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Multimodality and the Construction of Mathematical Knowledge: An Analysis of the Video Production Process

Multimodalidade e a Construção do Conhecimento Matemático: Uma Análise do Processo de Produção de Vídeos

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ABSTRACT

The videos stimulate the human senses in the construction of mathematical knowledge. In this context, this article presents a discussion around the analysis of the reflective video production process with regard to the possibilities of producing mathematical knowledge in the collective interaction that unites technologies and humans in this production.The qualitative methodology guided the research design, finding support in Espiral RePARe (Reflection, Planning, Action, Reflection), in order to organize the analysis of the production process of the video “Statistics in Football”, produced by researchers.The results indicate that the multimodality present in the stages of video production provides the exploration of different representations, a determining factor for the construction of mathematical knowledge.The analysis also showed that the process enables the analysis of mathematical content in specific contexts, research and interdisciplinarity, simulation and exploration of the visual, dynamic and manipulative character of mathematical objects.

KEYWORDS: Social Semiotics. Semiotic Resources. Digital Technologies. RePARe spiral.

RESUMO

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Os vídeos estimulam os sentidos humanos na construção do conhecimento matemático. Neste contexto, este artigo apresenta uma discussão em torno da análise do processo reflexivo de produção de vídeos no que diz respeito às possibilidades de produção de conhecimento matemático na interação do coletivo que une tecnologias e seres humanos. A metodologia qualitativa direcionou o design da pesquisa, encontrando apoio na Espiral RePARe (Reflexão, Planejamento, Ação, Reflexão), a fim de organizar a análise do processo de produção do vídeo “Estatística no Futebol”, produzido pelos pesquisadores. Os resultados indicam que a multimodalidade presente nas etapas da produção do vídeo propicia a exploração de diferentes representações, fator determinante para a construção de conhecimento matemático. A análise mostrou que o processo possibilita a análise do conteúdo matemático em contextos específicos, a pesquisa, a interdisciplinaridade, a simulação e a exploração do caráter visual, dinâmico e manipulativo de objetos matemáticos.
PALAVRAS-CHAVE: Semiótica Social. Recursos Semióticos. Tecnologias Digitais. Espiral RePARe.

Introduction

This article will present and discuss the results of a research that proposed the analysis of the possibilities of building mathematical knowledge in the process of video production. These media, essential for communication today, have resources that promote a new way of expressing oneself. Setton (2015) states that we are in the midst of a revolution of audiovisual communication, which influences the formation of the individual in modern society and culture, by the insertion of digital media and technologies, especially videos, in the educational and social context, enabling alternative representations in this scenario.

The revolution of audiovisual communication (SETTON, 2015) also influences the production of mathematical knowledge. In fact, the production of knowledge is conditioned to the technology used (BORBA; VILLARREAL, 2005). According to Tikhomirov (1981), with the media, the individual reorganizes thinking for the production of knowledge that is built in a collective way. This collective, formed by humans and technologies, is the basic unit of thought (BORBA, 1999), which is transformed with the insertion of new technologies, at the pace of technological advances. In this sense, the intense use of videos, available on the internet, by students, to study mathematics and by teachers, to prepare lessons (BORBA; NEVES; DOMINGUES, 2018), connects humans and technologies emphasizing characteristics, such as multimodality, interdisciplinarity, movement and emotions, modifying, in this way, the impact of the mathematical discourse available in the online environment (NEVES; BORBA, 2020).

Recent studies on the use of videos as a teaching resource in the educational context (NEVES; BORBA, 2020; BORBA; OECHSLER, 2020; DOMINGUES, 2020; DOMINGUES; BORBA, 2021) highlight that this resource captures the attention of the

new generation of students, offering tools that enable to potentiate the production of meaning through the combination of semiotic resources, such as images, mathematical symbolism, verbal language, scenarios and music, which characterizes multimodality. The combination of semiotic resources (resources produced over time by culturally and socially organized communities to produce meaning) enhances digital mathematical discourse, which adds the emotion component to the experience with mathematics (NEVES, 2020).

There are two possibilities for the use of videos in mathematics teaching, namely, ready-made videos used in mathematics classes or video production activities (OECHSLER, 2018). Moran (2013) and Ferrés (1995) point out that encouraging students to produce within a given subject enables them to become active in the construction of knowledge. According to Moran (2013), students can be protagonists of their learning processes and the act of learning occurs when making links, integrating what is loose in a new context, assigning meaning. Ferrés (1995, p. 13), in turn, highlights that "the use of new technologies causes changes in the forms of thought and expression, in mental processes and attitudes, in the patterns of perception, in the proportion of the senses. Thus, the activity of producing videos with mathematical content presents itself as an alternative for learning.

In this context, the research reported here was established, which aimed to analyze the possibilities of construction of mathematical knowledge in the process of production of videos with mathematical content. This is a reflective analysis (SCHON, 2000; MAGINA; SANTANA; SANTOS; MERLINI, 2018), around the production process of the video entitled "Statistics in Soccer" in which the phases of the RePARe spiral (Reflection, Planning, Action, Reflection) were carried out during the development of the stages of video production.

Reflections on practices enable the theoretical foundations to take on a more tangible meaning, further favoring the practice, as well as reflection on student learning. About reflection in teacher education, Fiorentini and Castro (2003, p. 127) state:

> Without it, teacher training and the respective production of knowledge do not happen effectively. Without reflection, the teacher mechanizes his practice, falls into a routine, starting to work in a repetitive way, reproducing what is ready and what is more accessible, easier or simpler [...] Reflecting, then, about the context in which we are inserted, with its limitations and possibilities, allows us to move forward by looking at the school world in its dynamics and complexity.

These authors present the act of reflecting as an important aspect of the teaching practice, being the moment in which the "teaching knowledge is mobilized, problematized and re-signified" (FIORENTINI; CASTRO, 2003, p. 127), necessary

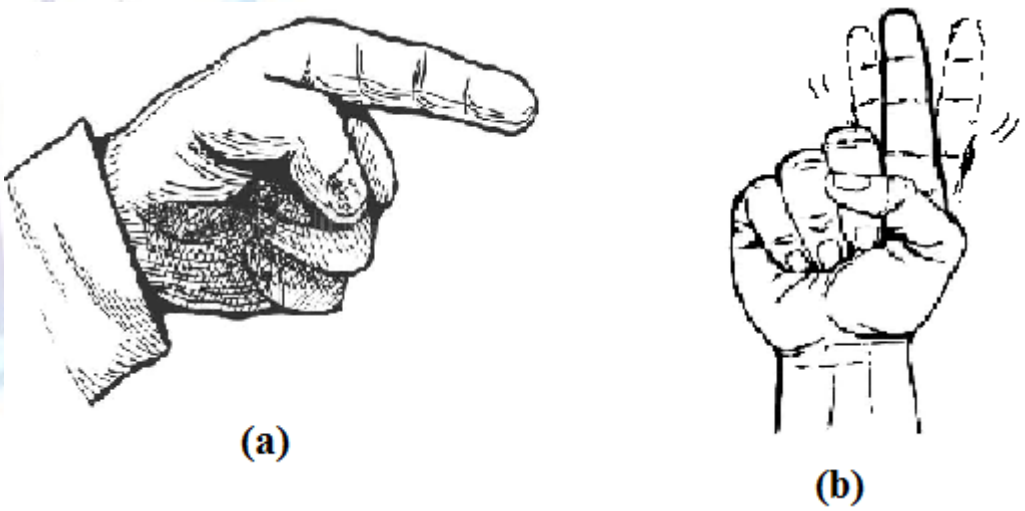
attitudes for the development of integrative pedagogical actions. This article will highlight the pedagogical potentialities of video production activities, based on the reflections of the researchers around the experience with the process of video production with mathematical content.

In order to report clearly and accurately this research, which proposes the reflective analysis of the production process of a video with mathematical content, its development is presented in four sections, being the first section dedicated to the theoretical aspects that underpinned the studies, namely the theoretical construct Human-Beings-with-media and the concept of Multimodality in the aspect of Social Semiotics. The second section described the methodological procedures carried out from the assumptions of the RePARe spiral (MAGINA; SANTANA; SANTOS; MERLINI, 2018), which emphasizes the process of reflection in action, allowing the construction of a new repertoire of experiences contributing to the production of practical knowledge. The third section presents the research data, as well as the description of the procedures for systematization, analysis and discussion of the data, based on the theoretical assumptions that underpin the research. The fourth section is dedicated to the Final Considerations.

Multimodality and the production of videos in Mathematics Education

Characterized as the natural state of communication, multimodality represents the use of different semiotic resources, such as language, images, sounds, music, scenery, look, body posture, gestures, clothing and their variations, in communicational events. For example, a gesture is a semiotic resource and its variations can be manifested by intensity or extent, which characterize modes. According to Oechsler (2018), modes imprint meanings to semiotic resources in communication. In Figure 1 (a) we have the use of the deictic gesture, with the function of pointing or indicating something, establishing a referential from the foundation of thought in the physical environment. Figure 1 (b) illustrates the gesture in a way that assumes an intensifying function of speech, in this case the gesture of denial that emphasizes the intention to deny something to someone.

Figure 1 - Gestures and the production of meanings



Source: Prepared by the authors

In Figures 1 (a) and 1 (b) the same semiotic resource is explored, the gesture, whose functions establish a classification, as highlighted by Mortimer and Quadros (2018), being the two typologies highlighted in Figure 1, the deictic gestures and the gestures of modes, respectively. According to these authors, in multimodal approaches the modes are studied in all their materiality, such as speech that is materialized through sound, so it can be studied considering its variations that involve aspects such as frequency, duration, and intensity, thus producing discourses with different meanings. Kress (2011) states that the concept of multimodality has gained importance in research from a variety of fields, including semiotics, linguistics, media studies, education, sociology, psychology, and medicine, addressing different issues. Systemic Functional Theory (SFT) is a theory of meaning that has its principles applicable to the study of language and other media or resources used to produce meaning. In this sense, SFT explores the ways in which language and other non-linguistic means produce meanings as individual resources and as interrelated systems (JEWITT; BEZEMER; O'HALLORAN, 2016). Several strands of Systemic Functional Theory address multimodality from an interest in meaning production. The research described here is based on the Social Semiotics approach, which aims to understand the social dimensions of meaning, its production, interpretation and circulation, and its implications. This approach proposes to analyze how the processes of meaning creation (signification and interpretation, that is, semiosis) shape individuals and societies (JEWITT, BEZEMER; O'HALLORAN, 2016).

In Mathematics Education, multimodality was introduced with the advent of fast internet, which transformed online communication, which started to be conducted by diversified modes, joining image, music, sound, language, symbolism, gestures, facial expressions, etc., from friendly interfaces for video production and editing (BORBA;

SCUCUGLIA; GADANIDIS, 2018). The use of videos in mathematics teaching in the distance modality already inserted aspects of multimodality in the teaching and learning of mathematics, but the Internet intensifies the flow of access to mathematical discourse expressed through video. In fact, a quick Google search on mathematics videos presents a surprising number of results.

In Mathematics Education, multimodality often appears in the combination of graphs, verbal language, numerical representation, tabular representation, and algebraic representation (or mathematical symbolism). For Friedlander and Tabach (2001) the use of these representations has the potential to promote learning, considering that different representations express different aspects of the mathematical idea in question. Borba and Confrey (1996) state that mathematics is a combination of representations, since it materializes through multimodal phenomena, which is also stated by O'Halloran (2000). In fact, according to this researcher, "mathematical discourse is multisemiotic, because it involves the use of mathematical symbolism, images and language (O'HALLORAN, 2000, p. 359). In characterizing mathematical discourse as multisemiotic, O'Halloran (2000) refers to the use of diverse semiotic resources for the production of meaning in mathematics. The notion of mathematical discourse used is broadened and encompasses textbooks, classroom, lectures, blogs, and videos about mathematics, for example.

With the videos that express mathematical ideas, technology that stimulates the senses in the production of knowledge, hearing and vision are enhanced by the combination of images, sounds, music, scenarios, body expressions, camera movements, so that the understanding of the mathematical concept is performed not only by deductive and analytical processes, but also by the senses (NEVES, 2020). Thus, as Lemke (2010) points out, the "multiplier meaning" present in multimodal events, in which the meaning options of each media multiply among themselves in a combinatorial explosion, that is, the possibilities of signification are not additive. To exemplify, Lemke (2010) explains that text and figure together are not two ways of saying the same thing, the text means more when juxtaposed to the figure and vice versa. According to Moran (1995, p. 28):

> video also and basically explores seeing, visualizing, having before us situations, people, scenery, colors, spatial relations (near-distant, high-below, right-left, big and small, balance-unbalance). It develops an intercutting view - with multiple cuts of reality - through the plans - and many visual rhythms: static and dynamic images, fixed or moving camera, one or several cameras, still or moving characters, live images, recorded or created in the computer.

Thus, scholars have conducted research that highlights the importance of using media in the production of meanings in Mathematics Education, so that not only the reproduction of a video is done in the classroom, but also the interaction of both the teacher in the video production and the students. Digital mathematical performances (DMP), explored by Gadanidis, Borba and Scucuglia (2010), allow students to express, through art and digital technologies, mathematical ideas, involving multimodality to transmit mathematical content, promoting a different experience of students with mathematics.

According to Ferrés (1995), the video is an educational resource that leads to a new way of knowing, causing changes in the ways of thinking and expression, in the mental processes and attitudes, in the perception guidelines and in the proportion of the senses. The possibilities of mathematical knowledge production, with the video media, given its multimodal characteristic (KRESS, 2011), are related to the production of meanings, for those watching or producing the video, who choose the semiotic resources and combine them focusing on the possibilities of meaning production. Thinking of the video with mathematical content as an activity that enables the production of knowledge, in the research reported here we analyzed possibilities of mathematical knowledge production during the process of producing a video. For this analysis, we considered, a priori, the process proposed by Neves (2020), which is composed of six steps, namely, choice of the mathematical content, choice of the way to approach the content in the video, theoretical deepening, preparation of the script, research around the techniques of production and editing of the video and, finally, the production and editing. However, with the procedure based on the RePARe Spiral method (MAGINA; SANTANA; SANTOS; MERLINI, 2018), the video production process gained new contours, resulting in a new proposal with stages involving more analysis and contributions by peers, emphasizing collaboration in the activity.

Methodology and procedures

The methodology, and consequently, the research procedures, must be in accordance with the vision of knowledge assumed by the researcher (LINCOLN; GUBA, 1985). The position that underpins this research is one that considers that "to know is to understand deeply in an almost endless process" (BORBA; ALMEIDA; GRACIAS, 2018, p. 77). In addition, it is admitted that knowledge is gradually constituted under the influence of human beings and the technologies involved in the process (BORBA; VILLARREAL, 2005). These ideas compose the bases of this research, which presents

interest in the potential of the collective human-beings-with-digital-videos (DOMINGUES, 2014) to assist in the production of mathematical knowledge, making use of combinations of semiotic resources. The research reported here revolved around the analysis of the video production process as an environment for the construction of mathematical knowledge.

In the search for interpretations around this research objective, importance was given to subjective factors concerning the data, which characterized the qualitative approach of the research (BOGDAN; BIKLEN, 2006). This is a research in which the object of inquiry was the process of video production with mathematical content. The methodological instruments used were the field diary and the video produced in the research, which was entitled "Statistics in Soccer".

The procedures for data collection were organized according to the video production process proposed by Neves (2020), which suggests six steps, namely: 1) Choice of the mathematical content; 2) Choice of the approach of the content in the video; 3) Theoretical study; 4) Preparation of the video script; 5) Research on video recording/editing and organization of the materials for recording/editing; 6) Production of the first version of the video. This organization into stages favors collaborative work among students and between students and teacher, and allows for better monitoring and guidance by the latter.

Following the order of the steps suggested by Neves (2020), for each of them we developed the cycle of the RePARe Spiral (MAGINA; SANTANA; SANTOS; MERLINI, 2018), establishing in each cycle the sequence: Reflection 1 - Planning - Action - Reflection 2.

Considering the collaborative characteristic of the RePARe Spiral model, the production process was carried out with the contribution of two members of the research group to which the research was linked, in addition to the principal researcher in the Reflection 2 phase. According to Bogdan and Biklen (2006), in peer analysis, characteristic of qualitative research, researchers from the research group discuss the interpretations made by a given researcher on a portion of the data constructed. In this way, knowledge is generated in which the subjectivity of individual interpretations is confronted with fellow researchers.

The organization of this process, based on the combination of the RePARe method, which allowed a reflective analysis of the process that analyzes the possibilities of building mathematical knowledge, with the stages of video production proposed by Neves (2020), made it possible to reflect and realize the importance of decisions made

at each stage of the video production process with the intention of improving it. Some authors present the act of reflection as an important aspect of teaching practice, being the moment in which the "teaching knowledge is mobilized, problematized and re-signified" (FIORENTINI; CASTRO, 2003, p. 127), necessary attitudes for the development of integrative pedagogical actions.

It is also worth noting that self-reflection is a key point for re-signification in the process of knowledge construction and the creative process, essential in the production of a video. Thus, as stated Ponte (2009), it is important to first reflect on your own experience, because the knowledge coming from the experience of others is not enough, so it is necessary, according to the conception of (SCHÖN, 2000), reflect on your action, reflect during the action may modify it or adapt it for the better in due course and even reflect on your reflection in the action, which allows us to project the future by adopting new strategies and ensuring a rational intervention.

Based on these assumptions, we sought to reflect on the video production process, looking through the theoretical lenses of Multimodality and its own aspects of mathematical discourse.

The production of the data consisted in the preparation of a field diary. These raw data were organized in a table called Extended Systematization Table, which divided the data into two columns considering the types of knowledge identified during the process, namely theoretical knowledge and technical knowledge. The data from the extended systematization table were refined, generating the simplified systematization table, in which we tried to codify the data emerging from the extended systematization table. In this step, the focus was on the possibilities of combining semiotic resources and on the possibilities of interaction in the collective formed by human beings and technologies.

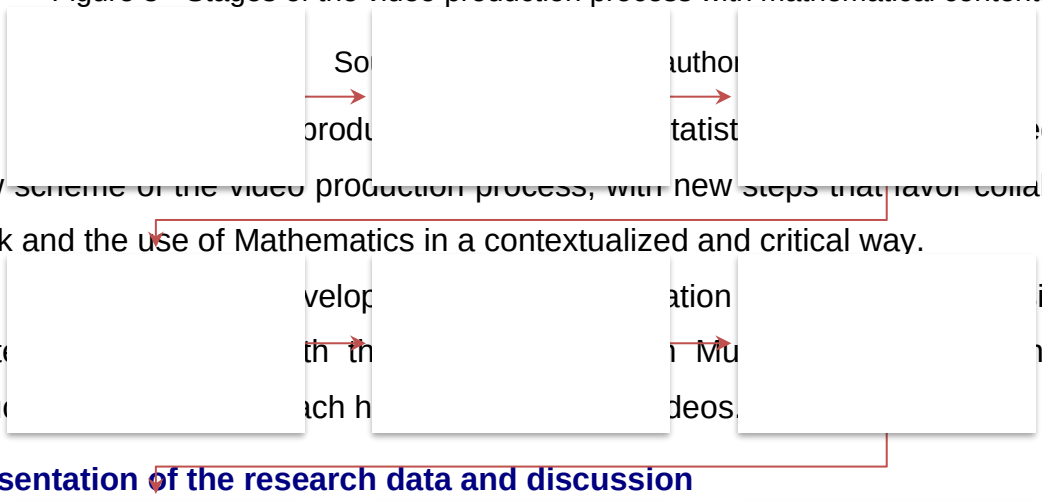
Another data from the research was the video produced in the research. Entitled "Statistics in Soccer", the video was produced collaboratively among peers, participants of the project, in a reflective process. The video "Statistics in Soccer" deals with initial concepts of Statistics, namely Mean, Mode, and Median in the context of the Soccer theme.

Figure 2 - "Statistics in Soccer" video.

Source: https://youtu.be/lqao2eUtI04

It is worth noting that the stages of video production do not necessarily happen in the order presented. For example, the theoretical deepening occurs in more than one stage, according to the need of the development and based on the reflection that influences this articulation, in order to justify and improve the video content. However, the initial organization favors more extended collaborative work, involving all participants and the monitoring of the process by the teacher. With the insertion of the cycles of reflection - planning - action - reflection, a new process is proposed here in which the following stages are considered:

Figure 3 - Stages of the video production process with mathematical content.



The ... in this new scheme of the video production process, with new steps that favor collaborative work and the use of Mathematics in a contextualized and critical way.

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Presentation of the research data and discussion

The ... owledge ... as. This ... ell as, to the way semiotic resources are combined in the elaboration of the mathematical

discourse of the video, which takes place in all stages of the video. It should be noted how important the usual semiotic resources of mathematics are, such as tables, graphs, mathematical formulas, which, in the video "Statistics in Soccer", were combined with other resources, such as colors, movement, images of real situations, video clips, and music. This facilitates the contextualization of the mathematical content and can be implemented in all stages of video production, favoring a continuous research process to deepen the mathematical content.

During the video production process, the need to implement new steps was observed, in order to ensure that the potential of the video, with respect to contextualization and/or interdisciplinarity, was considered. The choice of the video theme leads to an initial discussion about which mathematical content is related to the theme. The definition of the content approach and the development of the script that involves the choice of semiotic resources should take into account the target audience, influencing the theoretical and technical characteristics of the video.

The research data were collected during the production process of the video "Statistics in Soccer", from the field diary. These data went through two stages. The first resulted in the organization of a table, which was called Extended Systematization Table. In this table the data were divided into two columns considering the types of knowledge identified during the process, namely, theoretical knowledge and technical knowledge. In the second stage, the data from the extended systematization table were refined, generating the simplified systematization table. The simplified systematization table was built from the codification of the data emerging from the extended systematization table.

Table 01 - Simplified systematization table.

SYSTEMATIZATION OF THE RESEARCH DIARY DATA		
Step	Theoretical Knowledge	Technical Knowledge
Choice of the theme	Research on current affairs, problems involving the local, social and cultural context.	Research and analysis of data that may influence the choice of theme.
Mapping and content choice	Research on mathematical content that converges with the chosen theme.	Research and analysis of data that may influence the choice of content.

Choice of approach	Analysis of the most appropriate approach considering the target audience and possibilities around contextualization, interdisciplinarity, and simulations.	Analysis of video techniques available on the Internet to map the types of approach.
Theoretical deepening	In-depth reading of textbooks. Research and in-depth theoretical study, involving historical elements that involve the content and help in its understanding. Research on videos available on the internet that address the content.	Analysis of the techniques of the videos watched for theoretical deepening.
Preparation of the script	Analysis of specific textbooks for the target audience. Planning and elaboration around the handling of the content in the video. Choice and combination of semiotic resources appropriate for the construction of the mathematical discourse.	Production of resources (images, tables, choice of music, among others) and elements that make up the script, such as vignette and credits, for the construction of the mathematical discourse.
Presentation of the script to peers	Review of the script development with analysis of the choice and combination of semiotic resources.	Review of the production of resources for constructing mathematical discourse.
Research on recording/editing	Review of the preparation of the script with analysis of the choice and combination of semiotic resources.	App research and analysis.
Production cycles and presentation of versions to peers	Review of the script with analysis of the choice and combination of semiotic resources and theoretical deepening.	In-depth knowledge of techniques from practice.

Source: Prepared for the research.

From the analysis of the stages of video production with mathematical content, it was found that it is a process that allows reviewing and learning new concepts. In the stage of theoretical deepening, the search for historical contextualization allows a greater involvement with the mathematical content, contributing to the construction of meanings. According to the Law of Directives and Bases of National Education (LDBEN), contextualization can be a way to give meaning to a mathematical knowledge, to be used not only to "illustrate", but also to build meaningful knowledge

and to substantiate the meaning that the student gives to the mathematical concept. This is fundamental for learning, because it enables a social experience, in which there is "the conversion of social relations into mental relations" (SMOLKA, 2004, p. 45). According to Morais (2008), contextualization allows relating what the subject knows to the new content. In the same line, Souza (2009) states that, through contextualization, the student has the opportunity to know everyday Mathematics.

In choosing the approach of the mathematical content chosen to be presented in the video, analyses of approaches of other videos available on the internet, analyses of the language and problems used in textbooks, along with the technologies that aim at the mediation of the Statistical content through Soccer, were carried out in order to provide a production of knowledge that, when used in this context, had the possibility of generating meaning.

In the phase that concerns the elaboration of the script it was possible to explore ideas of the combination of mathematical representations, as well as other semiotic resources proper to the video, such as effects, colors, music, transition, clips, characters, keeping a harmony between the content, the context and the chosen approach, engaging and shaping the mathematical message. The discussion with peers and the questioning of colleagues about the theme helped in the certification of what to use in the video when preparing the script, assisting creativity and individual reflection. Creativity was also instigated with research on materials available on the internet for the construction of the mathematical discourse of the video. This research enables the construction of a more mature and well-structured discourse, with regard to the connections between statements and the use of references. Reorganization of thought is promoted in the process from the development of writing the script with a beginning, middle, and end, articulating ways to express the mathematical idea using language, images, and other resources. The combination of resources is essential for the production of mathematical knowledge and should highlight the relationships between different representations (or semiotic resources). Each resource has a function in mathematical discourse and their combinations lead to a deeper understanding of the mathematical object.

The stage of production and editing of the video is preceded by research for ways of making it, which can lead to new changes in the script based on resources that become interesting to the video producer. In the editing stage, the ideas are put into practice, showing the relationship of the collective human-being-with-media (BORBA; VILLARREAL, 2005), in which technology influences the construction of knowledge

and reorganization of thought, since it promotes different views of the same mathematical object and analysis of how to approach it from the possibilities of combinations of different semiotic resources. It is worth pointing out that knowledge is not more or less from this interaction, but rather the possible ways of exploring mathematics by this collective human-being-with-media. In this sense, the set between theoretical knowledge and technical knowledge, explored through the potentialities that the video media makes available with its tools, condition the mathematical knowledge produced.

The RePARe methodological model adopted in the research assisted in the production of the video, as well as serving as a method of analysis. The cycle of peer analysis allowed the improvement of the video edition, constituted from an environment of discussion and reflection, focusing on the mathematical content incorporated by the video. In these collaborative moments, suggestions, indications of changes, adaptations and development of mathematical ideas emerged with analysis and reflections around the versions of the video, which established another opportunity for knowledge construction with the sharing of ideas in group.

Conclusion

The quality of the digital mathematical discourse is influenced by the action of the technologies used, in general, and by the choice of semiotic resources combined in the construction of the discourse. In the case of the video production process, we identified that the proposed steps promote the construction of knowledge, as well as the choice of semiotic resources for the elaboration of digital mathematical discourse (NEVES, 2020). The possibilities of mathematical knowledge production in the video production process were analyzed in this research.

Considering the multimodal characteristic of videos, given the possibility of combining semiotic resources, the video entitled "Statistics in Soccer" was produced, built in a collaborative and reflective process. From the analysis of the data in the simplified systematization table, we can highlight the production of theoretical knowledge and technical knowledge in the process of video construction: the exploration of different representations, the re-reading of mathematical content from contextualization or applications in other areas, the simulation and exploration of the visual, dynamic and manipulative character of mathematical objects, also from different representations. The proposed organization of the production process made it possible to identify the articulation between the two types of knowledge inserted in the process: theoretical

knowledge and technical knowledge, the latter related to the technical procedures for video production and editing. For the video "Statistics in Soccer" a commercial editing software was used, but there are many possibilities for producing videos that are accessible, free, and many tutorials available to guide the video editing stage. This favors the idea proposed based on the results of this research, namely, the realization of video production activities, as a collaborative action and with great potential for mathematical learning.

Considering the potential of the video production process with mathematical content, it is worth mentioning that, in the script development stage, the combination of mathematical representations can be explored, as well as other semiotic resources of the video, such as effects, colors, music, transition, clips, characters, which unify the content to the context engaging and giving form to the digital mathematical discourse. This step requires a broad knowledge of the content for its adaptation to the digital medium, providing the reorganization of thought (BORBA; VILLARREAL, 2005). Thus, the production of the video with mathematical content happens based on the choice and adaptation of the content, so that the context to be worked influences the expression of mathematical ideas, generating meaning through a theme.

The video produced during this research used the theme of soccer to discuss concepts of statistics, which allowed the use of graphics, images, tables, playfulness and historical contextualization, to make the theory more dynamic. The research done to learn about other video approaches, topics for contextualization, resources for implementing the mathematical discourse in the video, the choices of semiotic resources, as well as the research in textbooks, provided a production of knowledge, generating meaning through connections with applications and the resources needed to discuss the mathematical content.

The theoretical and technical knowledge explored in the process of producing videos with mathematical content can be shared in such a way that provide a dialogical environment (FREIRE, 2015; MOURA, 2021) in the mathematics classroom. In this context, the teacher, who guides the whole process, involves Mathematics in problems of the school context, encourages critical analysis and the search for solutions, promoting meaningful mathematical learning and the formation of conscious and critical citizens.

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