

Student-centered approach and alternative assessments to improve students' learning domains during health education sessions

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Summary

Study aim: The purpose of this study was to evaluate the effects of a student-centered approach and alternative assessments on students' learning domains (i.e., cognitive, affective, psychomotor) during health education learning sessions.

Material and methods: Four groups totaling 65 mixed-gender undergraduate students (ages 20–25) of physical and health education participated in this study of alternative assessments' effects on students' learning once per week (3 hours) in their respective classrooms for seven weeks at a central Malaysia university. Students' knowledge on the lesson contents was gathered using a series of quizzes. Students' self-efficacy was assessed using the modified Traits Sport-Confidence Inventory (TSCI), and students' levels of physical activity were assessed using a mobile pedometer. Data were analyzed using descriptive statistics and *t*-tests to evaluate pre/post differences.

Results: The students' perception and knowledge on health education improve across interventions with greater efficacy (7.64 ± 0.97) at the post-test compared to the pre-test (7.30 ± 1.38). Students' recorded improvement in step counts between week two and week five. A slight reduction during weeks six and seven may be due to the end of the semester and preparation for the final examinations.

Conclusions: This study demonstrated that a student-centered approach and alternative assessment of learning were effective to engage students with contents and developing whole learning domains within the classroom.

Keywords: Knowledge – Self-efficacy – Alternative assessment – Physical activity – Student-centered approach

Introduction

The rationale for this study came out of class observations at a local university in central Malaysia. The students (aged 20–25) appeared to be uninterested in participating in classroom learning and the teaching process. The lessons observed were taught with the instructor's direct approach where the teacher provided and the students received all inputs. The lesson outcomes were not achieved as expected. These sessions were also lacking in brain-break/energizer activities between the lectures and reinforcement of rules by the instructors. Furthermore, the relationship between the instructor and students appeared to be limited, often causing students' disengagement from the activity. Thus, this project was designed to increase students' engagement in learning contents and their perceptions towards a different approach in learning and teaching.

Ideally, physical and health education is useful to provide students with the opportunity to acquire and develop

motor skills, gain knowledge, and participate in an enjoyable learning environment [14]. Nonetheless, several authors have suggested that the instructors' philosophies and approach in teaching contributed towards students' disengagement from learning. They rarely or never took individuals' experiences and capabilities into consideration (e.g., direct teaching style) in the planning, teaching, and evaluating process [7, 8].

Student-centered approach

The student-centered approach shifts some learning responsibility to the learners and allows them more ownership in their learning process. This approach promotes higher student involvement to inquire, speculate, reflect, analyze, and find solutions to challenges during lectures [13].

In this method, the instructor facilitates student learning through a combination of questions, challenges, scenarios, and modified learning activities to develop student creativity, a lifelong learning habit, and content knowledge

(in this case of health education) [26]. The two-way communication between instructor and students creates a comfortable learning environment to practice and collaborate without fear of failure among students [13].

Peer teaching

Peer teaching is associated with a partnership design whereby students work together in pairs or a small group toward achieving specific objectives and goals [3]. It emphasizes social skills; students were encouraged to learn, discuss, and make decisions together on issues and provide each other feedback. This style helped nurture quality traits such as tolerance, critical thinking, and leadership in students [3].

Johnson and Ward [17] studied the reciprocal teaching style as compared to a teacher-directed style over 20 days of a striking unit with girls. They found that reciprocal teaching led students to perform fewer trials of a higher quality regarding accuracy as well as higher percentages of correct technique used for both high-skilled and low-skilled girls. Furthermore, with the teacher's guidance, the students were capable of analyzing their peers' performance with a 90% accuracy rate. The peer teaching style has also been reported not to alter the organizational time for teachers [17].

Concept mapping

Concept mapping is an exciting approach to learning as it helps students to simplify complex processes and promote engagement with the learning contents. Teachers can promote concept mapping to students as a framework to demonstrate a knowledge domain, define problems, or explain processes involved in learning [11]. Unlike the narrative linear note-taking format, this learning concept provide higher meaningful understanding and more personalized learning experience. Additionally, concept mapping can be utilized as a medium to promote higher collaboration learning strategies with students making decisions and teachers adopting the facilitator role. These benefits allow more students' learning ownership and continuous improvement of knowledge [11, 23].

Portfolios

Educators can use portfolios as a form of assessment that integrates elements of learning and creates more personalized students' learning experience. Integration of portfolios into learning allows students to establish clear goals and monitor their learning progress. Moreover, this assessment presents students with a non-judgmental platform to take risks, explore knowledge, have fun in the learning process, and initiate the foundation of comprehensive wellness. Hence, the higher learning ownership enhances students' enjoyment, motivation, and self-efficacy to learn [1, 28, 30].

Additionally, teachers should use this platform to encourage students to include health information, learning reflections, and physical activity logs in the portfolios. Students were encouraged to reflect their understanding of the contents by writing and drawing using colors, stickers, pens, and shapes [18]. These provide teachers with the opportunity to assess students' learning effectively compared to highly inferential traditional testing. Thus, portfolios enable teachers to assess their teaching while meeting the standards as well as becoming informed on future teaching [1]. Besides that, teachers can use portfolios as a unique tool to advocate physical and health education among stakeholders (e.g., parents, community members, administrators, staff) as portfolios provide concise academic expectations and allow continuous monitoring of students' learning [5, 16].

Step counts

According to Duncan, Birch, and Woodfield [6], collecting step counts using devices such as a pedometer or accelerometer is beneficial to improve the physical activity (PA) levels among the wearers. The wearers were willing to be involved in PA for a prolonged period of time due to the capabilities of the devices to offer their users motivation, reflection, accountability, goals, and rewards [2, 6]. Additionally, these devices provide more opportunities for an individual to develop self-monitoring skills (e.g., goals setting, PA log). Therefore, the individual was more likely to be aware about his/her current behavior, goal behavior discrepancy and work towards improving their lifestyles [6].

Furthermore, the opportunity to share data through various mobile applications and the Internet increases the social effects from using the wearable technologies, making it more attractive for many individuals [2, 6]. Due to the steady increase of non-communicable diseases (e.g., obesity, hypertension, diabetes, cardiac issues) in Malaysia, integrating these wearable technologies seems to be more relevant at all levels of society [24].

Purpose

This study builds on these previous studies to determine whether a student-centered approach and alternative assessments to promote learning would benefits students' learning domains, that is be student-centered (affective), include a variety of brain breaks/energizer activities (psychomotor), and use alternative assessment methods (cognitive) to improve students' learning experience. Therefore, the following research questions were addressed in this study:

1. Does the intervention improve students' self-efficacy related to learning in health education?
2. Does the intervention influence students' perceptions of learning in health education?

3. Does the intervention increase students' levels of physical activity during teaching and learning?

Material and methods

Participants

The participants of this study were bachelor's degree students in physical and health education. There were a total of 65 participants after the exclusion of three students (i.e., did not consent, missing test values) with an age range of 20–25 years old, voluntarily participating in this study. The participants were selected from both anatomy and exercise physiology classes during the semester. Nonetheless, they were allowed to opt out of the study at any time they wished. Most participants reported a Malay ethnic background with five reporting Sabahan/Sarawakian heritages. Most of the participants orally reported limited experience in a student-centered approach and the alternative assessments as part of their teaching and learning process.

Setting

The Progressive University (pseudonym) was located in a large suburban area in central Malaysia. There are 146,403 students currently enrolled in the university throughout 35 campuses in Malaysia.

The faculty's classrooms were the main area used to implement the intervention. The lecture sessions were three hours long. The rules, learning aids, and classroom environment were modified to help students learn and achieve a higher rate of success during the learning and teaching process.

Instruments

Instruments that have been shown to produce reliable and valid scores were used for this study. These includes a series of quizzes, the modified Traits Sport-Confidence Inventory (TSCI), and a pedometer.

The Traits Sport-Confidence Inventory (TSCI). This instrument contains 13 questions with no subscale components and utilizes a 9-point Likert-like scale ranging from low to high. Specifically, it was used to explore participants' feelings and degree of certainty of their capability of learning health education effectively [34]. Participants were asked to self-assess their sense of competence on various aspects of health education (e.g., critical thinking, making decisions). The instrument developer supported the TSCI inventory's validity and reliability, and used a similar sample of youth [34, 35]. The self-efficacy score was obtained by adding up scores for the 13 items. General confidence scores of 13 to 39 indicate low-level confidence and scores of 91 to 117 represent a high level of self-confidence. Meanwhile, the scores obtained between

those levels are considered moderate levels of self-confidence [31].

Pedometer. This is a small electronic device used to measure the number of steps an individual takes. Apart from being a self-monitoring tool, the device is also able to stimulate PA as it provides instant visual feedback of cumulative step counts [6, 10, 29]. Consequently, the individual will have higher awareness in terms of one's behavioral choice affecting his/her lifestyle [6]. Additionally, previous research also associated the use of a pedometer with higher motivation and achieving set goals [6, 12].

Study design and procedures

The intervention involved a student-centered approach and alternative assessments to evaluate students' learning during regular sessions lasting seven weeks between October and November 2018. This study primarily focuses on accentuating participants' roles during learning and assessing their knowledge and self-efficacy related to health education using alternative assessments. Participants were given more opportunity to explore practical options during learning, make a collective decision, and dictate their own learning sessions under the instructor's supervision. Additionally, instructor initiating situational-related discussions during learning also helped participants to improve their linking between understanding and actions.

The intervention focused on formative assessments (e.g., peer teaching, concept mapping, and portfolios). The instructions, rules, and learning environment (e.g., bright ball, frontless classroom, brain-break activity) were modified according to the participants' current level of understanding of the lessons, age-appropriate activities, and to inform participants of specific learning objectives. Reciprocal teaching was used as an instructional method throughout this intervention.

For the interventions, participants were given a short quiz to assess their existing knowledge and the modified TSCI to assess their initial self-efficacy towards health education. The instructor also explained the study's objectives and expectations from the participants throughout the intervention. This introductory session helped the instructor to establish routines and promote positive attitudes among the participants.

Throughout this study, the instructor adopted the roles of a facilitator and task delegator; the lectures were minimal, and participants were given more time to discuss contents in groups. The instructor's roles included organizing the learning aids (e.g., slides, videos, ball, task cards) for specific contents, initiating discussion and activity with participants related to their health and physical activity (PA), as well as providing functional feedback during lessons. Although they were given more ownership in learning, the instructor was expected to intervene when

problems arose either physically or emotionally [22]. Students gave consent for participation and taking photographs or videos for the purposes of this project.

The author designed the intervention and was present at the classroom during all sessions. The researcher also noted the day of the intervention in a log with daily notes. Data were collected at the beginning and end of the study, which included participants' knowledge on specific contents of health education using set quizzes, participants' perceived self-efficacy on health education using the modified TSCI, and the step count throughout each session using a mobile pedometer.

Data analysis

Descriptive statistics, that is, means, standard deviations (SD), and percentages, were calculated for variables assessed in this study (knowledge, self-efficacy, PA levels) [21]. To evaluate the differences (pre-and-post intervention scores) in participants' health education knowledge, self-efficacy, and PA levels, *t*-tests were performed [33]. A Bonferroni adjustment was made to the *p* value required for significance since more than one *t*-test was performed on the data set (i.e., $\alpha/\#$ of comparisons or a $p = 0.02$ for significance).

Additionally, bar graphs were used to visually compare the pre/post differences qualitatively. Bar graphs can be used to determine the significance of behavioral changes among participants, behavior interpretations, and offer visual feedback to readers [4].

Results

After the exclusion of three participants (i.e., did not consent, missing pre-test, post-test values), participants

consisted of 65 students from four classes who participated in this study throughout the seven-week time frame.

Participants' confidence level

The effect of the intervention on participants' self-efficacy, is shown in Figure 1 below, showing increases of approximately 0.2–0.72% with the most significant improvement of 0.72% found in the performance descriptor “execute the skills necessary to be successful in learning contents.” Participants' post-test scores for items 8 and 11, found in the performance descriptor “ability to be consistently successful during practice or soccer games” and “ability to be successful even when the odds are against you,” were documented at an average success rate of 0.2%. This was observed to be a small increase from the pre-test result. Participants had significantly greater efficacy (7.64 ± 0.97) at the post-test than they did in the pre-test (7.30 ± 1.38). The *t*-test score related to self-efficacy was $t(-3.72)$, $p < 0.02$.

Physical activity levels

Participants in this study improved their step count results throughout the seven-week time frame. Participants had a lower step count at week one (59560) and week six (77758). In contrast, participants' steps count improved drastically between week two and week five, with the best scores (99621) recorded in week two. Generally, students were more active in the classroom with the interventions.

Knowledge on health education

Results for the quizzes' scores across pre-and-post intervention amounted to 8.29 ± 2.12 and 16.6 ± 2.28 , respectively ($t = -17.2$, $p < 0.01$). Participants had a mean improvement in their knowledge on health education of 6.31 (27.6%).

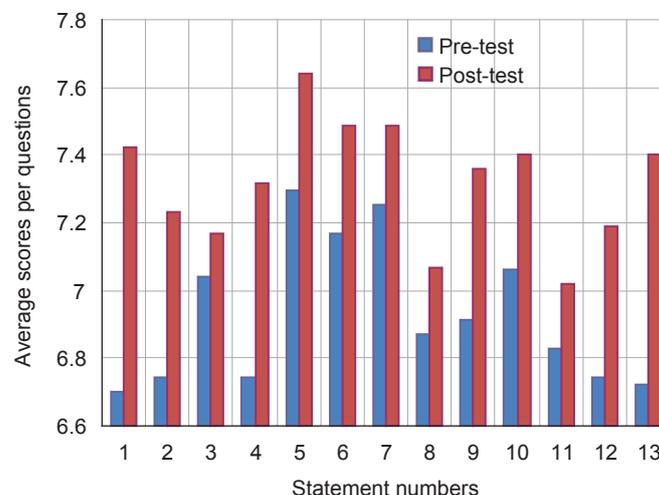


Fig. 1. Mean self-efficacy level on teaching and learning health education across pre-and-post intervention

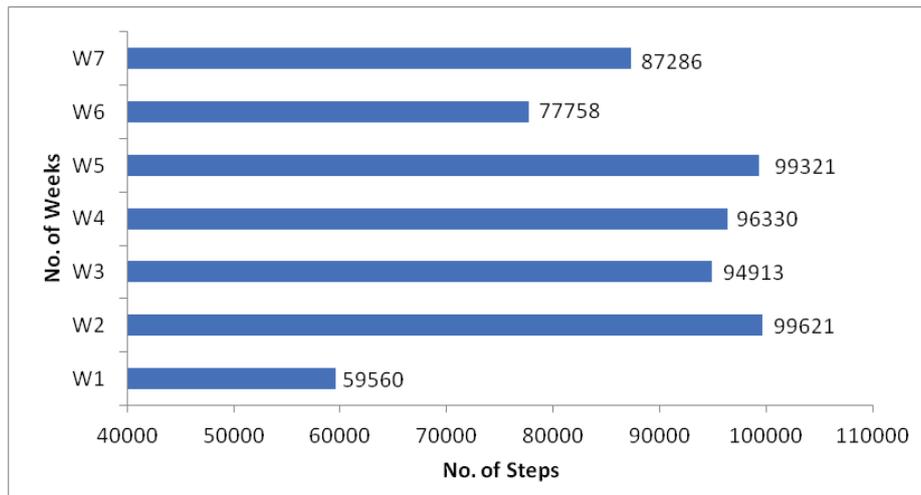


Fig. 2. Weekly scores of students' steps count performance across pre-and-post intervention

Discussion

The willingness of educators to embrace the concept of openness to new ideas and initiate changes in the classroom is crucial in the teaching and learning process. This study showed that higher students' learning ownership and varied learning styles helped them to link the concepts to real-life scenarios meaningfully, thus leading to increased interest and confidence in learning the contents [13]. This study also agreed with Johnson and Ward [17], who suggested that teacher organizational time was not interrupted by integrating a student-centered approach in their classroom. Therefore, the instructor was able to focus on students and invest more time to evaluate their learning [15, 32].

This study also demonstrated the potential of PA in the classroom to promote teaching and learning. The integration of movements in the classroom was beneficial for students as it boosts the brain functions [20], oxygen movement throughout body [27], and PA levels throughout the day, while supporting their learning physically, cognitively, and emotionally [25]. Most importantly, movement in the classroom fulfilled their needs to be free, belong, and have fun [19]. This study demonstrated a dose-response relationship; the more participants engage in learning with movements, the better are their academic performance and emotional well-being. The student-centered approach also encourages the participants to explore more ways to solve issues and reduces fear of failure among them [14, 16].

The integration of concept mapping and portfolios as part of alternative assessment also contributed to the improvement of quiz scores across the intervention. The opportunity for students to use these platforms increases their engagement and motivation to explore the contents as they have more freedom to dictate their learning [9,

13]. Additionally, the variety of sources and format of the contents were important to promote teaching and learning among students at all levels of learning institutions [5].

The author established set goals early in the study with the participants as extra motivation for them to do their best during each session. They were periodically reminded about the goals and the potential health benefits from their effort to continue being active in the classroom [3, 10]. The author believes the reduction of step count in week five and week six was due to the end of the semester and preparation for the final examinations. Meanwhile, in the first week, the activities were more focused on establishing expectations and developing positive routines.

Implications for practice

This study strengthens the current findings on the student-centered approach and alternative assessments potential to transform teaching and learning into a meaningful and enjoyable process. Educators should invest their time to review the current literature about teaching and learning as well as developing skills (i.e., energizer games, grouping students, stations, note-taking) through professional development programs (e.g., workshop, conference, seminar). Through customizing the instructions, rules, and learning spaces, educators can enhance students' teaching and learning experience. There were a few limitations to the study, including a small sample size, usage of a pedometer application on smart phones, and a similar course enrolled in by the participants.

Conclusion

In short, educators who adopt a student-centered approach and innovate their assessment tools are more likely to be successful to promote students' engagement and

collaboration in learning that leads to a learning outcome [5, 36]. Learning through movements, peer teaching, concept mapping, and portfolios are effective ways to improve whole learning domains of the students. Future studies should consider bigger and more varied background samples and use of an actual pedometer or accelerometer to achieve better results.

Conflict of interest: Authors state no conflict of interest.

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