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Predicting Teachers' Acceptance to Use Computers at Traditional and Innovative Levels in Teaching Mathematics in Serbia

Extended summary

The aim of this paper is to determine the acceptance and predict the use of computers at the traditional and innovative levels in teaching mathematics by in-service and pre-service teachers in Serbia. Various studies have shown that the use of information and communication technologies (ICT) in teaching mathematics has the potential to improve the learning process, strengthen and transform teaching practice. Some researchers recognized two levels of computer use in teaching mathematics, the traditional and the innovative level. The use of computers at the traditional level includes the use of ICT to support teaching led by the teacher using the frontal form of teaching through lectures, which aims to achieve the same traditional goals without significant changes in class activities. The use of computers at the innovative level necessitates ICT-based learning to support innovative learning, with the aim of achieving educational goals based on the needs of the current knowledge in the society and lifelong learning goals. On the other hand, practice and scientific research demonstrate that computers are utilized sparingly, mostly at traditional level, or not at all in teaching mathematics.

Research to date has shown that teachers' intention to use computers in teaching is a very important variable as it has the greatest impact on acceptance. The tasks of this study were to: determine the predictors that influence the intention of the in-service and pre-service mathematics teachers to use computers; establish a research model; test the validity of the model; identify the differences in the predictors of intention between pre-service and in-service math teachers. In this study, a technology acceptance model (TAM) for testing predic-

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tors of participants' intention was used, extended by external variables taken from appropriate theories and adapted to mathematics teaching. The following predictors of intention to use computers at traditional (BIT) and innovative level (BII) were examined: participants' attitudes towards computer use (ATCU), their perceived ease of use (PEU), perceived usefulness (PU), technological pedagogical content knowledge of mathematics (TPCK), subjective norm (SN) and technological complexity (TC).

The sample consisted of 228 in-service and pre-service mathematics teachers (82 of them were teachers of mathematics), with 18.3% (15) males among in-service teachers and 15.1% (22) among pre-service teachers. The average age of the pre-service teachers was 22.77 (SD = 1.52) years. and of in-service teachers 42.51 (SD = 10.6) years. Students attended the final years of the faculty and teachers had an average of 14.54 (SD = 9.85) years of service. The analysis of the structural equation modelling indicated that the proposed model has a good fit and that the given variables are significant predictors of the intention to use computers at the traditional and innovative levels in teaching mathematics. The results suggest that TAM variables (PEU, PU, ATCU), together with TPCK, SN and TC, are important predictors of the intention of the both categories of mathematics teachers to use computers at traditional level in teaching mathematics, and that the traditional use is a significant predictor of the innovative use. The results indicate that TPCK has the most significant and direct positive impact on BIT, both among in-service and pre-service teachers of mathematics, followed by PEU. All of the TAM model's hypotheses were confirmed for both groups of teachers in this study. TC significantly influences the PEU in both cases. On the other hand, the SN has no influence on ATCU in mathematics teaching, neither among in-service teachers nor among pre-service mathematics teachers.

However, the findings indicate that there are differences in the importance of both direct and indirect predictors between the two groups of teachers. For in-service mathematics teachers, important direct predictors of BII are their ATCU and BIT. Also, SN indirectly significantly influences ATCU through PU. On the other hand, the ATCU of the pre-service mathematics teachers and BIT do not have a significant impact on BII, and the SN does not affect PU. What has proven important for BII by the pre-service mathematics teachers is TPCK, which also affects their PU. ATCU significantly influenced BIT.

These findings suggest that the pre-service mathematics teacher education and professional development for in-service teachers should include, among other things, the development of the TPCK in mathematics, favorable attitudes about computer use, and examples of good practice in order to improve their acceptance of the computer use in teaching, at both traditional and innovative levels.

Keywords: innovative level of using computers, technology acceptance model, intention to use computers, mathematics instruction, traditional level of using computers

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