

A case study of the use of technology-digital assessment disks (DAD) to support teaching / coaching, learning and assessing in physical education and sport. “Easier Assessment for All?” An Innovative Digital Assessment Disk Program (“DAD”) employing “touch – screen” Technology

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Abstract

Despite developments in information and communications technology (ICT), current research on the use of ICT in physical education (PE) and sports coaching is limited in nature; primarily research has been confined to investigating the use of visual technology, particularly digital cameras. The purpose of this research was to examine the use of chosen digital assessment disks (“dad”) by 100 student teachers/coaches (referred to participants from final year Physical Education Sport Science-PESS and Sports Science and Management-SSM four year degree courses) in school/sports club based settings when completing professional work placement teaching practice (TP) for student teachers and work placement (WP) for sports coaches. Data was collected by questionnaires, work placement journals and interviews. Results showed that although these participants’ were convinced of the value of DAD in teaching/coaching and assessing PE and sport, and were likely to use DAD in the in future, they also recognised that there were several challenges that need to be addressed if the advantages of using DAD were to be realised. This is an interesting finding, highlighting the awareness of participants to potential issues associated with using DAD in teaching/coaching and assessing PE and sport. The experiences of the participant are presented as are the identified challenges and advantages are discussed with a view to their implications for using DAD in the future.

Keywords: Information Communication Technology, Digital Assessment Disks, Learning, Physical Education, Sports Coaching, Advantage, Challenge, and Potential

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Extended Abstract

A case study of the use of technology-digital assessment disks (DAD) to support teaching / coaching, learning and assessing in physical education and sport

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Introduction

In the 21st Century there has been considerable focus on the inclusion of ICT in teaching and coaching; with a significant drive worldwide to raise pupil achievement in schools and community sports through the use of ICT across all subject areas. The use of ICT can play an important role in creating an effective and adaptable learning environment, providing numerous opportunities for enhancing teaching, coaching, learning and assessment, which has the potential to increase learning opportunities for all learners in varied contexts (1 *Ertmer, P. A., Ottenbriet-Leftwich, A., & York, C. S. (2007)*). Goktas, Yidirim and Yidirim (2 2009) suggest that the integration of ICT enhances the quality of education by helping student teachers / coaches to do their job and by helping pupils / athletes learn more effectively. Thus, recent technological advancement has resulted in almost all of today's classrooms and training contexts requiring student teachers to embrace the use of ICT to support their teaching (3 *Tearle & Guilder, 2008*). Physical Education (PE) and sport are no exceptions, as studies have found that ICT can be beneficial in teaching and coaching (4 *McNeill & Fry, 2012*; 5 *Shumack & Reilly, 2011*). Littlejohn, Margaryan and Vojt (2010) have shown how technology, particularly digital cameras, at one school have been integrated effectively into PE and sport. Currently there is an increased opportunity for applying ICT in schools and community sport as a result of improved mobility of ICT tools (6 *Casey & Fletcher, 2011*). An increasing number of student PE teachers, sport coaches, pupils and athletes possess mobile devices which may be more readily used giving greater access to mobile technology, as identified by Almas and Nilsen (7 2006) on the employment of ICT in Australia.

Despite developments in technology, current research on the use of ICT in PE and sport is limited in nature; primarily research has been confined to investigating the use of visual technology, particularly digital cameras (8 *Bates, A. W. 2005*). There is no research specifically focused on the use of a broader range of technologies, which might be employed in teaching PE and coaching sport. One reason for this might be that, despite the increased availability of a range of technological applications, many PE teachers, student teachers and coaches are not utilising advances in technology to support or enhance sound pedagogical practices. Despite ever-increasing development of ICT appropriate for use to enhance and assist learning in school PE and coaching sport, the process of employing ICT does not seem to have become fully integrated into teaching PE and coaching sport.

If student PE teachers / coaches are going to employ relevant technologies, they need to understand how ICT can be used in rich and meaningful ways (9 *Keating and Evans, 2001*). Teacher / coach educators play a crucial role in improving student teachers/ coaches proficiency and ability to integrate a range of technologies into the curriculum. However, it has been suggested (e.g. 10 *McNeill, M. C. Mukherjee S., & Singh, G., 2010*) that teacher / coach education programmes do not provide student teachers / coaches with the necessary skills, competencies and experiences to prepare them to use ICTs effectively. Various challenges and advantages to the inclusion of ICT in initial teacher / coach education programmes have been identified. Goktas, Yidirim and Yidirim (11 2009) found that the main challenges identified for integrating ICT in initial teacher / coach education programmes were lack of in-service training, lack of appropriate software, materials and hardware. They suggested that if ICT is to be successfully adopted, schools / sporting authorities need to develop clear policies and guides to ensure ethical and safe use of ICT. Seferoglu (12 2007) examined student teachers perceptions of their self-efficacy in relation to computer use. He concluded that for students to use ICT effectively certain conditions were required including: sufficient funding, provision of training opportunity, and time for teachers to improve their technological skills, funding to secure software and hardware and institutional support.

The Digital Assessment Disk Program (DAD) program

Digital Assessment Disk Program “dad” is an example of technology enhanced teaching (“TET”), creative, and innovative assessments tool (13 Browne, 2014) for all those involved in assessing performance (PE teachers and sports coaches) regardless of discipline based on employed assessment criteria. The assessment criteria are also outcome based descriptors based on the identity of the task, the unique characteristic specific to the completion of the task, the principles of performance, the shared common attributes of the tasks, which also serve as key learning factors/ teaching points which are readily and observable by all concerned in the assessment process (manager/coach/teacher, worker/player/pupil, and other stakeholders: The coach/teacher, regardless of the standard of the team being coached, can adapt the “dad” system. The assessment information is presented in terms of observable outcomes allowing self or/and peer assessment, and provides a supportive, motivating training environment.

The “dad” assessment procedure: The assessors (teachers/coaches) determine the level (1 – 4, enthusiast, emerger, evolver and expert) they identify/measure / record the level at which that the pupil / athlete is performing in each of the elements being assessed. Touch screen technology allows permanent recording capture of the score. This rating is stored and kept on profile in both “dad” and CVS (excel) formats. On the completion of assessing each performer’s disk a visual individual profile is stored and can be conveniently retrieved. Where required games/activities can be identified to provide remediation and intervention resulting in individual pupil/players improved performance.

The “dad” is a unique, innovative, creative digital assessment disk system allowing the profiling / measuring, and provision of accurate assessment data related to the progress and performance level of each pupil or player by employing a game profile, and pupil / player profile. Principles of play, functional roles, and player’s current performance level can also be measured. “dad” has been developed by the studying alternative and authentic assessment methods over many years. The assessment system “dad” replaces the traditional pencil and paper protocol and overcomes many of the difficulties of assessing players.

The “dad” system measures the pupils’/coaches’ progress in live sporting situations. Teachers/coaches and pupils’/players’/coaches’ are supported in their learning with insightful and comprehensive assessment disks. Teaching / coaching staff, pupils / players are responsible for, and involved in, the assessment process. The digital assessment “dad” is a creative and innovative assessment tool for PE teachers and sport coaches suitable for all performance standards and all sports. Currently there are over a thousand support disks available that can be manipulated to suit each individual setting (club, school or sport).

Purpose

The purpose of this research is to examine how digital assessment disks was used by 100 student teachers and coaches (referred to as participants) in school and community based settings during their student placements (micro-teaching-teaching practice for 50 (Physical Education and Sport Science-PESS) teachers and internship for 50 (Sport Science and Management-SSM) coaches as part of the course requirements. Specifically, the purpose of the research is threefold. Firstly, to consider how the use of “dad” impacts the teaching of PE and coaching of sport. Secondly, to investigate and report on the participants’ methods and attitudes, the issues, challenges and advantages, that they faced, and the lessons learnt when participants used the innovative touch screen technology. Thirdly, to gather data (placement journal, questionnaire and interviews) on participants implementing the “dad” technology to assist their adopted pedagogies in their teaching and coaching whilst investigating any implications for their training as teachers and coaches.

Methodology

The research adopted an interpretative multiple site case study design. The case study design is not an uncommon strategy in education and training when investigating an innovation such as the use of technology-assisted pedagogy when teaching PE and coaching sport. Yin (14 1984), in discussing different kinds of case studies, stated that a case study could investigate a contemporary phenomenon. The study of different

technologies is just such a phenomenon. Yin continues (1984, p.23) "... the essence of a case study, the central tendency amongst all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how well they were implemented and with what result." The lack of scientific generalisation is a recognised criticism of the case study design. However, the case study does not represent a sample and it is not the goal of the study to expand or generalise a theory, but rather to understand how and why participants (teachers and coaches) employ different technologies in their practical teaching and coaching. This research does not intend to offer generalisable findings, but aims to provide an in-depth description from which helpful conclusions might be drawn when considering employing technology in PE and sport. The research is explorative in nature, and findings will be presented in the light of knowing that further research and investigation will be required.

Participants

The sample comprised of fourth year of a four-year BSC in Physical Education and Sports Science (PESS) and Sports Science and Management (SSM) Degrees students (PESS n = 50) and sport coaches (SSM n = 50) from either the PESS or SSM programmes. They participated in the study at a time when they were required to complete their professional placement by way of teaching practice (PESS students) and Work Placement (SSM Students) as part of the requirement of the programmes.

Procedure

A range of different technologies to assist with teaching and learning content, and lesson organisation were presented to student teachers and coaches. Each participant employed the assessment system "dad" as a technologically assisted pedagogy (TAP) as they saw appropriate to support their professional training during their professional placement. At all times conditions as required by the Institutional Review Board (IRB) were adhered to.

Instruments

Questionnaire

Section one of the questionnaire (completed prior to school-and community based experiences) was designed to understand participants' background, personal experience and training in the use of digital assessment disks in teaching and coaching as well as their attitudes towards using the technology when teaching PE and coaching sport, resulting in the development of an individual technological bibliography. Section Two (completed prior to and post school / community-based experiences) explored participants' experiences, attitude and recommendations prior to and after having used the digital assessment disk technology.

Professional Placement (Teaching Practice PESS or Work Placement SSM) files and journals

Student teachers and coaches maintained comprehensive and extensive teaching practice and Work Placement files during their school / community based experiences. They also maintained journals in which they documented their experiences on using the digital assessment disk technology ("dad") in their teaching and coaching.

Interviews

20 participants were interviewed. The interviews were semi-structured and focused on seeking information about the use and effectiveness of the digital assessment disk technology, rationales for practices, problems preventing or encouraging the use of the technology in teaching PE and coaching sport.

Questionnaires

Participants completed a questionnaire. The first section of the questionnaire was completed once; prior to use of the technology in school / community - based experiences. The second part was completed twice; prior to and post use of digital assessment disks in school / community-based experiences. The questionnaire was completed in a classroom setting as part of the participants' normal sequence of lectures. 20 participants (10-PESS and 10-

SSM) were purposefully selected for interview after completion of the questionnaire post professional placement. All 100 participants maintained files and journals throughout professional placement

Data Analysis

As this study is exploratory in nature it was not intended to commence the study with a hypothesis to prove or disprove. In accordance with Lincoln and Guba (1985, p.333) naturalistic methodology this study employed “the process of data analysis in the naturalistic paradigm is essentially a synthetic one in which constructions that have emerged (been shaped by inquirer-source reactions) are reconstructed into a meaningful whole.”

The researcher’s goal was to employ methods of analysis that lead to discovering participants’ rationale for, experience with, and advice for others when employing the digital assessment technology in teaching physical education and coaching sport. Another goal of this study was to gain a better understanding of the challenges and advantages of employing a technologically assisted pedagogy. In considering the experiences of participants, implications were unearthed which might influence the future of technologically assisted pedagogies in schools and community sports contexts. A result of this study was the generation of new connections, insights and understanding of related issues influencing the adoption of technological based practices enhancing quality teaching of physical education and coaching sport.

Questionnaire data were analysed employing compare and contrast technique to establish themes to compare student teachers’ /coaches’, perceived competence, confidence and attitude towards using technologically assisted pedagogies pre and post their experience in the school/community setting.

Interviews, professional placement files and journals were subjected to document / content analysis, which was used to construct study findings and recommendations. The study combined two analytic approaches. “Analytic induction”, also called conceptual categorisation, involving the data for categories of phenomena and for relationships among such categories being identified and discussed. Rather than imposing prior categories, the aim was to induce results. The second analytical approach was that of constant comparison and contrast (Locke, 1989). Data analysis therefore was inductive (developed from the general to the specific) and interpretative in that meaning was attributed to the data in an attempt to understand the reasons for change in the study phenomena of technologically assisted pedagogies (Kellehear 1993). Open coding of the data was employed for the retrieval of text from interviews, and professional placement practice files and journals. This data was indexed in text units to allow for the exploration of the data. The units were organised into categories that are systematically related. Through this process, data from document analysis was organised into different categories that express themes of meaning. It was therefore interpretive in order to elicit similarities and differences between the student teachers /coaches experiences. Triangulation of research data (files, interviews and questionnaires) was undertaken to cross check the understanding and interpretation of gathered data.

Results/Findings

A snapshot of what participants said and thought about the using the “dad” system as an example of technologically assisted pedagogy during their professional placement.

“The “dad” system transformed my method of teaching/coaching and assessing and the way in which pupils /athletes learn. It sped up their learning rate.” (Non-Such Primary School PE Teacher)

“This form of assessment appears to be the most advanced and convenient method we have experienced so far. We were able to easily assess pupils and players as they played games so we can remediate techniques and put those skills under ever increasing pressure. What is really powerful is that the assessment criteria are also performance prompts” (School Sport Coach, BCE School)

Table 1 Perceived preparation for, competence, confidence and willingness to use “dad” to support teaching and coaching

	1 Almost none	2 very little/low	3 good	4 very good/high
<i>Preparation for using "DAD" to support teaching coaching</i>				
Pre - professional placement	19	18	13	0
Post - professional placement	3	10	27	10
<i>Perceived competence</i>				
Pre - professional placement	16	24	7	3
Post - professional placement	8	10	17	5
<i>Perceived confidence using "dad"</i>				
Pre - professional placement	15	15	10	10
Post - professional placement	3	5	32	10
<i>Willingness to use "dad"</i>				
Pre - professional placement	6	17	18	9
Post - professional placement	2	8	30	10

Descriptive analysis suggests that there was significant difference in teacher and coaches perceived confidence pre and post professional student placement.

I know the system was prepared for sport and PE but it is relevant to any situation whereby outcomes are It is a good idea and a developing product, which is based on empowering those being assessed to take responsibility for their own learning. The support material is very useful but also the ability to add or subtract elements for assessment. (The Managing Director of the Application Development singsys)

The "dad" system appears to provide the foundation and backbone of how we will assess, plan and evaluate learning across all dimensions of the PE and sports curriculum as well as extra curriculum sport." (Primary PE Teacher, Nieyang School)

Table 2 Participants identified opportunities to use "dad"

	1 Almost none	2 very little/low	3 good	4 very good/high
<i>Opportunities for using "dad" in school and community club</i>				
Pre - professional placement	25	20	5	0
Post - professional placement	0	5	25	20
<i>Hands-on experience specifically using "dad" in school and community club</i>				
Pre - professional placement	27	16	7	0
Post - professional placement	0	5	30	20
<i>Schools clubs as supportive settings to explore the use of technology in PE and sport</i>				
Pre - professional placement	27	9	10	4
Post – professional placement	0	4	42	8

Once again there was significant improvement in teacher / coach competence and confidence in using "dad" pre and post professional placement

Conclusions and recommendations

What happened and what lessons have we learnt? This study provides some initial data pertaining to the challenges, advantages and potential use of "dad" in teaching PE and coaching sport. Results suggest that there are potential advantages of using "dad", and they can be a viable tool in teaching PE and coaching sport, including impacting positively on the attainment of a core outcome of PE and sport to promote intelligent performance through purposeful movement. However, all those (teacher / coach educators, student teachers / coaches, teachers / coaches and pupils / athletes) intending to use "dad", should be aware that the artificial use of technology is educationally unsound. In order to realise the potential advantages, the challenges of employing "dad" need to be recognised and steps taken to minimise them. Student teachers/ coaches in this study as did not perceive the challenges as insurmountable and they may

be addressed with considerable thought and extreme care. As a result, student participants perceived that, with careful management and improved support and guidance, “dad” could provide potential alternative-learning pathways. Student teachers’ / coaches identified the need for student teachers/ coaches, teachers / coaches, teacher / coach educators and pupils/athletes to develop “*new skills with training*” (Sylvia, interview).

This study highlights, professional development requirements and awareness of school / sport clubs resourcing needs when using ICT in teaching and coaching. An overemphasis on using ICT in PE lessons and sport coaching at the expense of the physical and practical aspects of PE and sport can potentially do more harm than good with respect to pupils’ / athlete learning. In keeping with Zeichner’s (18, 2010) suggestion it is apparent that professional judgment must be used to make decisions about the use of “dad” to enhance pupils’ / athlete achievement of learning outcomes, providing opportunities to explore and enhance understanding. It seems a certainty that the use of “dad” in within PE and sport will continue to be an integral part of many future developments and initiatives. A pertinent question is: Will the acquisition of ICT skills improve the delivery of PE in school and sport in the community? Reflective practitioners are professionals who keep up with the times and predict the changes to come and demonstrate a willingness to “keep ahead of the game”. Future research might include, for example, whether and how there is a shift in teachers’ / coaches pedagogy when using in PE lessons; whether and how the use of “dad” can impact on pupil / athlete engagement in terms of nature of participation, problem solving, teamwork and communication skills.

References

- [1] Ertmer, P. A., Ottenbriet-Leftwich, A., & York, C. S. (2007). Exemplary technology-using teachers: Perceptions of factors influencing success. *Journal of Computing in Teacher Education*, 23(2), 55-61
- [2] Goktas, Z. (2012). The Attitudes of Physical Education and Sport Students towards Information and Communication Technologies. *Techtrends: Linking Research & Practice to Improve Learning*, 56(2), 22-30.
- [3] Tearle, P., & Golder, G. (2008). The use of ICT in the teaching and learning of physical education in compulsory education: how do we prepare the workforce of the future? *European Journal of Teacher Education*, 31(1), 55-72.
- [4] McNeill, M. C., & Fry, J. M. (2012). The Value of ICT from a Learning Game-playing Perspective. *ICHPER-SD Journal of Research in Health, Physical Education, Recreation, Sport & Dance*, 7(2), 45-51.
- [5] Shumack, K. A., & Reilly, E. (2011). Video podcasting in physical education. *Journal of Physical Education, Recreation, and Dance*, 82(1), 39-43.
- [6] Casey, A., & Fletcher, T. (2012). Trading Places: From Physical Education Student teachers to Teacher Educators. *Journal of Teaching in Physical Education*, 31(4), 362-380.
- [7] Almas, A.G., & Nilsen, A.G. (2006). ICT competencies for the next generation for teaching with technology. In J. Price, J. Willis, D.A. Willis, M. Jost & S. Boger-Mehal (Eds). *Current developments in technology-assisted education*. Retrieved February 1, 2008 from [http: www.formatex.org.micte2006/book/htm](http://www.formatex.org.micte2006/book/htm)
- [8] Bates, A. W. (2005). *Technology, e-Learning and Distance Education*. Routledge, Oxon (p.45).
- [9] Keating, T., & Evans, E. (2001). Three computers in the back of the classroom: Pre-Service teachers’ conceptions technology integration. In Crawford et al. (Eds.), *Proceedings of ~Society for Information Technology and Teacher Education International Conference 2001* (p.1671-1676). Chesapeake, VA: AACE.
- [10] McNeill, M. C. Mukherjee S., & Singh, G. (2010). Podcasting in physical education teacher education. *ICHPER SD Journal of Research*, V(1), 16-19.
- [11] Goktas, Y, Yidirim, Z. & Yidirim L (2009). Main barriers and Possible enablers of ICT’s Integration into Pre-service Student teachers Programs. *Educational Technology & Society*, 12(1), 193-204

- [12] Sefgeroglu S. S. (2007). Preservice Teachers' Perceptions of their Computer Self-Efficacy, Fourth International Conference on eLearning for Knowledge-Based Society, November 18-19, 2007, Bangkok, Thailand
- [13] Browne, T. B. J. (2014) "*Easier Assessment for All?*" An Innovative Digital Assessment Disk Program ("DAD") employing "*touch – screen*" Technology. Under review
- [14] Yin, R. K. (1984). *Case study research: Design and methods*. Beverly Hills, CA: Sage
- [15] Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Newbury Park, California: Sage Publications.
- [16] Locke, L. F. (1992). Changing secondary school physical education. *Quest*, 44, 361-372.
- [17] Kellehear, A. (1993). *The unobtrusive researcher: A guide to methods*. Sydney: Allen & Unwin
- [18] Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college and university based teachers' education. *Journal of teacher Education* 61(1): 89-99