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Examining the Impact of Teachers' Attitudes on College Students' Attitudes in a Mathematics Classroom

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Abstract

This paper discusses the relationship between teachers' attitudes and students' attitudes toward mathematics in the classroom. Through a review of more than twenty relevant pieces of literature, the paper analyzes the impact of teachers' attitudes on students' achievement, performance, confidence, and motivation in mathematics. The study concludes that positive attitudes displayed by teachers can enhance students' positive feelings toward mathematics and increase their engagement in the subject. On the other hand, negative attitudes displayed by teachers can hinder students' motivation and engagement in mathematics. The paper suggests that teacher training programs should prioritize the development of positive attitudes toward mathematics and the incorporation of technology in the classroom to increase student engagement. The findings emphasize the importance of addressing teachers' attitudes in secondary and post-secondary education and the need for ongoing professional development to improve student outcomes in mathematics.

Keywords: attitudes, achievements, confidence, motivation, mathematics

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1. Introduction

The role of faculty as teachers in higher education is crucial, as they play a pivotal role in shaping the academic, personal, and professional growth of students. They also facilitate student learning by providing feedback, answering questions, and guiding discussions that foster critical thinking, problem-solving, and collaboration. The statement from Odiri (2011) argues that many teachers are not fully aware of their potential impact on educational effectiveness, both within and beyond the confines of the classroom. According to Odiri, such teachers may not fully understand their role in fostering student learning and development and may thus miss out on opportunities to enhance the quality of education that they provide. This highlights the importance of recognizing and embracing the diverse roles and responsibilities of teachers in creating positive and effective learning environments. The responsibilities of teachers have expanded beyond simply possessing knowledge of their subject matter, to also include the ability to effectively communicate, collaborate, create, critique, and positively influence their students' attitudes toward the subject. According to Vargas (2013), every interaction between a teacher and their students has the potential to influence not only their present behavior but also their future attitudes and actions. This underscores the crucial role that teachers play in shaping the academic, social, and emotional growth of their students, and highlights the need for positive and impactful interactions in the classroom.

When evaluating professors, a key factor to consider is their professional demeanor toward their students in the classroom. Teachers who are effective communicators, collaborative with their students, provide constructive criticism with integrity, and offer guidance for improvement are greatly valued. These qualities contribute to creating an engaging and inspiring learning environment, fostering a greater interest in the subject matter being taught based on students' experience.

Gelisli (2007) contends that the purpose of the teaching and learning process is to facilitate the proper modification of students' behavior through the application of various classroom management techniques. Agir (2019) suggested that, from the teacher's point of view, the relationship between teachers and students can be influenced by a range of factors, including school culture and climate, the educational program, and available

equipment and resources. According to Agir (2018), students place greater importance on the attitudes of their teachers toward them both inside and outside of the classroom. Gelisli (2007) elaborates that the environment in which successful classroom management is implemented is likely to have a significant impact on student achievement. Specifically, a positive and structured classroom setting that is conducive to learning can contribute to student success. Effective classroom management techniques that promote engagement, motivation, and positive behavior can help to create such an environment, thereby facilitating student learning and academic progress.

Based on interactions with numerous college students, it has been found that many of them express dissatisfaction with their mathematics courses due to the negative attitudes of their professors. While some of these students admit to struggling with the subject matter, they still hope to encounter a teacher who can inspire and motivate them to improve. They expect their professors to possess the skills and techniques necessary to help them regain their enthusiasm for the subject and rekindle their interest in learning mathematics. Therefore, the attitude and teaching approach of the instructor can play a crucial role in shaping students' experiences and outcomes in college mathematics classes. Ojo (2018) expressed the opinion that there is often a tendency to assign blame for poor academic performance. Some may blame the students themselves, while others may blame the teachers. In turn, teachers may blame the parents or students for lack of effort or motivation. This cycle of blame highlights the need for all stakeholders in the education system to recognize their respective roles and responsibilities. Rather than simply blaming students for their attitudes toward learning, it is essential to work together to create a supportive and engaging learning environment that fosters student success. This requires collaboration and cooperation between teachers, parents, students, and other education professionals, with a shared commitment to promoting academic achievement and success.

It is widely acknowledged that all stakeholders, including teachers, students, and parents, have a crucial role to play in creating a successful academic environment. While educational researchers have focused on identifying potential factors that contribute to poor academic performance and negative attitudes toward learning mathematics, one area that has received less attention is the impact of teachers' attitudes on their students. To address this gap, this research paper aims to explore the influence of teachers' attitudes on college students' attitudes toward learning mathematics in the classroom. By examining the relationship between teacher attitudes and student attitudes, the study aims to shed light on the important role that teachers play in shaping students' perceptions and attitudes toward mathematics, and ultimately, their academic success.

2. Research Questions

This paper aims to investigate the impact of teachers' attitudes on college students' attitudes toward mathematics in the classroom. In the United States and many other developed countries, there is a general social identity issue where a lower proportion of people have positive attitudes towards mathematics compared to other countries. Given the significance of teachers and their teaching methods, Alkan (2013) cited Midgely et al.'s claim that "the relationship between teachers and students is a major determinant of students' progress both in and out of the classroom, which significantly influences students' success and attitudes towards mathematics" (p. 796). The following questions will guide this study:

1. To what extent do teachers' attitudes towards mathematics influence their teaching practices, and how might this impact students' attitudes towards the subject?
2. What specific teaching strategies or behaviors are most effective in promoting positive attitudes towards mathematics among college students?

3. Literature review

Research studies have shown that teachers' attitudes and behaviors can have a positive or negative impact on students' attitudes, motivation, engagement, and achievement in the classroom. Researchers emphasize the importance of professional attitude as well as the emotional state of teachers have a significant impact on the atmosphere of the classroom in promoting effective student performance in the classroom (Ojo, 2018; McTighe and Willis, 2019). The teacher's attitude can create an environment that is either conducive or not conducive to learning. The tone set by the teacher's attitude can influence the level of engagement of the students in the learning process. For example, if a teacher comes into the classroom with a positive attitude, it can help to create an atmosphere that is welcoming, warm, and enthusiastic, and the students are more likely to participate and engage in the learning process. Conversely, if the teacher has a negative attitude toward students or the subject matter, it can have a detrimental effect on the student's academic performance and motivation.

According to Ulug et al. (2011), academic achievement in the classroom is influenced by several factors, and the most important one is the teacher's attitude, not just the outcome of students' efforts. Olakunle and Salman (2020) assert that possessing qualities of professionalism and conscientiousness is essential for teachers to effectively perform their duties.

According to Ojo's (2018) study, there is a strong positive correlation between teachers' professional

attitudes and students' academic performance in the classroom. This means that when teachers possess effective communication skills, classroom management skills, and pedagogical and subject knowledge skills, students exhibit significantly better performance in the classroom.

It is not unexpected that poor performance in math during the K-12 years can cause challenges for both students and teachers at the college and university levels. Logue (2017) discovered that 60% of first-year college students in the United States were unprepared for college-level mathematics. Jaschik (2008) confirmed in his study that many college professors were dissatisfied with the statistic that 60% of first-year college students in the United States were not ready for college mathematics, as they did not enjoy teaching unprepared students. The lack of communication between K-12 schools and higher institutions is a significant factor contributing to college student unpreparedness, as noted by Shankle (2015).

Gelisli (2007) conducted a qualitative study where he observed that students were more engaged and interested in teachers who were cheerful, friendly, disciplined, and treated them with respect, and who had a positive impact on their learning process. On the other hand, students were less interested and often disengaged in classes where teachers made fun of them and did not use appropriate teaching strategies and techniques in the classroom. Ulug et al. (2011) conducted a study in Istanbul, Turkey to explore the impact of teachers' attitudes on students' personalities and academic performance. The researchers found that 91.2% of the 353 students surveyed strongly believed that a teacher's positive attitude had a significant influence on their academic performance and personality. This supports the notion that teachers' attitudes can greatly impact students' learning outcomes in the classroom.

In their research on teachers' emotions, Fried et al. (2015) developed a theoretical model that outlines five functions operating at the intrapersonal and interpersonal levels of teachers. These functions include information provision, giving quality to the experience, influencing cognitive processes, regulating internal and external processes, and providing motivation. The researchers argue that through these functions, teachers can enhance their own well-being, motivation, and cognitive processes, as well as positively impact the lives of their students.

4. Theoretical Framework

The impact of teachers' attitudes on college students' attitudes in a mathematics classroom will be examined using the non-traditional theoretical framework of attitudes developed by Van Aalderen-Smeets et al. (2012). While this framework was initially designed for K-12 science teachers, there is currently no similar framework for post-secondary mathematics teachers' attitudes toward teaching. Therefore, this framework will be used to explore the influence of teachers' attitudes on college students' attitudes in the mathematics classroom. According to Van Aalderen-Smeets et al. (2012), attitude is multi-dimensional and has various characteristics, such as cognitive beliefs, affective states, and perceived control (See figure 1).

4.1 Cognitive beliefs

Undoubtedly, teaching mathematics at the college level is crucial for various disciplines, especially in science, technology, engineering, and mathematics (STEM). In this regard, cognitive beliefs can be classified into three categories, which include perceived relevance, perceived difficulty, and gender beliefs. For the current study, the focus will be on perceived difficulty since it is a well-known fact that teaching mathematics is essential to other disciplines at the college level. According to Logue (2017), 60% of first-year students in the US are not ready for math college-level work, as research has indicated. Jaschik (2008) also reported that many professors feel frustrated when they have to teach unprepared students, which can lead to many of these students dropping out. The level of frustration felt by faculty teaching unprepared college students can affect their cognitive attitude based on the perceived difficulty category. Shankle (2016) affirms that even though some faculty members are willing to help college students who were not ready for post-secondary education, it did come with a degree of frustration. According to Gilakjani and Sabouri (2017), teachers must be mindful of what they say and do in the classroom as their beliefs can influence their attitudes, awareness, and teaching methods. Faculty members' complaints about unprepared students, such as slowing down the class and lacking motivation, may stem from their cognitive beliefs about the perceived difficulty of teaching mathematics to unprepared students. They also suggest that teachers' beliefs have a significant impact on the development of active teaching methods and learners' capabilities.

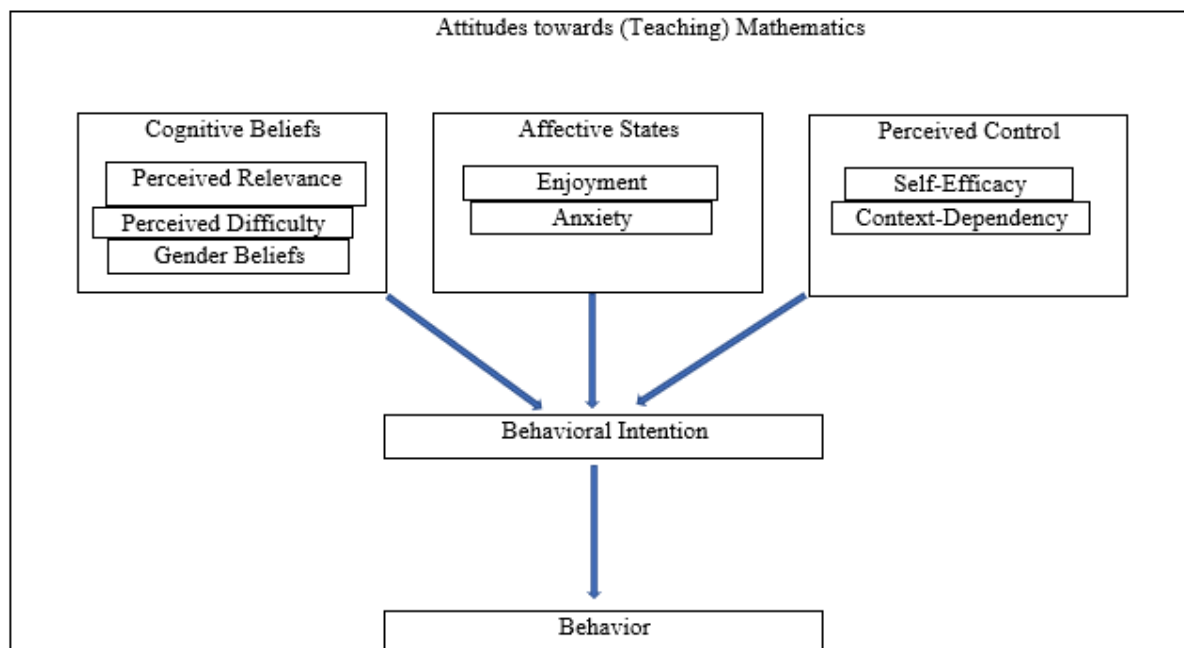


Figure 1: Van Aalderen-Smeets et al. (2012) Multidimensional framework on attitudes.

4.2 Affective states

Van Aalderen-Smeets et al. (2012) propose that affective states, one of the attributes of attitudes, can be classified into two categories, positive and negative. The positive affective state is related to enjoyment, whereas the negative affective state is associated with anxiety. It is crucial to note the impact of teachers' emotions, either positive or negative, on students' learning outcomes. Positive emotions in the form of enjoyment are also referred to as achievement emotions as they promote success through the active participation and engagement of students in the learning process (Ainley & Hidi, 2014). Frenzel et al. (2018) conducted a study on emotion transmission in the classroom, which involved collecting data from 69 teachers and 1,643 students over the first six months of the school year. Their findings indicated a strong positive correlation between teachers' enjoyment of teaching at the beginning of the school year and students' perception of their teachers' passion for teaching. This highlights the importance of teachers' enjoyment in their profession and how it can impact students' perception of their teaching. The study found that there is a two-way emotional exchange between teachers and students, and these shared emotions can have a significant impact on the behavior and perception of both parties in the classroom. Teachers who are more aware of this emotional dynamic can use it to their advantage to create an optimal classroom environment for learning. By acknowledging and managing their emotions, teachers can create a positive emotional climate in the classroom that promotes engagement and motivation, leading to better academic outcomes for their students. This implies that teacher training programs that focus on helping teachers understand the dynamics of emotions in the classroom can be an effective way to enhance their teaching effectiveness and improve student outcomes.

According to Krischler and Pit-ten Cate (2019), the emotional behavior of teachers towards their students in and outside the classroom is reflected in the affective component of their attitudes. This means that how teachers feel and express emotions towards their students can influence their students' emotional experiences and academic outcomes. For instance, if a teacher shows positive emotions towards their students, such as being warm and supportive, it can lead to a positive learning environment, increased engagement, and better academic outcomes. Conversely, negative emotions, such as anger or frustration, can lead to a negative learning environment and decreased engagement and performance.

Becker et al. (2014) conducted a study and found that there is a relationship between the emotions of teachers and students. Their research revealed that the attitudes and emotions of teachers have a significant impact on the attitudes and emotions of students during the teaching and learning process. This study highlights the importance of teacher-student relationships and the need for teachers to be aware of their emotions and how they can affect their students. Teachers who approach their work with positive attitudes and emotions can help foster positive emotions in their students, which can lead to a more effective and engaging learning environment. On the other hand, negative attitudes and emotions of teachers can result in disengaged and unmotivated students.

In Rodrigo-Ruiz's (2016) study, six areas were identified where teachers' emotions, whether positive or negative, affect the attitudes and behaviors of their students. These areas include students' emotions and

perceptions, emotional competence, motivation, learning and academic performance, classroom discipline, and social behavior. The study shows that teachers' positive attitudes have a positive impact on their students, while negative attitudes can reduce student engagement and even cause anxiety toward learning. Thus, it is crucial for teachers to manage their emotions effectively and cultivate positive attitudes in the classroom, as this can lead to improved academic performance, increased motivation, and better social behavior among students.

Ulug et al. (2011) found that teachers, whether at the college or K-12 level, play a crucial role in the development of students and are the second most important factor after parents. Therefore, their attitudes and behaviors during teaching and learning should be given significant attention as they influence the students' views on life and behavior, ultimately guiding them toward success. Teachers have a responsibility to create a positive and conducive learning environment that fosters the growth and development of their students. As such, their attitudes, beliefs, and emotions towards teaching have a significant impact on the classroom climate, which in turn affects the academic outcomes and success of the students. Teachers' attitudes and behaviors towards their students not only affect their learning but can also shape their overall experiences and prepare them for future success.

4.3 Perceived control

Van Aalderen-Smeets et al. (2012) suggest that perceived control is a significant factor that influences teachers' attitudes toward teaching. The concept of perceived control can be divided into two categories: self-efficacy and context dependency. Self-efficacy relates to the belief that teachers have in their own ability to influence student outcomes, whereas context-dependency refers to the degree to which teachers perceive external factors to affect their ability to teach effectively. Nordlof et al. (2017) support this idea by acknowledging that teachers' perceptions of control are influenced by various factors such as the level of autonomy they have over their curriculum, the support they receive from their institution, and the resources available to them. Teachers who have a greater sense of control over these factors tend to have a more positive attitude toward teaching, which can positively impact their students' academic performance and motivation. Conversely, teachers who lack control over these factors may experience feelings of frustration, which can lead to a negative attitude toward teaching and potentially impact their students' learning outcomes.

Nordlof et al. (2017) cited a study by Van Aalderen-Smeets et al. which classified perceived control into two categories: self-efficacy and context-dependency. According to Nordlof et al., certain factors such as control over syllabus and classroom, institutional support, among others, influence teachers' perceptions that affect their teaching. The study by Van Aalderen-Smeets et al. further explains that self-efficacy is a component of the teacher's attitude towards science and is related to their belief in their ability to teach the subject. For this study, it can be assumed that self-efficacy is also a component of the teacher's attitude toward teaching college-level mathematics. On the other hand, context dependency refers to the belief of teachers that external factors can make their teaching easier or harder. This implies that teachers' perception of the environment, such as the quality of institutional support, can affect their perceived control, and consequently, their teaching practices.

Ualesi and Ward (2018) observed that having a high level of self-efficacy as a teacher is crucial in building confidence to teach students effectively regardless of the teacher's years of experience. Self-efficacy is defined as the belief in one's ability to accomplish specific tasks or attain certain goals, and in the context of teaching, it refers to a teacher's confidence in their ability to manage classroom activities, instruct students, and handle academic challenges. The study indicates that a high level of self-efficacy helps teachers overcome challenges that may arise while teaching and boosts their motivation to improve their teaching methods. This means that a teacher who has a strong belief in their ability to teach can approach new challenges with confidence, take more risks in their teaching, and engage in continuous professional development.

Siegel and McCoach (2007) conducted a study aimed at increasing students' mathematics self-efficacy through teacher training. The study found that self-efficacy has a significant relationship with academic achievement, and that students whose teachers received self-efficacy training demonstrated a stronger relationship between post-test self-efficacy and post-test achievement than students whose teachers did not receive the training. The results of the study suggest that self-efficacy training can have a positive impact on both teachers and students and can lead to improved academic outcomes. The findings highlight the importance of providing professional development opportunities for teachers to help them enhance their teaching practices and foster their students' self-efficacy beliefs.

Agir (2019) conducted a study on the effects of perceived teacher behaviors on students' self-esteem and attitudes toward learning. The study revealed that students' perceptions of their teachers' behaviors can significantly impact their self-esteem and attitudes toward learning. In particular, the study found that negative teacher attitudes may have short-term positive effects, but in the long term, they can negatively affect students' subsequent developmental periods. Thus, teachers should be aware of their behaviors and attitudes towards their students, as they can have long-lasting effects on students' well-being and academic success.

The study found that there is a correlation between how students perceive their teacher's attitudes and their

own learning-related attitudes. According to the findings of the study, there is a weak but positive relationship between the nature of learning and perceived teacher attitudes, except for certain sub-dimensions such as discipline, double bind, belittling, and indifference. This means that students' attitudes towards learning are influenced by their perception of their teacher's attitudes towards them and their learning. It is important for teachers to be aware of how their behavior and attitudes affect their students and to strive to create a positive learning environment.

5.0 Conclusion and Recommendations

This paper aims to investigate the attitudes of current and aspiring post-secondary education teachers toward teaching mathematics in the classroom. The literature reviewed reveals that teachers' attitudes play a crucial role in either facilitating or hindering students' academic success, performance, confidence, and motivation toward learning mathematics at the college level. This study emphasizes the importance of teachers' attitudes in shaping students' attitudes and perceptions toward mathematics, highlighting the need for teachers to be aware of their own attitudes and how they may impact their students. By examining the existing literature, this paper provides insights into how teachers' attitudes can be improved to create a positive learning environment and enhance students' mathematical learning outcomes.

Jaschik (2008) reported that research has confirmed an increasing number of unprepared first-year college students. There has been a growing concern that K-12 schools need to improve their efforts to better prepare their students for college curriculums. This issue is particularly critical in the field of mathematics, where many students struggle due to a lack of foundational knowledge and skills. The consequences of this gap in preparation can have a significant impact on students' academic success, retention rates, and even their long-term career prospects. Therefore, addressing this issue requires a collective effort from K-12 schools, post-secondary institutions, and educators to identify the root causes and develop strategies to address them.

The current reality in education is that the number of unprepared first-year college students is increasing, and this poses a challenge for post-secondary institutions to provide the necessary support to ensure student success. While there has been criticism towards K-12 schools for not adequately preparing their students for college, it is now essential to focus on how best to work with the unprepared students who are already present, including transfer students. In addition to addressing the current situation, it is also necessary to prepare for the future by utilizing professional expertise to ensure that students receive the necessary support to excel in their academic pursuits. This includes providing resources and support for students in areas such as math, where many students struggle, and ensuring that teachers are equipped with the attitudes, skills, and knowledge needed to effectively teach and support their students. By prioritizing the needs of unprepared students and proactively working to support their success, post-secondary institutions can help bridge the gap between K-12 and college-level education and better prepare students for academic success.

This study is grounded in the theoretical framework developed by Van Aalderen-Smeets et al. (2012) and proposes that teachers' affective states, cognitive states, and perceived control states must be considered when designing effective teaching strategies. It is argued that teachers must be willing to engage their students actively and not rely solely on academic support or tutoring centers. Students want instructors who can provide effective instruction, monitor their learning progress, show them respect, and maintain a disciplined classroom environment when necessary. By prioritizing these aspects of teaching, teachers can positively impact their students' overall academic performance and improve their attitudes toward learning. This can enhance emotional competence, classroom discipline, and social behavior, leading to a more engaging and effective learning environment. Therefore, it is crucial to recognize the importance of teachers in promoting positive attitudes toward learning and developing students' academic abilities. To achieve this, teachers must adopt a proactive approach to teaching and actively engage with their students. This will not only improve student performance but will also increase their motivation and confidence in learning, resulting in long-term academic success.

The study on teachers' context-dependency by Ward (2018) highlights the importance of providing collegial support and implementing math labs for students to improve the overall learning experience. It is crucial for teachers to create a supportive and conducive environment for students, where they can engage in collaborative learning and practice different mathematical concepts with their peers. Additionally, providing teachers with behavioral professional training can help them respond professionally to students who need academic support. This would not only help students improve their academic performance but also enhance their emotional competence and attitudes toward learning.

Professional development programs that provide teachers with the necessary skills to manage classroom behavior, establish positive relationships with students, and address individual learning needs, can have a positive impact on students' attitudes toward mathematics. Moreover, creating a safe and supportive classroom environment can help students feel more confident and motivated to learn. Teachers who use positive reinforcement, praise, and encouragement can help build students' self-esteem and self-efficacy, which are crucial for success in mathematics.

In conclusion, providing teachers with the necessary support and training can help them create a positive learning environment that fosters academic success and enhances students' attitudes toward learning mathematics. Teachers should be equipped with the necessary tools and strategies to address the individual learning needs of their students and provide them with the necessary academic support to achieve their full potential.

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