Teaching Innovations, Volume 36, Issue 1, pp. 133–149
DOI: 10.5937/inovacije2301133V

Dragiša S. Vučinić[1]
Zvezdan M. Arsić
University of Priština – Kosovska Mitrovica, Faculty of Philosophy, Kosovska Mitrovica, Serbia

Radovan M. Antonijević
University of Belgrade, Faculty of Philosophy, Belgrade, Serbia

Original research paper

Paper received: Oct 16 2022
Paper accepted: Mar 15 2023
Article Published: Apr 20 2023

Motivational Actions of Mathematics Teachers – Students' Perspective

Extended summary

The authors' determination to conduct this survey arises from two reasons: importance of mathematics education in the modern world, and importance of motivation in the learning process. The problem of this research arises from different studies which indicate a low level of motivation of the students in the higher grades of primary school for studying mathematical content (Pavlović-Babić, Baucal, 2013; Vučinić, 2018; Ekmekci& Serrano, 2022).

The aim of the survey was to determine the quality of the mathematics teachers' motivational procedures in the higher grades of primary school. The quality of the teachers' motivational actions was determined based on the students' assessments of the teachers' work methods and behavior in the classroom. In accordance with this defined goal, two research tasks were set: (1) to determine students' assessments of the motivational actions of mathematics teachers; (2) on the basis of student evaluations, to determine the relationship between the teacher's motivational actions and the level of achievement of students in mathematics.

The research sample included 570 seventh-grade students from 114 classes, from the central and southern part of the Republic of Serbia. Using the method of random sampling, 5 students from each class participated in the survey.

Two research techniques were used in the research, questionnaire and scaling. The constructed research instrument represents a combination of the survey questionnaire and a five-

1 vucinic_dragisa@yahoo.com

point Likert-type rating scale. The questions in the questionnaire determined the social and demographic characteristics of the students. The content assessment scale consists of 49 items, structured within seven motivational areas: 1) teacher's attitude towards students; (2) understanding and appreciating the individual differences of students; (3) the importance of the concept of time in learning mathematics; (4) connecting mathematical contents with real situations; (5) diversity of teaching methods, forms of interaction and teaching aids; (6) implementation of interesting teaching contents and activities; and (7) monitoring and evaluation of students. The quality of teachers' motivational actions and behavior was assessed based on their frequency in teaching and extracurricular activities.

On the basis of the results obtained in the research, it was established that the examined students differently evaluate the motivational actions of mathematics teachers. According to students' evaluation, it can be assumed that there are three groups of teachers, with differences among them in relation to the applied motivational models in teaching. The first group includes teachers that most often use traditional motivational methods. These teachers take a rigid attitude towards students, control students more often, do not respect individual differences in students, and others. The second group includes teachers who, based on student assessments, occasionally include various motivational procedures in teaching activities. The third group consists of teachers who cultivate a positive attitude towards students, classify mathematical requirements according to the individual abilities of students. They often use different motivational models, aimed at developing students' interest in learning mathematical content. The analysis of the obtained results identified the connection between the teachers' motivational actions and the students' level of achievement. A higher level of achievement in mathematics was found in students whose teachers cultivate a positive attitude towards them, understand their needs and problems and who motivate students in different ways and develop their interests in learning mathematical content. On the other hand, students who observed that high-quality motivational models are not often represented in mathematics classes, were found to have a lower level of mathematical achievements. The obtained results indicate the need to provide support to teachers to understand the significant motivation in teaching mathematics. Accordingly, it is necessary to draw more attention to understanding the individual characteristics of students and the use of different motivational models in teaching mathematics. The results obtained in this research have a broader importance. They indicate the need for a unique and systematic approach to all relevant factors in the organization and implementation of teaching, with the aim of developing students' mathematical interests. Also, these results indicate the need to initiate various researches in the context of the problem of learning mathematical content for students in the higher grades of primary school.

Keywords: motivation, teaching mathematics, teachers' actions; achievements of senior elementary school students

References

- Antonijević, R. (2005). Koncepcija istraživanja TIMSS 2003.U: Antonijević, R., Janjetović, D. (prir). *TIMSS 2003 u Srbiji* (13–33). Beograd: Institut za pedagoška istraživanja.
- Antonijević, R. (2010). Karakteristike motivacije u procesu vaspitanja. *Nastava i vaspitanje*. 1 (59), 54–71.
- Anthony, G. & Walshaw, M. (2009). Characteristics of effective pedagogy for mathematics education. In: Forgasz, H., Barkatsas, T., Bishop, A., Clarke, B., Sullivan, P., Keast, S., Seah, W. T. & Willis, S. (Eds.). *Research in mathematics education in Australasia 2004–2007*. (195–222). Rotterdam Netherlands: Sense.
- Aunola, K., Viljaranta, J., Lehtinen, E. & Nurmi, J.E. (2013). The role of maternal support of competence, autonomy and relatedness in children's interests and mastery orientation. *Learning and Individual Differences.* 25, 171–177.
- Boekaerts, M., Cascallar, E. (2006). How far have we moved toward the integration of theory and practice in self-regulation? *Educational Psychology Review*. 18 (3), 199–210.
- Charanchi, A. A. (2011). Catalogue of generators of interest in mathematics. *JORIND*. 9 (2), ISSN 1596-8308. Retrieved May 12, 2015. from: www.ajol.info/journals/jorind
- Dagnew, A. (2011). *Attitude of teachers towards the use of active learning methods*. Retrieved, 5. 2. 2013.from: Vetrieducational.com/wp-conten/uploads2/*Journal.*4.
- Dejić, M. i sar. (2009). *Matematička darovitost i kreativnost*. Pančevo: Regionalni centar za talente Mihajlo Pupin.
- Divjak, B., Ostroški, M. (2009). Learning outcomes in mathematics:case study of their implementation and evaluation by using e-learning. U: Pavlekovic, M. (ur.). *The second international scientific colloquium Mathematics and Children (Learning out-comes)* (65–76). Zagreb: Element.
- Egerić, M. R. (2000). Domaći zadaci učenika. *Nastava i vaspitanje*. 49 (4), 532–542.
- Ekmekci, A.& Serrano, D. M. (2022). The impact of teacher quality on student motivation, achievement, and persistence in science and mathematics. *Education Sciences*, 12 (10), 1–21. https://doi.org/10.3390/educsci12100649
- Elliot, A. J. (2006). The hierarchical model of approach-avoidance motivation. *Motivation and Emotion*. (30), 111–116
- Fredricks, J. A., Wang, M.-T., Schall Linn, J., Hofkens, T. L.,Sung, H., Parr, A. & Allerton, J. (2016). Using qualitative methods to develop a survey measure of math and science engagement. *Learning and Instruction*. 43, 5–15. https://doi.org/j.learninstruc.
- Frenzel, A. C., Pekrun, R. & Goetz, T. (2007). The Control-Value Theory of Achievement Emotions: *An Integrative Approach to Emotions in Education.* 13–36.
- Frenzel., A., Thomas, G., Reinhard, P. & Watt, H. (2010). Development of mathematics interest in adolescence: Influences of gender, family, and school context. *Journal of Research on Adolescence.* 20 (2), 507–537.

- Frenzel, A., Pekrun, R., Barchfeld, P. & Perry, R. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology*. (36), 36–48.
- Gašić-Pavišić, S. i Stanković, D. (2012). Obrazovna postignuća učenika iz Srbije u istraživanju TIMSS 2011.*Zbornik Instituta za pedagoška istraživanja*, 44 (2), 243–265.
- Gojkov, G. (2003). *Dokimologija*. Vršac: Viša škola za obrazovanje vaspitača.
- Hidi, S. (2006). Interest: A unique motivational variable. *Educational Research Review*. 1, 69–82.
- Hidi, S. & Harackiewicz, J. M. (2000). Motivating the academically unmotivated: A critical issue for the 21st century. *Review of Educational Research*. 70, 151–179.
- Ivić, I., Pešikan, A. i Antić, S. (2001). *Aktivno učenje 2. Priručnik za primenu metoda aktivnog učenja/nastave*. Beograd: Institut za psihologiju, Ministarstvo prosvete i sporta Republike Srbije i Ministarstvo za prosvjetu i nauku Crne Gore.
- Keitel, C. (2006). Mathematics, Knowledge and Political Power.In: Maasz, J. & Schloeglmann, W. (Eds.). *New Mathematics Education Research and Practice* (11–22). Rotterdam: Sense Publishers.
- Kiamanesh, A. R. (2004). Factors affecting Iranian students' achievement in mathematics. In: Papanastasiou, C. (Ed.). *IEA International Research Conference – Proceedings of the IRC-2004 TIMSS*, *1* (157–169). Nicosia: Cyprus University Press.
- Klang, N., Natalia, K., Wiggo, K., Pia, E. & Karlberg, M. (2021). Mathematical Problem-Solving Trough Cooperative Learning – The Importance of Peer Acceptance and Friendships. *Frontiers in Education*, 6. https://doi.org/10.3389/feduc.2021.710296
- Kovač-Cerović, T., Cenerić, I. i Jokić, T. (2017). *Kako do kvalitetne dopunske nastave – oslonci za unapređenje i primeri dobre prakse*. Beograd: Centar za obrazovne politike.
- Kubat, U. (2018). Identifying the Individual Differences Among Students During Learning and Teaching Process by Science Teachers. *International Journal of Research in Educational and Science*, 4(1), 30–38. https://doi.org/10.21890/ijres.369746
- Lalić-Vučetić, N. (2015). *Postupci nastavnika u podsticanju motivacije učenika za učenja* (doktorska disertacija). Beograd: Filozofski fakultet.
- Lazarides, R., Dicke, A.-L., Rubach, C. & Eccles, J. S. (2020). Profiles of motivational beliefs in math: Exploring their development, relations to student-perceived classroom characteristics, and impact on future career aspirations and choices. *Journal of Educational Psychology*. 112 (1), 70–92. https://doi.org/10.1037/edu0000368
- Lawrence, M., S. (2020). A theatre of mathematical history – a historical memoir. Gde možemo da naučimo matematiku – istorijski memorijal. *Inovacije u nastavi*. 33 (1), 123–135.
- Mata, M. L., Monteiro, V. & Peixoto, F. (2012). Attitudes towards Mathematics: Effects of Individual, Motivational, and Social Support Factors. *Child Development Research*, 1–10. https://doi.org/10.1155/2012/876028

- McCarthy, R. & Slater, R. (2010). Beyond Smash and Crash: Part Two. *Technology & Engineering Teacher*. 70 (4), 25–33.
- Middleton. A. J., M. Pantziara & Qiaoping, Z. (2016). Attitudes, Beliefs, Motivation and Identity in Mathematics Education. In: *Attitudes, Beliefs, Motivation and Identity in Mathematics Education. ICME-13 Topical Surveys*. Springer, Cham. https://doi.org/10.1007/978-3-319-32811-9_1
- Mikk, J. (2000). *Textbook: Research and Writing*. New York: Peter Lan.
- Mathew, T. (2009). *Effective Teaching: A measure of excellence.* New Delhi: S Chand and Company Ltd.
- Nikolić, N. (2018). Kvalitet problemski orijentisane nastave i postignuće učenika. *Inovacije u nastavi*. 4, 1–14
- Odili, G. O. (2006). *Mathematics in Nigeria Secondary Schools*. Port-Harcourt: Anachuna Educational Books.
- Pavlović-Babić, D., Baucal, A. (2013). PISA 2012 u Srbiji: prvi rezultati: *Podrži me, inspiriši me*. Beograd: Institut za psihologiju Filozofskog fakulteta u Beogradu – Centar za primenjenu psihologiju.
- Puzić, S., Baranović, B. (2012). Društveni aspekti matematičkog obrazovanja. *Revija za sociologiju*. 42, 161–186.
- Sarrazin, P., Tessier, D., Pelletier, L., Trouilloud, D. & J. Chanal (2006). The Effects of teachers' expectations about students' motivation on teachers' autonomy-supportive and controlling behaviors. *International Journal of Sport and Exercise Psychology*, *Fitness Information Technology*. 4, 283–301.
- Schwartz, A. E. (2000). Axing math anxiety. *Education Digest*. 65 (5), 62–65.
- Sofroniou, A. & Konstantinos, P. (2016). Investigating the Effectiveness of Group Work in Mathematics.*Education sciences*.6 (3), 30. https://doi.org/10.3390/educsci6030030
- Šefer, J., Radišić, J. (2013). Podsticanje stvaralaštva, inicijative i saradnje u školi – perspektiva učenika. *Nastava i vaspitanje*. 62 (4), 553–575.
- Špijunović, K., Maričić, S. (2016). *Metodika početne nastave matematike*. Užice: Univerzitet u Kragujevcu, Učiteljski fakultet u Užicu.
- Tessier, D. & Sarrazin, P. (2008). The effects of an experimental programme to support students' autonomy on the overt behaviours of physical education teachers.*European Journal of Psychology of Education*. 3 (23), 239–253.
- Vujisić-Živković, N. (2013). Interesovanja u nastavi i „učenici novog milenijuma": mogu li stari didaktički principi da pomognu u rešavanju savremenih pedagoških problema. U: Potkonjak, N. (ur.). *Obrazovne inovacije u informacionom društvu* (231–248).Beograd: Srpska akademija obrazovanja.
- Vučinić, D. (2018).*Uloga nastavnika i uspeh učenika u nastavi matematike* (doktorska disertacija). Beograd: Filozofski fakultet.

- Wang, M.-T., Fredricks, J. A., Ye, F., Hofkens, T. L. & Linn,J. S. (2016). The math and science engagement scales: Scale development, validation, and psychometric properties. *Learning and Instruction*. 43, 16–26. https://doi.org/10.1016/j.learninstruc.2016.01.008
- Woodrow, D. (2003). Mathematics, Mathematics Education and Economic Conditions. *Second International Handbook of Mathematics Education*. 9–30.
- Xia, Q., Yin, H., Hu, R., Li, X. & Shang, J. (2022). Motivation, Engagement, and Mathematics Achievement: An Exploratory Study Among Chinese Primary Students. *SAGEOpen*. 12 (4). https://doi.org/10.1177/21582440221134609