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FLIPPED CLASSROOM AS A STRATEGY FOR INCREASING THE ACHIEVEMENTS OF STUDENTS WITH DIFFICULTIES IN GEOMETRY

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ABSTRACT

This study aims to analyze the effectiveness of the Flipped strategy Classroom in increasing the achievements of students with difficulties in geometry, with a special focus on the construction of regular polygons. The research was conducted at the Primary and Lower Secondary School "Heronjtë e Lumës", Vërmicë /Prizren (Kosovo), including 12 purposefully selected students, identified with obvious difficulties in geometric tasks. The study used a qualitative approach, while the data were collected through classroom observation, semi-structured interviews with students, and the analysis of their papers and exercises during the learning process. Flipped Strategy Classroom was implemented using instructional videos from YouTube, which students watched in advance at home, while classroom time was used for practical work, continuous explanations, collaboration, and direct support from the teacher during the construction with ruler and compass. The results show that the implementation of this strategy had a positive impact on improving procedural accuracy and reducing errors during construction, increasing engagement and active participation in class, as well as strengthening self-confidence and developing more positive attitudes towards geometry. However, the study also identified implementation challenges, mainly related to uneven access to the internet/devices and cases where some students did not watch the videos regularly. In conclusion, the study recommends the integration of Flipped Classroom as a supportive practice in geometry teaching, especially for struggling students, suggesting practical measures such as providing offline materials and brief summaries in class to guarantee full inclusion.

KEYWORDS: Flipped Classroom, geometry, learning difficulties, achievement, educational videos, primary school, Kosovo.

INTRODUCTION

Geometry is one of the most challenging areas of mathematics in primary and lower secondary education, as it requires visual thinking, logical reasoning, and the ability to make connections between shapes, properties, and construction processes. For many students, especially those with learning difficulties, these demands are often accompanied by conceptual ambiguity, procedural errors, and reduced self-confidence when solving geometric tasks (National Council of Teachers of Mathematics [NCTM], 2020). In this context, traditional teaching, which relies mainly on frontal explanation and uniform exercises, does not always create sufficient space for guided practice, reinforcement of understanding, and differentiated support for students with different needs (OECD, 2021).

The construction of regular polygons is a fundamental process in geometry, which aims to build figures where all sides and angles are equal, usually carried out with classical tools such as a ruler and compass. This process is based on important principles such as dividing the circle into equal parts, using the radius and diameter, and constructing exact angles, connecting theoretical knowledge with practical application (Coxeter, 1969). Through construction, students develop step-by-step thinking, accuracy, and geometric reasoning, because each action in the construction requires logical argumentation and verification of the relationships between the elements of the figure (NCTM, 2020). Geometric constructions also contribute to the development of visual and spatial skills, making the learning of geometry more concrete and understandable for students, especially when accompanied by practical exercises and structured demonstrations (Sinclair & Bruce, 2015).

The use of instructional videos, especially for procedural topics such as constructing polygons, can be particularly beneficial because students have the opportunity to follow the construction process step by step, pause and review key moments, and reinforce the connection between verbal description and visual presentation (Mayer, 2021). This is especially important for struggling learners, who often need multiple examples, clear instruction, and ongoing support to build lasting understanding (Hattie, 2009). Furthermore, studies show that Flipped Classroom can positively impact not only achievement, but also motivation, engagement, and active participation, as students feel more involved in the process and have more time to practice with classroom support (van Alten et al, 2019).

Flipped Classroom is a teaching approach that moves the presentation of content outside the classroom, usually through videos or digital materials, while classroom time is used for active activities such as exercises, discussions, and problem-solving with direct support from the teacher (Bergmann & Sams, 2012). This approach aims to increase student engagement and enable more personalized learning, because students can follow the previous material at their own pace and return to the parts they do not understand, transforming the classroom into a space for practice and structured interventions (Lo & Hew, 2017). In the contemporary literature, the Flipped Classroom is reported to have a positive impact on learning outcomes and student satisfaction, especially when accompanied by well-structured activities and pedagogical support during classroom work (van Alten et al, 2019).

Therefore, a contemporary approach that is finding widespread use in education is the Flipped Classroom, which moves the presentation of learning content outside the classroom through digital materials (e.g., instructional videos), while classroom time is used for practical work, discussions, problem-solving, and direct teacher intervention (Bergmann & Sams, 2012). This new organization of the learning process creates opportunities for students to learn at their own pace, retrieve content when needed, and come to class better prepared to practice and apply knowledge, thus increasing the effectiveness of active learning (Lo & Hew, 2017).

Problem Identification

In mathematics teaching in primary and lower secondary education, geometry continues to be one of the most problematic areas for students, especially for those who show difficulties in learning and conceptual understanding. In school practice, it is observed that many students encounter obstacles in understanding the properties of geometric figures, in step-by-step reasoning, and in the practical application of the construction of regular polygons, making frequent errors in the use of the compass and ruler, in constructing correct angles, and in interpreting the relationships between the elements of the figure. These difficulties are often associated with reduced self-confidence, lack of motivation, and poor engagement during geometry classes, as students fail to connect the theoretical explanation with the practical solution of tasks (NCTM, 2020). Furthermore, traditional teaching arrangements do not always provide sufficient time for guided practice and differentiated support, which results in students with learning difficulties falling behind and not achieving the expected outcomes in this area (Lo & Hew, 2017). For this reason, there is a need to explore alternative strategies, such as the Flipped Classroom, which allows more time in the classroom for practical

exercises, clarifications, and individual interventions, with the aim of increasing student achievement in geometry.

While international literature reports the benefits of this approach in mathematics, there is still a need for qualitative studies in the context of pre-university education that explore the real experiences of students with difficulties in geometry and how this strategy helps them understand and apply concepts (Bond, 2020). In this context, this study aims to analyze the role of the Flipped Classroom as a support strategy for increasing the achievements of students with difficulties in geometry, through a qualitative approach with 12 students from the Primary and Lower Secondary School "Heronjtë e Lumës", Vërmicë /Prizren, Kosovo, focusing on their experiences during video learning and guided practice in the classroom.

Purpose of the Study

The purpose of the research is to analyze the role and effectiveness of the Flipped strategy Classroom in improving the achievements of students who show difficulties in geometry, focusing on how the use of instructional videos from YouTube and practical activities developed in the classroom affect conceptual understanding, accuracy in solving tasks, as well as increasing students' self-confidence and engagement during the construction of regular polygons.

Research Objectives

The overall objective of this research is to explore and analyze the effect of the Flipped strategy Classroom in increasing the achievements of students with difficulties in geometry, especially when constructing regular polygons.

Specific objectives:

- To identify the main difficulties that students encounter in understanding and applying geometric concepts, especially in constructing regular polygons.
- To analyze how the use of instructional videos from YouTube within the Flipped Classroom helps students prepare in advance for classroom learning.
- To examine how practical activities and direct classroom support affect the improvement of students' performance when solving geometric problems.
- To explore students' perceptions and experiences regarding this teaching strategy, including their engagement, motivation, and self-confidence while learning geometry.
- Evaluate whether the Flipped Classroom creates opportunities for more personalized learning and more effective support for students with learning difficulties.

- To issue practical recommendations for teachers on integrating the Flipped strategy
- Classroom in teaching geometry, with the aim of improving the achievements of students with difficulties.

Research Questions

1. What are the main difficulties that students encounter in understanding and realizing the construction of regular polygons in geometry?
2. How does using the Flipped strategy affect the classroom, through instructional videos from YouTube, in preparing students for geometry lessons?
3. How do students experience the learning process through Flipped? Classroom during the construction of regular polygons?
4. In what way do practical activities and teacher support in the classroom contribute to improving the achievements of students with difficulties in geometry?
5. How does Flipped affect Classroom in student engagement, motivation, and self-confidence while working with geometric tasks?
6. What are the main advantages and challenges of implementing Flipped? Classroom in teaching geometry to students with learning difficulties?

Literature Review

Flipped Approach Flipped Classroom is an innovative pedagogical model that aims to transform traditional teaching practices by shifting the presentation of content outside the classroom through digital materials (e.g., instructional videos) and maximizing classroom time for active student activities (discussion, exercises, collaboration) and direct teacher support (Bergmann & Sams, 2012). This approach has received widespread attention in mathematics education, due to its potential to increase student engagement, motivation, and performance through more personalized and active learning (Bond, 2020). Meta-analytic studies and systematic reviews indicate that the impact of the Flipped Classroom on mathematics achievement is often positive, engaging students in participation and reflection on learning, although the multiplier effects vary according to context and implementation method (Lo & Hew, 2017; Fung, 2021).

Literature reviews highlight that the flipped classroom model can increase students' time devoted to complex exercises, allowing for direct instruction and immediate feedback within the classroom, a key element for mathematics areas such as geometry, where visual and hands-on exercises are essential for understanding abstract concepts (Lo & Hew, 2017;

Albay, 2024). Several recent studies have combined the flipped classroom model with advanced visual technologies such as augmented reality (AR) to develop students' three-dimensional geometric thinking skills and enhance their spatial imagination, achieving significant improvements in understanding spatial constructs (Wang, 2025; Rizos, 2024).

On a practical level, research shows that implementing the Flipped Classroom can improve student performance in various mathematical subjects, including arithmetic, algorithms, and often even basic mathematics, positively affecting test scores before and after the instructional intervention (Novianti, 2025). Framework and experimental studies suggest that students participating in flipped learning often achieve better results than traditional groups, especially when active strategies are used outside and inside the classroom (Egara et al., 2024).

Although the results are encouraging, the literature also points out challenges related to the implementation of Flipped Classroom, including a high dependence on access to technology, the need for literacy digital skills among students and teachers, as well as difficulties in managing time in the classroom when students are not prepared in advance for learning (Lo & Hew, 2017; Kadarisma, 2024).

In addition to academic performance, the Flipped Classroom has also shown an impact on other dimensions of learning, such as student engagement and collaboration. Numerous studies report an increase in collaboration and active participation, which is related to how this model maximizes classroom presence time to develop collaborative activities, group problem solving, and direct reflection on learned concepts (Bond, 2020; Fornons et al, 2021).

Various studies in the field of mathematics education have highlighted that instructional video can serve as an effective tool to support the learning of procedural and visual concepts in geometry, especially when the topics require clear step-by-step follow-up, such as the construction of regular polygons. The use of videos allows students to follow the construction process repeatedly, to stop and return to key moments, thus improving the accuracy and understanding of geometric construction operations (Mayer, 2021). In this way, learning through videos contributes to reducing unnecessary cognitive load and makes the connection between verbal explanation and visual presentation of operations with ruler and compass clearer, which is especially important for students who have difficulties in learning and organizing procedural thinking (Hattie, 2009). In the context of Flipped Classroom, videos serve as preliminary preparation, while class time is used for guided exercises, error correction, and clarification of ambiguities, making the construction process more understandable and accessible to students (Bergmann & Sams, 2012). Similarly, Orhani's

(2023) study highlights that the use of video tutorials from the senadorhani channel on the YouTube platform provides a powerful tool for explaining and demonstrating geometric constructions clearly and comprehensibly. This channel provided an engaging and effective way of learning that had the potential to improve student engagement and interest in geometry.

Similarly, the literature on Flipped Classroom in mathematics reports that the integration of instructional videos increases engagement and learning effectiveness, especially when topics require practical application and immediate feedback, as is the case with geometric constructions (Lo & Hew, 2017). This model creates conditions for students to come to class more prepared, transforming the classroom into a space for problem solving and guided practice, which is associated with better results and higher learning satisfaction (van Alten et al, 2019). In this context, the construction of regular polygons, as a process that requires logical reasoning, accuracy, and verification of geometric relationships, benefits from the combination of visual explanation through videos and practical exercises in the classroom (NCTM, 2020). Therefore, existing studies suggest that the use of videos within the framework of Flipped Classroom can be an appropriate strategy to support students with difficulties in geometry, gradually increasing their conceptual understanding and ability to carry out constructions with fewer errors and more confidence (Bond, 2020).

However, the literature shows that the effects on certain psychological dimensions, such as self-confidence, anxiety, or students' emotions, are still mixed and require more in-depth studies, especially at lower educational levels (Bond, 2020). This highlights the need for qualitative studies that explore students' subjective experiences during the implementation of Flipped Classroom in geometry, including their perceptions of video materials, classroom activities, and how these affects conceptual understanding and learning performance, precisely the gap that this study aims to address.

Methodology

Research Design

This study was conducted using a qualitative approach, with the aim of exploring students' experiences and perceptions regarding the implementation of the Flipped strategy. Classroom in geometry teaching, especially on the topic of constructing regular polygons. The qualitative approach was chosen because it allows for a deeper understanding of how students experience the learning process, what difficulties they encounter, and how their engagement changes during the teaching intervention. The study was conceived as a small-scale

classroom-level case study, focusing on a selected group of students in a specific school context.

Context and Participants

The research was conducted at the Primary and Lower Secondary School "Heronjtë e Lumës", Vërmicë/Prizren, Kosovo. A total of 12 students from grade VI-2, purposive sampling participated in the study, who were identified as students with difficulties in geometry, based on their previous performance on geometry tasks, repeated errors during exercises, and teacher observations. Purposive selection was used to ensure that participants were appropriate for the purpose of the study, as the focus was on students who need additional support in this area.

Description of Dntervention (Flipped Classroom)

Flipped Strategy Classroom was implemented using instructional videos from YouTube, which students had previously watched at home. The videos were selected to match the lesson topic and provide clear, visual, and step-by-step explanations for constructing regular polygons (e.g., equilateral triangle, square, and regular hexagon). After watching the videos, practical work was carried out in the classroom, where students carried out the constructions with geometric tools (ruler and compass), discussed the difficulties encountered, and received direct support from the teacher. This method of organization aimed to create more time for exercises and for correcting errors during the lesson.

Instruments and Data Collection

Data was collected through several sources to provide a more complete picture of the learning process and student experience:

- Classroom observation was used to identify student engagement, collaboration, difficulties during construction, and their reactions during practical work.
- Semi-structured interviews with students were conducted to understand their perceptions about the use of videos, their learning style at home, and the benefits or challenges of working in the classroom.
- Analysis of students' work and exercises, examining the constructions made, their accuracy, repeated errors, and improvements during the process.

  The combination of these instruments has enabled data triangulation, increasing the reliability of the results.

Research Procedure

The research was carried out in several steps: first, students with difficulties in geometry were identified, and the construction topics to be addressed were determined. Then, relevant videos were selected from YouTube through the teacher's channel https://www.youtube.com/results?search_query=senad+orhani, and the students were instructed to watch them in advance at home. During class, the students carried out the constructions, working individually and in small groups, while the teacher provided continuous guidance and feedback. After the intervention, interviews were conducted with the students, and their work was analyzed.

Data Analysis

Qualitative data from observations and interviews were analyzed through thematic analysis, identifying key themes related to the students' experience, such as concept understanding, improvement in construction, engagement, motivation, self-confidence, and challenges when using videos. Students' work was analyzed to identify differences in accuracy and in the way construction was carried out. The results were interpreted by relating them to the objectives and research questions.

Ethical Issues

During the implementation of the study, the ethical principles of research in education were respected. Students were informed about the purpose of the study, the method of data collection, and the use of the results for academic purposes only. Participation was voluntary, and confidentiality of the data was guaranteed by not publishing names or identifying information of the students.

RESULTS

This chapter presents the results of qualitative research on the implementation of the Flipped strategy. Classroom in geometry teaching, with a focus on the construction of regular polygons, for 12 students identified with difficulties in this area at ShFMU "Heronjtë e Lumës", Vërmicë/Prizren. The results were derived from classroom observations, semi-structured interviews with students, and analysis of their papers/exercises, organized into main topics in accordance with the research questions.

Table 1Thematic analysis.

Main topic	Sub-topics / Codes	Brief description of the finding	Evidence (data source)
1. Initial difficulties in geometry	Procedural errors; order of steps; use of compass/ruler	Students had difficulty following the step-by-step construction and produced inaccurate figures due to errors in measurement and construction.	Classroom observation; analysis of papers
	Conceptual ambiguity	Difficulty understanding relationships between elements (sides, angles, radius, diameter) and geometric reasoning	Interview; analysis of works
2. Preliminary preparation with video	Understanding the procedure, retrieving content	The videos helped students better understand the process and review the parts they didn't understand.	Interview; observation
	Better preparation for class	Some students started working faster in class and had less uncertainty in the initial steps.	lookout
3. Improving construction performance	Increased accuracy; reduced errors	Progress was observed in construction accuracy and a decrease in repeated errors after continuous exercises in class.	Analysis of works; observation
	Better work organization	Students became clearer in using tools and controlling steps during construction.	Observation: analysis of works
4. Engagement and active participation	Greater activity in the classroom; collaboration	Students were more actively involved in the exercises, asked for clarifications, and collaborated with each other.	Observation; interview
	Interest in tasks	Increased effort to complete the task and verify the accuracy of the result	lookout
5. Self-confidence and attitudes	Higher confidence; willingness to try again	Students showed more confidence because they had seen the process before and understood the task better.	Interview; observation
	More positive attitude towards geometry	Construction was perceived as a feasible and less intimidating process	interview
6. Advantages and challenges of Flipped Classroom	Personalized learning; more time for practice	The strategy created space for individual pace and more time in class for exercises and support.	Observation; interview
	Technological challenges	Some students had limited internet/device access or did not watch the video regularly.	Interview; observation

Data from observation and analysis of the works showed that students had obvious difficulties in understanding and carrying out the construction of regular polygons, especially in following the logical order of steps and in the correct use of geometric tools (ruler and compass). Many students encountered obstacles in measuring and transferring lengths, in locating the center of the circle, and in constructing correct angles, resulting in incorrect or incomplete figures. Furthermore, difficulties were evident in interpreting the relationships between the elements of the figure (sides, angles, radius, diameter), which influenced repeated errors and hesitation during practical work.

Table 2Results of students who encountered difficulties in geometry.

The difficulty observed	**in**	**%**	**Intensity**
Order of steps (step-by-step)	9	75.0%	□□□□
Using the compass	8	66.7%	□□□
Measuring/transferring lengths	7	58.3%	□□□
Construction of right angles	6	50.0%	□□
Interpretation of geometric relationships	6	50.0%	□□
Center/district location	5	41.7%	□□

Intensity level:

□ Very high (≥ 70%) □ High (50–69%) □ Average (30–49%) □ Low (< 30%)

The table presents the distribution of the main difficulties of the students during the construction of regular polygons. The most pronounced difficulty was the step-by-step ordering of the procedure (75%), followed by the use of the compass (66.7%) and the measurement/transfer of lengths (58.3%). These findings indicate that the main obstacles are mainly related to the procedural and technical aspects of the construction.

The results showed that the instructional videos watched in advance at home helped students develop a clearer idea of the construction procedure and the tools they should use during the implementation. Students reported that watching the videos enabled them to better understand the sequence of steps and to be able to return to the parts they did not understand, making the lesson more accessible and manageable. The observation showed that some students came to class more prepared, starting work faster and with less uncertainty in the initial steps of construction.

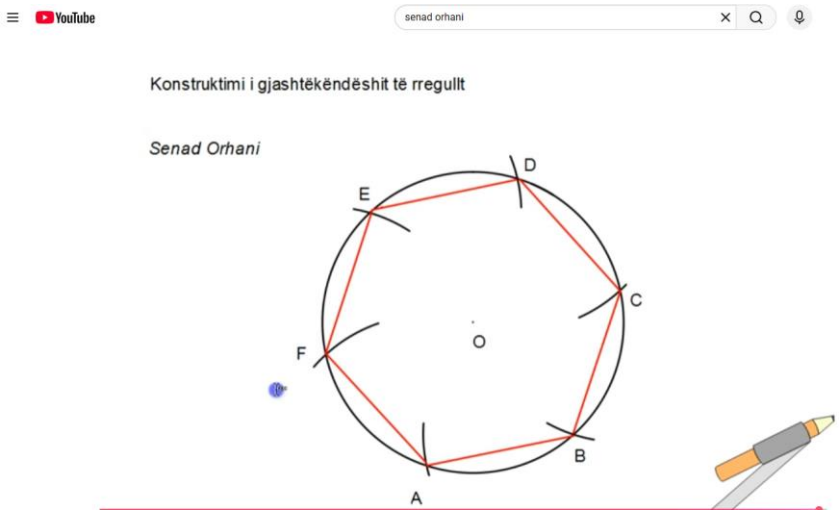

Figure 1Construction of a regular hexagon via a YouTube video.

One of the most notable results of the study was the gradual improvement in construction accuracy during classroom practice. After implementing the Flipped Classroom, students showed improvement in organizing their work, using compasses and rulers more correctly, and producing more accurate figures. Analysis of the papers showed that initial errors were reduced over time, especially when students had the opportunity to practice several times and receive direct instructions. This proves that the combination of prior preparation with videos and guided practice in the classroom created more favorable conditions for students with geometry difficulties.

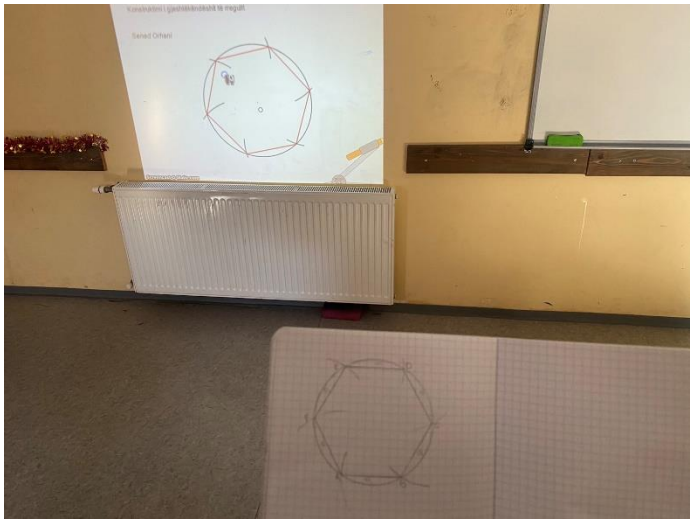

Figure 2Student's work.

During the observations, it was evident that students showed greater engagement in class, especially in the practical work phase. Compared to previous situations where students were

hesitant to start the task, during the implementation of Flipped Classroom, they were more quickly involved in the activity and sought more focused explanations. Students showed greater interest in completing the construction, checking the accuracy of their work, and comparing results with their classmates. This engagement was also observed in the form of collaboration, where some students helped each other by recalling the steps they had seen in the video.

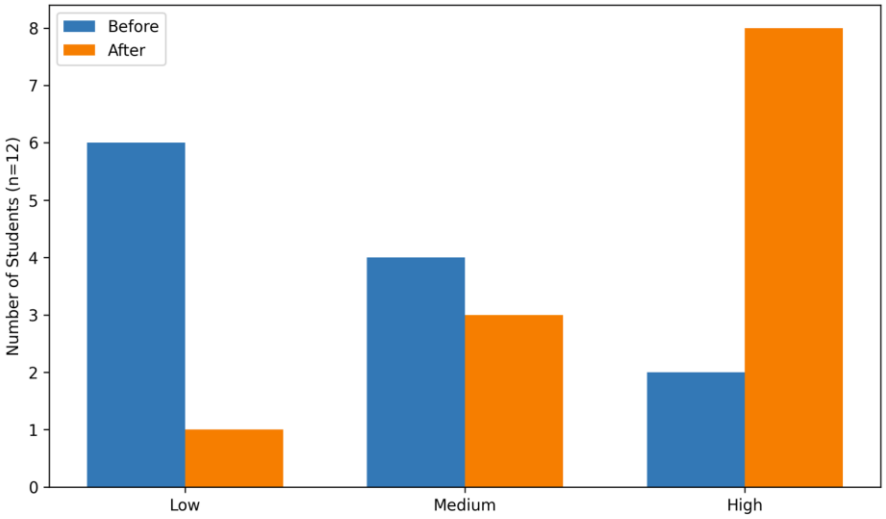

Figure 3Change in student engagement level before and after implementing the Flipped Classroom.

The figure shows the change in student engagement levels before and after implementing the Flipped strategy. Classroom. After the intervention, the number of high-engaged students increased from 2 to 8, while low-engaged students decreased from 6 to 1, indicating a significant increase in active participation and involvement in practical construction activities.

Interviews showed that students began to show increased self-confidence when completing geometry tasks. Some students stated that they felt more confident because they had seen the procedure before and knew what to expect in class. Through this approach, students perceived construction not as an impossible task, but as a process that could be accomplished if the steps were followed carefully. The improvement in self-confidence was also reflected in their willingness to try again after mistakes, indicating a more stable and positive attitude towards learning geometry.

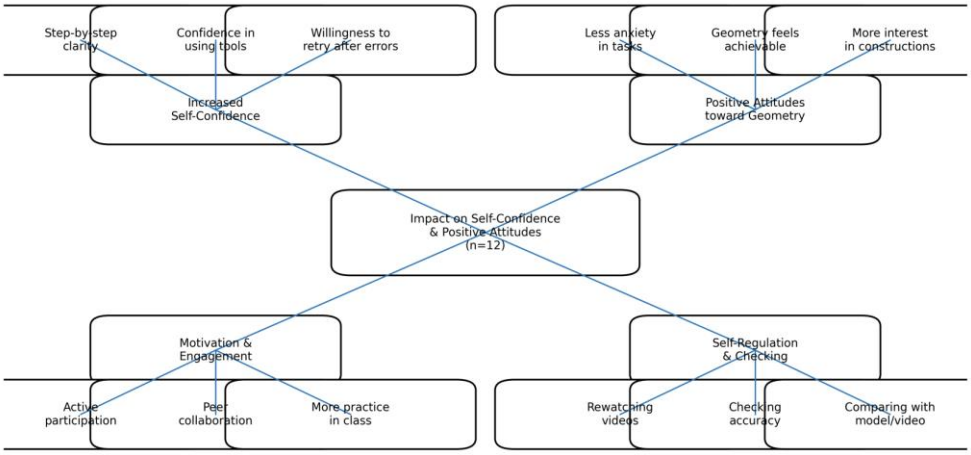

Figure 4MindMap Selfie Confidence Attitudes.

The figure presents the thematic structure of Flipped's impact. Classroom on students' self-confidence and attitudes towards geometry. Students reported increased confidence during construction, greater willingness to try again after mistakes, and reduced uncertainty because the videos allowed for review and prior preparation. This influenced the development of more positive attitudes towards geometry, making the learning process more understandable and accessible.

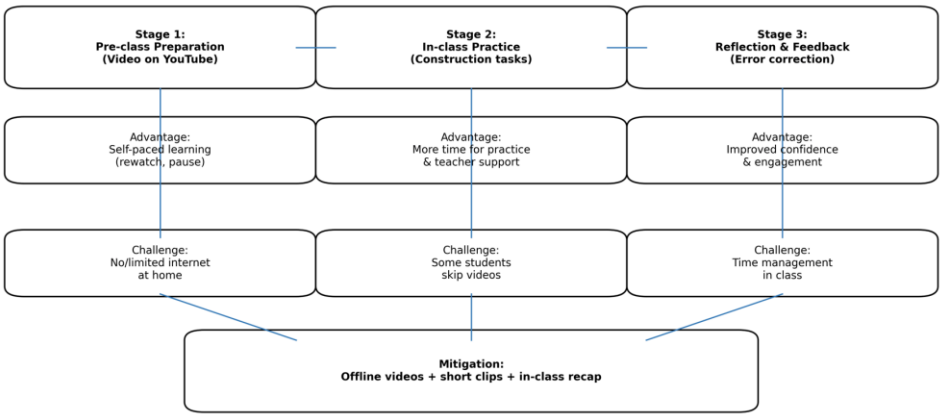

Figure 5Advantages and challenges.

The figure presents a strategic map of the implementation of Flipped Classroom in a pathway format, organizing the process into three main phases and indicating for each phase the respective priority and challenge, as well as a shared solution at the end (mitigation). In Phase 1 (pre-class preparation), students watch videos on YouTube, which brings the advantage of learning at an individual pace (possibility to pause and review), but the main challenge is related to the lack or limitation of internet at home. In Phase 2 (classroom practice), the focus shifts to practical construction tasks, where the advantage is to increase the time for exercises

and support from the teacher, while the challenge arises when some students do not watch the videos in advance and come unprepared. In Phase 3 (reflection and feedback), the emphasis is on correcting errors and reinforcing learning, where the advantage is to increase self-confidence and engagement, but the main challenge remains time management during the lesson. Finally, the figure presents a common mitigation strategy that aims to address the challenges of the three phases through: providing offline videos, using short videos, and quick summaries in class. Overall, this figure shows that the Flipped Classroom is a structured process that produces visible benefits, but requires planning and support measures to ensure successful implementation for all students.

The results showed that the Flipped Classroom brought several important advantages for students with difficulties, such as: the opportunity to learn at an individual pace, increased time for practical exercises in the classroom, and greater support from the teacher during work. However, some challenges were also identified, mainly related to the fact that not all students had the same conditions to watch the videos at home (internet access, devices, and time). Also, in certain cases, some students needed additional guidance even after watching the video, showing that the videos are an important help, but not a complete replacement for pedagogical intervention in the classroom.

Overall, the results of this study show that implementing the Flipped strategy in geometry learning contributed to improving conceptual understanding, construction accuracy, engagement, and self-confidence of struggling students. Through the combination of instructional videos and guided classroom practice, students were able to be more actively involved and make progress in completing geometric tasks, making this approach a valuable alternative for supporting students in this area.

DISCUSSIONS

This study aimed to analyze the effectiveness of the Flipped strategy Classroom in increasing the achievement of students with difficulties in geometry, with a particular focus on the construction of regular polygons, through the use of instructional videos from YouTube and guided practice in the classroom. Findings showed that this approach positively affected several dimensions of learning: improving procedural and conceptual understanding, increasing active engagement, and strengthening self-confidence and positive attitudes towards geometry. This interpretation is consistent with the literature that considers the Flipped Classroom as a model that increases active learning time and shifts the focus of the

class from passive listening to problem solving and interaction with the teacher (Bergmann & Sams, 2012; Lo & Hew, 2017).

The results of the study showed that students had significant difficulties in the step-by-step sequence of construction, the use of a compass, and the transfer of lengths, which led to repeated errors and uncertainty during practical work. These findings are understandable considering that geometric constructions require logical reasoning, accuracy, and visualization, which, for many students, especially those with difficulties, present ongoing challenges (National Council of Teachers of Mathematics [NCTM], 2020). In this context, the literature emphasizes that geometry should not be treated only as theoretical knowledge, but as a process where students construct meaning through actions, testing, and reflection, needing structured support (NCTM, 2020).

One of the main findings of the study was that instructional videos helped students better understand the sequence of construction steps and return to unclear parts, making the lesson more accessible. This result is related to the principles of multimedia learning, where the combination of verbal explanation with visual demonstration improves understanding and facilitates information processing, especially in procedural tasks (Mayer, 2021). For struggling students, the opportunity to pause and review the video several times creates an additional form of support that is not always achieved in traditional learning, gradually increasing their clarity and preparation for class work (Bergmann & Sams, 2012).

The study found significant improvements in construction accuracy and a reduction in repetitive errors during the classroom exercise process. This finding supports the idea that the Flipped Classroom is most effective when classroom time is used for hands-on activities and direct feedback, making learning more active and problem-oriented (Lo & Hew, 2017). In the same vein, meta-analyses have shown that this approach positively impacts learning outcomes and student satisfaction, especially when the intervention is accompanied by structured exercises and ongoing teacher support (van Alten et al, 2019). In the context of this study, this was reflected in the way students began to construct with fewer errors and more control over the process.

One important result was increased student engagement during classroom practice. Students were more engaged in the task, sought more focused explanations, and collaborated more with peers. This is consistent with reviews that argue that the Flipped Classroom increases student engagement by transforming the classroom into a space for active collaboration and interaction (Bond, 2020). Engagement is a key factor in the success of students with difficulties, because through active participation, they create more direct experience with the

task and reduce the hesitation that often accompanies geometry (Hattie, 2009). In this sense, increased engagement is not only an organizational result but also an indicator of the improvement of the learning climate and the active role of the student in the process.

Interviews showed that students showed increased self-confidence and a more positive attitude towards geometry. This can be interpreted as a result of the fact that students had prior preparation through videos and more opportunities for guided practice in the classroom, which made the construction more understandable and feasible. The literature suggests that the experience of success and continuous feedback are important factors in building academic self-confidence and reducing anxiety during learning, especially in mathematics (Hattie, 2009). Similarly, engaging students in active activities, such as constructions and problem solving, contributes to the development of more positive attitudes towards the subject (Bond, 2020). In this study, students began to perceive geometry as a process that can be managed with clear steps, reducing the fear of making mistakes.

The results showed that the Flipped Classroom offered important advantages, such as self-paced learning, increased time for in-class exercises, and more direct teacher support. However, challenges were also identified, particularly uneven access to the internet/devices and the fact that some students did not watch the videos in advance. These challenges are also recognized in the literature, which highlights that the implementation of Flipped Classroom requires careful planning and support strategies to ensure equal student participation (Lo & Hew, 2017). For this reason, it is recommended to use short videos, provide offline materials, and provide a quick summary at the beginning of the lesson for students who have not had the opportunity to prepare (Bergmann & Sams, 2012).

CONCLUSIONS

This qualitative study analyzed the impact of the Flipped strategy Classroom in increasing the achievements of students with difficulties in geometry, with a focus on the construction of regular polygons, at ShFMU “Heronjtë e Lumës”, Vërmicë /Prizren. The results of the research showed that the implementation of this strategy contributed to improving the procedural and conceptual understanding of students, helping them to follow the construction steps more accurately and reduce repeated errors when working with compasses and rulers. This proves that organizing the lesson through preliminary preparation with videos and practical exercises in the classroom creates more favorable conditions for learning geometry, especially for students who need additional support.

An important finding was the increase in student engagement and active participation during geometry lessons. Students were more quickly involved in practical activities, sought more focused explanations, and collaborated more actively with each other, reflecting an improvement in the learning climate and the active role of the student in the process. This result is consistent with the literature that emphasizes that the Flipped Classroom can increase student engagement by transforming the classroom into a space for active and collaborative learning.

Furthermore, the study evidenced a positive impact on the affective aspect of learning, showing increased self-confidence and the development of more positive attitudes towards geometry. Students perceived construction as a more understandable and feasible process, as the instructional videos enabled them to review the procedures and come to class more prepared. This element is also related to the principles of multimedia learning, where visual demonstration and structured explanation contribute to better understanding and reduced uncertainty during learning. In this way, the Flipped Classroom not only impacted the practical results of the construction but also improved the students' experience and reduced the fear of mistakes.

However, the study also identified some challenges in implementing this strategy, mainly related to unequal access to the internet/devices and the fact that some students may not have watched the videos beforehand. These challenges indicate that the success of the Flipped Classroom also depends on technological and organizational conditions; planning and support are required to ensure equal participation for all students. In conclusion, it can be said that the Flipped Classroom represents a valuable strategy for improving learning in geometry, especially for struggling students, but its implementation must be accompanied by practical support measures, such as providing offline videos and brief summaries in class, to guarantee effectiveness and full inclusion.

Implications for Teaching Practice and for Teachers

The findings of this study suggest that the Flipped Classroom is particularly well-suited for geometry topics that require visual demonstration and procedural exercises, such as constructing regular polygons. Teachers can benefit by selecting clear videos, planning structured practice tasks, and using class time for personalized feedback. This approach also supports NCTM recommendations that encourage active learning, mathematical reasoning, and classroom interaction to enhance geometry learning (NCTM, 2020).

Study Limitations and Suggestions for Future Research

This study has methodological limitations, as it was conducted with a small number of students (n=12) and in a single school, so the results are not intended to be generalized broadly. However, as a qualitative study, it provides an in-depth understanding of how struggling students experience the Flipped Classroom and which of its elements contribute to their progress. Future research could expand the sample, include comparisons with control groups, or use mixed-methods approaches to also measure changes in performance through standardized tests (van Alten et al., 2019).

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