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Integrating Mobile Technology in Teaching Physical Education[2]

Extended summary

Mobile technologies are becoming significantly important in teaching Physical Education. It has been observed that they can contribute to the culture of healthy living (Palmárová & Lovászová, 2012), as well as to raising ecological awareness and developing a sustainable relationship with nature (Uzunboylu et al., 2009). Owing to cloud computing, mobile technologies are omnipresent, economical and user-friendly for both teachers and students, but still not sufficiently used for teaching purposes (Ristić, 2018). Their successful implementation in educational institutions for the purpose of creating a stimulating educational environment is becoming imperative, whereas the models of their use represent a challenge.

Apart from the analysis of cloud computing service models and detection of educational potentials of mobile technologies, the aim of this paper is to analyse the mobile technology implementation models in teaching Physical Education. The paper represents a qualitative research which uses the modeling method, as well as the reinterpretation of the existing research.

The conducted analyses show that mobile technologies can improve Physical Education teaching and that they can be integrated through the two-phase implementation process. They can help students to: 1) develop and improve their potential for creative and in-depth thinking in order to implement specific skills, tactics and improve their efficiency; 2) collect, process, and interpret data; 3) take an active part in teaching and extra-curricular activities; 4) access relevant information for gaining more knowledge about different aspects of physical education, such as anatomy, physiology, the role of sports in society, health, as well as skills needed for per-

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forming specific activities and connecting physical education with other school subjects; 4) understand the importance of physical education, sports and dance for society; 5) access images and films dealing with different activities in order to improve their skills, strategies, choreography and physical exercise (Mimica-Ugrešić & Batarelo, 2005).

When it comes to teachers, they can use mobile technologies to: 1) diagnose students' anthropological status; 2) undertake biomechanical analysis of movement; 3) define and evaluate the frequency of physical load (e.g. pulse frequency and blood pressure values); 4) make digital and evaluate some video-clips showing specific movements, shaping exercises or body movement); 5) analyse movement stages by using animated images, evaluate various sports competitions by using appropriate software, such as games without borders; 6) create and use different documents including: diplomas, questionnaires, anthropometric measurement lists, files containing information about students' motor skills, team scores, competition systems, etc. (Ivanović, Ivanović, 2012).

It should be noted that what removes many obstacles in the two-phase implementation of mobile technologies is the fact that cloud computing has provided an alternative. We no longer need classic hardware and software. A portable mobile device such as a tablet or a smartphone will suffice. The first phase of the implementation involves the introduction of basic features that mobile devices possess (access to network resources, photography, video recording, communications, etc.). This phase does not require interactive applications and specific tools. The second phase of integration of mobile technologies in physical education is realised through the use of various mobile applications (web-tools). There are many web tools created by the systems such as Google Play, Apple Store and Microsoft Mobile Apps, but also out of the system, which teachers can use for preparation, realisation and evaluation of the teaching process. Many of the tools can be used by students as well.

The results of the analysis of the TPACK model for integration of mobile technologies in physical education indicate that this process is not easy and fast as teachers of physical education do not acquire advanced and specialised digital competences during initial education. The findings indicate that our schools do not have the necessary level of e-maturity, and that Physical Education teachers do not obtain advanced digital competences during their initial education.

It is necessary to emphasise that faculties and schools need constant social support and cooperation for systematic training of future teachers and development of their competences through a good-quality and continuous professional development during their work.

Keywords: physical education teaching, cloud computing, mobile technology, teachers, students.

References

- Al-Zoube, M. (2009) E-learning on the Cloud. *International Arab Journal of e-Technology*. 1 (2), 58–64. Retrieved May 12, 2018. from: http://www.iajet.org/iajet/iajet_files/vol.1/no.2/E-Learning%20on%20the%20Cloud.pdf.

- Archambault, L. M. & Barnett, J. H. (2010). Revisiting technological pedagogical content knowledge: Exploring the TPACK framework. *Computers & Education*. 55 (4), 1656–1662.

- Balanskat, A. (2013). *Introducing tablets in schools: The Acer-European Schoolnet tablet pilot*. Brussels: European Schoolnet. Retrieved June 12, 2018. from: http://files.eun.org/netbooks/TabletPilot_Evaluation_Report.pdf.

- Caldwell, H. & Bird, J. (2015). *Teaching with tablets*. Learning Matters.

- CARNET (2018). *Organizirajte svoj tim unutar projekta*. Retrieved June 22, 2018. from: http://elaboratorij.carnet.hr/trello-organizirajte-svoj-tim-unutar-projekta/.

- Di Costanzo, A., De Assuncao, M. D. & Buyya, R. (2009). Harnessing cloud technologies for a virtualized distributed computing infrastructure. *IEEE Internet Computing*. 13 (5), 24–33.

- Dumančić, M. (2017). Nastava i škola za net generacije. U: Matijević, M. (ur.). *Mobilne tehnologije u obrazovanju* (115–144). Zagreb: Učiteljski fakultet Sveučilišta u Zagrebu.

- Durando, M., Blamire, R., Balanskat, A. & Joyce, A. (2012). *E-mature schools in Europe. Insight-Knowledge building and exchange on ICT policy and practice*. Retrieved June 28, 2018. from: http://insight. eun. org/shared/data/pdf/emature_schools_in_europe_final. pdf.

- Džigurski, S., Simić, S., Marković, S., Šćepanović, D. (2013). *Istraživanje o upotrebi informaciono-komunikacionih tehnologija u školama u Srbiji*. Beograd: Tim za socijalno uključivanje i smanjenje siromaštva, Kabinet potpredsednice Vlade za evropske integracije.

- El-Hussein, M. O. M. & Cronje, J. C. (2010). Defining mobile learning in the higher education landscape. *Journal of Educational Technology & Society*.13 (3), 12.

- Gajević, A. (2009). *Fizička razvijenost i fizičke sposobnosti dece osnovnoškolskog uzrasta*. Beograd: Republički zavod za sport.

- Hardman, K. (2008). Physical education in schools: a global perspective. *Kinesiology*. 40 (1), 5–28.

- Hayes, E. & Silberman, L. (2007). Incorporating video games into physical education. *Journal of Physical Education, Recreation & Dance*. 78 (3), 18–24.

- Henderson, S. & Yeow, J. (2012). *iPad in education: A case study of iPad adoption and use in a primary school. In System science (hicss), 2012 45th hawaii international conference on* (78–87). IEEE. Retrieved May 28, 2018. from: www: http://ieeexplore.ieee.org/abstract/document/6148617/.

- Ivanović, M., Ivanović, U. (2012). Tehnika i informatika u obrazovanju. U: Golubović, D. (ur.). *Savremene informacione tehnologije u nastavi fizičkog vaspitanja* (737–748). Čačak: Tehnički fakultet Univerziteta u Kragujevcu.

- Jarvenpaa, S. L. & Lang, K. R. (2005). Managing the paradoxes of mobile technology. *Information systems management*. 22 (4), 7–23.

- Kohl III, H. W. & Cook, H. D. (Eds.). (2013). *Educating the student body: Taking physical activity and physical education to school*. National Academies Press.

- Markun-Puhan, N. (2012). Kako moderna tehnologija može oplemeniti nastavu tjelesnog odgoja. *Zbornik radova CARNetova korisnička konferencija CUC* (1–8). Retrieved June 2, 2018. from: https://cuc.carnet.hr/2012/images/33_markunpuhan0b7a.pdf

- Milanović, I., Radisavljević-Janić, S., Čaprić, G., Mirkov, D. (2016). *Priručnik za praćenje fizičkog razvoja i razvoja motoričkih sposobnosti učenika u nastavi fizičkog vaspitanja*. Beograd: Zavod za vrednovanje kvaliteta obrazovanja i vaspitanja.

- Mimica-Ugrešić, M. & Batarelo, I. (2005). Informacijska i komunikacijska tehnologija kao kros-kurikularna aktivnost u nastavi tjelesne i zdravstvene kulture. U: Findak, V. (ur.). *Zbornik radova „14. letnja škola kineziologa Republike Hrvatske“* (208–211). Poreč: Hrvatski kineziološki savez.

- Palmárová, V. & Lovászová, G. (2012). Mobile technology used in an adventurous outdoor learning activity: A Case Study. *Problems of Education in the 21st Century, Recent Issues in Education – 2012*. 44 (6), 64–71.

- Pegrum, M., Howitt, C. & Striepe, M. (2013). Learning to take the tablet: How pre-service teachers use iPads to facilitate their learning. *Australasian Journal of Educational Technology*. 29 (4), (464–479). Retrieved March 3, 2017. from: https://ajet.org.au/index.php/AJET/article/view/187.

- Popadić, D., Kuzmanović, D. (2016). *Mladi u svetu interneta: korišćenje digitalne tehnologije, rizici i zastupljenost digitalnog nasilja među učenicima u Srbiji*. Beograd: Ministarstvo prosvete, nauke i tehnološkog razvoja Republike Srbije, UNICEF.

- Ristić, M., Blagdanić, S. (2017). Nove perspektive u obrazovanju – vanučionička nastava u digitalnom okruženju. *Inovacije u nastavi*. XXX, 2017/2, 1–14. DOI:10.5937/inovacije1702001R.

- Ristić, M., Mandić, D. (2017). *Obrazovanje na daljinu*. Beograd: Učiteljski fakultet.

- Ristić, M. (2018). Digitalne kompetencije nastavnika i saradnika. U: Katić, V. (ur.). *XXIV skup Trendovi razvoja Digitalizacija visokog obrazovanja* (123–126). Kopaonik: Fakultet tehničkih nauka Univerziteta u Novom Sadu.

- Štihec, J. & Leskošek, B. (2004). Informacijska in komunikacijska tehnologija pri procesu športne vzgoje v šoli. In: Adamič Makuc, A., Medica, I., Labernik, Z. (Eds.). *Zbornik prispevkov 9* (11–19). Piran: MIRK.

- Stoković, G., Ristić, M. (2016). Razvoj digitalnih kompetencija nastavnika razredne nastave.U: Ristić, M. i Vujović, A. (ur.). *Zbornik sa međunarodnog naučnog skupa Didaktičko-metodički pristupi i strategije – podrška učenju i razvoju dece* (423–435). Beograd: Učiteljski fakultet.

- Sultan, N. (2010) Cloud computing for education: A new dawn?. *International Journal of Information Management.* (109–116). Retrieved May 20, 2018. from: http://www.sciencedirect.com/science/article/pii/S0268401209001170 (26. 1. 2014.).

- Uzunboylu, H., Cavus, N. & Ercag, E. (2009). Using mobile learning to increase environmental awareness. *Computers & Education*. 52 (2), 381–389.

- Vujin, V. (2013). *Elektronsko obrazovanje u računarskom oblaku*. Beograd: Zadužbina Andrejević.

- ZUOV (2018). *Nastavni planovi i programi – fizičko vaspitanje*. Retrieved June 3, 2018. from: http://zuov.gov.rs/zakoni-i-pravilnici/.