Attitudes Toward Mathematics of Lower Secondary Education Students in Korca Region

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Abstract

The lower secondary education plays a crucial role in overall education. It represents an important phase in a students' mathematical lifetime which has been shown to have a considerable impact on students' performance and attitudes to mathematics. The current study is aiming to explore the factors that affect attitudes toward math among 221 students from 6 to 9 grades. An adapted questionnaire of 20-items (short ATMI) covering four domains: motivation, self-confidence, value and enjoyment were used in this case. Data analysis demonstrated that lower secondary education students have a positive attitude toward mathematics in the four domains of short ATMI. The Mann-Whitney U Test revealed that gender does not affect students' attitudes toward mathematics. Meanwhile a significant difference was revealed in domains of Value and Enjoyment between students in private and public school with a small effect size.

1. Introduction

Understanding the importance of a positive attitude toward learning and fostering their development among students is considered as a part of effective teaching of mathematics and science. The question is: Do our students from lower secondary education (LSE) have a positive attitude toward mathematics? Are our teachers doing a good work related to this? Are our curricula good enough for our students? Because, recently the performance of Albanian students in international mathematics assessments has been unsatisfactory. The Albanian students have been placed below most of those in the other developed nations in the Organization for Economic Cooperation and Development (OECD, 2023) by the Program for International Student Assessment (PISA), a system of international assessments that focuses on 15-year-olds' capabilities in reading, mathematics and science.

A vast researches had revealed many factors exerting influence on attitudes toward mathematics such as: math course level, teacher practices, gender, parental influence, academic achievement, motivation, anxiety, school type, ect. Influence of motivation on the perception of mathematics by secondary school students was studied by Hossein-Mohand H et al. (2023). In their paper was revealed that student motivation appears to be significantly related to perceptions of teaching practices and the use of resources for study. Students' motivation in mathematics and their willingness to engage in it including attitudes, emotions and self-related beliefs at the end of students' first year of secondary education in Ireland, were investigated by (Ryan, et.al., 2022), the results of this study showed high levels of student engagement, motivation and positive self-belief in mathematics, despite recorded declines in mathematical performance after a full year's instruction. Also this study highlights a gender disparity in mathematics self-beliefs, particularly in relation to self-efficacy, self-concept, and anxiety.

Meanwhile, related to gender Galende et al. (2020) reported more positive attitudes toward mathematics in males compared to females in secondary school students.

Garo, (2008) reported that Compared to Americans, Albanian students of 9th grade seem more satisfied with being in school and learning mathematics. At Kacerja (2011) a qualitative investigation among Albanian students' motives for preferring certain real-life situations to be used in school mathematics, and possible connections of these motives to characteristics and issues within Albanian society were studied. This research it is based on realistic interviews with students from Grades 8 and 9 in a school in the district of Shkodra in northern Albania. Also results related to students' preferences for real-life situations in mathematics and its gender and school location dimension studied by Kacerja, (2013) revealed a hierarchy of preferences of contextual situations used in Mathematics and items related to students' affiliation with modern technologies

were highly preferred. Results of PISA 2000 study placed Albania among four countries which scored lowest on students' sense of enjoying school. Also, results showed that Albanian students which show greater interest in and enjoyment of mathematics are inclined to achieve better results than those who show lower interest in and enjoyment of mathematics (Mita, 2001). Harizaj, (2011) presents a view of the results and progress of Albania in PISA, (2009) and a comparison made between mathematics results in Pisa 2000 and 2009 showed a decrease of 4 points. Results revealed that according to data analysis on the three domains of assessment, private schools achieved higher results. Likewise, gender differences in mathematics performance were revealed where girls outperformed boys by 11 score point.

Recently, (Japelj Pavešić, et. al., (2022)) at chapter Students' Interests, Motivation, and Self-beliefs of Dinaric Perspectives on TIMSS 2019, Teaching and Learning Mathematics and Science in South-Eastern Europe from IEA Research for Education, revealed related to grade 4 students (pp.94) that:

> *In comparison to other systems in the Dinaric region, Albanian students had very strong positive attitudes toward mathematics and science, but, conversely, they reported the lowest confidence in mathematics and science, and their science achievement was negatively related to parents' perceptions of their school. When assuming all other factors were equal for all students, higher mathematics achievement was predicted for students who more often reported liking to learn mathematics, who were more confident in mathematics, and who had more home learning resources, but, curiously, achievement was also related to a lower sense of school belonging. Higher science achievement was predicted for students who were more confident in science and had more home learning resources.*

But which is the situation among students from 6 to 9 grades, what is their attitude toward mathematics, is there any difference between males and females, or between public and private school? Wanting to have a broad overview related to lower secondary education students' attitudes the following research questions were raised.

Research questions

1. What is the students' attitude toward math as measured by short ATMI among lower secondary education students?

2. Is there a difference in each domain of attitudes toward math between male and female lower secondary education students?

3. Is there a difference in each domain of attitudes toward math based on school (public, private) within lower secondary education students?

2. Methodology

Sample

This research study was conducted during the school year of 2022-2023, with a sample of 221 lower secondary education students (n = 118 (53.4 %) females; 103 (46.6 %) males) enrolled in various lower secondary education institutions in Korca region.

Instrumentation

Achieving the objective of the current study depended on using the adapted version made by Klanderman et.al (2019) to a survey originally developed by Tapia (1996) and later shortened by Lim and Chapman (2015). The adapted questionnaire contains 20-items (short ATMI) covering four dimensions/domains: motivation, self-confidence, value and enjoyment.

The 20-item questionnaire is a five-point Likert scale; ranging from 1 = "strongly disagree" to 5 = "strongly Agree". All positive items were scored normally from 1 to 5, on the other hand, the negative items were scored reversely.

Data collection

The short ATMI was designed on Google forms with a full description of the purpose of the study, and the procedure for answering the questions. After receiving permission, the researcher posted the link of the short ATMI with guidelines and were available during administering the questionnaire to answer any concerns or questions. Many students from different schools and grades responded to the questionnaire. All collected data was transferred to SPSS version 20 for analysis and conclusion.

3. Data Analysis and Findings

A reliable Cronbach's alpha values were obtained for the overall scale (0.898). Descriptive statistics were also computed to analyze the mean and standard deviation for each of the domains.

Table 1 Descriptive statistics and Reliabilities for short ATMI domains

Domain	k*	Mean	SD	α
Self-confidence	5	3.6	0.87293	.844
Value	5	4.2	0.70005	.845
Enjoyment	5	3.7	0.74685	.751
Motivation	5	3.9	0.80974	.692
All 20 items				**0.898**

*k indicates number of items that make up each domain

To answer research question 1, the mean score (table 1) was calculated for all four domains of the short ATMI. Data analysis revealed that lower secondary education students in the Korca region in general have a positive attitude toward math in all domains. For the domain Self-confidence, (M = 3.6, SD = 0.87293), which represents high level of students' confidence and self-concept of their performance in mathematics. For the domain Value (M=4.2, SD=0.70005) students has shown high level of beliefs on the usefulness, relevance and worth of mathematics in their life now and in the future. For the domain of Enjoyment (M=3.7, SD=0.74685) high level of students' enjoyment working mathematics, and also a high level on interest in mathematics and desire to pursue studies in mathematics at dimension of Motivation (M=3.9, SD=0.80974).

To answer research question 2: Is there a difference in each domain of attitudes toward math between male and female lower secondary education students?, independent samples Mann-Whitney U test is performed and results are presented in table 2.

Table 2 Mann-Whitney U Test results for each domain related to gender

Domain	Gender	N	Mean Rank	U	Z	Asymp. Sig.
	Male	103	119.80			
Self-confidence	Female	118	103.32	5171	-1.916	0.055
	Total	221				
	Male	103	111.18			
Value	Female	118	110.84	6058.5	-0.039	0.969
	Total	221				
	Male	103	112.79			
Enjoyment	Female	118	109.44	5893	-0.389	0.697
	Total	221				
	Male	103	110.84			
Motivation	Female	118	111.14	6061	-0.035	0.972
	Total	221				

In the four dimensions/domains Self-confidence (U=5171, Z=-1.916, p=0.055), Value (U=6058.5, Z=-0.039, p=0.969), Enjoyment (U=5893, Z=-0.389, p=0.697) and Motivation (U=6061, Z=-0.035, p=0.9720) findings reveal no significant difference between males and females.

To evaluate the difference between private and public schools in each domains of short ATMI (research question 3), Mann-Whitney U Test was utilized and findings (Table 3) reveal in domains Self-confidence (U=5274.5, Z=-1.741, p=.082) and Motivation (U=6012.5, Z=-0.186, p=.852) no significant difference.

While findings reveal significant difference in domains of Value between students in private school (Median=4.2 n=114) and public school (Median=4.4, n=107), U=5105.5, Z=-2.103, p=.035, with a small effect size r=0.14 and Enjoyment between students in private school (Median=3.6, n=114) and public school (Median=4, n=107), U=4524.5, Z=-3.326, p=.001, with a small effect size r=0.22.

Table 3 Mann-Whitney U Test results for each domain related to school

Domain	School	N	Mean Rank	U	Z	Asymp. Sig.
Self-confidence	Private	114	103.77	5274.5	-1.741	.082
	Public	107	118.71			
	Total	221				
Value	Private	114	102.29	5105.5	-2.103	.035
	Public	107	120.29			
	Total	221				
Enjoyment	Private	114	97.19	4524.5	-3.326	.001
	Public	107	125.71			
	Total	221				
Motivation	Private	114	111.76	6012.5	-0.186	.852
	Public	107	110.19			
	Total	221				

4.   Conclusions

The lower secondary education students' attitudes were examined related to posed research questions. Based on the findings in the previous sections, we bring out the following conclusions.

The findings revealed that LSE students in the Korca region show a positive attitude toward math in the fourth domains of short ATMI, which suggests that students have moderate to high self-confidence, motivation, value and enjoyment of learning math.

Related to differences among males and females the Mann-Whitney U Test applied in each of the four domains revealed no significant difference in the four domains of short ATMI between males and females who participated in the study.

No significant difference were the findings in domains of Self-confidence and Motivation between students in private and public schools. The two domains revealing a significant difference between students in private and public schools were Value and Enjoyment.

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