

# Learning Styles, Information and Communication Technology Integration, and Learning Behavior Patterns of Physical Education Students in the Tertiary Level

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## Abstract

Low learning behavior patterns are evident. Examined in this research was the significance of learning styles and ICT integration as predictors of learning behavior patterns. Using multiple linear regression, with 100 tertiary students selected through simple random sampling, the results indicated that the determinants do not significantly predict learning behavior patterns. Hence, the constructivism theory was denied. Future research may be focused on exploring emerging themes and other variables in order to establish potential factors of learning behavior patterns.

*Keywords: Learning styles, information and communication technology integration, learning behavior patterns, physical education students, tertiary level*

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## 1. Main text

Low learning behavior patterns are more evident among today's generation of students, serving as a primary problem in the school environment.

Globally, proof shows that behavior patterns among students are low. The World Health Organization reported low behavior among children and adolescents aged 5–17 years, which recommends engaging in an average of at least 60 minutes per day of moderate-to-vigorous intensity physical activity (Guthold et al., 2020). In Australia, it was found that university students display low behavior patterns, which recommends the implementation of structured digital detox programs, promote mindfulness and time management training, and create more interactive and engaging learning environments (Smith et al., 2019). In the Philippines, the results revealed low behavior patterns among university students (Teodoro et al., 2023). Furthermore, the study conducted by Bangalan and Agnes (2024) revealed that the students in the university

have low behavior patterns, which recommends universities provide more comprehensive mental health support services, including counseling and stress management programs, to address the psychological factors contributing to low behavior patterns.

Low learning behavior patterns, if left unaddressed, may lead to poor learning habits and irregular sleep, which in turn can result in serious negative health and psychological consequences such as obesity, mental health struggles, and disengagement in school (Raza, Awais 2021). Addressing this gap is crucial, as unexplained student behaviors remain unresolved without targeted investigations. This research aims to identify areas in the existing literature that require further study to inform effective interventions.

### *1.1. Structure*

One of the most important qualities a student must possess is a high level of learning behavior patterns, as this is vital in shaping their daily habits and overall performance. The researcher believes that this study holds significance in relation to Sustainable Development Goal 4 (Quality Education), as it examines how students with strong behavioral patterns are more likely to take ownership of their actions, engage actively in learning, and positively influence their peers. Furthermore, the study aims to support the goal of equipping learners with the knowledge and skills necessary to promote sustainable development.

The study used a predictive research design, particularly employing descriptive-correlational techniques. Descriptive correlational design is used in research studies that provide static pictures of situations and establish the relationship between different variables (McBurney & White, 2009). In this study, learning style, information and communication technology integration, and learning behavior patterns were described. Further, the descriptive-correlational method was used for this study since it examines the relationship between physical education student's learning styles, information and communication technology integration, and learning behavior patterns.

The research was conducted at a private tertiary institution in Midsayap, North Cotabato. This location was selected because the study targeted 100 students specializing in the researcher's field. The institution provided a sufficiently large population for the survey, ensuring meaningful results.

The respondents of this study were the private school tertiary level. This study utilized a simple random sampling technique. According to Creswell (2015), random sampling is a method of selecting a sample of observations from a population to conclude the population. This method is ideal for my research because it eliminates bias and ensures proper representation. This is beneficial because it ensures the scientific method of selecting my respondents. Using a random sampling technique, the researcher identified 100 tertiary-level Physical Education students at private institutions for the academic year 2024-2025. The 100 samples are enough to statistically compute the data gathered in preparation for answering the questions and problems raised in this study.

The research instrument is made up of 89 items in total. To ensure that the tool is both valid and reliable, it was reviewed by a panel of experts and pilot-tested before the actual data collection. The first section of the questionnaire focuses on learning styles, which includes 35 items and shows a Cronbach's alpha of .968. This means it has excellent internal consistency. The second section, which looks at information and communication technology integration, it has 39 items and produced a Cronbach's alpha of .903, indicating excellent internal consistency. The third section measures physical literacy and, like the others, contains 15 items. It showed a Cronbach's alpha of .962, also reflecting excellent internal consistency. When all sections

were combined, the overall reliability of the instrument was .801, which confirms that the tool as a whole has excellent internal consistency.

The data collection process began with obtaining ethical approval, followed by securing permission from the relevant academic departments. Survey questionnaires were then distributed and administered with clear instructions to ensure respondents' understanding. The researcher supervised the entire data collection process to maintain accuracy, after which the collected data was compiled and systematically organized for analysis.

**Asking Permission to Conduct the Study.** The researcher obtained approval from the Research Ethics Committee (REC), confirming that the study posed minimal risk to respondents. Following this, the researcher sent a formal request for an endorsement letter to the Dean of the Graduate School of Holy Cross of Davao College, with the consent of the thesis adviser to conduct the study. With the endorsement letter, a request letter was then sent to the President of the selected institution offering Physical Education courses, seeking formal approval to carry out the study. Once the president approved the request, the letter was given to the subject coordinator or physical education coordinator for further coordination in conducting the study.

**Administration and Retrieval of Questionnaires.** The data collection was conducted face-to-face, with all qualified respondents gathered in one area. Before the actual administration, the researcher oriented the respondents about the purpose and significance of the survey questionnaire. The researcher also asked for their consent to ensure voluntary participation in the study. After receiving informed consent, the willing respondents who are the students enrolled in the Physical Education course, were asked to complete the survey. Once all questionnaires were answered honestly and thoroughly, the researcher retrieved the completed forms for analysis.

**Gathering and Tabulation of Data.** After the successful administration and retrieval of the completed questionnaires, the researcher collated and tabulated the data. The responses were systematically organized, and appropriate statistical tools were employed to analyze the data, enabling accurate interpretation and further analysis to address the study's objectives.

The data were analyzed using several statistical tools to assess different aspects of the study. To ensure the reliability of the questionnaire, a Cronbach's Alpha test was conducted, confirming the internal consistency of the survey items. The mean was used to describe the levels of body esteem, physical activity barriers, and physical literacy among respondents. The Pearson Correlation Coefficient was employed to measure the strength and direction of relationships between the variables. Additionally, multiple linear regression was applied to predict the influence of body esteem on physical activity barriers and physical literacy.

Ethical research conduct is crucial, particularly when involving human subjects. The researcher strictly adhered to the HCDC-SMILE Review standards, ensuring informed consent, evaluating risks and benefits, prioritizing safety, and safeguarding privacy and confidentiality. Additionally, the principles of justice and transparency were upheld throughout the study. With this, a minor risk was identified. Before gathering the data, the researcher provided an informed consent form emphasizing voluntary participation and the right to withdraw. Moreover, this study promoted fair treatment among physical education students while protecting their privacy under the Data Privacy Act of 2012 and ensuring confidentiality in data collection, handling, and proper disposal of information.

## Results

### Descriptive Analysis

Table 1. Descriptive Table

		Standard Deviation	Mean	Descriptive Interpretation
<b>Learning Styles</b>	100	0.40	3.55	High
Visual		0.46	3.61	High
Auditory		0.56	3.52	High
Kinesthetic		0.55	3.44	High
Information and <b>Communication Technology Integration</b>	100	0.46	3.66	High
Affective Strategies		0.72	3.50	High
Metacognitive Strategies		0.62	3.53	High
Personal Significance		0.58	3.69	High
Mobile Tools		0.79	4.04	High
Curriculum-based		0.48	3.69	High
Task-centered Strategies		0.60	3.67	High
ICT Tools in Learning		0.60	3.59	High
Motivating Role		0.60	3.57	High
<b>Behavior Patterns</b>	100	23.14	6.08	Very High
Moderate Type-A		11.8	6.94	Very High
Extreme Type-A		4.50	8.04	Very High
Moderate Type-B		63.6	5.50	Very High
Extreme Type-B		17.3	3.85	High

Specifically, Table 1 shows that the learning styles variable obtained a mean of 3.55, described as high level. This indicates that physical education students exhibit good learning styles. All the indicators obtained a mean that was described as high level.

Furthermore, Table 1 shows that the information and communication technology integration variable obtained a mean of 3.66, classified as a high level, indicating that students' information and communication technology integration is excellent. All indicators received respective mean scores that were also described as high level. Finally, the behavior patterns variable attained a mean of 6.08, similarly classified as a very high level, signifying that students' behavior patterns are excellent. All corresponding indicators were likewise rated at a very high level.

### Correlation Analysis

Table 2. Correlation Table

Variables	r	Learning Behavior Patterns			Interpretation
		p-value	Decision on Ho @ 0.05 level of significance		
Learning Styles	0.065	0.505	Failed to Reject Ho		No significant correlation
Information and Communication Technology Integration	0.090	0.358	Fail to Reject Ho		No significant correlation

Table 2 specifically shows that the correlation between learning styles and learning behavior patterns resulted a p-value of 0.505, which is greater than the 0.05 level of significance. Hence, the null hypothesis was not rejected, indicating that there is no significant correlation between learning styles and learning behavior patterns, although the relationship exhibits weak positive strength. Similarly, the correlation between information and communication technology integration and learning behavior patterns yielded a p-value of 0.358, which exceeds the 0.05 level of significance. Therefore, the null hypothesis was likewise not rejected. This suggests that there is no significant correlation between information and communication technology integration and learning behavior patterns, though the relationship exhibits weak positive strength.

#### Regression Analysis

**Table 3. Regression Table**

Learning Behavior Patterns					
Variables	Coefficients ( $\beta$ )	t	p-value	Decision on Ho	Interpretation
Intercept	69.271				
Learning Styles	3.125	1.046	0.813	Failed to reject Ho	Not Significant
Information and Communication Technology Integration	4.036	1.034	0.303	Failed to Reject Ho	Not significant

$R^2=0.616$ ; F-value=0.616; P-value=0.652

Table 3 specifically shows that learning styles obtained a beta coefficient ( $\beta$ ) of 3.125, indicating no significant influence on learning behavior patterns. This influence is not statistically significant, as shown by a p-value of 0.652, which is more than the 0.05 significance level.

On the other hand, information and communication technology integration obtained a beta coefficient ( $\beta$ ) of 4.036, indicating no significant influence on learning behavior patterns. This is also not statistically significant, as indicated by a p-value of 0.303, which exceeds the 0.05 level of significance. The findings show that learning behavior patterns do not have a meaningful influence on learning styles. This implies that individual variations in learning behavior patterns may not be strong predictors of how people prefer to learn.

Lastly, the table indicates that two predictive variables together yield an  $R^2$  value of 0.24, meaning they account for 24% of the variance in learning behavior patterns. This is quite low, suggesting that learning styles do not strongly account for differences in learning behavior patterns. The F-value of 0.616 and the overall p-value of 0.652 confirm that the regression model is not statistically significant at the 0.05 level.

### Summary of Findings

1. The learning style and information and communication technology integration among physical education tertiary students are very good while learning behavior patterns are highly exhibited.
2. Learning styles and information and communication technology integration are not significantly correlated with behavior patterns and show a weak positive relationship.
3. Both learning styles and information and communication technology integration do not significantly influence behavior patterns. Together, they account for only 24% of the variance in students' behavior patterns.

### Discussions

The results of the study are discussed in this chapter. Following the sequence: Very Good Learning Styles, Very Good Information and Communication Technology Integration, Highly Exhibited Learning Behavior Patterns, Significant Correlations between the Predictors and Criterion Variable, Significant Influence of Predictor Variables and Criterion Variable. Thus, this chapter also includes these results to either support, affirm, or deny previous findings. Furthermore, the conclusions and recommendations are also presented here.

#### Very Good Learning Styles of Physical Education Tertiary Students

The learning styles of Physical Education students in the tertiary are very good. This finding corroborates the findings of Ilcin et al. (2018), who explored learning styles among tertiary-level physical education students. Likewise, it corroborated the study of Magulod Jr. (2019), who found that Filipino university students in applied science courses tend to prefer visual, auditory, and kinesthetic learning approaches.

Lusa et al. (2025) examined the relationship between learning styles and academic performance among Bachelor of Elementary Education students. The study found that while students exhibited strong auditory, reading/writing, kinesthetic, and visual learning preferences, these styles did not significantly impact their academic performance. This suggests that students can adapt their learning methods and achieve success regardless of their preferred styles, challenging the idea that tailoring teaching approaches to specific learning styles directly enhances academic outcomes.

#### Very Good Information and Communication Technology Integration of Physical Education Tertiary Students

The information and communication technology Integration of Physical Education students in the tertiary is very good. This result highlights the effective integration of information and communication technology among tertiary Physical Education students, covering their perspectives on Affective ICT Strategies, Metacognitive Strategies, Personal Significance of information and communication technology, Importance of Mobile Tools, Curriculum-Based Limitations, Task-centered Strategies, Use of information and communication technology tools in learning, and the Motivating Role of ICT. This result corroborates the study of Cabansag (2025), who found that most respondents were proficient in information and communication technology, particularly in using word processing applications like Microsoft Word.

While some studies suggest that information and communication technology integration in tertiary Physical Education is effective, Koh et al. (2022) offered a different view. Their research on Physical Education classes in Singapore highlights major barriers, including limited technology access, inadequate

training, lack of institutional support, time constraints, and data privacy concerns. These challenges prevent full information and communication technology adoption, especially for older and more experienced teachers who struggle with digital tools. This suggests that despite information and communication technology's potential, significant obstacles still hinder its successful implementation in Physical Education.

### **Highly Exhibited Learning Behavior Patterns of Physical Education Tertiary Students**

The research highlights consistent learning behavioral patterns among physical education students, suggesting that their actions and reactions significantly contribute to strong learning outcomes. This study affirms the findings of González-Peño et al. (2021), who found that teaching behaviors influence student engagement in Physical Education classes. Furthermore, the study supports the idea that these learning behavior patterns contribute to sustained academic performance and skill development in physical education. Cid et al. (2019) explored how motivational climate, basic psychological needs, and autonomous motivation relate to academic performance in Physical Education classes. Their study found that while a task-oriented climate enhances basic psychological needs and motivation, these factors do not directly determine Physical Education grades. This suggests that positive learning behavior patterns and motivation alone may not guarantee higher academic performance in Physical Education.

### **Learning Styles and Information and Communication Technology Integration Do Not Significantly Correlated with Learning Behavior Patterns of Physical Education Tertiary Students**

The correlational analysis found no significant relationship between learning styles and learning behavior patterns. This result aligns with the findings of Kohan et al. (2021), who investigated the connection between learning styles and academic performance among nursing students in Kermanshah. Using the VARK model, their study concluded that there was no statistically significant difference between students' learning styles and their academic performance.

The study found no significant correlation between information and communication technology integration and learning behavior patterns. This result is consistent with the findings of Hossein et al. (2024), who investigated the impact of learning styles on the academic achievement of nursing students. Their research revealed that although various learning styles were prevalent among students, none demonstrated a significant relationship with academic performance.

Shirazi and Heidari (2019) found a strong link between learning styles and academic achievement among nursing students. Their study revealed that students who adopted the accommodating learning style had the highest academic performance. This suggests that learning styles can positively impact success in nursing education.

### **Learning Styles and Information and Communication Technology Integration Do Not Significantly Influence Learning Behavior Patterns of Physical Education Tertiary Students**

The study found that learning style and information and communication technology integration do not significantly influence the behavior patterns of tertiary students, aligning with previous research by Barbosa-Granados et al. (2019) and García-Planas (2018), which similarly reported no significant differences between learning styles, information and communication technology use, and academic experiences across various student groups.

The research conducted by Zagulova et al. (2019) found that different learning styles significantly influence students' academic performance, particularly in online distance learning environments. The study revealed that students with moderate and strong activist learning styles performed significantly lower than those with mild activist tendencies. This suggests that learning styles play a measurable role in shaping academic outcomes and should be considered in the development of effective educational strategies.



## Conclusion

Based on the study's findings, learning styles and information communication technology integration do not significantly predict learning behavior patterns among physical education tertiary students. This conclusion denied the Constructivist Theory, which emphasizes that learning is a dynamic process where individuals construct new understanding by integrating their prior knowledge, beliefs, and interactions with new concepts and experiences.

## Recommendations

Based on the conclusion, it is recommended that future researchers may conduct a qualitative study to explore emerging themes and identify predictor variables that influence learning behavior patterns. This approach could uncover previously unnoticed factors and provide deeper insights into how learning behavior patterns develop. Additionally, educational institutions may implement programs that broaden the scope of analysis, promoting a more comprehensive understanding of behavior. These efforts can lead to improved instructional strategies and enhance student learning dynamics.

## References

- Bangalan, Sherna G., and Maria Claudette A. Agnes. 2024. "A Mixed-Methods Study on the Assessment of the Mental Health Concerns among University Students in the Philippines." *Current Psychology* (New Brunswick, N.J.) 43 (22): 19804–19. <https://doi.org/10.1007/s12144-024-05777-0>.
- Barbosa-Granados, S. H., & Jaramillo, M. L. A. (2019). Learning styles and the use of ICT in university students within a competency-based training model. *Journal of New Approaches in Educational Research*, 8(1), 1–6. <https://doi.org/10.7821/naer.2019.1.296>
- Cabansag, M. O. (2025). Teachers' competency of ICT integration in teaching elementary teachers in Flora District. *Asian Journal of Education and Social Studies*, 51(2), 281–293. <https://doi.org/10.9734/ajess/2025/v51i21785>
- Cid, L., Monteiro, D., Teixeira, D., Silva, M. N., Moutão, J., & Alves, S. (2019). The role of motivational climate and basic psychological needs in physical education students' academic achievement. *Frontiers in Psychology*, 10, 1808. <https://doi.org/10.3389/fpsyg.2020.01808>
- Cruz, A. B., Kim, M., & Kim, H.-D. (2021). Physical Education Attitude of Adolescent Students in the Philippines: Importance of Curriculum and Teacher Sex and Behaviors. *Frontiers in Psychology*, 12, 658599. <https://doi.org/10.3389/fpsyg.2021.658599>
- García-Planas, M.I., Taberna, J. and Domínguez-García, S. (2018) "The use of e-portfolio in a linear algebra course," *Journal of technology and science education*, 6(1). Available at: <https://doi.org/10.3926/jotse.181>.



- González-Peño, A., Franco, E. and Coterón, J. (2021) "Do observed teaching behaviors relate to students' engagement in Physical Education?," *International journal of environmental research and public health*, 18(5), p. 2234. Available at: <https://doi.org/10.3390/ijerph18052234>.
- Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2020). Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1.6 million participants. *The Lancet Child & Adolescent Health*, 4(1), 23-35. [https://doi.org/10.1016/S2352-4642\(19\)30323-2](https://doi.org/10.1016/S2352-4642(19)30323-2)
- Granero-Gallegos, A., Carrasco-Poyatos, M., & Baena-Extremera, A. (2022). Social skills, sports participation and disruptive behavior in physical education students. *Sustainability*, 14(7), 3894. <https://doi.org/10.3390/su14073894>
- Hossain, M.A., et al. (2024) Anomaly-Based Threat Detection in Smart Health Using Machine Learning. *BMC Medical Informatics and Decision Making*, 24, Article No. 347. - References - Scientific Research Publishing (no date) Scirp.org. Available at: <https://www.scirp.org/reference/referencespapers?referenceid=3957458> (Accessed: May 15, 2025).
- İlçin, N. et al. (2018) "The relationship between learning styles and academic performance in TURKISH physiotherapy students," *BMC medical education*, 18(1), p. 291. Available at: <https://doi.org/10.1186/s12909-018-1400-2>.
- Kohan, N., Heidari, M., & Miri, M. R. (2021). Relationship between learning styles and academic performance of nursing students in a virtual education system. *Journal of Education and Health Promotion*, 10, 326. [https://doi.org/10.4103/jehp.jehp\\_909\\_20](https://doi.org/10.4103/jehp.jehp_909_20)
- Koh, K. T., Tan, L. Q. W., Camiré, M., Paculdar, M. A. A., & Chua, W. G. A. (2022). Teachers' and students' perceptions of factors influencing the adoption of information and communications technology in physical education in Singapore schools. *European Physical Education Review*, 28(1), 3–20. <https://doi.org/10.1177/1356336X211017949SAGE Journals>
- Liu, X. et al. (2024) "Variability of ambient air ammonia in urban Europe (Finland, France, Italy, Spain, and the UK)," *Environment international*, 185(108519), p. 108519. Available at: <https://doi.org/10.1016/j.envint.2024.108519>.
- Lusa, L. R., Marcelino, C., Navales, J., Nardo, J., Pios, M., Eslabon, L., Guanzon, R., Epacta, C. M., & Bagundol, M. C. (2025). Learning Styles and Academic Performance of BEED Students. *Pantawan*, 1(1). <https://stiwnu-journals.org/index.php/pantawan/article/view/89>
- Magulod, G. (2019) "Learning styles, study habits and academic performance of Filipino University students in applied science courses: Implications for instruction," *Journal of technology and science education*, 9(2), p. 184. Available at: <https://doi.org/10.3926/jotse.504>.
- McBurney, D., & White, T. L. (2009). *Research methods*. Belmont, CA Wadsworth Cengage Learning. - References - Scientific Research Publishing (no date) Scirp.org. Available at: <https://www.scirp.org/reference/referencespapers?referenceid=846406> (Accessed: May 15, 2025).
- Nagy, Judit, and Anita Habók. 2018. "Use of ICT Tools Questionnaire (Nagy & Habók, 2018)." Unpublished. <https://doi.org/10.13140/RG.2.2.13898.31689>.
- Navarro-Patón, R., Mecías-Calvo, M., Eirín-Nemiña, R., & Arufe-Giráldez, V. *Journal: International Journal of Environmental Research and Public Health* Year: 2022 DOI: 10.3390/ijerph19031166
- Navarro-Patón, R., Mecías-Calvo, M., Eirín-Nemiña, R., & Arufe-Giráldez, V. (2022). Disruptive Behaviors in Physical Education: A Matched Study of Social Skills and Sport Practice in a Region of Spain.

- International Journal of Environmental Research and Public Health, 19(3), 1166. <https://doi.org/10.3390/ijerph19031166>
- Raza, Awais. 2021. "Effect of Dietary Habits on Mental and Physical Health: A Systemic Review." *International Health Review* 1 (2): 56–84. <https://doi.org/10.32350/ihr.0102.04>.
- Shen, B., Li, W., Sun, H., & Rukavina, P. (2017). The influence of students' perceived mastery climate on behavioral engagement in physical education: A self-determination perspective. *European Physical Education Review*, 23(2), 212–226.
- Shirazi, F., & Heidari, S. (2019). The relationship between critical thinking skills and learning styles and academic achievement of nursing students. *The Journal of Nursing Research*, 27(4), e38. [https://doi.org/10.1097/jnr.0000000000000307:contentReference\[oaicite:16\]{index=16}](https://doi.org/10.1097/jnr.0000000000000307:contentReference[oaicite:16]{index=16})
- Smith, Robert, and Mehmet Akif Karaman. 2019. "Development and Validation of the Contextual Achievement Motivation Measure." *International Journal of Psychology and Educational Studies* 6 (3): 16–26. <https://doi.org/10.17220/ijpes.2019.03.003>.
- Teodoro, Vanessa, Patricia Pelo, Sharmaine Joyce Bonquin, Athazia Ashley Dasco, Jasmine Gonhuran, and Erica Mae San Juan. 2023. "Impact Analysis of Students Misbehavior to Academic Performance." *Psychology and Education: A Multidisciplinary Journal* 11 (1): 1–1. <https://ejournals.ph/article.php?id=21528>.
- Tsegay, L., & Gebremedhin, H. (2024). Learning styles and academic achievement among nursing students: A cross-sectional study. *BMC Research Notes*, 17, 94. <https://doi.org/10.1186/s13104-024-06949-8>
- Zagulova, D., El-Bishouty, M., & Ali, R. (2019). Learning style preferences, academic satisfaction, and performance in online distance learning in tertiary education under the new normal. *International Journal of Early Childhood Special Education*, 11(3), 1–10.