European Journal of Physical Education and Sport Science
ISSN: 2501 - 1235
ISSN-L: 2501 - 1235
Available on-line at: www.oapub.org/edu

DOI: 10.46827/ejpe.v11i6.5656 Volume 11 | Issue 6 | 2024

FACTORS CONTRIBUTING TO STUDENTS' ACTIVE LEARNING IN PHYSICAL EDUCATION

Nguyễn Thanh Dũng[1i],
Huỳnh Văn Em[2],
Đặng Hà Việt[3]
[1]MSc,
People's Police College No. 2,
Vietnam
[2]Dr.,
People's Police College No. 2,
Vietnam
[3]Associate Professor, Dr.,
Sport Authority of Vietnam,
Vietnam

Abstract:
This study sought to examine factors contributing to students' active learning in physical education based on motivational and active learning variables. The study attracted the participation of 400 students at the People's Police College II in Vietnam, using a quantitative data collection and analysis method. Results from the study indicate that, although emotion is the most critical one, factors related to students' attention/cognition, self-determination, behavior and knowledge mastery played significant roles in motivating students' motivation and engagement in active learning in physical education. The study's findings suggest practical and pedagogical implications for both administrators and instructors in preparing appropriate physical education lessons to promote students' active learning.

Keywords: active learning, physical education, self-determination, cognition/attention, behavior, emotion, knowledge-mastery

1. Introduction

Education has been claimed to be traditionally inherited from an old-fashioned practice of one-size-fits-all teaching methodology (Moya *et al.*, 2021). However, with the advances in technology and digitalization in education, different forms of education that seek to renovate education have emerged, focusing on enhancing students' active learning and

[i] Correspondence: email nguyenthanhdungt10@gmail.com

Copyright © The Author(s). All Rights Reserved.

their efforts to actively construct knowledge (Carr *et al.*, 2015). The notion of active learning has been widely discussed in the existing literature, focusing on identifying what students are doing in their learning process and how teaching practice is undertaken to promote students' learning. Chickering and Gamson (1987, p.4) emphasize that active learning does not mean that students are just *"sitting in classes listening to teachers, memorizing pre-packed assignments, and spitting out answers"*. Instead, as O'Loughlin (1992, p.792) indicates, active learning calls for *"forth images of active, student-centered and participatory learning"*.

Petress (2008, p.566) briefly defines active learning as the one which is *"the opposite of passive learning"*. Based on a constructivist view of learning, active learning is recently believed to be associated with learning strategies and learning activities, including case studies, experiential learning and learning by doing practices (Chi, 2009; Laird & Kuh, 2005). In active learning, students actively challenge and critique concepts that are developed from their own experiences under the guidance of the instructor, who is responsible for encouraging students' cognitive conflicts in order to build their knowledge (Ford, 2010). At this point, active learning is significantly involved with interpersonal interaction between students and others in the classroom (Chi, 2009; Chickering & Gamson, 1987, Hendriks & Maor, 2004).

Whilst discussion about active learning and its practices are continuing, a review of existing research has additionally indicated that active learning is commonly associated with self-directed learning of students and that both have resulted from student-control, self-regulation and motivation (Chi, 2009, Hagel *et al.*, 2012; O'Loughlin, 1992). Significantly, active learning is generated with the involvement of the creation of student-centered learning environment in which attention is highly given to what students are doing and their behavior, which is viewed as a critical determinant of what is learned (Michael, 2006).

In the sphere of physical education (PE), a variety of research has been undertaken to explore different aspects of active learning, including measures of active learning and methodologies to enhance students' active learning in classes. Findings shared among these studies are that active learning contributes to students' learning, achievement and engagement (Chaplin, 2009; Freeman *et al.*, 2014), and that the active learning environment is more effective in students' learning than the traditional learning environment of passive and classroom-lecture dominance (Abeysekera & Dawson, 2015). To design active learning, different efforts from both instructors and students are needed. These efforts are related to the creation of an active learning environment for students, methodologies used by teachers in enhancing students' active learning and students' motivation and needs in learning (Chang *et al.*, 2016; Dane-Staples, 2019; Leyton-Román *et al.*, 2020; Moya *et al.*, 2021). For example, Leyton-Román *et al.* (2020) have recently investigated predictive power to support active learning of 922 students in PE classes and concluded that students' self-determined motivation strategies can positively and negatively predict students' intention in PE active learning. To identify a pedagogical model for PE instructors to create quality PE for students in which students' active learning can be best enhanced, Moya *et al.* (2021) adopt a study incorporating an exploratory, descriptive and comparative design on 303 PE students. While showing a significant correlation between three methodological components of the model, including organizing modalities, methodological approaches and evaluation system, the study's results emphasize that PE students' perceptions and opinions take a special role in developing student-centered methodologies for PE practices; thus, their satisfaction and motivation play a significant role in actively engaging in learning.

Although findings from these studies have intensely contributed to the existing literature on PE practice, they are still limitedly scoped within the identification of interventions or methodologies and motivational aspects associated with students' intention to participate in PE activities. There is still a paucity of research investigating factors contributing to students' active learning in PE and the relationship between these factors and students' active learning in PE classes. Similarly, a review of the existing literature in PE in Vietnam has significantly indicated a lack of efficacious studies investigating students' motivation in PE active learning and factors contributing to students' active learning in PE classes. To bridge these gaps, this study was conducted to examine factors that can help contribute to students' active learning in PE and identify the relationship between these factors and students' active learning practice.

The following research questions guided the study:

1) What are the factors that contribute to students' active learning in PE classes?
2) What motivates the student to participate in PE classes actively?

2. Literature Review

2.1 Active Learning and Active Learning Design's Elements

Based on a constructivist view of learning, active learning is believed to be a critical self-regulatory learning process of students in which students develop their complex skills, knowledge and promotion of adaption by involving their own existing knowledge base 'to change a learned procedure, or to generate a solution to a completely new problem' (Ivancic & Hesketh, 2000, p. 1968). In this process, self-regulation is referred to as a progression which enables students to guide their goal-directed activities in the long run and through different changing circumstances (Karoly, 1993). As Karoly (1993, p.25) indicates, this progression includes the 'modulation of thought, affect, behavior, or attention' of the students. Active learning is distinctive from other traditional classes in that it focuses on using formal teaching elements to purposefully influence and support students' cognitive, motivational and emotional processes, which later characterize how students direct their effort and attention as well as manage effects in learning (Bell & Kozlowski, 2008). A review of active learning literature has demonstrated different interventions developed to create active learning in the classroom. In an attempt to systemize active learning design, Bell and Kozlowski (2008) emphasize that active learning design needs to be undertaken in alignment with students' cognitive, motivational and self-regulated processes and describe three core elements of active learning, which are related to these processes as follows.

A. Exploration

The exploration element includes three sub-aspects of the cognitive pathway: exploratory learning and interactions with cognitive ability. Cognitive pathway refers to students' use of different metacognitive activities to engage themselves in learning, including planning, monitoring and revising behavior (Brown *et al.*, 1983). As Ford *et al.* (1998) clarify, metacognition is a mechanism through which students monitor their progress and decide if they have a problem or adjust their learning when it is needed. The metacognition function helps students self-monitor their cognitive functions. Thereby, they become active in their construction of knowledge instead of being passive to absorb knowledge from the instructors (Cannon-Bowers, 1998). Another aspect of exploration is students' exploratory learning, which refers to the engagement of students in self-directed learning. Advocates of active learning theory believe that learning, which is designed toward understanding through exploration or experimentation, is a process that involves students with control over learning, which is viewed as a critical condition for metacognition stimulation (Ford & Kraiser, 1995). Finally, the interactions with cognitive ability refer to students' level of cognitive ability in constructing knowledge. As Bell and Kozlowski (2008) emphasize, effective teaching depends on the level of cognition ability of students. Specifically, students with high cognition abilities may acquire higher levels of skills when they are engaged in exploration activities. In contrast, those with low levels of cognition may need extra support or have an extra activity which requires using their existing cognition resources to reduce their self-regulation. In short, students with low levels of cognitive ability benefit from well-structured or controlled lessons than those with higher levels of cognitive ability.

B. Motivational Pathway and Error Framing

It is believed that when students actively engage in learning, they will take on different motivational orientations (Brown & Ford, 2002). Advocates of achievement motivation theory emphasize that activities developed in achievement settings are often oriented toward students' accomplishment of success or failure avoidance (Harackiewicz *et al.*, 2002). According to Bell and Kozlowski (2008), these orientations affect how students' approach, understand and react to their learning achievement differently. This view was earlier confirmed by Rawsthorne and Elliot (1999) that students who have a knowledge mastery orientation tend to have a high level of intrinsic motivation in learning. Significantly, while knowledge mastery orientation can lead to students' higher levels of motivation in learning than performance orientation does, performance orientation can lead to students' demotivation if they find learning performance challenging (Colquitt & Simmering, 1998). To help students induce demotivation in learning performance, Bell and Kozlowski (2008) suggest adopting error-framing activities as instrumental interventions for students' self-improvement in performance orientation. Specifically, during the learning process, occurring errors serve as feedback for students' direct efforts and attention. This instructive feedback can direct students to performance evaluation, which is likely to be adopted as a mastery orientation by students (Ivancic &Hesketh, 1995). In contrast, when this feedback is viewed as errors which need to be avoided, students may frame errors as punishment and likely adopt a performance-avoid orientation. Therefore, instructors must help students effectively develop active learning strategies to encourage errors and view errors as instructive feedback for their self-improvement of learning (Heimbeck *et al.*, 2003).

C. Emotional Control

When engaging in active learning, it is believed that students will take on a complicated process of emotions, including stress and anxiety. Given the negative effects of anxiety on students' learning and performance, instructors need to take into consideration emotional control's role in enhancing students' active learning. Emotional control in active learning is viewed as students' utilization of self-regulatory processes to maintain performance anxiety or stress and related negative emotions at the lowest level (Kanfer *et al.*, 1996). To reduce the effects of negative emotions such as negative thoughts, Kanfer and Ackerman (1990) suggest that students should be helped to develop appropriate emotional control strategies, such as frequently using positive thought statements when they are engaging in active learning.

2.2 Self-determination Theory and Active Learning in PE

Grounded on a social cognitivism view, self-determination theory (SDT) is a macro human motivation theory that defines the degree to which human behaviors are determined. In the PE learning context, SDT analyzes the degree to which students perform their actions or engage in the activities by their own choice (Vansteenkiste *et al.*, 2010). Advocates of the SDT believe that individuals perform actions or engage themselves in learning when the learning environment includes conditions that facilitate their oriented learning process or growth (Deci & Ryan, 1985; Niemiec & Ryan, 2009). The SDT theorists propose that motivation is a continuum which is characterized by different types of self-determination, varying from more to less self-determined factors of intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation and demotivation (Leyton-Román *et al.*, 2020). Therefore, students are motivated to learn, do, and grow when they satisfy the three basic psychological needs: autonomy, competence, and relatedness (Niemiec &Ryan, 2009). The need for autonomy refers to the possibility or confidence in performing activities by students' own choice. In contrast, the need for competence is defined as students' desire to achieve expected learning results. The need for relatedness is viewed as a social and emotional bond between students, including their desire for communication, exchange, support and social interaction with the community (Ushioda, 1996, p.2).

Based on the SDT, Vallerand (2007) develops the Hierarchical Model of Intrinsic and Extrinsic Motivation (HMM), which includes three hierarchical levels of global motivation, contextual motivation and situational motivation, which are interrelated and affected together. According to Vallerand (2007), global motivation is viewed as students' willingness to participate in the activities; contextual motivation refers to student's motivation in a specific context; and students experience situational motivation when they engage in activities in a specific context. In addition to the three motivation levels, Vallerand (2007) emphasizes that social aspects related to the environment have a significant influence on students' motivation in terms of whether the three basic needs (i.e. the need for autonomy, competence and relatedness) are satisfied. In the meantime, the satisfaction of these three basic needs helps increase students' motivation, leading to positive affective (positive emotion), cognitive (attention) and behavioral (intention to be physically active) consequences (Leyton-Román *et al.*, 2020). In contrast, dissatisfaction with the three basic needs increases controlled motivation, leading to students' demotivation, which results in different negative affective, cognitive and behavioral consequences.

Due to the importance of related aspects and components of the SDT and the HMM, especially in the PE context, this study aimed to analyse the related factors that support students' active learning in PE classes via active learning and motivational variables.

The study was directed by the following five hypotheses:

1) Students' emotional consequences positively predict students' active learning in PE classes.
2) Students' attention/cognitive consequence positively predicts students' active learning in PE classes.
3) Students' self-determination consequence positively predicts students' active learning in PE classes.
4) Students' behavioral consequences positively predict students' active learning in PE classes.
5) Students' knowledge mastery consequence positively predicts students' active learning in PE classes.

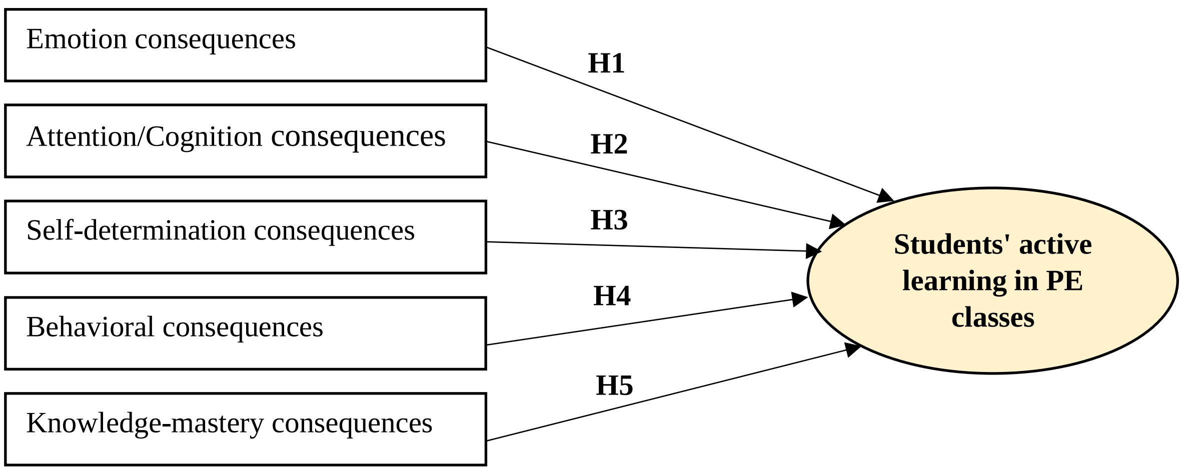

Figure 1: Factors Contributing to Students' Active Learning in PE Classes

3. Research Methods and Results

3.1 Participants, Data Collection and Analysis

3.1.1 Participants

The study included students from the People's Police College II in Vietnam. All students were aged 18-24.

3.1.2 Questionnaire

The questionnaire included 28 scale questions adapted from both long-researched and up-to-date scales. Except for the first question investigating students' demographic features, such as age, gender, and major course of study they are engaged in, the other questions were all 5-item Likert scale, ranging from strongly agree to disagree strongly.

Because most participants in this study were Vietnamese, the authors employed back-translation to enhance the return rate of the questionnaire. Additionally, acknowledging the flaws of potential inconsistency and translation (Behr, 2017), the authors employed a quality assurance procedure to minimize the possible problems that caused these flaws. Specifically, all the questions were translated by all authors before both Vietnamese and English versions of the questionnaire were sent for peer review by three experts in the field. The authors revised the questionnaires following suggestions by the experts. The revised questionnaire was used for an online pilot test with a sample of 20 Vietnamese students. The authors tested the reliability of the Likert-scale questions in the questionnaire using Cronbach's alpha coefficient in SPSS, with the following results:

Table 1: Cronbach's Alpha Results on the Scale's Reliability (n=400)

No.	Factors	Cronbach's Alpha coefficient
1	Emotion consequences	0.906
2	Attention/cognition consequences	0.901
3	Self-determination consequences	0.874
4	Behavioral consequences	0.821
5	Knowledge-mastery consequences	0.814
6	Students' active learning in PE classes	0.906

All the Cronbach's alpha values (.906, .901, .874, .821, .814, .906) were fairly high to excellent (.7≤ æ ≤.94) (Taber, 2018), which guaranteed the reliability of this questionnaire for the official stage of large-scale data collection.

3.2 Results and Discussion

Before the data analyses, regression was used to diagnose related outliners, multicollinearity and assumption violations. The participants' demographic features were analyzed using SPSS 20's mean comparison tools. Regarding dependent dimensions, Kaiser-Meyer-Olkin (KMO) and Bartlett's tests of Sphericity were used. As for other dimensions, which include more variables, ANOVA was employed to analyze the statistics of the study. The authors additionally analyze the Exploratory Factor

Analysis (EFA) to reduce the number of redundant variables and discover the relationship between latent variables and their dimensions (Williams *et al.*, 2010). The number of participants was 400, which is twice the number needed for factor analysis (Comrey & Lee, 2013). The Varimax rotation method was used for factor extraction (Eigenvalue>1). If the loadings of an item were below 0.04, the item would be suppressed. In this study, the KMO value was 0.888 (>0.6), affirming the sampling adequacy.

Table 2: KMO and Bartlett test results (n=400)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.888
Bartlett's Test of Sphericity	9280,555	3085.444
	528	120
	.000	.000

The scale for students' active learning in PE includes 04 observed variables. After achieving reliability by analyzing Cronbach's Alpha coefficient, they were included in EFA analysis. The results of the KMO test and Bartlett's test show that the KMO index was 0.832 (> 0.5). This coefficient satisfied the condition of 0.5 ≤ KMO ≤ 1, indicating that the observed variables in the population were correlated with each other and EFA factor analysis was accepted with the research data.

Table 3: KMO and Bartlett's test results for the dependent variable (n=400)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.832
Bartlett's Test of Sphericity	596.995	600.995
	6	6
	.000	.000

As shown in Table 4 below, the analysis results indicate that four initial observed variables were grouped into one group. The value of the total variance extracted was 77.639% > 50%, indicating a satisfactory requirement. It is also reported that this one factor explains 77.639% of the variation in the data. The Eigenvalues of the factors were all high (>1), with the Eigenvalues of 3.106> 1.

Table 4: Eigenvalues and variance extract of dependent factor

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	3.106	77.639	77.639	3.106	77.639	77.639
2	.399	9.974	87.613			
3	.284	7.088	94.701			
4	.212	5.299	100.000			

The rotated factor matrix results shown in Table 5 indicate that all four variables have factor loading coefficients > 0.5. Therefore, the factors ensure convergent and discriminant validity when analyzing EFA. The results show that the composition of the factors has no disturbance compared to the original expected composition.

Table 5: Results of the Factor Rotation Matrix

	Observed variables	**Factor**
		1
1	TC1	.900
2	TC2	.897
3	TC3	.888
4	TC4	.837

Regarding the regression analysis, based on the theoretical research model, the authors had a multiple linear regression equation to describe the influencing factors of students' active learning in PE as follows:

$$TC = \beta0 + \beta1*XC + \beta2*CY + \beta3*YC + \beta4*HV + \beta5*KQ$$

The independent variables in the equation included XC, CY, YC, HV, KQ and the dependent variable (TC) (students' active learning in PE); βk was the partial regression coefficient (k = 0,1,2,3,4,5). Results from Table 6 show that the adjusted R2 value was 0.558, indicating that the variation of six independent variables explained 55.8% of the variation of the HL variable.

Table 6: Results of Model Summary Analysis

Model	**R**	**R2**	**R2 correction**	**Estimated error**	**Coefficient Durbin-Watson**
First	.754a	.569	.558	.401	2.056

As shown from the results in Table 7, the F value has a significant level with Sig. = 0.000 < 0.05, meaning that the proposed linear regression model is suitable for the collected data, and the included variables are statistically significant at the 5% significance level. (95% confidence).

Table 7: Variance ANOVA Analysis Results

Model		**Sum of squares**	**Degrees of freedom (df)**	**Mean squared**	**F**	**Sig.**
First	Regression	47.018	6	8.003	49.765	.000b
	Residual	35.345	226	.161		
	Total	81.363	232			

As for the study's statistical analysis, the variance magnification factor VIF reached the maximum value of 2.624 (< 10), showing that these independent variables were not closely related to each other. Therefore, no multicollinearity phenomenon existed. The results significantly indicated that the relationship between independent variables did not significantly affect the explanatory results of the regression model.

Table 8: Statistic Analysis Result of the Coefficient of the Regression Model

Coefficients								
Model		**Coefficients are not standardized**		**Normalization coefficient**	**t**	**Sig.**	**Multicollinearity statistics**	
		B	**Standard error**	**Beta**			**Tolerance**	**VIF**
First	Constant	.190	.244		.778	.438		
	XC	.292	.079	.260	3.673	.000	.381	2.624
	CY	.229	.070	.205	3.276	.001	.487	2.053
	YC	.074	.053	.083	1.413	.039	.557	1.795
	HV	.075	.064	.072	1.179	.040	.516	1.939
	KQ	.031	.061	.030	.503	.015	.552	1.813

Regarding the multiple linear regression equation, statistical analysis indicates the following standardized regression equation form:

TC = 0.260*XC + 0.205*CY + 0.083*YC + 0.072*HV + 0.030*KQ

Results of multivariate regression analysis show that the five independent variables (XC, CY, YC, HV, KQ) had the same impact on the dependent variable (TC) because the standardized regression coefficients (β) of these variables are all positive and statistically significant (Sig. < 0.05). A comparison of the impact level of these five variables on the dependent variable (students' active learning in PE) shows that the emotional consequences of learning (XC) have the strongest impact and the strongest motivation (β = 0.260), followed by the self-determination consequences (YC) (β = 0.83). In contrast, the behavioral performance consequences (HV) (β = 0.072) and the knowledge mastery consequences (KQ) (β = 0.030) were ranged as the third and fourth impact factors accordingly.

Results from the study's data analysis report that all five factors of students' emotion, cognition, self-determination, behavior and knowledge mastery are positively contributing to their active learning in PE classes, affirming the five hypotheses developed from the beginning of the study. Among these five factors, the emotional consequence plays the most important role in leading students' engagement in active learning in PE classes, seconded by the motivational consequence. The other three factors, including self-determination, behavioral and knowledge mastery consequences, are followed as the third, fourth and fifth factors, respectively.

The study's data analysis findings reaffirm those obtained from the earlier study conducted by Moya *et al.* (2021) that there is a correlation between students' engagement in active learning and their motivation and that students' motivation in learning has a strong impact on their active learning in PE classes. The motivation identified in this study is strongly related to the intrinsic motivation of students, which leads them to be more self-determined in actively learning PE activities in the classroom. These results are consistent with those obtained by Chang *et al.* (2016) that self-determination can create students' motivation in learning; in turn, students' motivation stimulates more self-determined activities they engage in PE classes.

Significantly, findings from this study have been found to reaffirm further the HMM's theoretical view identified by Vallerand (2007) in that students' basic needs satisfaction is crucial in stimulating their motivation in active learning, which in turn enhances students' positive emotion, cognition and behavioral consequences (Leyton-Román *et al.*, 2020). Whilst the study's results reveal a considerable interrelationship among the five factors of emotion, motivation, self-determination, cognition and knowledge mastery in students' active learning in PE classes, the results crucially indicate a correlation between active learning's components, which is earlier described by Bell and Kozlowski (2008) to those related to the HMM's points of view described by Vallerand (2007). However, more research should be conducted to confirm the specific relationship between these components and viewpoints.

This study's findings help reaffirm the research hypotheses about factors contributing to students' active learning in PE classes in Vietnam. However, this study still has limitations. First, this study was conducted with a sample population from only a public college in Vietnam, which limits the generalization of the study's results to different groups of students across the country. Furthermore, the study employed only a quantitative research method based on statistical analysis, which may reduce the extent and degree of confirmation of the study's findings. Future research in the related topics may consider mixed research methods to further confirm the results.

4. Conclusion

This study aimed to explore factors that help contribute to students' active learning in PE in a public college in Vietnam. The study additionally examines the motivation of students to engage in active learning in PE classes. Results obtained from the data analysis indicate that students were intrinsically motivated to engage in active learning in PE classes, which included the following five factors: emotion, self-determination, cognition, behavioral consequences, and knowledge-mastery consequences. The study's results significantly reveal an interrelation between these five factors and components of active learning identified by earlier research, including exploration, motivational pathway and emotional control of students when they engage in active learning.

Findings from the study have significantly contributed to the existing literature about students' active learning, especially in the PE context in Vietnam. It is critically suggested for administrators and instructors of PE classes to design appropriate active learning activities for PE classes and support students' engagement in active learning in PE classes. In addition to the utilization of a variety of active learning activities in the classroom, consideration of students' psychological aspects that are developed during the learning process taking place is essential. These aspects include students' motivation, emotion and self-determination, which may lead to students' cognitive, knowledge mastery and behavioral consequences. Furthermore, as suggested by the study's findings, instructors need to help students develop appropriate emotional control strategies to help them induce unnecessary anxiety and stress that may be caused, thereby increasing their active learning in PE activities. Given the above-identified limitations in this study, it is significant for future research about students' active learning in PE to consider the participant population and diversity as well as research methods for more confirmed research results.

Conflict of Interest Statement

All authors declare that they have no conflicts of interest.

About the Author(s)

Nguyen Thanh Dung, PhD candidate at University of Sports, Ho Chi Minh City. Working at People's Police College II, Ministry of Public Security. Between 1996-2020, Deputy head of military; between 2020 – 2024: Head of the Police Department, Special Tasks. Lecturer of Physical Education and Sports, especially in martial arts.

References

Abeysekeraa, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *Higher Education Research and Development, 34*(1). 1-25. DOI: 10.1080/07294360.2014.934336

Behr, D. (2017). Assessing the use of back translation: the shortcomings of back translation as a quality testing method. *International Journal of Social Research Methodology*, *20*(6), 573–584. https://doi.org/10.1080/13645579.2016.1252188

Bell, B. S. & Kozlowski, S. W. J. (2008). Active learning: Effects of core training design elements on self-regulatory processes, learning, and adaptability. *Journal of Applied Psychology, 93*(2), 296-316. DOI: 10.1037/0021-9010.93.2.296

Brown, A. L., Bransford, J. D., Ferrara, R. A., & Campione, J. C. (1983). Learning, remembering, and understanding. In J. H. Flavell & E. M. Markman (Eds.), *Handbook of child psychology* (Vol. 3, pp. 77–166). New York: Wiley.

Brown, K. G., & Ford, J. K. (2002). Using computer technology in training: Building an infrastructure for active learning. In K. Kraiger (Ed.), *Creating, implementing, and managing effective training and development* (pp. 192–233). San Francisco: Jossey-Bass.

Cannon-Bowers, J. A., Rhodenizer, L., Salas, E., & Bowers, C. A. (1998). A framework for understanding pre-practice conditions and their impact on learning. *Personnel Psychology, 51*, 291–320.

Carr, R., Palmer, S., & Hagel, P. (2015). Active learning: The importance of developing a comprehensive measure. *Active Learning in Higher Education.* 16, 173–186. doi: 10.1177/1469787415589529

Chang, Y., Chen, S., Tu, K., & Chi, L. (2016). Effect of autonomy support on self-determined motivation in elementary physical education. *Journal of Sports Science and Medicine. 15*, 460–466.

Chaplin, S. (2009). Assessment of the impact of case studies on student learning gains in an introductory biology course. *Journal of College Science Teaching, 39*(1), 72-79.

Chi, M. T. H. (2009). Active-constructive-interactive: A conceptual framework for differentiating learning activities. *Topics in Cognitive Science, 1*(1), 73–105.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin, 39*(7), 3–7.

Colquitt, J. A., & Simmering, M. J. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A longitudinal study. *Journal of Applied Psychology, 83,* 654–665.

Comrey, A. L., & Lee, H. B. (2013). A first course in factor analysis. In *A First Course in Factor Analysis. Psychology Press*. https://doi.org/10.4324/9781315827506

Dane-Staples, E. (2019). Assessing a two-pronged approach to active learning in sport sociology classrooms. *Sport Management Education Journal*, *13*, 11-22. https://doi.org/10.1123/smej.2018-0019

Deci, E. L, & Ryan R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Berlin: Springer Science & Business Media.

Ford, M.J. (2010). Critique in academic disciplines and active learning of academic content. *Cambridge Journal of Education, 40*(3), 265–80.

Ford, J. K., & Kraiger, K. (1995). The application of cognitive constructs and principles to the instructional systems model of training: Implications for needs assessment, design, and transfer. In C. L. Cooper & I. T. Robertson (Eds.), *International review of industrial and organizational psychology, 10*, 1–48. New York: Wiley

Ford, J. K., Smith, E. M., Weissbein, D. A., Gully, S. M., & Salas, E. (1998). Relationships of goal orientation, metacognitive activity, and practice strategies with learning outcomes and transfer. *Journal of Applied Psychology*, *83,* 218–233.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, H. J., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. Proceedings of the National Academy of Sciences of the United States of America, 111(23), 8410–8415. PubMed ID: 24821756. doi:10.1073/pnas.1319030111

Hagel, P., Carr, R., & Devlin, M. (2012). Conceptualising and measuring student engagement through the Australasian survey of student engagement (AUSSE): A critique. *Assessment and Evaluation in Higher Education, 37*(4), 475–86.

Harackiewicz, J. M., Barron, K. E., Pintrich, P. R., Elliot, A. J., & Thrash, T. M. (2002). Revision of achievement goal theory: Necessary and illuminating. *Journal of Educational Psychology, 94*(3), 638–645.

Heimbeck, D., Frese, M., Sonnentag, S., & Keith, N. (2003). Integrating errors into the training process: The function of error management instructions and the role of goal orientation. *Personnel Psychology, 56,* 333–361.

Hendriks, V., & Maor, D. (2004). Quality of students' communicative strategies delivered through computer-mediated communications. *Journal of Interactive Learning Research, 15*(1), 5–32.

Ivancic, K., & Hesketh, B. (2000). Learning from error in a driving simulation: Effects on driving skill and self-confidence. *Ergonomics, 43,* 1966–1984.

Karoly, P. (1993). Mechanisms of self-regulation: A systems view. *Annual Review of Psychology, 44*, 23–52.

Kanfer, R., & Ackerman, P. L. (1990). *Ability and metacognitive determinants of skill acquisition and transfer* (Air Force Office of Scientific Research Final Report). Minneapolis, MN: Air Force Office of Scientific Research.

Kanfer, R., Ackerman, P. L., & Heggestad, E. D. (1996). Motivational skills and self-regulation for learning: A trait perspective. *Learning and Individual Differences, 8,* 185–209.

Laird, T. F. N., & Kuh, G. D. (2005). Student experiences with information technology and their relationship to other aspects of student engagement. *Research in Higher Education*, *46*(2), 211–33.

Leyton-Román, M., Núñez, J.L., & Jiménez-Castuera, R. (2020). The importance of supporting student autonomy in physical education classes to improve intention to be physically active. *Sustainability, 12*(4251), 1-14.doi:10.3390/su12104251

Michael, J. (2006). Where's the evidence that active learning works?. *American Journal of Physiology - Advances in Physiology Education, 30,* 159-167. doi:10.1152/advan.00053.2006.

Moya, E. C., & Cara, C. M. J. (2021). Active methodologies in physical education: Perception and opinion of students on the pedagogical model used by their teachers. *International Journal of Environmental Research and Public Health, 18,* 1438. https://doi.org/10.3390/ijerph18041438

Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education, 7*(2), 133–144. DOI: 10.1177/1477878509104318

O'Loughlin, M. (1992). Rethinking science education: Beyond Piagetian constructivism toward a sociocultural model of teaching and learning. *Journal of Research in Science Teaching, 29*(8), 791–820.

Petress, K. (2008). What is meant by 'Active Learning?'. *Education,128*(4), 566–569.

Rawsthorne, L. J., & Elliot, A. J. (1999). Achievement goals and intrinsic motivation: A meta-analytic review. *Personality and Social Psychological Review, 3,* 326–344.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, *48*(6), 1273–1296. https://doi.org/10.1007/s11165-016-9602-2

Ushioda, E. (1996). *Learner autonomy: The role of motivation*. Dublin, Ireland: Authentik.

Vallerand, R. J. (2007). Intrinsic and Extrinsic Motivation in Sport and Physical Activity: A Review and A Look at the Future. In *Handbook of Sport Psychology*, 3rd ed.; Tenenbaum, G., Eklund, R.C., Eds.; John Wiley: New York, NY, USA, 2007; pp. 59–83.

Vansteenkiste, M., Niemiec, C., & Soenens, B. (2010). The development of the five mini-theories of self-determination theory: A historical overview, emerging trends, and future directions. In *Advances in Motivation and Achievement, Vol. 16: The Decade Ahead*; Urdan, T., Karabenick, S., Eds.; Emerald: Bingley, UK, 2010; pp. 105–166.

Williams, B., Onsman, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine*, 8(3).

Creative Commons licensing terms
Authors will retain the copyright of their published articles agreeing that a Creative Commons Attribution 4.0 International License (CC BY 4.0) terms will be applied to their work. Under the terms of this license, no permission is required from the author(s) or publisher for members of the community to copy, distribute, transmit or adapt the article content, providing a proper, prominent and unambiguous attribution to the authors in a manner that makes clear that the materials are being reused under permission of a Creative Commons License. Views, opinions and conclusions expressed in this research article are views, opinions and conclusions of the author(s). Open Access Publishing Group and European Journal of Physical Education and Sport Science shall not be responsible or answerable for any loss, damage or liability caused in relation to/arising out of conflict of interests, copyright violations and inappropriate or inaccurate use of any kind content related or integrated on the research work. All the published works are meeting the Open Access Publishing requirements and can be freely accessed, shared, modified, distributed and used in educational, commercial and non-commercial purposes under a Creative Commons attribution 4.0 International License (CC BY 4.0).