Exploration of CoachEye Application Features to Improve Feedback During Physical Education

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Abstract: The main purpose of this study was to explore the CoachEye movement analysis application features most preferred to enhance engagement and learning experience among learners. This study adopted the mixed-method research design comprising both qualitative and quantitative methodologies. Participants consisted of 30 undergraduate physical and health education major students ages between 20-26 years (16 males and 14 females respectively). The qualitative data were gathered via focus group discussions (i.e., 6 sessions, 5 participants/session) while quantitative data were collected through a modified TSCI questionnaire at the beginning and end of this study. Data analysis was conducted with SPSS (version 26.0) using tests such as descriptive statistics (e.g., means, standard deviation, percentage) and inferential statistics to determine the relationship between variables. The paired sample t-test was also used to compare mean values between pre-and-post intervention while graph and table were utilised to demonstrate behavioural changes. The phenomenological approach was used to gather qualitative data and analysed using Consider.ly software. The participants' knowledge and perceptions towards technology-assisted physical education improve across intervention with greater efficacy (7.47 ± 0.64) at the post compared to pre-intervention (6.57 ± 0.4). With regards to features, positive values associated with the abilities to analyse movements and identification of correct and false techniques while negative values associated with confusion and lack of confidence. This study demonstrated the addition of technology was generally effective to complement teaching and learning. Nonetheless, issues such as practice time, personal preferences, and digitised perceptions serve as future challenges in this topic.

Keywords: CoachEye analysis, Feedback, Mobile application, Physical education, Teaching and learning

1. Introduction

The rationale for this study came out of sports class observation at a local university in central Malaysia. The physical education preservice teachers (aged 20-26) often lose interest in the learning contents. Furthermore, insufficient, inaccurate, and sometimes absence feedbacks from the instructor throughout practice sessions have contributed towards student disengagement with both the educators and learning contents. Apart from that, most educators provide only verbal feedback which also increases students' dependence on educators for feedback and physical education for the opportunity to become active. Consequently, most of the students tend to develop weak content, pedagogy, and technological pedagogy knowledge about sports. Thus, this study was designed to introduce mobile

application (CoachEye movement analysis by TechSmith Corp) as an addition to the common verbal feedback into learning sport skills during physical education.

Our new generation today are more exposed to technology (e.g., smart devices, wearable technology) to the point where it has become a necessity in our daily life. For instance, as much as 97.9% Malaysian possess a minimum of one mobile device and 97.1% participated in social networks (Department of Statistics Malaysia (DOSM), 2019). And the fact that most youngsters worldwide attended schools for many hours daily, the educators should also move towards innovating their teaching and learning through the application of technology (Henninger & Richardson, 2016; Casey, Goodyear, & Armour, 2017). In addition, the earlier introduction of technology into these youngsters' lives should also make them more familiar with smart devices concepts and functions which offer more opportunity for the teachers to integrate technology in their instructions.

Teaching and learning

The addition of technology via mobile application during learning offers a more immediate, attractive, and personalised experience to learners (Selwyn & Sterling, 2016). Teaching with technologies also shifts some learning responsibilities to the learners and presents them with more freedom to dictate their learning process. According to Henninger and Richardson (2016), a student-centred approach with the conjunction of the mobile application would stimulate higher students' participation in the process of inquiring, speculating, reflecting, analysing, and solving problems to the challenges during physical education. Besides that, the student-centred approach adopted in this study also encourages higher engagement between the instructor and students which help create a positive learning environment and reduce the fear of failure among students (Henninger & Richardson, 2016). Additionally, many authors found that student-oriented teaching and learning enhance students' creativity, innovative, minimize boredom, and reduce off-task behaviour (Henninger & Richardson, 2016; Beni, Fletcher, & Chroinin, 2017). Nonetheless, students particularly in Malaysia have yet to fully embrace the potential of technology for academic purposes. Study of smartphone usage by Fook et al. (2021) on 55 public university students suggested they were somewhat addicted to smartphones but not for academic purposes.

Feedback

Studies throughout the years have found feedback to be an important component in the process of teaching and learning. Meaningful feedback is often associated with the abilities of the instructor to identify false techniques and offer correction to improve motor learning (Schmidt & Lee, 2005; Beni et al., 2017). Additionally, feedback influence the quality of gross-and-fine motor skills acquisition which affects the skill learning process. The skills learned then allows the individual to perform many complex movements (e.g., triple jump, dancing) efficiently, successfully, and minimize the risk of getting injuries (Schmidt & Wristberg, 2008). The introduction of the mobile application with the conjunction of CoachEye application (TechSmith Corp) into learning also made it possible for the student to review themselves in action. It offers the extrinsic or augmented feedback that is lacking with the conventional teaching and learning physical education (Rucci & Tomporowski, 2010). Authors such as Hodges, Chua, and Franks (2003) believe the techniques are particularly useful to help novice learners who are struggling to interpret intrinsic feedback and have less stable movement patterns.

The many ways to integrate technology into teaching and learning have suppressed the traditional teaching style which is often associated with a teacher-centred approach while opening more opportunity and resources to conduct teaching meaningfully (Xianzhou, 2018). The dynamics and interactive features of mobile application were attention grabber among students as it more stimulating (i.e., visual and hearing) and more in-trend among the students rather than solely listening waiting for instructor's direction (Banville & Polifki, 2009; Xianzhou, 2018). Apart from that, mobile application features (e.g., manipulate videos, cloud-sharing) also help educators to develop more independence, motivated, active, and physically competent learners. Therefore, using the mobile application as part of the learning tool should allow educators to improve their productivity and encourage physical education beyond class settings (Jourdan et al., 2016; Wattelez et al., 2019).

This study aims to advocate and demonstrate the potential of technology with the conjunction of mobile application towards improving physical education in Malaysia. Building on these previous studies, this study seeks to determine the current efficacy, perceptions, and most preferred features on the CoachEye application (TechSmith Corp) that would benefit students' learning domains, that is student-centred (affective), learning sport skills (psychomotor), and verbal and visual feedback (cognitive) to enhance students' learning experience. Therefore, the following research questions were addressed in this study:

1. Does the intervention help increase participants' self-efficacy towards mobile application and learning sport skills?
2. Does the intervention influence participants' perception of mobile application integration into teaching and learning?
3. What features in CoachEye mobile application (TechSmith Corp) most preferred by the participants during teaching and learning sports skills?

2. Method

Research Design

This study adopted the concurrent mixed-method research design which involves a single group of 30 participants (i.e., 16 males and 14 females respectively). The CoachEye application interventions completed pre-and-post study allow both quantitative and qualitative data to be collected simultaneously. Data from the group were then compared to gain insights on the relationship between mobile application and feedback during teaching and learning (Hanson et al., 2005). The research design strengths such as (1) generalization of qualitative data, (2) designing and validating instrument effectively, (3) complement strengths and overcome the weaknesses of single design study, (4) more reliable data interpretation of the study, and (5) time-efficient compared to sequential methods were important for this study purposes (Creswell, 2003).

Settings

The university's outdoor field and multi-purpose hall were chosen as the main area to implement this study. The researcher utilizes the physical education session (three hours/session) to introduce and provide guidance on participants on ways to utilize the mobile application. Most of the time, the students were encouraged to explore and practice using the mobile application on their smart device to solidify various skills learned throughout the sessions. Importantly, the researcher assumes the role of an active observer throughout the study with minimum interruption of the participants' teaching and learning. The data collection was performed between October and December 2019.

Participants

The participants involved in this study comprises physical and health education undergraduate level pre-service teachers at central university located in Selangor, Malaysia. The participants consisted of 30 undergraduate students (16 male and 14 female) with age ranging between 20-26 years old. The university predominantly consisted of Malay ethnicity with the minority of students originating from the East of Malaysia (e.g., Sabahan, Sarawakian). Additionally, probability cluster sampling was utilized in recruiting potential participants for this study. As this study was done with a single class during the semester, the sampling technique chosen was appropriate as it is timesaving and geared towards improving the participants' contents and pedagogy knowledge (Sharma, 2017). Additionally, the inclusion criteria for this study include (1) novice learners (i.e., 1 – 5 years of experience with the sports), (2) mix-genders (male & female), (3) undergraduate level physical and health education pre-service teacher, and (4) no health concerns at the beginning of the study (e.g., musculoskeletal injuries, pregnancy). Meanwhile, the participants were excluded if: (1) expert in the taught sports (i.e., 5 years onwards experience with the sports), (2) enrolled in postgraduate studies or different departments, (3) possess any health issues at the beginning of the study, and (4) decline to participate in this study.

Measures

Quantitative data

The quantitative data were collected using the Modified Traits Sport-Confidence Inventory (TSCI) questionnaire (Vealey, 1988). The questionnaire was modified to suit Malaysian tertiary education context and focus on mobile application features. Specifically, the questionnaire consisted of 13 questions with no subscale component utilizing a 9-point Likert-like scale ranging between 1 – 9 (1 = least likely, 9 = most likely) (Vealey, 1988). The instrument's main purpose was to prompt participants to reflect their sense of competence on various aspects such as skill execution, decision-making, and adapting to situations before and after the intervention. Previous studies have supported the instrument's validity and reliability and used a similar sample of youth (Vealey, 1986; Vealey, 1988; Soltani, Reddy, & Hojati, 2013). Additionally, this instrument was particularly helpful as it allows a large amount of data collection in a short period to explore both participants' feelings and degree of certainty of utilizing the CoachEye movement analysis application during physical education (Mills, 2014). Importantly, the instrument was also peer-reviewed and corrected by more experienced researcher to ensure the contents and word selection were appropriate to the contexts and aims of this study.

Qualitative data

The qualitative data were gathered through focus group discussions. The instruments were meant to explore participants' knowledge and feelings towards integrating smart devices with the conjunction of movement analysis application into their teaching and learning sport skills. There were six sessions of focus group discussion (5 participants/session) lasting for a maximum of 60 minutes were held toward the end of the study. The participants' were prompt with open-ended questions such as: (1) what are your current knowledge levels about the integration of technology into teaching and learning?, (2) how confident are you in using technology during your lesson?, (3) what feature on the CoachEye movement analysis application (TechSmith Corp) most interest you?, (4) why do you think the specific feature is most useful during teaching and learning?, and (5) would you use this application during your teaching session? Each of the sessions was audio-recorded and transcribed verbatim for meaningful information (Pietkiewicz & Smith, 2014). The researcher used these sessions to gather shared understanding and opinion from the participants; thus, providing insights on how participants perceive the mobile application features (Cresswell, 2012).

These features help increase participants' engagement with the contents and educator as well as motivation to stay on-task due to its interactive and fun learning experience (Ciesielkiewicz, 2019). Importantly, the researcher has taken the time to ensure the modification and selection of instruments were appropriate based on the purpose of the study, literature related to the topic, and participants' needs and interests in learning sport skills.

Procedures

This study involves several stages mainly: (1) preparation, (2) implementation, and (3) data processes. In the early stages, the researcher spends considerable time to observe how sports classes were conducted around the campus and engage with the students for some insights on potential issues and their expectations. Both observation and students' feedback were noted and useful in planning for the interventions.

For this study, the participants were requested to utilize their smartphones of any sizes using either Android (Google Inc.) or Apple OS (Apple Inc.) as long as they can download the CoachEye movement analysis application (TechSmith Corp) on "Google Play Store" or "Apple App Store" needed for this study purposes. Other inclusion criteria of smartphones include: (1) boast the capabilities of high definition of visual output (i.e., minimum 720p), (2) battery capacity of minimum 3000 mAh, and (3) possess a minimum of two gigs of processing RAM.

Apart from smartphones, the material used in this study was the CoachEye movement analysis application (TechSmith Corp). The researcher decided to use this application for this study due to its

abilities to provide meaningful information on learning movements. The full version application was very useful as it provides the user with the chance to: (1) create analysis video (e.g., freehand arrow, line, circle, square), (2) video comparison, (3) precision measurement tools (e.g., angle, timer), and (4) share the videos via email, text messages, and social media. Many authors suggested the use of such applications to improve both teacher's feedback and students' learning experience (Truskowski & VanderMolen 2016; Mahoney, Macfarlane, & Ajjawi, 2018). Before the study, the researcher downloaded and practiced using the mobile application in various physical activities (e.g., football, badminton, brisk walking) to increase competency and experience in using the application.

Data collection was done throughout October and December 2019 involving single undergraduate classes of physical and health education pre-service teachers. Before data collection, the researcher has ensured the participants were fully aware of this study aims, objectives, benefits, and risks of participating in this study. Only after this process, the participants who were interested in this study provided their consent to participate and have their pictures and video taken throughout the study. Importantly, participants could withdraw from this study at any time duration without any implications to their on-going assessments and marks for the sports subject.

Once the consent form obtained and checked by the researcher, the participants were given the modified TSCI questionnaire at the beginning of the study. Additionally, both groups were also guided to search for the CoachEye (TechSmith Corp) application on the "Google Play Store" and "Apple App Store", download it into their smart devices, and introduced to the basic purpose and function of the mobile application. The researcher has also adopted the single-blind intervention throughout the study. Therefore, the researcher does not inform the groups about the intervention and strives to ensure the learning session to be as usual as possible throughout the study (Sidani, 2015). As a result, the researcher was able to minimize the "Hawthorne Effect" from occurring during the study. The "Hawthorne Effect" refers to the risk of participants changing their behaviours as a result of them knowing about the intervention (Portney & Watkins, 2000).

Throughout the study, the main author was responsible for teaching various sports (e.g., badminton, tennis, table-tennis, petanque) throughout the study period. The classes have fully integrated the usage of the application into teaching and learning sport skills. The participants were encouraged to utilise the movement application and reflect their experience with peers at the end of each session. Apart from the mobile application, the teaching and learning also emphasized on student-centred approach which involves higher peer-teaching, self-assessment and evaluation (e.g., partner record the video and provide feedback), group practice as well as higher engagement between educator and participants. The participants received higher verbal, visual, and physical feedback during learning from the researcher and CoachEye mobile application throughout the study.

On the 12th weeks of the semester, all participants completed the post-study modified questionnaire. Additionally, six sessions of focus group discussion (i.e., 5 participants/session) lasting for maximum 60 minutes in each session were also held with both groups to gain insight of the knowledge and perceptions related to technology in physical education as well as their preferred features on the CoachEye movement analysis application. The researcher noted and audio record each of the session to allow verbatim transcription for meaningful information (Pietkiewicz & Smith, 2014).

Data analysis

Quantitative

The IBM Statistical Product and Service Solutions (SPSS) (version 26.0) computer software was utilized to analyse the data collected. Descriptive statistics, that is means, standard deviation (SD), and percentages were calculated for variables assessed in this study (efficacy, perception, preferred features on the mobile application). Apart from descriptive statistics, the inferential statistic was also conducted to determine the potential relationship between independent and dependent variables as well as the likelihood of this study results being generalized in physical education sessions in various education levels in Malaysia (Gratton & Jones, 2010; Mills, 2014).

The paired samples t-test was also used to compare means between the variables pre-and-post study period. Specifically, how CoachEye movement analysis application (TechSmith Corp) may

influence participants' self-efficacy and perceptions towards technology-assisted learning sport skills (Cunningham & Aldrich, 2012). Besides that, graphs were also used to visually compare the differences between intervention and control groups. Some advantages of graphs include: (1) demonstrate behavioural changes among participants, (2) behaviour interpretations, and (3) offer visual feedback to readers (Cooper, Heron, & Heward, 2007).

Qualitative

According to Awang (2011), the qualitative data collection was equally important as it allows the researcher to obtain non-numerical information from participants related to the issues. In this study, the qualitative data were compiled to achieve the following objectives: (1) to identify participants' self-efficacy levels pre-and-post intervention on teaching and learning with the mobile application, (2) to identify participants' perceptions on technology integration into physical education, and (3) to identify participants' features preferences when using the CoachEye movement analysis application.

To obtain meaningful qualitative data, this study adopted the phenomenological research approach which emphasizes the wholeness of experiences and how it affects an individual's behaviours (Moustakas, 1994). Instead of focusing on describing the categorical system, conceptual, and scientific criteria, the researcher strives to focus on participants' perceptions about learning sport skills with CoachEye movement analysis application (Pietkiewicz & Smith, 2014). The discussion data were extracted with the Interpretive Phenomenological Analysis (IPA) with several steps such as (1) observing phenomenon, (2) questioning, (3) collecting data, (4) linking concepts with data, and (5) communicating (Sudria, Redhana, Kirna, & Aini, 2016). Furthermore, the researcher also utilizes qualitative data analysis software (Consider.ly by Usertimes Solutions GmbH) to transcribe, coding, and tagging data into themes and categories. The addition of artificial intelligence (AI) in the software also increases the researcher's abilities to analyse, organise, search, and trace data with ease and higher accuracy. Data extracted were then used by the researchers to attempt inductive reasoning and provide conclusions that may be beneficial for educators and generalization of ideas on this topic (Sudria et al., 2016).

3. Results

After the exclusion of 7 participants (i.e., injured at beginning of the study, missing either pre-or-post questionnaires and absence in the focus group discussion session), participants consisted of 30 students from one class who participated in this 12-weeks long study.

Participants' levels of knowledge towards learning with mobile application

The effects of CoachEye movement analysis application towards participants' levels of knowledge is shown in Figure 1 below. All descriptors recorded increment in means values from pre-to-post intervention between 0.76 – 0.90% with the most significant improvement of 0.90% found in the 12th descriptor, "ability to bounce back from performing poorly in practice or games". In contrast, descriptor eight, "ability to consistently successful during practice or games" reported the lowest mean values (M=6.17, SD=1.48) during pre-intervention while descriptor three, "ability to perform under pressure during practice or games" reported the lowest mean values (M=6.83, SD= 1.46) during post-intervention. Nonetheless, both descriptors still recorded an increment mean values from initial to end of the study with (M=6.17 – 6.93) and (M= 6.23 – 6.83) respectively. The average mean values for pre-intervention were (M=6.30, SD= 1.55) and post-intervention with (M= 7.30, SD= 1.34). Besides that, similar means values were documented post-intervention for descriptors five, six, seven, and 10 with (M= 7.40).

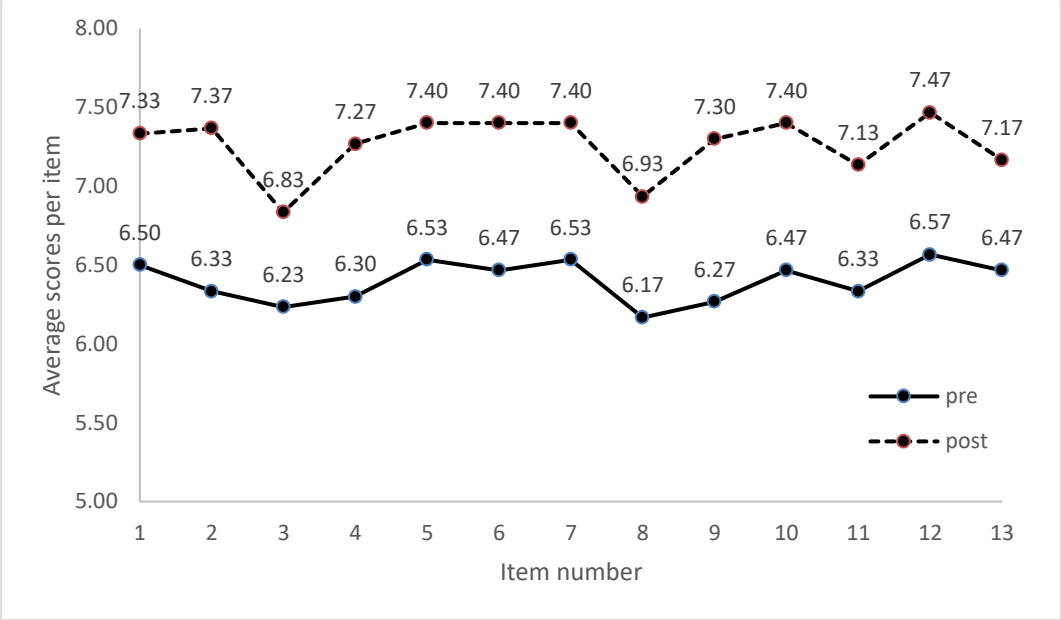

Fig. 1 Mean self-efficacy level on learning sport skills with CoachEye movement analysis application across pre-and-post intervention

The paired sample t-test demonstrates changes from pre-to-post intervention in Table 1. Generally, all items demonstrated an increase in both knowledge and perceptions with items 2 and 9 recorded the highest improvement in the mean values with (M= 6.33 to 7.37) and (M= 6.27 to 7.30) respectively. Item 3 showed the lowest improvement with (M=6.23 to 6.83) compared to the rest of the items. Interestingly, item 8 demonstrated higher SD in post compared to pre-intervention with (SD= 1.48 to 1.55) with means of (M=6.17 to 6.93) while other items have SD decreased in the post-study. The standard error mean (SEM) also showed a reduction from pre-to-post intervention ranging from 0.317 to 0.211.

Table 1. Comparison of mean, SD, and SEM for questionnaire items across pre-and-post intervention

Paired Samples t-test

		Mean	Std. Deviation	Std. Error Mean
Item 1	PRE	6.50	1.408	0.257
	POST	7.33	1.155	0.211
Item 2	PRE	6.33	1.470	0.268
	POST	7.37	1.351	0.247
Item 3	PRE	6.23	1.654	0.302
	POST	6.83	1.464	0.267
Item 4	PRE	6.30	1.557	0.284
	POST	7.27	1.285	0.235
Item 5	PRE	6.53	1.570	0.287
	POST	7.40	1.192	0.218
Item 6	PRE	6.47	1.456	0.266
	POST	7.40	1.329	0.243
Item 7	PRE	6.53	1.383	0.252
	POST	7.40	1.221	0.223
Item 8	PRE	6.17	1.487	0.272

	POST	6.93	1.552	0.283
Item 9	PRE	6.27	1.388	0.253
	POST	7.30	1.343	0.245
Item 10	PRE	6.47	1.548	0.283
	POST	7.40	1.429	0.261
Item 11	PRE	6.33	1.539	0.281
	POST	7.13	1.332	0.243
Item 12	PRE	6.57	1.736	0.317
	POST	7.47	1.479	0.270
Item 13	PRE	6.47	1.548	0.283
	POST	7.17	1.487	0.272

Participants' perception of technology assisted learning sport skills

Utilising the Consider.ly qualitative data analysis software (Usertimes Solutions GmbH), based on Table 2; the green colour indicates positive values, while the red colour associated with negative statements. Whereas the yellow colour tags indicate caution and require attention from stakeholders (e.g., teachers, researchers, administrators, parents). The researcher managed to identify as much as 31 positive statements whereas 5 negative statements appear throughout the sessions. There were 6 participants who suggested they were very confident in learning sport skills with the conjunction of CoachEye movement analysis application in their smart device. Several keywords associated with negative statements include but are not limited to: (1) low knowledge, (2) nervousness, (3) confusion, and (4) lack of confidence. Additionally, the researchers also noted most participants consider the mobile application to be useful due to its abilities such as: (1) analyse performance (repeated 5 times), (2) identify correct and false technique (repeated 4 times), improve decision-making during practice and games (repeated 4 times), and ease of use/user-friendly (repeated 3 times). Importantly, several participants also valued practice time and collaborative learning as a critical factor to develop their knowledge, interest, and self-efficacy in learning sport skills with technology.

Table 2. The usage of tags in focus group discussions data

	positive	negative	low knowledge	correct technique	curriculum promote tech	time spend with tech	creative	improve decision making	analyse performance	refer to other people	initially nervous	confuse	always prepared	very confidence	no confidence
knowledge level	7	1	1	1	1	1	1	1	0	0	0	0	0	0	0
confidence in using th...	11	4	0	0	0	3	0	0	0	1	1	1	1	6	2
Features most interest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Features most useful	13	0	0	3	0	0	0	3	5	0	0	0	0	0	0
#Notes	3	2	1	2	1	2	1	2	1	1	1	1	1	1	1
Total	31	5	1	4	1	4	1	4	5	1	1	1	1	6	2

Mobile application's features and participants' interests

Based on the researcher's note and audio transcription with the aid of qualitative data analysis software, the researchers found that most of the participants were interested with the slow-motion, pause, rewind, and fast-forward features (repeated 9 times) where they can view movement much clearly and thus, giving them the opportunity to identify the correct and false technique. Next, many participants also highlighted the tools (e.g., square, circle, line, angle) (repeated 4 times) features to help learn various sports skills. Apart from that, several participants also thought the abilities to measure movements (e.g., angle) (repeated 3 times) to be important in helping them to learn and improve both their knowledge and skills. Additionally, the collaborative features offer in-app such as sharing video and comparing videos were also highlighted during the sessions.

4. Discussion

The added values of technology into physical education

Based on the results, many participants perceive they have higher capabilities to bounce back from performing skills poorly with the aid of CoachEye movement analysis application. The addition of technology has allowed them to review their performance through manipulation of recorded video (e.g., pause, rewind, slow-motion) and thus, they can get more accurate feedback on what was right and false techniques. This finding was in line with Henninger and Richardson (2016) suggesting student-centred and technology approaches would excite students into learning, discussing, and solving issues to improve their future movement. Additionally, the usage of the smart device also increases students' ownership of learning and gives them space to experiment skills and practice the movement both during and beyond physical education. Consequently, the students would be more likely to perceive their physical education as more meaningful, able to achieve goals, and provide the chance for self-improvement (Jakobsson, 2014; Beni et al., 2017).

Both items 2 and 9 related to response and making critical decision scores higher compared to item 8 (i.e., keyword consistent) also may be due to additional feedback gained visually and the opportunity to compare their movement individually as well as with their peers. These advantages would help them to anticipate opponents' potential movements in various situations (e.g., offence & defence). Studies as far as Chua and Frank (2003) as well as Rucci and Tomporowski (2010) have supported the findings and suggest the usage of the mobile application was particularly useful in helping novice learners to understand what went wrong in their movements and develop stable movement patterns.

The challenge and risks of learning physical education with technology

Both descriptors 8 and 3 recorded lower in mean values in the pre-and-post intervention. Both items associated with the keywords "consistent" and "perform under pressure" were least improved may be due to the short period of practice time, personal preferences, and digitised health perceptions. Despite some improvement in item 8 scores from pre-to-post intervention, the author believes the sudden introduction of CoachEye mobile application and lack of practice time using mobile devices during physical education have led some participants to experience nervousness, confusion, lack in self-esteem and perceive low meaningfulness in using technology during their learning. Previous studies have suggested the participants' absence of satisfaction, enjoyment, and feeling overwhelmed by the challenge of using technology and receiving feedback from various sources (e.g., researcher, mobile application, peers) might result in the negative thoughts (e.g., nervousness, low self-esteem) (Beni et al., 2017). Apart from individual factor, the participants may also experience negative thoughts due to lack of structure as well as financial difficulties. Issues such as trouble focusing, lack of printed instructional resources and difficulty of accessing information were some common excuses participants relate to learning with technology (Rahiem, 2021).

From personal preferences on pedagogies of technology aspect; some participants believe technology would bring higher engagement, motivation, and level of knowledge attainment while others still believe in the "natural" ways in teaching and learning (i.e., conventional learning) (Casey et al.,

2017). Individual's acceptance of knowledge also differed from one another. Therefore, an individual's willingness and capabilities in adopting technology in learning also influence their self-esteem differently. For example, on several occasions, some participants were observed to enjoy the new learning experience (i.e., eager to view their movement through a mobile device, demonstrate movement to peers) while some participants seem to avoid or minimised viewing their movements from the mobile application. Subsequently, they attempted fewer movements and played a passive role during practice or gameplay.

This study also wishes to highlight concern regarding the term "digitized perception of health" which digital data become the primary determinant of good health or movements (Ohman, Almqvist, Meckbach, & Quennerstedt, 2014). The researcher noted some participants were overly dependent on the feedback given by the CoachEye mobile application and less dependent on their instructor for feedback. These observations were worrying as technologies were capable to demonstrate results such as "fat", "unhealthy", and "stress" without taking consideration of individuals' differences (Rich & Miah, 2015). Additionally, individual's higher dependency on smart devices would also manifested into mobile addiction where the individual exhibit increase frequency, excessive use and always connected to their devices (Fook et al., 2021).

5. Implication for practice

Results from this study are valuable to educators, students, and administrators in planning effective merges of technology into physical education. Educators played a big role in bridging the gap between teacher, students, and curriculum by strengthening content knowledge, well-planned lessons and using technology to enhance the whole learning process (Casey et al., 2017). Furthermore, results from this study can be used as part of a diagnostic tool to assess students' current strength and weaknesses in a specific area of the sport. The assessments allow the educators to modify lesson plans, instructions, rules and regulations, as well as playing area to support positive teaching and learning processes. Besides that, this study serves as guidance for teacher planning to merge technology into teaching and advocate the potential of technology to facilitate teacher conducting lessons. A couple of limitations to the study included limited access to features in the free version of CoachEye movement analysis application, the limited number of samples, and intervention was restricted to individual sports (e.g., badminton, tennis, table-tennis).

6. Conclusion

This study provides some important findings to advocate educators, particularly in Malaysia to adopt the new normal in teaching physical education. The combination of the student-centred approach, various practice structures, and well-used learning aids (including smart devices) would help create meaningful and exciting learning experiences through physical activity. This study demonstrated that undergraduate pre-service teachers benefited from the addition of mobile devices and CoachEye applications most when identifying right and false techniques and anticipating future movements. Whereas, both consistency and performance under pressure were least improved when learning with technology. Some suggestions for future studies include the application of technology in a different type of sport (e.g., invasion sport) and having skill tests to better measure changes of participants throughout the study period.

7. Co-author contribution

The authors affirmed that there is no conflict of interest in this article. Author 1 carried out the fieldwork, prepared the literature review, wrote the research methodology, conducted data entry, statistical analysis, and interpretation of the results. Author 2 ensures study fidelity, provides support on the statistical analysis, interpretation of the results and overlooks the writeup of the whole article.

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