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Original scientific paper

Learner Motivation, Perception of the Primary School Teachers' Practices, and Students' Experience of Self-Efficacy in Mathematics and the Sciences

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Extended summary

The goal of the research presented in this paper was to determine the correlations among students' motivation for learning, their perception of teachers' practices in class, and student self-efficacy beliefs as well as the presence of these dimensions relative to students' attitudes towards mathematics and science lessons. The results of the secondary data analysis from questionnaires for students obtained in the international research TIMSS 2015 (Trends in International Mathematics and Science Study) are presented in this paper. The representative national sample (N=4036; 48,8 % students) included students from 192 fourth-grade classes in 160 primary schools in Serbia.

Compared to the previous research cycle, in this research cycle the students from Serbia made considerable progress in some areas of mathematics and sciences (according to the previously conducted analysis of the TIMSS 2015 research results, the progress was attributed to the shift of focus and changes in teaching practice of primary school teachers). The aim of the paper is to identify students' attitudes towards mathematics and sciences teaching. Their responses were analyzed by applying the following indicators: Student motivation for learning mathematics/science (level of enjoyment, level of interest in the content, affective attitude towards lesson content); Students' evaluation of teachers' actions at mathematics/science classes (teacher expectations, Učeničke procene postupaka nastavnika na časovima matematike/prirodnih nauka (očekivanja učitelja, whether lessons are interesting or not, understanding teachers' manner of speaking, teacher support of students, attitudes towards mistakes); Student experience of self-efficacy in mathematics/sciences (perception of efficacy, learning difficulties).

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The responses to six questions from the questionnaire used in the TIMSS research in the form of a Likert Scale were analyzed in detail. Frequency analysis, the percentage and Pearson's correlation coefficient were the instruments used for data analysis.

The researchers analyzed the correlation among the students' self-efficacy beliefs regarding mathematics and sciences, their motivation for learning, and their perception of teachers' practices in class. The results confirmed the correlation between students' motivation for learning and the self-efficacy beliefs and their perception of teachers' practices in both mathematics and science classes. A higher level of self-efficacy directly correlates with a higher level of motivation. The students who are strongly motivated to learn mathematics and sciences have a positive perception of teachers' practices in class. There is a relatively low correlation between the perception of teachers' practices and students' experience of self-efficacy in learning mathematics and the sciences.

The analysis of the responses showed that there is a very small difference in the representation of the responses regarding the motivation for learning the two subjects. Approximately one half of the students expressed a high level of motivation for learning mathematics and the sciences. The majority of the students have a positive perception of their teachers' practices in class. More than three-thirds of the respondents have a very positive opinion about their teachers' practices, whereas very few respondents had a negative opinion, which is indicative of the lack of critical thinking among the students. The respondents also experience a high level of self-efficacy (very high for approximately a half of respondents) in learning mathematics and sciences, while the percentage of students experiencing a low level of self-efficacy is small. No differences were identified relative to school subjects in question.

The findings on self-efficacy correlate with the findings on learning motivation. Over three-thirds of students are highly motivated and experience a high level of self-efficacy in learning mathematics, whereas the percentage of students with a high level of motivation and the feeling of self-efficacy in learning the sciences is even higher. There is a high correlation between the experience of self-efficacy and the motivation for learning mathematics and the sciences.

The frequency of student responses relative to specific statements in the questionaire was also analyzed in order to obtain a deeper insight into specific aspects of students' attitudes towards learning mathematics and the sciences. Very small differences were identified in the representation of the reponses regarding the motivation relative to the examined school subjects. The students expressed a very high level of motivation, while their reponses went in favor of the imortance of interesting content of these school subjects, a research-oriented approach in the sciences, and problem-solving in mathematics.

No differences were identified in the perceptions of teachers' practices in mathematics and science classes, and in the experience of self-efficacy. The majority of the respondents said that their teachers explained well both mathematics and the sciences, and that they gave interesting tasks to their students in the science classes.

As far as self-efficacy is concerned, the majority of the respondents claimed that they learned mathematics quickly and easily. Similarly, the majority of the respondents stated that they were successful in learning the sciences.

The data obtained in Serbia were compared with the data from other countries included in the TIMSS 2015 project. The advantages and disadvantages of the applied methodology are also discussed in the paper. The suggestions for obtaining more precise and comprehensive data in future research are offered as well to enable a deeper insight into the correlations among different aspects of teaching and facilitate the understanding of the roles of the key actors in the acquisition of knowledge.

Key words: teaching mathematics and science, student attitudes, learner motivation, perception of teachers' practices, self-efficacy

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