowledge of how technologies, media, things and human beings are intrinsically linked. However, in a very colloquial way, both music and sports

manage to express the essence of this concept that surrounds various theories and, in Mathematics Education in particular, is also identified in Borba & Villarreal's (2005) human-beings-with-media construct. Artist Joey Santiago, when paying homage to the man he considers to be the "God of the Guitar", said: "The guitar seemed to be an extension of Jimi Hendrix's body — it's a part of his arm" (Ruy, 2020), in other words, it seems that a separation between human beings and technology (in this case, the guitar) is unacceptable.

So, when it comes to the arts and adjusting the focus a little more, in this dossier we find the article "Digital video as a way of assessing learning in Mathematics" by Gimenez (2023), which also agrees with this non-compartmentalized view. The author suggests that

> technologies are not just supporting artifacts; they act, along with humans, as protagonists in the process of producing knowledge. Something similar is presented by Augusto Boal (2019), when he uses the word EspectAtor (Spectator + Actor) to refer to an audience that is not only a spectator, but also an actor. In brechtian theater, there is no curtain between the audience and the stage, in other words, the "fourth wall" falls, a technique that brings the actor closer to the audience and the audience closer to the actor so that they can, collectively, produce knowledge (Gimenez 2023, p. 2).

This author then states that during the production of the digital videos analyzed in his research, students and teachers formed a collective with technologies/media that produced knowledge at all stages of the work. The research adopted A/r/tography and the notions of the human-beings-with-media construct as a knowledge-producing unit, Art as an aesthetic experience and the estrangement effect of Didactic Theater Theory. As a result, the author pointed out that the production of videos as an evaluative resource focuses on learning and not just the indication of right or wrong answers. It is considered by the author to be a more equitable way of assessing learning, since it provides the opportunity to communicate mathematical ideas and concepts in a multimodal way, encourages research and generates reflections through the use of art.

But, as we pointed out earlier, it's not only in the arts that we find examples to seek answers to the question in the title of this editorial: Mathematics Education and Digital Technologies: how are media, artifacts, instruments, tools and technological means presented? Sports also provide fertile ground for illustrating this view. Researcher Iamarino (2014) states that

> if you ask tennis players to indicate, with their eyes closed, where the tip of their arm is, it is not uncommon for them to point a little further forward, out of their hand, where they are normally holding the racket [...] the brain treats the racket as if it were an extension of their arm.

Interpreting these considerations, we can say that tennis players are thinking-with-rackets, and with this, we identify a resonance with the research by Neves (2023) who discusses, in this dossier, "how mathematics undergraduates in Distance Education combine semiotic resources when using videos to express mathematical ideas" in the subject of Analytical Geometry. The author draws on Silva and Rosa (2020) to state that "thinking-with-digital-technologies occurs when the being is-with-digital-technologies. Making a reference to the philosophical strand that is present in this more contemporary vision that we referred to earlier. She used Multimodal Discourse Analysis to study the strategies used in the combinations of

semiotic resources in the videos produced. The author stated that "the multimodal nature of video encourages the use of contextualization in the construction of digital mathematical discourse" (Neves, 2023, p. 1).

We can say that the research by Neves (2023) dialogues with Souto and Santos (2023) in various aspects, but mainly with regard to the philosophical aspect present in this more contemporary view that both use. This is because in the article on "Interdisciplinarity with digital mathematical cartoons during Emergency Remote Teaching in Elementary School", Souto and Santos' (2023) statement that "the hyphens [of the human-beings-with-media system] are used to highlight the formation of an inseparable collective that moves and metamorphoses when producing knowledge" is indicative of harmony in the way media, technologies, artifacts and humans are presented in these studies. There are also traces of Vygotsky's thinking in this article, which surround the vision present in some of the articles in this dossier. The expression "collective that metamorphoses" is a reference to the reciprocal transformations that occur dialectically and that are established within a minimal unit (humans-technologies) of knowledge production, or under the lens of a re-reading of Activity Theory (Souto, 2013; Souto & Araújo, 2013; Souto & Borba, 2018), of a basic unit of human development that is constituted by the cultural-historical process.

From this same perspective, Canedo Jr. & Borba (2023) present the results of a study that was developed in an online course and sought to understand how a technology (video) can transform the mathematical modeling of in-service teachers when a problem is proposed using this media — video problem and video answer. These authors highlight more explicitly something about the vision of technologies/media that is also intrinsic in other research presented here (e.g. Gimenez, 2023; Neves, 2023; Souto & Santos, 2023). This is the assertion that, in these collectives, it is not considered plausible for these authors to have any kind of hierarchy or classificatory scale that could divide and/or quantify technologies as better or worse. Considering that they are different and therefore cause peculiar reorganizations of thought, in their view, the knowledge they contribute to producing is qualitatively different. This work expands on the theoretical dialog initiated by Souto (2013), since in addition to the human-beings-with-media construct and activity theory, Canedo Jr. & Borba (2023) include social semiotics. For these authors, "the way in which semiotic resources are combined in the video problem scenes influences the production of meanings and modeling, and [...] the underutilization of this media's resources can limit educational possibilities" (Canedo Jr. & Borba, 2023, p. 1).

With a strong emphasis on how thought can be reorganized, based on the constitution of different collectives of human and non-human actors (technologies/media), and produce different types of knowledge, this dossier also includes research by Souza and Belo (2023). These authors reaffirm that the influence of a given technology is not secondary in the production of mathematical knowledge and that the harmonization of semiotic resources (images, filming, animations, writing, orality, various sounds, deictic gestures, etc.) in mathematical communication accentuates the co-participation of technology in this process. They conclude that a teacher produces meaning in their discourse when they produce digital videos and harmoniously combine semiotic resources from mother tongue and mathematics to approach the concepts of the sphere and the cylinder.

It is important to note that mathematical thinking, its process of organization and reorganization, as these are the forms referred to in research that consider the production of knowledge in this way, are not algorithmic or that "mechanical, compartmentalized, encapsulated" responses or constructions can be attributed. On the contrary, mathematical

thinking can refer us to the traits of critical and problematizing thinking, which are advocated by Freire (2019, 2023). The discussions made by Shaeffer (2023) represent well this element that makes up a way in which the media present themselves in mathematics education. She highlights the importance and influence of the participation of digital technologies in the formation of critical and creative thinking. Her study presents the view that DT are mediating artifacts. It was carried out with undergraduate students taking part in the Institutional Teaching Initiation Scholarship Program (PIBID) and building a Learning Object (LO) using the GeoGebra software. For the author, "the activities developed promoted the understanding that a LO can value visualization, representation, creation, reflection, knowledge, [creativity, construction of thought and future pedagogical possibilities]". Shaeffer (2023, p. 13). The theoretical framework of this research also includes reflections on policies for Initial Teacher Training with Digital Technologies, the study of graphs and mathematical visualization.

Thus, Brito and Bairral (2023) consider the discursive aspects, the modalities of dragging points and the categories of signs present in the process of semiotic mediation in their research, with the aim of involving the use of a grid in a task on the congruence of triangles and discussing similarity using a slider. In this sense, the Dynamic Geometry Environment used is understood as a microworld and considered an artifact, although this consideration is not restricted to the DGA, encompassing an expanded notion, "including all types of human creation that have a practical character [...], [that is, that which] an individual attributes use to and at the same time transits the sphere of the intellect and the practical and vice versa" (Brito & Bairral, 2023, p.6). In this way, the article reveals the importance of understanding the process of semiotic mediation presented, as the authors highlight how significant it is to evaluate the evolution of signs from artifact to mathematical signs by means of a pivot sign. In this sense, the research can contribute to exploring the semiotic potential of geometric tasks with or without the use of VMTcG (DGA adopted) and can infer about the learning of similarity of triangles and other geometry topics, in an interactive, exploratory way, interpreting and verifying what students think.

Also, in terms of artifacts, but leading them to instruments, Basniak and Oliveira (2023) investigate the contributions of the applets Cuisenaire Bars, Quadrilaterals and Fraction Models in the learning of fractions. They developed their research from the perspective of measurement in classes based on Exploratory Mathematics Teaching, which were developed in Emergency Remote Teaching. The research then highlights that the students mobilized strategies to make multiplicative comparisons between the bars and establish equivalence of fractions, understanding the symbolic representation and the signaling of numerical magnitude with the use of the Cuisenaire Bars applet. The Quadrilaterals applet allowed students to measure quadrilaterals (sides, perimeters and areas) and the Fraction Models applet allowed them to validate or not the same magnitude of fractional and decimal representations. In this way, the schemes for using the artifacts (applets) allowed the association of the three artifacts used, favoring the understanding of the product property which, when multiplying two fractions other than zero and one, takes as the result of the multiplication the possibility of this being less than one of the two factors. In this way, the teaching and learning of mathematical content, in this case fractions, was significantly influenced by the use of applets in the production of students' knowledge. For the authors, the instrumentation that occurred, for example, when the students believed that the fraction was greater than, without looking at the Cuisenaire Bars, demonstrates how much their production of knowledge changed when they looked. For them, the way in which the participants' understanding shaped the use of the applets also became clear when, for example, the students used the Cuisenaire Bars to find the fraction equivalent to the unit of measurement 100. We understand, then, that the concept encompassed by the technologies

exerts significant power in the analysis and conduct of the mathematical thinking aimed at in each lesson.

With this in mind, Lucena, Morais and Gitirana (2023), in terms of training, also conducted research that considers Digital Technologies as artifacts that can become instruments, depending on the processes of instrumentation and instrumentalization. Their experimental study includes an analysis that led to the development of data visualization tools in an internal analysis situation that they define as Instrumental Orchestration (IO). This concept refers to a theoretical model made up of the notion of scheme and situation, the concept of instrumental genesis, the stages of didactic configuration and mode of execution and the stage of didactic performance, from different authors of didactic engineering and french didactics. However, in the contemporaneity of their research, the authors move on to the Instrumental Meta-Orchestration (IMO) model, since they identify events external to IO. Thus, the concepts of ad hoc reaction, artifacts such as didactic webdocs and analysis of events between orchestrations show the potential of the IMO and support new research into teacher training in mathematics in the integration of Digital Technologies, since a training approach is not constituted in a single way, or instrumental orchestration, but is organized, according to the authors, always in chains or compositions of instrumental orchestrations. The perception of the events that are "between" the so-called IOs is one of the important results of the research. In addition, this perception leads to what they called didactic metaconfiguration and metamodel of execution. In other words, there is a need to look between the IOs and to make changes to the training process that indicate the inclusion of the characteristics of flexibility and adaptation in the instrumental meta-orchestration. For us, it theoretically reveals itself as a model or yet another model for analysis and formative configuration, but one that assumes beforehand other possibilities that are in the "between", when they do not escape perception and are not presented in a way that is faithful to any model. In any case, from the point of view of instrumentalization, it is something innovative and an advance in terms of broadening the proposed analysis.

With regard to the idea of Digital Technologies as tools, Alves, Souza Jr. and Jafelice (2023, p. 1) set the objective of their research as "presenting a tool for authoring Learning Objects (LOs) for Mathematics Education in Digital Culture". The article by these authors deals with simulation as a new way of knowing the world through three modeling methods. The methods are defined as "Discrete Event" modeling, "Agent-Based" modeling and "System Dynamics" modeling. Assuming the culture of convergence as a criterion for choosing software, they arrived at AnyLogic as the only authoring tool that, given the research procedures, is capable of carrying out all three types of modeling simultaneously. They then simulated the availability of care in a hospital during an epidemic and the results of this simulation indicated a culture of programming, by blocks of code, in the creation of the Learning Object. In the meantime, attention must be paid to ensuring that the mathematics is not intrinsic to the blocks of code, or only in the use of Agent-Based Modeling, or even in the rules of agent behavior. Methodological alternatives to reduce this concern have been adopted by producing data through simulation or validating the data through differential equations. In the case of the AnyLogic tool used, there is an intense movement to present its potential for both heuristic and computational learning. It makes it possible to model the level of concern of infected individuals using characteristics of an epidemiological model in a community. This can generate fruitful reflections from mathematics undergraduates on the interpretation of an epidemic, which is a topical issue. It could also be a tool to support these discussions in continuing education and Basic Education.

In their research, Mello, Roth and Goetz (2023) also sought to understand how the reconstruction of historical monuments in the city of Picada Café, using Tinkercad, can

contribute to the development of mathematical skills based on Maker Culture. From this perspective, Tinkercad is considered to be a tool that, if used with a critical eye, prioritizing the development of students, allows for the development of skills such as logical reasoning, creativity, teamwork, problem-solving... In addition, the research shows that many maker skills were mobilized when the students "got their hands on", taking on the role of protagonists in building their own historical construction projects. In addition, the authors assume the development of competences as a premise of maker culture, presenting among the specific competences of mathematics, seen in the BNCC, that of "Using mathematical processes and tools, including available digital technologies, to model and solve everyday, social and other areas of knowledge problems, validating strategies and results". In this way, we understand that the idea of a tool that supports mathematical learning as the development of skills and competencies converges with the perspectives of both researchers and teachers on what and how to teach, what mathematics is and how it needs to be learned. In this sense, the maker culture itself can and is perceived in various studies from other perspectives on technologies and, consequently, from other perspectives on what mathematics is taught and how it is taught. We assume that the theoretical perspective adopted on Digital Technologies also entails perspectives on the act of educating mathematically and through mathematics.

Rosa's article (2023b) discusses possible connections between cinema, math education and exclusion/inclusion (transphobia) that can be experienced in math classes. In the meantime, it highlights cinema as a cultural and pedagogical technology that is currently shown via streaming, in order to dialog with the crossings, intertwining and possible connections with the critical, political and social dimensions of educating through mathematics, seeking to contribute through cinematographic products to the planning of mathematics classes. Rosa (2023b) understands Digital Technologies, in this case Cinema via streaming, as a means of revelation, which bring experiences and make individuals and/or collectives live those experiences. Cinema reveals the stories of characters that people often come to care about. It also reveals visual qualities, sound textures and ways of glimpsing light, image, sound, soundtrack and this can involve, captivate and open up possibilities for taking a journey that offers experiences, sometimes following patterns, sometimes awakening minds and emotions. Or, in many cases, experiences that combine the two. In terms of educating through mathematics, the article explores and analyzes a teacher's lesson plan, indicating that a connection/articulation created by the teacher is in the mathematical foundation conceived and sustained in the transformations experienced by people, highlighting the educational sense of transformation, especially starting from trans people and transvestites, by questioning the meaning of gender and the connection of this meaning to mathematics. More than that, the discussion engages the math class in a critical approach to discussing empathy, humanity and equity, suggesting the contributions that a class like this can bring to the understanding/constitution of social responsibility and political hexis of its students, which can and is revealed through the film discussed.

Nevertheless, the article by Souza and Barros (2023) uses DT as a means of revelation when reflecting on the teaching practices of participants in a training course in the process of adapting to Emergency Remote Teaching (ERE) and on the contributions of Cybertraining in this process. The authors present an analytical narrative that focused on the participation of three teachers in a task that involved producing a mathematical-activity-with-a-video. The videos, taken on as DT, are not seen as tools that help the teachers, but as means that participate in the constitution of knowledge, as defended by the Cyberformation construct. Thus, the "role of DT as a means of transforming society, teachers, teaching and learning" (Souza, 2022) is evidenced when the authors emphasize that they understand that

> the mathematical dimension was highlighted when the teachers reflected on how the practices of teaching progressions through an asynchronous activity with video and Google Forms would be different from what they were used to, with face-to-face practices. These differences could be both mathematical and pedagogical, as the video, Google Forms and the open questions posed by the group would require different attitudes from teachers and students and would enable investigations and new discoveries by the students (Souza & Barros, 2023, p. 20).

Therefore, we understand that in the universe of Brazilian Mathematics Education, Digital Technologies have long been debated, used and experienced in favor of doing mathematics. We assume that, in theoretical terms, there has been progress in articulating, deepening and developing new constructs. The DT are shown as media, artifacts, instruments, tools and technological means of revelation, so that there is a strong relationship with the theoretical and philosophical assumptions adopted, with the worldviews and knowledge of the researchers in question. But above all, it highlights their understanding of mathematics and mathematics education, which mathematics to educate and how to educate mathematically or through mathematics. We know that, according to Rosa, Bairral, Gitirana & Borba (2018), the understanding that Digital Technologies transform the mathematics involved in the process of educating shows a form of agglutination of the ways in which DT is inserted into educational/training spaces. These modes of insertion, use and experience take on philosophical perspectives, such as phenomenology; epistemological perspectives, such as those of Vygotsky and instrumentalization, such as Rabardel's; collaborative perspectives, in terms of thinking collectives; social and political perspectives, such as Freire's, and many others that bring a rethink to Mathematics Education itself.

In this sense, we are not advocating a single conception of Digital Technologies in Mathematics Education, nor are we arguing that one conception is better or worse than the other, but we are clarifying that each one is based on defined assumptions and envisions ways of contributing to teaching, learning and the training of teachers in the field of mathematics education. The examples given in this text and in the GT06 dossier as a whole express where the conceptions come from and how they understand their role in the world of mathematics education. Therefore, it is always up to us to move forward in order to increasingly express these nuances of how we understand mathematics with Digital Technologies and how we envision the future of educating with them.

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