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The Influence of Instructional Strategies on Students' Attitudes Towards Mathematical Learning in a Sports Setting

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ABSTRACT: This study looked into how learning mathematics in a sporting setting affected Year 10 students' views toward the subject. Data was gathered using a closed-ended, self-reported questionnaire with Likert-type comments. Analysis of each statement was done by comparing the percentage of pupils' agreement or disagreement before and after instruction. Students' attitudes in this study made up of their engagement, confidence, and mathematical awareness. According to this study, kids' confidence, awareness of the value of arithmetic, and engagement all raise when they learn in a sporting setting. The consequences for educators, teachers, and researchers are also taken into consideration in this work.

KEYWORDS: Attitudes, involvement, self-assurance, the value of math, and sports.

1.INTRODUCTION

Learning mathematics requires more than just thinking and reasoning; it also depends on how students feel about learning and arithmetic (Anthony & Walshaw, 2007; Grootenboer, Lomas, & Ingram, 2008; Kele & Sharma, 2014). According to Han and Carpenter (2014), attitudes are made up of people's cognitive, emotional, and behavioral responses to an object or their environment based on their interests or sentiments. The inclination to react in a particular manner when learning mathematics is the behavioral component of attitude (Akinsola & Olowojaiye, 2008; Maio & Haddock,2009; Mensahetal.,2013).

Affective attitude also affects behavioral attitude. Success in mathematics is correlated with students' confidence in their ability to do the subject, which is considered a positive behavior. Students may not succeed in mathematics if they lack confidence, and poor performance is seen as a sign of negative emotions (Zan & Di Martino, 2007). Therefore, the behavioral aspect of attitude influences the cognitive aspect of attitude as well. Students feel involved, self-assured, and connected to their education when they recognize the practical applications of mathematics (Attard, 2012). Accordingly, the three elements of involvement, attitude, confidence, and the significance of mathematics are interconnected (Mensah et al., 2013). This raises a crucial question: how can students' attitudes toward learning mathematics be improved by raising their level of confidence, knowledge of the value of mathematics, and engagement? The answer might lie in teaching arithmetic in a relevant setting.

This study sought to determine whether teaching in an athletic setting would affect students' attitudes toward learning mathematics. This publication presents results from a broader study (Sanchal, 2016).

2. LITERATURE REVIEW

Students' perspectives on studying mathematics

Researchers have found significant elements that influence students' attitudes toward learning mathematics (Attard, 2012; Grootenboer et al., 2008; Mata, Monteiro, & Peixoto, 2012). These include the students themselves, the school, the attitudes and beliefs of the teachers, and their methods of instruction (Beswick, 2006).

Students' attitudes are greatly influenced by the way professors educate (Akinsola & Olowojaiye, 2008; Mensah et al., 2013). According to Attard (2012) and Kele & Sharma (2014), there are numerous ways that teachers can help pupils learn mathematics in the classroom. Sullivan and McDonough (2007) state that educators can identify strategies to boost students' confidence and involvement in their mathematical education. This can be accomplished by incorporating worthwhile activities into authentic settings (Kacerja, 2012) .

Conventional teaching methods and contextual teaching

According to numerous research (Anthony & Walshaw, 2007; Boaler, 2002; Dickinson & Hough, 2012; Kacerja, 2012), teaching mathematics in real-world situations increases students' appreciation of math classes. Students are more engaged in the mathematics activities because of the link they develop with the task. Students typically recognize the value of mathematics by developing, investigating, and validating mathematical concepts (Reys et al., 2013). Students who received traditional instruction saw mathematics as a set of methods, according to Boaler's (2002)

study. Students who received instruction in a context, on the other hand, saw mathematics as an active, inquiry-based subject. Dickinson and Hough (2012) collaborated on a project that experimented with teaching arithmetic in a setting. Teachers' and students' opinions on the effects of teaching mathematics in a setting were included in the project.

Mathematics instruction in a sporting setting

Because the work is distinct from monotonous arithmetic exercises, students who are taught in a sporting context may find it more entertaining (Reys et al., 2013). According to Reys et al. (2013), relating mathematics to sports can give mathematical issues a framework for measurement, estimation, and tessellation. Students may be able to determine what mathematics is required to solve a problem if they have played a game like basketball.

This study involved 54 pupils in a cohort of Year 10 students. These pupils had been actively involved in playing for the school and were also active players of the game. Three very notice able concern tricking make up the field.

3. METHODOLOGY

The attitude questionnaire that Martha (1996) used to examine "The Attitudes toward Mathematics Instrument" was examined, and while creating the questionnaire for this study, certain statements unique to the circle theme were added. Students answered the attitude questionnaire both before and after instruction to determine whether teaching in context affected their attitudes toward learning mathematics (Appendix A). Strongly Agree SA, Agree A, Undecided U, Disagree D, and Strongly Disagree SD were the five points on a Likert scale. Students indicated on the questionnaire how much they agreed or disagreed with each statement. The percentage of students who strongly agreed and agreed with each statement was determined, and the pre-teaching and post-teaching percentages were compared.

4. RESULTS:

The 40 statements were categorized into the three attitude components of participation, confidence, and realizing the value of mathematics.

Three categories were created from the first twenty statements under the name "Confidence": mathematical reasoning, dread, and feeling at ease when studying mathematics. Table 1 displays the percentage responses to the categories before and after.

Statement 2 revealed a 10% rise in the proportion of students who felt happy with their solution to a mathematical problem in the mathematical Idea category. The Two Statements There was a two percent increase in 1 (I want to improve my mathematical skills) and 3 (Mathematics helps develop the intellect and teachers a person to think).

Statement 5 revealed that 18% more students were able to think clearly when performing mathematics in the setting in the panic group. Additionally, 7% more kids began to feel competent when attempting mathematics, and 8% more students desired to take mathematics in college.

Table 1: Pre and Post Teaching Percentage Responses to Confidence Categories

Category	Students	Pre- teaching %	Post- teaching %
Mathematical Idea	1	80	82
	2	48	58
	3	80	82
	13	59	58
Panic	4	53	47
	5	55	37
	6	28	32
	7	23	28
	8	22	32
	9	26	26
	14	39	32
	17	38	30
Satisfied	10	59	63
	11	35	44
	12	38	45
	15	37	37
	16	28	35
	18	31	37
	19	52	50
	20	37	36

The majority of students agreed with Statements 11, 12, and 16 when it came to feeling at ease when studying mathematics. These claims pertained to students' self-assurance, their capacity to solve mathematical problems without trouble, and their trust in their abilities to study advanced mathematics. Additionally, statements 10 and 18 demonstrated a rise in the proportion of students who were at ease expressing their own opinions and did not fear mathematics.

The percentage of pupils who felt good about learning math in an athletic setting increased overall in the confidence category. These results are consistent with the conclusions drawn by several authors (Barnes & Venter, 2008; Gallian, 2010; Van Den Heuvel-Panhuizen, 2005; Widjaja, 2013), who noted that when math is taught in a sporting context, students typically feel at ease and are comfortable answering or solving mathematical problems.

Daily mathematics and mathematics for forward courses were the two categories into which the nine propositions under this category were further divided. Table 2 displays the percentage of responses.

Table 2: Pre and Post Teaching Percentage Responses to Importance of Mathematics Categories

Category	Statements	Pre-teaching %	Post- teaching %
Daily Mathematics	22	75	80
	23	77	79
	24	80	76
	29	66	67
Mathematics for forward courses	25	74	65
	26	66	69
	27	59	48
	28	54	56
	30	76	76

According to Statement 20, the majority of students believed that mathematics was an important and essential subject. Additionally, students believed that mathematics plays a significant role in daily life.

The proportion of students who saw mathematics being used in other contexts increased by 3%. Just 2% of students thought that preparing for advanced.

It would be helpful to apply mathematics. On the other hand, the percentage of students who strongly agreed and agreed with Statement 22 (High school mathematics courses would be very helpful no matter what I chose to study) and Statement 28 (I aim to take as much mathematics as I can during my education) decreased.

The eleven statements in this section were categorized into three groups: enjoyment, favor and disfavor when learning mathematics.

Table 3: Pre and Post Teaching Percentage Responses to Engagement Categories

Category	Statements	Pre-teaching %	Post-teaching %
Disfavor	32	54	55
	33	57	32
	35	48	45
Favor	36	52	56
	38	33	42
	41	29	45
	42	40	42
Enjoyment	34	48	52
	37	43	46
	39	19	24
	40	43	50

Statement 33 indicated that 5 percent more pupils felt clear and not confused in mathematics class. Furthermore, 3 percent more pupils believed mathematics instruction was engaging after being taught in the context.

Following instruction in the setting, 16% of the pupils were prepared to absorb more than the necessary level of mathematical knowledge (Statement 40). Student's liking in mathematics improved by 9 percentage (Statement 38). According to Statement 40, seven percent of students thought mathematics was a very interesting topic, and five percent said they were happier in math classes than in any other.

Furthermore, after learning mathematics in the setting, 4% of the pupils reported enjoying the subject.

Additionally, 7% more Year 10 students said they thought mathematics was an interesting subject. These pupils were able to understand and draw connections while simultaneously enjoying math classes thanks to the interaction between mathematics and the game scenario.

5. CONCLUSION

The development of mathematical thinking was linked to the pupils' confidence in their ability to master mathematics in a sporting setting. The results of this study indicate that students may have felt more confident when expressing their mathematical ideas in a sporting setting. It may be said that the athletic setting made it possible for these pupils to appreciate the value of mathematics outside of the classroom, as evidenced by the five percent increase in this percentage. Students should consider applications of mathematics outside of the classroom. The results also imply that students' involvement level rose as more of them felt at ease and enjoyed math classes. Therefore, it can be said that students' attitudes toward learning mathematics increased along with their confidence, recognition of the value of mathematics, and participation in math classes. There were some restrictions on this study. 54 pupils from a single school and year level made up the Year 10 cohort. Students from various schools and year levels may be the subject of future studies.

The questionnaire's use of closed-ended questions prevented participants from adding comments or explanations. Furthermore, no remarks regarding the students' opinions of employing mathematics to build the field were included in the questionnaire. Additionally, participants may have become weary due to the questionnaire's forty-four statements. To delve deeper into these difficulties, future study could minimize the number of items and supplement the questionnaire with interviews.

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