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## ***The Impact of Integrative Teaching in Physical Education and Science and Social Studies on the Quality of Students' Knowledge in the Field of Natural Sciences***

### **Extended summary**

The research examines the impact of integrative teaching of Physical Education and Science and Social Studies on the quality of the primary school students' knowledge of natural sciences, physics and biology, within the framework of the school subject Science and Social Studies.

The theoretical part of the paper is based on the results of various studies that have shown that in modern society the level of physical activity of the school-age children is low and that the knowledge that students acquire in schools in Serbia is not functional, especially in the field of natural sciences. In accordance with that, and relying on the recommendations given in the Teaching and Learning Program for the first cycle of primary education, an experimental program was designed to integrate teaching contents and classes realized outside the classroom wherever possible.

The research was conducted using an experiment with parallel groups. The sample consisted of N=128 primary school fourth-graders. There were 65 students in the experimental group and 63 students in the control group. In the experimental group, the classes of Physical Education and Science and Social Studies were held by implementing an experimental program – a teaching model integrating the content of natural sciences and physical education.

The content of Physical Education, which are integrated with the content of Science and Social Studies within the experimental model, refer to the topics of movement, functioning and

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movement of the human body, diet and the basics of healthy living, and they are implemented using the multimedia, various web tools, physical exercises, learning through movement (application of movement-based learning models such as Math & Movement and Movement-Based learning, then active learning based on the Hop Into Literacy model, etc.), and concrete examples of how science affects children's daily activities and movement.

The classes with the control group were held using traditional/common teaching methods, frontal teaching, without integrating the teaching content. At the beginning of the experimental part of the research, an initial test was performed in order to check the quality of students' knowledge and whether the groups are uniform. At the end of the experiment, the final testing of E and K groups was performed, which again measured the quality of students' knowledge.

The results indicate that there is a statistically significant difference in the quality of knowledge between the students in the experimental and control groups when it comes to the second and third level of knowledge according to the revised Bloom's taxonomy (reproductive knowledge and practical application knowledge). Our conclusion is that integrative teaching of Physical Education and Science and Social Studies leads to a better quality of students' knowledge. The students from experimental group, who learned the content of natural sciences in the classes of Science and Social Studies by using the integrative approach to Physical Education and Science and Social Studies, acquired better knowledge and achieved better results in terms of the level of reproduction and practical application of knowledge at the final test than the students in the control group. They were more successful in solving tasks requiring memorization of facts, critical thinking, creativity and divergent reasoning, solving problem tasks, and the practical application of knowledge in new and different everyday situations.

The results of this research may be important for researchers working at the faculties of education and looking for methods that could be useful for improving the education system in Serbia, as well as for educating future teachers who will work in primary schools. Also, these results can be an incentive to conduct similar research on a larger sample, so the newly obtained results could serve as a starting point for reforms in primary education, but also change the syllabus and the way of working at faculties of education in terms of applying more intensively this teaching model and studying didactic-methodological elements of movement-based learning. A systematic training of future teachers and development of their interdisciplinary competencies through initial education and quality continuing education during work can be important factors for a more frequent application of integrative teaching in practice, which would result in innovating teaching and improving its efficiency. Future research conducted in this area may provide new guidelines in the search for more efficient and productive learning strategies, which will provide students with the acquisition of better and more functional knowledge, but also increase their physical activity. This research also opens a number of issues that could be further explored, and related to: research into the possibilities of the integrative approach of Physical Education and Science and Social Studies to the development of competencies for the 21st century teachers and students; studying the combination and integration of more than two subjects with the application of the movement-based learning, etc. Also, future research could deal with the impact of integrative teaching of Physical Education and Science

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and Social Studies on the development and improvement of physical abilities, motor skills, habits. Knowledge, and health culture in order to preserve health and apply proper and regular physical exercise in modern living and working conditions.

**Keywords:** integrative teaching, Physical Education, the content of natural sciences in the classes of Science and Social Studies, quality of knowledge, experimental program.

## References

- Applebee, A. N., Adler, M. & Flihan, S. (2007). Interdisciplinary curricula in middle and high school classrooms: case studies of approaches to curriculum and instruction. *American Educational Research Journal*, 44 (4), 1002-1039.
- Baucal, A., Pavlović Babić, D. (2010). *PISA 2009 u Srbiji: prvi rezultati - Nauči me da mislim, nauči me da učim*. Beograd: Institut za psihologiju Filozofskog fakulteta u Beogradu i Centar za primenjenu psihologiju.
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M. & Rumble, M. (2012). Defining twenty-first century skills. In: Griffin, P., McGaw, B. & Care, E. (Eds.) *Assessment and teaching of 21st century skills* (17-66). Dordrecht: Springer.
- Blagdanić, S. (2009). Kvalitet niza zadataka objektivnog tipa u nastavi prirode i društva. *Inovacije u nastavi*, 23 (3), 40-50.
- Buchanan, A. M., Martin, E., Childress, R., Howard, C., Williams, L., Bedsole, B. & Ferry, M. (2002). Integrating Elementary Physical Education and Science: A Cooperative Problem-Solving Approach. *Journal of Physical Education, Recreation and Dance*, 73 (2), 31-36.
- Coral, J. & Lleixa, T. (2016). Physical education in content and language integrated learning: successful interaction between physical education and English as a foreign language. *International Journal of Bilingual Education and Bilingualism*, 19 (1), 108-126.
- Džinović Kojić, D. (2002). *Fizičko vaspitanje predškolskog deteta (metodički priručnik za učitelje i vaspitače)*. Beograd: Tipograf.
- Vilotijević, M., Vilotijević, N. (2016). *Modeli razvijajuće nastave II*. Beograd: Učiteljski fakultet.
- Gagen, L. & Getchell, N. (2008). Applying Newton's Apple to Elementary Physical Education. *Journal of Physical Education, Recreation and Dance*, 79 (8), 43-51.
- Gomez-Pinilla, F. & Hillman, C. (2013). The Influence of Exercise on Cognitive Abilities. *Comprehensive Physiology*, 3, 403-428.
- Harrell, P. E. (2010). Teaching an integrated science curriculum: linking teacher knowledge and teaching assignments. *Teacher Education*, 19 (1), 145-165.
- Hatch, G. M. & Smith, D. R. (2004) Integrating Physical Education, Math, and Physics. *Journal of Physical Education, Recreation & Dance*, 75 (1), 42-50.
- Kerry, T. (2011). *Cross-curricular teaching in the primary school: planning and facilitating imaginative lessons*. London: Routledge.

- 
- Kitchen, D. & Kitchen, J. K. (2013). Integrating physical education and mathematics: A collaborative approach to student learning. *Strategies: A Journal for Physical and Sport Educators*, 26 (1), 31-38.
  - Koontz, S. (2010). *Math & Movement training manual for elementary schools*. Ithaca, NY: Suzanne Kuntz.
  - Kopas-Vukašinić, E., Mihajlović, A. & Cekić-Jovanović, O. (2020). Teachers Attitudes about Integrated Approach in Teaching. *Pedagogy*, 92 (6), 858-871.
  - Lee, B. Y., Adam, A., Zenkov, E., Hertenstein, D., Ferguson, M. C., Wang, P. I., Wong, M. S., Wedlock, P., Nyathi, S., Gittelsohn, J., Falah-Fini, S., Bartsch, S. M., Cheskin, L.J., Brown ST. (2017). *Modeling The Economic And Health Impact Of Increasing Children's Physical Activity In The United States*. New York: Health affairs.
  - MacIver, D. J. (1990). Meeting the needs of young adolescents: advisory groups, interdisciplinary teaching teams, and school transition programs. *Phi Delta Kappan*, 71 (6), 458-464.
  - MacMath, S., Roberts, G., Wallace, J. & Chi, X. (2010). Curriculum integration and at-risk students. *British Journal of Special Education*, 37 (2), 87-94.
  - Maghnouj, S. et al. (2020). *OECD Reviews of Evaluation and Assessment in Education: Serbia, OECD Reviews of Evaluation and Assessment in Education*. Paris: OECD Publishing. Retrieved March 18, 2020. from www: <https://doi.org/10.1787/225350d9-en>.
  - Mäkinen, M. (2009). *Perspectives on teacher competences*. Retrieved July 16, 2019. from www: <https://www.european-agency.org/sites/default/files/Finland.pdf>.
  - Mandić, D. (2003). *Didaktičko-informatičke inovacije u obrazovanju*. Beograd: Mediagraf.
  - Markočić Dekanić, A., Gregurović, M., Batur, M. i Fulgosi, S. (2019). *PISA 2018: rezultati, odrednice i implikacije – Međunarodno istraživanje znanja i vještina učenika*. Zagreb: Nacionalni centar za vanjsko vrednovanje obrazovanja.
  - Mesaroš Živkov, A., Pavlov, S. i Milanović, M. (2018). Uticaj tradicionalnih dečjih pokretnih igara sa pevanjem na motorički razvoj predškolske dece. *Inovacije u nastavi*, 31 (2), 108-118.
  - Milanović, S. (2016). Efekti dopunskog metodičkog oblika rada na razvoj antropoloških obeležja školske dece. *Uzdanica*, 13 (2), 149-160.
  - Milanović-Nahod, S. (2005). Znanje od očekivanog do ostvarenog U: R. Antonijević, D. Janjatović (prir.). *TIMSS 2003 u Srbiji* (327-350). Beograd: Institut za pedagoška istraživanja.
  - Mullis, I. V. S., Martin, M. O., Foy, P. & Hooper, M. (2016). *TIMSS 2015 International Results in Mathematics*. Retrieved March 20, 2020. from Boston College, TIMSS & PIRLS International Study Center website: <http://timssandpirls.bc.edu/timss2015/international-results/>
  - *Pravilnik o nastavnom planu za prvi, drugi, treći i četvrti razred osnovnog obrazovanja i vaspitanja i nastavnom programu za treći razred osnovnog obrazovanja i vaspitanja* (2018). Službeni glasnik RS - Prosvetni glasnik, br. 1/2005, 15/2006, 2/2008, 2/2010, 7/2010, 3/2011 - dr. pravilnik, 7/2011 - dr. pravilnik, 1/2013, 11/2014, 11/2016, 10/17 i 12/2018.
  - Repko, A. F., Newell, W. H. & Szostak, R. (2011). Case studies in interdisciplinary research. *Reference & Research Book News*, 26 (2). Retrieved August 19, 2020 from www: <http://>
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go.galegroup.com/ps/i.do?id=GALE%7CA253496155&v=2.1&u=subd78095&it=r&p=AONE&sw=w&a sid=cf25e545583b39e7de2bf7a7d2f2f403.

- Richards, J. C. & Rodgers, T. (2001). *Approaches and Methods in Language Teaching. Second Edition*. New York: Cambridge University Press.
- Satiansiriwivat, S., Intorrathed, S. & Siriwan, S. (2018). Integration of agricultural knowledge with the Thai Language, Mathematics, and Science subjects for first-year elementary school of Thailand. *The New Educational Review*, 51 (1), 41–52.
- Sattelmair, J. & Ratey, J. J. (2009). Physically Active Play and Cognition: An Academic Matter? *American Journal of Play*, 1 (3), 365–374.
- *Strategija razvoja obrazovanja u Srbiji do 2020* (2012). Službeni glasnik RS, br. 107.
- Spremić-Solaković, A. (2009). Integrativna nastava kao sistemski način povezivanja znanja u nastavnom procesu. *Inovacije u osnovnoškolskom obrazovanju – vrednovanje* (400–409). Beograd: Učiteljski fakultet.
- Šekeljić, V. G., Stamatović, V. M. (2018). Obim i intenzitet motorne aktivnosti na časovima fizičkog vaspitanja. *Inovacije u nastavi*, 31 (2), 29–40.
- World Health Organization (2018). *Global action plan on physical activity 2018–2030: more active people for a healthier world*. Retrieved August 19, 2020. from www: <https://apps.who.int/iris/bitstream/handle/10665/272722/9789241514187-eng.pdf>.



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