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# Creative Mathematics: video production with 5th year Elementary School Students

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**Article**

***Abstract:*** The study investigated the production of digital videos for teaching quantities and measurements in the 5th grade of Elementary School. Using a qualitative approach and intervention research, the active participation of students in the creation of videos that related mathematical concepts to everyday life, such as measurements in supermarkets, was analyzed. The experience favored active learning, promoting engagement, creativity, and the development of abilities such as communication, teamwork, and critical thinking. The videos facilitated the understanding of the content and made learning more dynamic. Despite the challenges in organization and editing, students highlighted the importance of collaboration. It is concluded that audiovisual production, in a participatory approach, is an effective resource for making mathematics teaching more accessible and meaningful.

***Keywords:*** Teaching Mathematics. Video Production. Elementary School. Creativity.

## Matemáticas Creativas: producción de vídeo con alumnos de 5º de Educación Primaria

***Resumen:*** El estudio investigó la producción de videos digitales para la enseñanza de magnitudes y medidas en el 5to grado de la Educación Primaria. Con un enfoque cualitativo y una investigación de intervención, se analizó la participación activa de los estudiantes en la creación de videos que relacionaban conceptos matemáticos con la vida cotidiana, como las medidas en los supermercados. La experiencia favoreció el aprendizaje activo, promoviendo el compromiso, la creatividad y el desarrollo de habilidades como la comunicación, el trabajo en equipo y el pensamiento crítico. Los vídeos facilitaron la comprensión del contenido y dinamizaron el aprendizaje. A pesar de los desafíos en la organización y edición, los estudiantes resaltaron la importancia de la colaboración. Se concluye que la producción audiovisual, desde un enfoque participativo, es un recurso eficaz para hacer más accesible y significativa la enseñanza de las Matemáticas.

***Palabras clave:*** Enseñanza de Matemáticas. Producción de Vídeos. Educación Primaria. Creatividad.

## Matemática Criativa: produção de vídeos com estudantes do 5º ano do Ensino Fundamental

***Resumo:*** O estudo investigou a produção de vídeos digitais para o ensino de grandezas e medidas no 5º do Ensino Fundamental. Com abordagem qualitativa e pesquisa intervenção, analisou-se a participação ativa dos estudantes na criação de vídeos que relacionavam conceitos matemáticos ao cotidiano, como medições em supermercados. A experiência favoreceu a aprendizagem ativa, promovendo engajamento, criatividade e desenvolvimento de habilidades como comunicação, trabalho em equipe e pensamento crítico. Os vídeos facilitaram a compreensão dos conteúdos e tornaram a aprendizagem mais dinâmica. Apesar dos desafios na organização e edição, os alunos destacaram a importância da colaboração. Conclui-se que a

produção audiovisual, em uma abordagem participativa, é um recurso eficaz para tornar o ensino de Matemática mais acessível e significativo.

***Palavras-chave:*** Ensino de Matemática. Produção de vídeos. Ensino Fundamental. Criatividade.

## 1 Introduction

With the advancement of Digital Technologies (DT), digital media are increasingly taking up space in society, whether in the workplace, study or simply for entertainment (Santos, Sant'Ana and Sant'Ana, 2023). Constant notifications alert people about new messages, while fingers quickly slide across screens. Photos and videos constantly capture common moments of everyday life, with smartphones and tablets always at hand. These devices are becoming more prominent in young people's routines, as they allow for permanent connection, anytime and anywhere (Souza and Couto, 2016).

The development of technological resources and sound and image editing applications has made video production increasingly accessible. In this context of ubiquitous communication, video occupies a privileged position in users' lives, bringing together audiovisual stimuli that expand communication possibilities and arouse greater interest in the viewer. Furthermore, with the growing popularity of social networks that provide videos, access to this type of content has become easier (Santos, Sant'Ana and Sant'Ana, 2023).

In the educational field, videos can be used to illustrate themes, motivate actions and stimulate students' creativity in the construction of new readings (Santana and Souza, 2016). Thus, it is clear that video has gained a significant role among digital media, being recognized as an important enhancer in the teaching process, especially in Mathematics Education (Santos, Sant'Ana and Sant'Ana, 2023).

With the evolution of technological resources and sound and image editing applications, video production has become progressively more accessible. Santana and Souza (2016, p. 3) point out that “videos can be used to illustrate a theme, motivate an action and encourage students’ creativity in the construction of new readings”. Based on this point, it can be seen that video has gained considerable space among digital media, being seen as an enhancing tool in the teaching process, especially in Mathematics Education (Santos, Sant’Ana and Sant’Ana, 2023).

Teixeira and Diniz (2022) emphasize the importance of encouraging the use of videos in the classroom, in addition to preparing schools and teachers for the new generation of students, known as *digital natives* (Prensky, 2001). According to the authors, students and teachers need to adapt their school routine, which was previously centered on written texts, to include the use of different media — a change that has accelerated during the remote teaching imposed by the Covid-19 pandemic. Thus, it is essential to develop literacy in other languages, such as hypertext, images, video games, and videos.

Digital videos are not something new in Education, being widely used in Distance Education courses and in video classes available on the internet. Currently, they have also been implemented in Mathematics classes, with the aim of promoting more active student participation and aligning with new trends in teaching this subject (Santos, Sant’Ana and Sant’Ana, 2023).

According to Borba and Canedo Junior (2020), digital video allows documenting the complete development of a practical experiment, creating a resource that stands the test of time, especially in research that explores the use of modeling. However, “there is still little empirical research that reports on direct applications of video in Mathematics classes and analyzes

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students' interaction with the videos" (Domingues, 2014, p. 14) — a gap that is confirmed in more recent studies (Teixeira and Diniz, 2022).

The implementation of videos as a pedagogical resource in Mathematics classes has great potential, but requires the development of new research and practices that explore their direct implementation in the classroom. This approach not only modernizes educational practices, but also aligns with the needs of contemporary students, enabling education to keep up with advances in technology and offer new paths for the construction of mathematical knowledge.

In this context, this study aims to present the contributions of video productions, as well as the experience of students during this process, for the teaching of quantities and measurements in a 5th grade class of Elementary School. The structure of this article is organized as follows: initially, the theoretical basis is addressed; then, the description of the methodological path is presented; then, the results of the materials produced by the students are discussed and presented; finally, the article ends with the final considerations, which include observations and suggestions for possible interventions for future research.

## 2 Theoretical Foundation

This section presents the theoretical framework that underpins the study presented in this article. To discuss the teaching of quantities and measurements in the initial years of elementary school, we use authors such as Belfort, Nascimento and Silva (2020), D'Ambrósio (1996), Farias, Azeredo and Rêgo (2016), Medeiros, Silva and Farias (2021), Kenski (2012), Basso and Amaral (2006), among others. Regarding the production of digital videos in Mathematics classes, both classical references, such as Morán (1995) and Ferrés (1996), and more recent scholars were used, including Borba, Gadanidis and Silva (2020), Welmer and Cardoso (2024), Cardoso, Oliveira and Kato (2014), Borba and Oechsler (2018), Jewitt, Bezemer and O'Halloran (2016), O'Halloran (2011), Wohlgemuth (2005) and Oechsler (2018).

### 2.1 Teaching about quantities and measurements in Elementary School

Teaching quantities and measurements in Elementary School plays a fundamental role in the construction of children's mathematical knowledge, as it enables them to develop abilities to understand the world around them. In everyday experiences, children have their first contact with different types of quantities, learning to make informal comparisons of size, weight, volume, time, and temperature. These notions are essential for the construction of more abstract and formal concepts about the ideas of measurements (Belfort, Nascimento, and Silva, 2020).

In this sense, the Base Nacional Comum Curricular [National Common Curriculum Base — BNCC] establishes that, in Elementary School, it is essential that students understand the meaning of measurement and its application. According to the document, it is expected that "students recognize that measuring is comparing a quantity with a unit and expressing the result of the comparison through a number" (Brasil, 2017, p. 273). This approach guides the organization of teaching so that learning about quantities and measurements is meaningful, connected to everyday experiences and the construction of more elaborate mathematical concepts.

According to D'Ambrósio (1996), the teaching and learning process of magnitudes and measurements should be mediated by the teacher through the exploration of practical and concrete situations. These situations provide a dialogue between the students' experiences and the systematized knowledge of Mathematics. Therefore, Mathematics Education should provide means for the transition between the children's everyday experiences and the construction of abstract concepts, using resources and mediation procedures appropriate to the

school context. This approach allows students to develop not only the ability to measure, but also the ability to interpret and represent the results obtained, stimulating logical reasoning and mathematical understanding.

Based on these considerations, it becomes clear that pedagogical practice needs to integrate students' experiences with formal teaching, through activities that stimulate curiosity and enable the development of more structured concepts about the notion of measurements.

Farias, Azeredo and Rêgo (2016) highlight in their studies the importance of integrating historical aspects of the development of measurement practices into the teaching of quantities and measures. In ancient times, the measurement of quantities such as length and weight was important for the organization of society, both in the social and economic spheres. By knowing a little about the history of how measurements came about, students can easily understand that the idea of measurement is not just a technical process, but also a social construction that has evolved over time.

To teach quantities and measures in Elementary School, it is necessary that pedagogical practices promote the use of concrete and manipulable materials, such as scales, rulers, tape measures and measuring containers (Medeiros, Silva and Farias, 2021). These resources make learning more attractive and meaningful.

In addition to these resources, teachers can use digital resources, including the production of videos for and by students, to reinforce the content studied. According to Kenski (2012, p. 45), when using audiovisual resources, students are challenged to organize and explain ideas in a clear and coherent manner, which reinforces learning. According to Basso and Amaral (2006, p. 61),

> audiovisual language is a social condition that involves the concept of attending to the senses — hearing, vision and interaction, considered to be basic capabilities for learning and communication and which are closely related to the ways of learning.

When students produce videos explaining the concepts of quantities and measurements, they begin to internalize what they have studied in a deeper way, while also practicing abilities such as cooperation and problem-solving. Therefore, the inclusion of digital technologies, such as video production, enhances the teaching and learning process of the concepts of quantities and measurements, allowing students to appropriate the content in a more creative and autonomous way, connecting with the technological realities with which they are familiar.

Based on this information, the next section will expand the discussion, exploring how this resource can be used to engage students in activities involving Mathematics. The goal is to create a more dynamic, interactive learning experience that is aligned with modern pedagogical needs.

## 2.2 Production of digital videos in Mathematics classes

Digital videos and their potential as a pedagogical resource have been the subject of study since the 20th century (Morán, 1995; Ferrés, 1996). Borba, Gadanidis and Silva (2020, p. 105) state that "digital videos — the way the new generation makes jokes, communicates, and has fun — are important for the classroom". In this context, the incorporation of digital videos in the classroom is justified by the immersion of young people in these resources, mediated by social networks, whether in the production of memes, games, dances, among other forms of expression (Welmer and Cardoso, 2024).

With the advancement of technologies and means of communication, videos have

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gained increasing prominence (Welmer and Cardoso, 2024). More than two decades ago, Ferrés (1996) already addressed the implementation of audiovisual resources, outlining five ways of using them: video lesson, video support, video process, motivational program and monoconceptual program. In turn, Moran (1995), one year before the publication of Ferrés' studies, investigated the use of videos in the classroom. According to the author, digital videos connect the classroom to the students' daily lives, move through different forms of social communication and provide new challenges for the educational process.

Moran (1995) and Ferrés (1996) converge in their ideas when they place videos as a learning enhancer, since everyone watches videos, whether long or short. These resources also have the capacity to socialize cultures and ideas. Moran (1995) emphasizes that videos can be used in the classroom in a dynamic way, making learning meaningful, in addition to stimulating students' logical reasoning.

For these resources to be truly effective in the teaching and learning process, it is essential that they are integrated into the teacher's pedagogical planning, who must verify both the quality and relevance of the video content for each specific moment (Welmer and Cardoso, 2024).

In his research, Amaral (2013, p. 42) observes that videos in the lives of teachers are

> as a means of information (therefore an "informative" media), or as a path to the formation of a concept ("formative"). Of course, in order to form, it is necessary to inform, but the difference proposed here lies in the focus of each of these perspectives of use. Analyzing this aspect is part of the process of understanding the theoretical conception that underpinned the development of the material.

Cardoso, Oliveira and Kato (2014, p. 59) corroborate Amaral's (2013) idea, stating that

> we know that there are several educational videos from questionable sources that can lead students to conceptual errors. Hence the importance of teachers producing their own materials and publishing them for their students. This behavior can help students in their individual studies, in addition to helping teachers in classes, because if students attend in-person or online classes having already studied the content, the class will be the moment to delve deeper into the content, discuss and share experiences.

These ideas, in line with the aforementioned authors, converge towards the idea that digital videos have the potential to be a learning tool. However, for this to happen, it is essential that teachers know how to use them so that they do not become a resource that simply replaces what is already done in the classroom (Welmer and Cardoso, 2024).

Years after the studies developed by Moran (1995) and Ferrés (1996), Borba and Oechsler (2018) developed a more in-depth analysis of the production of videos in Mathematics classes. The authors propose three paths for implementing this resource in the classroom: 1) video as a recording of classes; 2) video as a teaching resource; and 3) production of videos by the students themselves. These perspectives highlight the elements used in video production, such as language, three-dimensional objects, gestures and sound, which are articulated through visual, auditory and somatic integration (Jewitt, Bezemer and O'Halloran, 2016; O'Halloran, 2011) with the aim of presenting mathematical ideas in a dynamic and comprehensible way.

The production of a video to present mathematical concepts requires an effort in visual

communication from those involved. This process involves the simultaneous use of different modes of expression in an aesthetic synthesis aligned with a coherent logic (Wohlgemuth, 2005). Furthermore, this stage requires a good theoretical background, the objective of which is to establish a logical line of reasoning and aesthetics, encompassing the knowledge necessary for it to be represented clearly and effectively in the audiovisual format (Borba, Xavier and Domingues, 2018). The production of videos with mathematical content

> involves mathematical knowledge and technical knowledge. The latter is related to care with audio, image transition and editing aspects, for example. All the elements that make up the narrative presented in the video can be defined and organized in a script, including the resources that will be used to produce the video. These elements are combined to create a synthesis in which the mathematical idea is expressed in the best way, considering the motivations of the interlocutor (Borba, Xavier and Domingues, 2018, p. 8).

Oechsler (2018) agrees with the authors when he states that, for students to be able to produce videos, it is essential that they fully understand the content included in the video, so that they are able to share it with their peers.

Borba, Xavier and Domingues (2018) emphasize that the production of videos with mathematical content can happen collaboratively, integrating teachers and students. This approach facilitates the sharing of knowledge, both mathematical and technical. To illustrate this process, the authors created a flowchart (Figure 1) that summarizes the necessary steps and interactions.

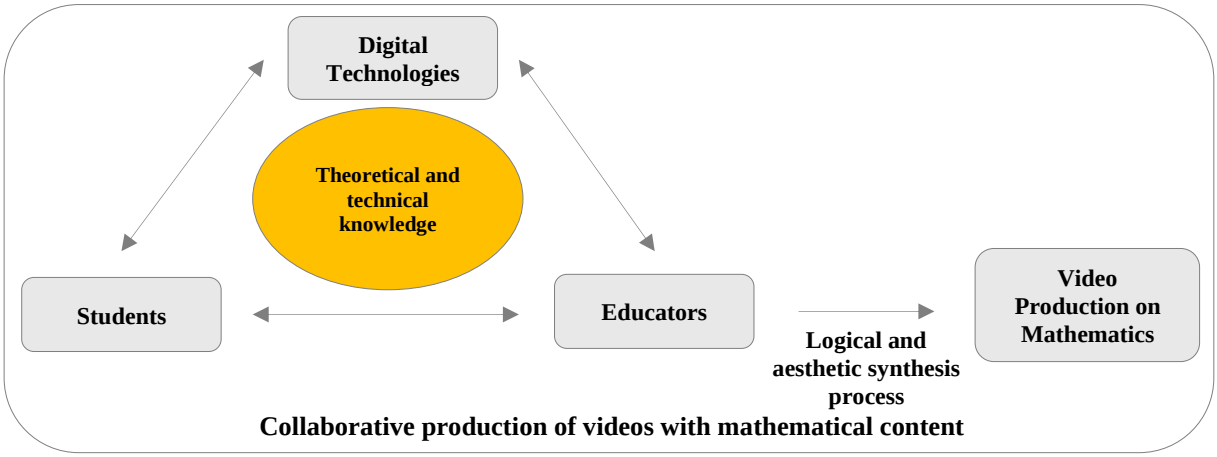


Figure 1: Shared knowledge in the production of videos in Mathematics (Borba, Xavier and Domingues, 2018, p. 9)

According to the authors, audiovisual creation intersects the use of digital technologies and the development of theoretical and technical abilities. Teachers and students contribute to the process of logical and aesthetic synthesis, relating knowledge with a view to producing videos that present mathematical concepts in an accessible and dynamic way. This practice, based on the ideas of Borba, Xavier and Domingues (2018), aims to promote a dialogical approach, in which participants are encouraged to collectively build the knowledge necessary to transform mathematical content into meaningful audiovisual narratives.

## 3 Methodological approach

The research is qualitative in nature, with the main objective of understanding educational phenomena in depth, based on the perspectives of the participants involved. According to Borba and Araújo (2023, p. 25), “research conducted using a qualitative approach

provides us with more descriptive information, which focuses on the meaning given to actions". In this context, the qualitative methodology allowed us to explore the nuances of interactions and the meanings attributed by participants, respecting the unique context of each response.

According to Bicudo (2023, p. 111), qualitative research offers an opening to capture the "idea of the subjective, capable of exposing feelings and opinions, something essential when one intends to investigate deep aspects of Mathematics Education". Therefore, we opted for a research format that did not follow a rigidly structured method, but sought to open space for the participants' expressions, as well as respect for the responses and ideas expressed by them.

Qualitative research is also aligned with the need for research that values subjects' interpretations of their practices and experiences. As Bicudo (2023, p. 113) explains, "this way of researching is given by the intention of reaching human aspects without going through the sieves of measurement, without starting from a previously defined method and, therefore, without being tied to quantifiers and recurring calculations".

In this way, an investigative approach was adopted that values the spontaneity and naturalness of what is being produced, without the need for numerical categorizations, which could limit the subjective expressions of the participants. In this context, this study sought not only to capture data, but also to understand the deep meaning of the experiences lived.

In conjunction with qualitative research, the intervention research typology was adopted — an approach that falls within the field of participatory methodologies, characterized by investigating the lives of communities in their rich qualitative diversity (Aguiar and Rocha, 1997). This perspective is not limited to the observation or description of phenomena, but assumes a proactive character, with interventions that aim to promote social transformations based on a socioanalytical analysis. As Rodrigues and Souza (1987) point out, intervention research represents an epistemological break in relation to the positivist model of science, questioning its objectivist and reductionist assumptions.

The experience described took place in Mathematics classes in a 5th grade class of Elementary School, totaling a number of 25 students aged 10 to 11 years old, in the afternoon period, at a public school in the city of Maceió, capital of Alagoas (Brazil). The proposed activities lasted 10 hours, distributed in classroom and extracurricular moments.

To this end, digital videos were used as a pedagogical resource to complement the content that was worked on in the classroom with the students. Therefore, the significant relationship between the implementation of this resource and the teaching of quantities and measurements in this specific class can be observed.

Finally, this research highlights the importance of adopting approaches that value the subjectivity of students and points to the need for a critical and comprehensive look at educational practices, promoting a continuous dialogue between theory and practice in Mathematics Education. Exploring new methods and considering different contexts are fundamental for improving pedagogical practices and advancing knowledge in the area.

## 4 Analysis of results

This section presents the main findings obtained from the analysis of the videos produced by 5th grade students and their perceptions about the experience of producing them. The information collected through semi-structured interviews made it possible to identify both the positive aspects and the challenges perceived by students in the use of these digital technological resources to produce a mathematical video.

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In addition, the results are discussed in light of theoretical references and previous studies, highlighting how the videos impacted the learning process and students' engagement with mathematical content. The analysis also reflects on the potential of using digital technologies in teaching Mathematics, promoting a more accessible learning environment.

### 4.1 Video Production Quantities and Length Measurements

The story begins with the students visiting a local seamstress to have their graduation gowns measured. During this visit, they closely observe the seamstress's work, as she uses a tape measure to accurately measure different parts of the body, such as waist, bust, hips, and skirt length.

The interaction is relaxed and spontaneous, reflecting an everyday situation that many young people can identify with, which favors audience engagement. In addition, the scene provides a valuable opportunity to discuss mathematical concepts related to measurement in a contextualized way, inserting Mathematics into a practical and meaningful activity. This approach also highlights the importance of these abilities in real life.

This approach makes learning more attractive and relevant to the young audience, who can visualize the application of the concepts in real situations. Figure 2 shows a screenshot of the video production carried out by the team responsible for *Length Measurement*.

Figure 2: Seamstress measuring the length of the student's back (Study collection)

Figure 2 shows a screenshot of the video about *Length Measurements*, focusing on the seamstress measuring the student's shoulder. This scene exemplifies the practical application of quantities and measurements, highlighting the importance of precision in manual work. In addition, it illustrates the use of a conventional measuring instrument, such as a tape measure, and units such as centimeters and meters, essential for making fitted clothes. In addition to the technical aspect, the image highlights the tacit and cultural knowledge of sewing, rescuing its social and economic relevance.

The video recorded with the seamstress lasts 6 minutes and 16 seconds, during which E1 and E2, 5th-grade students, explore the importance of Mathematics in the sewing profession. The recording begins with a brief presentation by the presenters (0:0 – 0:05), followed by an explanation of the objective of the video: to show the application of Mathematics in measuring for making graduation gowns (0:16 – 0:20). This section of the video highlights the relevance of each measurement and how they are applied in practice.

Souza (2012) emphasizes that mathematical learning becomes more meaningful when students are able to relate theoretical concepts to concrete situations. The video allows students to perceive Mathematics not as a set of abstract rules, but as an essential resource for the daily lives of various professions.

Next, there is a practical section in which the measurements of bust, waist, hips and length are taken to make the dress (0:5 – 2:18). This part highlights the relevance of each measurement and how they are used to determine the appropriate size of the dress. The

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seamstress explains the use of the measuring tape and the ruler, emphasizing the Mathematics involved in obtaining accurate and appropriate measurements (2:44 – 3:56).

The discussion about the practice and theory that support measurements is essential for more robust mathematical learning. As Farias, Azeredo and Rêgo (2016) point out, understanding the units of measurement and their application in real situations plays a crucial role in the development of mathematical abilities. In the video, the mention of units of measurement, such as centimeters and meters, reinforces a valid and relevant approach. However, this approach could be complemented with a deeper reflection on the importance of precision in measurements and the interrelationship between different units.

Additionally, the video addresses units of measurement, such as centimeters and meters, and highlights the importance of understanding these units for creating clothes (4:05 – 5:26). The video concludes with a thank you to the seamstress and a recap of the importance of Mathematics in the profession (5:39 – 6:09). The closing reinforces the idea that Mathematics is a fundamental area of knowledge in various professions, encouraging viewers to subscribe to the channel (6:09 – 6:16).

However, it is essential that this conclusion not only reinforces the practical usefulness of Mathematics, but also stimulates critical reflection on the use of Mathematics in different areas. As Ausubel (1968) suggests, learning is more effective when new knowledge is connected to previous experiences. Encouraging students to think about other applications of Mathematics, whether in cooking, engineering or art, could broaden their perception of the subject.

In short, the video was a positive initiative in connecting Mathematics to professional practice in an accessible and engaging way. However, its effectiveness could be improved through a more critical approach that encompasses not only practice, but also theory, the various applications and reflection on Mathematics in everyday life. This perspective, defended by several authors in the field of Mathematics, can contribute to forming students who are more critical and engaged with learning Mathematics.

### 4.2 Video production Magnitude and Capacity Measurements

At the local supermarket, E3 and E4 conducted a hands-on activity that demonstrated the application of capacity concepts when choosing and purchasing beverages for the school's group snack. The video begins with a brief introduction by E3 and E4, in which they explain the objective of the activity: to select different types of beverages suitable for the school event (0:20 – 0:35).

After the introduction, E3 and E4 begin to analyze the quantities of available products, initially focusing on a 1-liter, 500-milliliter bottle of juice. During this stage, they perform calculations to determine the additional quantity needed to fill exactly one liter, using 200-milliliter juice containers.

The activity involved addition and unit conversion operations, facilitating the understanding of capacity concepts and highlighting the importance of measurements in everyday life (0:46 – 1:43). This stage of the video offered a practical application of the concepts, with E3 and E4 comparing different beverage options and selecting those that best met the demand for the group snack. The dynamic interaction between students during the calculations stimulated the development of logical reasoning and problem-solving abilities.

Figure 3 presents a screenshot of the video production carried out by the team responsible for the *Capacity Measurement*.

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Figure 3: Student with a 1.5 l water bottle (Study collection)

In the image, the student holds a 1.5-liter water bottle, illustrating the importance of the concept of capacity, a central aspect in Mathematics classes applied to everyday life. This pedagogical practice reflects the principles advocated by Smole, Diniz and Cândido (2014), who emphasize the importance of contextualizing mathematical concepts to strengthen students' understanding. The authors emphasize that, by working with common objects, such as a water bottle, students develop a closer connection with the content, understanding the use of measurements in everyday life.

In addition, the practice exemplifies the principles of Borba (2005), who advocates the use of technologies and concrete objects for meaningful learning. When handling the bottle, the student not only observes the label, but understands that 1.5 liters represents a real, measurable measurement that he or she can add, compare, and manipulate. In this way, mathematical learning becomes more tangible, allowing the student to experience the concept of capacity and volume in a practical and accessible context.

The image, therefore, goes beyond the simple act of holding a bottle: it illustrates how active and contextualized learning, advocated by contemporary theorists, can envision the teaching of Mathematics in a hands-on experience, in which students not only understand the content, but apply it in a practical and meaningful way.

At the end of the video, the students shared a reflection on the learning acquired throughout the activity, focusing on the relevance of the concepts of Measurements and Magnitude of Capacity, such as milliliters and liters, in daily routine. During this final analysis, E3 and E4 explained how knowledge about measurements of capacity becomes useful in common activities, such as choosing and buying products at the supermarket. They note that, by understanding quantities, they are able to make more informed decisions about purchases, promoting a practical view of Mathematics that goes beyond the classroom.

Finally, by thanking the viewers and encouraging them to reflect on the relevance of Mathematics in everyday life, E3 and E4 are, in a way, putting into practice the principles of a critical mathematics education, as proposed by Lorenzato (2006). The author argues that the teaching of Mathematics should value questioning and reflection, so that students see Mathematics as essential knowledge that is close to their realities. With this conclusion, the video reinforces the idea that Mathematics, far from being just a school subject, is an ally in solving practical problems and contributes to the development of a critical and contextualized vision of the world.

### 4.3 Video production Magnitude and Time Measurements

The video was recorded at the home of one of the team members, providing a welcoming and familiar environment for the presentation of the concepts. E5 and E6, the students responsible for the explanation, take a practical and engaging approach to exploring the notions of time.

E5, with the help of a cell phone, shows the calendar and discusses the importance of

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days, weeks and months in organizing daily activities. E6, in turn, uses a clock to demonstrate how hours and minutes work, explaining how these units of time apply to task planning.

By using everyday objects, such as a cell phone and a clock, the duo is able to transform abstract concepts into a visual and tangible experience, allowing viewers to understand the concept in a more accessible and practical way. The familiarity of the environment helps to make the video more dynamic, while the visual examples reinforce the applicability of the concepts of calendar and time in everyday life, bringing Mathematics closer to the audience.

Figure 4 presents a screenshot of the video production carried out by the team responsible for *Measuring Time*.

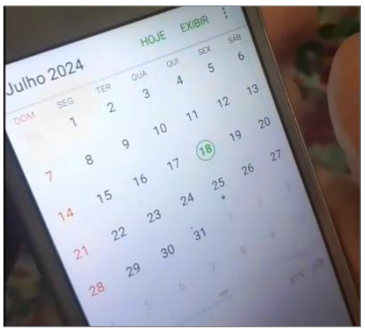


Figure 4: Student demonstrating the calendar on the mobile device (Study collection)

The video begins with a brief 4-second introduction (0:01 – 0:05), in which E5 and E6 introduce themselves in a relaxed and welcoming manner. In this short segment, both students say their names and greet the audience, establishing an initial connection that attracts attention and prepares the viewer for the content that follows. This initial moment is carefully planned to create a friendly atmosphere and encourage engagement, essential for the audience to feel part of the activity.

In addition to introducing the theme, E5 and E6 establish the tone of the video as practical and accessible, which reflects a pedagogical approach aligned with the principles of authors such as Smole, Diniz and Cândido (2014), who emphasize the importance of making teaching welcoming and connecting with the target audience. Thus, this brief introduction not only introduces the protagonists, but also prepares the viewer for a visual and interactive learning experience, contextualizing the concepts in a way that brings them closer to everyday life.

After a brief introduction, E5 begins his explanation of how the calendar works, using a practical example by showing the calendar on his cell phone and the current date. This segment (0:20 – 0:35) dedicates 15 seconds to detailing the concept of the calendar, highlighting the importance of understanding the passage of time and how dates are organized into months and weeks.

By using a visual and familiar example, E5 is able to make the concept easier for viewers to understand. This practical approach is in line with the principles of Smole, Diniz and Cândido (2014), who argue that contextualizing mathematical concepts makes learning more meaningful and accessible. The authors emphasize that using everyday objects and real-life situations helps students make connections between theory and practice, promoting more effective learning.

In this way, E5's explanation not only introduces the concept of a calendar, but also exemplifies a teaching methodology that favors the understanding and practical application of Mathematics, showing how this knowledge is fundamental to everyday life.

In conclusion, the video presented by E5 and E6 effectively illustrates the practical application of mathematical concepts, especially in relation to time. By using everyday

examples, such as the calendar and the clock, the students demonstrate that Mathematics is not just a theoretical discipline, but an area of knowledge essential for the organization and planning of daily activities.

### 4.4 Video production Magnitude and Temperature Measurements

The video, recorded in the neighborhood supermarket, begins with a brief presentation by E7, who introduces the topic of temperatures, focusing mainly on the concepts of degrees Celsius and negative temperatures (0:06 – 1:12). In this initial section, E7 explains what minimum temperature means and how temperature variations can affect the shelf life of products. He highlights the importance of maintaining correct temperatures to avoid problems, such as food spoilage, which can occur when products are not stored properly.

E7 illustrates the relevance of this knowledge in everyday life, showing how the appropriate temperature is essential to guarantee the quality and safety of the food consumed. By addressing these aspects in a practical and visual way, the video provides a clear understanding of the application of temperature concepts in the supermarket context, encouraging the viewer to reflect on the importance of these precautions in their own routine.

Figure 5 presents a screenshot of the video production carried out by the team responsible for *Temperature Measurement*.


Figure 5: Freezer thermometer (Study collection)

Next, E7 observes the reading on the thermometer attached to the freezer, as shown in Figure 5, captured from the temperature video. The thermometer registers a range of 0 to 0.7 ºC (degrees Celsius). During this analysis (1:14 – 1:48), E7 explains the concept of negative temperatures, using Antarctica as an example of an extremely cold place. In this section, he elucidates the difference between positive and negative temperatures, allowing viewers to understand how temperature scales work in practice.

E7 emphasizes the importance of technology in measuring and monitoring temperatures, showing how modern devices can simplify the collection of accurate data. By using Antarctica as an example, he impacts viewers by presenting extreme weather conditions, highlighting the need to understand these variables, especially when dealing with perishable products. This approach not only expands the understanding of temperature concepts, but also establishes a connection between theoretical knowledge and its practical application. In this way, the video highlights the relevance of the topic in food preservation and ensuring food safety.

Therefore, E7's explanation not only clarifies the difference between positive and negative temperatures, but also exemplifies how Mathematics can be taught effectively, using everyday references and technological resources, as proposed by Smole, Diniz and Cândido (2014) and Borba (2005). This approach contributes to the formation of critical and contextualized thinking, preparing students to face practical challenges in their lives.

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### 4.5 Video production Magnitude and Mass Measurements

The video, recorded at a local farmers' market, begins with an introduction by participants E8, E9, and E10, who explain the purpose of the activity: to buy fruit for a salad and vegetables for a soup (0:00 – 0:15). In this brief segment, in addition to presenting their intentions, the students show off the precision digital scale they used to measure the weight of the items, highlighting its importance in ensuring that each piece of fruit is measured correctly.

Choosing to begin the video in a familiar setting, such as the farmers' market, creates a practical and accessible setting that can resonate with the audience. E8, E9, and E10 use this introduction to engage viewers, piquing their interest, and showing that mathematics is a vital part of everyday activities, such as buying fruits and vegetables.

The use of the digital scale is also a central point in this segment, as it illustrates the application of mathematical concepts, such as weight and measurement, which are fundamental to everyday mathematics. This practical focus is in line with the ideas of Smole, Diniz e Cândido (2014), who point out the importance of contextualizing mathematical learning in real situations. By showing the scale and discussing its use, the participants, in addition to teaching about measurements, encourage viewers to see Mathematics as a useful tool in their lives.

In this way, the introduction of the video not only establishes the scenario and objectives of the activity, but also prepares the ground for a deeper exploration of the mathematical concepts applied throughout the recording, highlighting the relevance of Mathematics in everyday situations and the role of technology in measurement.

Figure 6 presents a screenshot of the video production carried out by the team responsible for *Mass Measurement*.

Figure 6: Mass measurement (Study collection)

Figure 6 illustrates one of the moments of the video production carried out by the team responsible for mass measurements. In this stage, we can see the result of the measurement of the mass of a product chosen by one of the team members, who uses a digital scale to collect precise data on the materials analyzed. This activity highlights the practical application of quantities and measurements, but it also highlights the importance of collaborative work and the use of technologies in the teaching and learning process. The scene demonstrates how Mathematics is present in everyday situations, connecting theory and practice in a meaningful way.

The proposal presented by Smole (2013) and Borba (2005) emphasizes the contextualization of learning by integrating mathematical concepts into everyday situations, such as buying fruits and vegetables. This approach allowed students to see Mathematics as more than a theoretical curricular component, but as practical and indispensable knowledge in their daily lives.

By relating school content to real activities, teachers are able to make learning more meaningful, promoting greater engagement and interest among students. Therefore, this connection between theory and practice develops essential abilities such as problem-solving and critical thinking, preparing students to face real-world challenges with confidence and competence.

### 4.6 Students' impressions of digital video production

In recent years, digital video production has become a resource for communication and learning. Whether it's for telling stories, explaining concepts, or sharing experiences, videos allow ideas to come to life in a dynamic and engaging way. For 5th grade students, this activity was a way to learn mathematical content, as well as an opportunity to develop important abilities, such as creativity, teamwork, and the use of technology.

By producing videos, students became true content creators. They learned how to plan, record, and edit, exploring each step with curiosity and enthusiasm. In addition, the creation process allowed them to express their ideas in unique ways, while facing challenges that stimulated critical thinking and problem solving.

In the meantime, some impressions and experiences of students who embarked on this digital journey are highlighted. Through their words, it is clear how video production impacted their perceptions of learning and the way they see the world of digital media.

> E8 — *It was difficult to finish the video in the time the teacher asked. Recording and editing took longer than expected. I learned that you need to organize yourself and share tasks with your classmates. Regarding measurements, I understood better how they are used in real life. A different and cool way to learn.*
>
> E10 — *I was embarrassed to record, but we managed to finish the recording. I learned that mathematics is part of our daily lives.*
>
> E3 — *At first, it was difficult to find a place outside of school to record, because we had to ask our parents for permission. The teacher accompanied us during the recording. I learned the importance of learning about measurements, especially for some professions.*
>
> E7 — *I learned the importance of knowing the quantities and measurements for our daily lives, and the way this activity was carried out, where I had to talk about what I had learned in class, but in video format.*

The difficulty reported by E8 in managing time and organizing tasks reflects a common challenge in collaborative and creative activities, as pointed out by Vygotsky (1984). For the author, cognitive development occurs through social interaction and the mediation of cultural instruments, such as language and technology. In this case, the production of videos required students to plan their actions and distribute responsibilities, promoting metacognitive and organizational abilities.

According to Perrenoud (2000), it is imperative to teach life abilities, such as time management and teamwork. By facing these challenges, students not only learned about quantities and measurements, but also developed other abilities for other areas of life.

The impressions of E3 and E7 highlight the relevance of contextualization in the teaching and learning process, as advocated by Ausubel (1968). For the author, significant learning occurs when the content is connected to the student's prior knowledge and their life context. By producing videos that addressed measurements in real situations — such as calculating the capacity of containers or measuring distances — students were able to attribute meaning to mathematical content.

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In turn, Skovsmose (2008) emphasizes the need for critical mathematics education, which relates school content to social issues and everyday practices. The students' testimonies show that they realized the practical applicability of quantities and measurements, especially in professions related to sewing and cooking, and in street market sales. This perception shows that the activity was able to broaden the participants' view of Mathematics.

The personal achievement reported by E10 can be analyzed from the perspective of Bandura (1997), who developed the theory of self-efficacy. According to the author, confidence in one's own abilities is built through successful experiences, even if initially challenging. By facing the embarrassment of recording and completing the activity, the student strengthened his self-confidence and realized that he was capable of doing something new and significant.

In turn, Freire (1996) emphasizes the importance of dialogue and valuing emotions in the educational process. The fact that the student overcame his shyness suggests that the learning environment was welcoming and encouraging, allowing him to express himself without fear of judgment.

E3's report highlighted the logistical complexity involved in activities that go beyond the confines of the classroom. According to Borba and Villarreal (2005), the use of digital technologies in education requires institutional adaptations and external support, such as family participation. Parental involvement and teacher supervision were essential to ensure the safety and viability of the proposed activity.

Lévy (1999) argues that digital technologies expand learning spaces, transforming the school environment into a connected ecosystem. Going outside allowed students to explore different scenarios and apply the concepts of magnitudes and measurements in different contexts, enriching the experience.

The experience described by E7 illustrates the importance of active methodology and the communication of knowledge, in accordance with Dewey (1938). For the author, learning occurs through experimentation and the active reconstruction of knowledge. By explaining the concepts of quantities and measurements in a video, the student, in addition to reviewing the content, consolidated his understanding by transmitting it to others through digital video.

Moran (2015) emphasizes that the production of digital videos is a strategic form of media literacy, as it allows students to express ideas in a creative and multimodal way. This activity helped students develop verbal and visual communication abilities, in addition to reinforcing mastery of mathematical content.

For students, the production of digital videos about quantities and measurements was an engaging way to learn Mathematics. The combination of technology, creativity and teamwork made the process fun and educational. Furthermore, the experience helped students better understand the concepts of capacity, length, time, temperature and mass, showing that learning can be both enjoyable and meaningful. These impressions demonstrate that, when technology is used in a playful and practical way, it becomes a resource that contributes to teaching and student learning.

## 5 Final considerations

The research investigated the contribution of digital video production to the teaching of Mathematics, with an emphasis on the construction of contextualized knowledge. The methodology adopted allowed students to actively engage in the learning process, assuming a central role as content producers and protagonists of their own knowledge.

During the production of the videos, students were challenged to apply mathematical concepts in practical and everyday situations, such as calculations involving quantities and

measurements in shopping contexts, organizing events, planning family activities and even creating visual models to explain mathematical phenomena. This approach facilitated the understanding of the content, promoting a meaningful connection between theory and practice, reinforcing the relevance of Mathematics in everyday life.

The results obtained show that the production of digital videos had a positive impact on the students' conceptual understanding. When exposed to real problems and challenged to solve them collaboratively, they demonstrated mastery of the content covered, in addition to a more critical ability to interpret and apply mathematical concepts. The methodology proved to be effective in assessing engagement, since students were motivated and committed throughout all stages of the process, from planning to final editing of the videos.

Creativity and interaction among team members were key factors in the success of the activity, reinforcing the importance of collaborative work in developing interpersonal and cognitive abilities.

Another relevant aspect was the identification of practices and uses of videos that expanded the scope of the activities carried out. Many students shared their stories with their peers at school, emphasizing the experience of carrying out activities outside the classroom. This practice reinforced the relevance of learning in the students' daily lives, but also increased the pedagogical impact of the activities by involving other people from the school community and family.

The dissemination of videos among other classes allowed students to perceive the potential of digital technology as a means of expression and communication, strengthening their abilities in areas such as content production, argumentation and critical thinking.

However, it is important to recognize the limitations of this research. One of the main challenges faced was the lack of adequate technological resources, such as high-quality recording equipment or advanced editing software. This limitation may have influenced the final quality of some videos and, consequently, the experience of certain groups of students. The sample investigated was restricted to a specific group of students, which may limit the generalization of the results.

Another point to consider is that not all students were equally familiar with the digital resources used, which required additional preparation and training time. These factors highlight the need for greater institutional support and investment in infrastructure so that methodologies such as this can be implemented more broadly and inclusively.

For future research, it is suggested to explore the use of digital videos in different educational contexts, such as public and private schools, and with more diverse populations, including students of different ages and levels of education.

It would also be interesting to evaluate the long-term impact of this methodology on school performance and to investigate how other digital technologies, such as augmented reality, gamification and artificial intelligence, can complement the teaching of Mathematics. Additionally, studies on the abilities developed by students during the production of videos, such as creativity, collaboration, critical thinking and communication abilities, can further enrich this area of research. It would also be relevant to investigate how videos produced by students can be integrated into other subjects, promoting an interdisciplinary approach and expanding the scope of application of this methodology.

In summary, this research demonstrated that the production of digital videos was a relevant strategy that promoted contextualized learning and the development of fundamental abilities for the comprehensive education of students. By integrating digital technologies into the teaching of Mathematics, it is possible to provide meaningful, motivating and

transformative experiences, stimulating more autonomous, critical and connected learning with the students' reality. Furthermore, the methodology encourages students to take the lead, strengthening their self-confidence and ability to solve problems creatively and collaboratively.

It can therefore be concluded that the production of digital videos has the potential to transform the teaching of Mathematics, making it more accessible, relevant and engaging for students, while opening up new possibilities to enhance pedagogical practices in the contemporary educational context.

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