

Teachers' Assessment of Student Higher Order Thinking Skills Towards Developing Interactive Physical Education Instructional Strategies

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Abstract: This study examines the current state of teaching practices in fostering higher-order thinking skills (HOTS) among students, particularly in the context of Physical Education (PE). The findings reveal an average assessment of HOTS development, suggesting that present teaching methodologies prioritize basic skills over advanced cognitive processes such as analysis, evaluation, and creativity. Moreover, the results indicate equitable assessment across genders, highlighting that teachers apply consistent criteria irrespective of gender, and that both male and female students demonstrate comparable levels of HOTS in PE-related activities. However, the study identifies room for improvement in teaching strategies and assessment methods, as current practices show inconsistency in effectively fostering critical thinking, problem-solving, and independent thought processes. A positive connection between effective teaching strategies and HOTS development underscores the significance of implementing well-designed instructional methods to enhance students' cognitive abilities. Recommendations include integrating activities that promote critical thinking and decision-making, providing targeted training for teachers, developing alternative assessment tools, and revising curriculum and evaluation methods to align with contemporary educational demands. The study emphasizes the need for a collaborative effort among teachers, school administrators, and curriculum planners to ensure that teaching practices and assessments effectively support the development of higher-order cognitive skills in all students.

Keywords: Higher Order Thinking Skills, Critical Thinking, Problem Solving.

1. Introduction

In education, higher-order thinking skills or HOTS is a concept that distinguishes critical thinking skills from low-order learning outcomes, such as those attained by rote memorization. HOTS include synthesizing, analyzing, reasoning, comprehending, application, and evaluation. This concept is anchored in Benjamin Bloom's "Taxonomy of Educational Objectives" that its one of the most well-known theories in teacher-education program. The aim of this concept is to level up thinking skills among students. They have to move up from reading and writing skills as they need to express themselves and speak their minds in a more profound and convincing way. Basically, Bloom's taxonomy was designed with six levels to promote higher-order thinking: knowledge, comprehension, application, analysis, synthesis, and evaluation, while the lower-order thinking skills (LOTS) involve memorization, while higher-order thinking requires understanding and applying that knowledge. The top three is often displayed as a pyramid, with ascending levels of thinking at the top of the structure: analysis, synthesis, and evaluation. These levels of the taxonomy all involve critical or higher-order thinking. Students who are able to think are those who can apply the knowledge and skills they have learned to new contexts. Looking at each level demonstrates how higher-order thinking is applied in education (Watson, 2019).

Analysis involves students use their own judgment to begin analyzing the knowledge they have learned. At this point, they begin understanding the underlying structure of knowledge and also are able to distinguish between fact and opinion. Some examples of analysis are recognizing facts from opinion, comparing and contrasting things, persons, places, etc., and

illustrating abstracts concepts. On the other hand, synthesis is a skill that student needs because it helps them to infer relationships among sources, such as essays, articles, works of fiction, lectures by instructors, and even personal observations. The high-level thinking of synthesis is evident when students put the parts or information, they have reviewed together to create new meaning or a new structure. And finally, evaluation skill helps students to arrive at a good judgement or discretion in the process of learning new things. This is also embracing the values of ideas, items, and materials. Learners are expected to frame good and substantial ideas to be used to formulate sound evaluations of the material.

Higher thinking skills are extremely important in today's educational pursuits because when students demonstrate the skill it means that that are capable of independent thinking, decision making skills, creativity, and intelligence and wisdom to grow. Moreso, these skills emphasize individual capability, highly capable individuals, preparations for the adult life and working environment, enhancement of students' performances where there is high competition, preparation for higher education institution, and prevention of mediocrity. coaching style. The flexibility and autonomy that athletes require to succeed are not possible under an autocratic approach.

In the same line of thought, a lot of experts affirm that these skills develop among Physical Education students the skills of analysis or the ability to distinguish and separate the different parts of a whole until they get to know their principles or elements; conceptualization or the ability to extract the necessary traits in order to be able to describe a situation, phenomenon or problem; information management or the ability to visualize the constituent elements of a

situation as a whole; investigation or the ability to propose precise hypotheses of what a person studies; and metacognition or this is the ability to reflect on one's own thoughts.

With the aforementioned discussion on the importance of this skills for 21st century students, the researcher was prompted to delve into this subject specifically on the teacher's perception and opinion. This is necessary because to measure the effects of changed curricula, teaching methods and learning materials in time on higher order thinking skills, it will provide a baseline for evaluation. As the teachers can best observe the higher order thinking skills of their students, their opinions are considered valid. There is indeed a need to determine the level of higher order thinking skills of students to measure the changes and efficacies of educational objectives, teaching methods and learning materials.

It's difficult to imagine any educational institutions or teachers that don't mind the importance of higher thinking skills among students and wont exhaust resources and strategies for students to develop the skills. However, the extent to which higher-order thinking skills are taught and assessed continues to be an area of debate, with many teachers and employers expressing concern that young people "cannot think". On the onset, higher order thinking skills involve project-based learning skills, problem solving skills, transferring knowledge- economy skills and critical thinking skills. There are many reasons that require these skills to be taught in schools.

2. Statement of the Problem

This study aims to determine the teachers' perception on PE students' higher order thinking skills towards developing interactive instructional strategies.in Physical Education Curriculum Specifically, this study seeks answers to the following questions.

- (1) What is the profile of the respondents in terms of:
 - 1) gender
- (2) What is the assessment of teachers on PE students' higher order thinking skills in terms of:
 - 1) problem solving
 - 2) critical thinking
 - 3) decision making
 - 4) divergent thinking
- (3) Is there a significant difference on the assessment of the teachers on P.E. students' higher order thinking skills when profile is taken as a test factors?
- (4)What is the assessment of the respondents on the teaching strategies used by the teachers in order to develop higher order thinking skills among the P.E. students in terms of:
 - 1) collaborative learning
 - 2) discovery learning
 - 3) inquiry-based
 - 4) reflective teaching
- (5) Is there significant relationships between the assessment of students higher order thinking skills and the strategies of teaching used by th teachers?
- (6) Based on the results of the study, what interactive teaching strategies plan can be proposed to enhance higher order thinking skills

3. Scope and Delimitation

This study focused on the perception or opinion of teachers

on the higher order thinking skills of Physical Education Students. Specifically, this study seeked answers to questions that Promote Higher Order Thinking Skills in Physical Education.

Further it find some practices employed by teachers to develop students' higher order thinking skills. Then, based on the results of the study, the research designed a trendy, modern, and interactive instructional strategies to enhance students' higher order thinking skills of the students of Hunan University of Humanities, Science and Technology.

The purpose of education is to develop aspects of knowledge, understanding, attitudes, values and skills of students. Acquiring the right skills has become essential elements in economics learning. In today's modern society, students must master thinking skills. Teachers need to teach their students to think .

Another way to form ideas is to use critical thinking. This involves a person using his own knowledge or point of view to decide what is right or wrong about certain ideas. Critical thinking is higher order thinking skill. Higher order skills go beyond basic observation of facts and memorization.

Teaching and learning HOTS are equally difficult, and teachers' competence must be ensured whether they can manage HOTS-bound activities in curriculum transaction or not.

In the implementation of learning (HOTS) cannot be directly taught to students. Students should be trained about HOTS, as a skill, through learning activities that support its development. Active learning and student-centered learning are activities for training about HOTS.

Teachers level of satisfaction and level of willingness of student teachers does not significantly influence the level of commitment of student teachers

4. Research Design

The research w employ a descriptive research method using questionnaires to gather, analyze, and interpret data regarding respondents' perceptions of the assessment of Higher Order Thinking Skills (HOTS) among Physical Education (PE) students. The study will also assess the teaching strategies employed by PE teachers to develop these skills in students. Additionally, a comparative approach will be utilized to identify differences in the assessment of HOTS among PE students based on gender as a test factor. Furthermore, a correlational research design will be implemented to examine the relationship between the assessment of HOTS among PE students and the strategies used by teachers to foster the development of these skills. According to Silva (2017), using descriptive research design helps provide answers to the questions of who, what, when, where and how associated with a particular research problem; a descriptive study cannot conclusively ascertain answers to why.

5. Research Instrument

This study mainly adopts the methods of literature research, questionnaire survey, and statistical analysis to carry out research and analysis.

Questionnaire survey is a very practical data collection method, and literature analysis is helpful to the construction of theoretical model of this study, but the actual relationship and influence path of each variable need to be verified by actual data. Through the questionnaire survey, the researcher collected basic information such as the profile variables of the

respondents, and understand the current situation and influencing factors of the students' learning satisfaction, professional commitment and willingness to teach.

6. Results, Analysis, and Interpretation

(1) Profile of the respondents in terms of sex:

Table 1. Frequencies and Percentage of Demographic Factors

Sex	Counts	% of Total
Female	115	57%
Male	85	43%

Table 1 shows the frequencies and percentages of the demographic characteristics, particularly their gender. According to the tabulated data, 57% were women and 43% were men. This shows that the majority of the respondents are female.

Historically, teaching has been considered as an extension of traditional feminine responsibilities such as nurturing and caregiving, in line with societal expectations of women as primary caregivers (Tanywe et al., 2025). Furthermore, teaching provides flexible hours and employment security, making it an appealing choice for women, particularly those juggling family duties.

(2) Assessment Of Teachers On PE Students' Higher Order Thinking Skills In Terms Of:

1) Problem Solving Skill

Table 2. Assessment of Higher Order Thinking Skills in terms of Problem-Solving Skill

Indicators	Mean	SD	Verbal Interpretation	Rank
1.Consistently applies their knowledge to real world scenario by creating activities where they strategize to overcome challenges	3.23	1.30	Good	3
2.Demonstrates effective processing and use of information processing by analyzing previous plays or tactics during sports activities to refine their approach in future matches	3.05	1.05	Good	5
3.Creatively formulate solutions to problems they encounter by developing their own fitness routines to meet specific health goals	3.64	1.15	High	1
4.Effectively analyzes data to draw meaningful solutions by tracking their own performance metrics such as heart rate or distance covered to determine improvement	3.11	1.06	Good	4
5.Exhibits strong analytical skills across various tasks by adopting sports equipment for different weather or environment	3.52	1.36	High	2
COMPOSITE MEAN	3.31	0.92	Good	

Legend: 1.00-1.50: Poor (Very Low); 1.51-2.50: Fair (Low); 2.51-3.50; Good (Average); 3.51-4.50: Very Good (High); 4.51-5.00: Excellent (Very High).

Table 2 shows how teachers evaluated PE students' higher-order thinking skills in terms of problem-solving skills, with a composite mean score of 3.31 and a standard deviation of 0.92. This means that they agree on an average level of evaluation and that students consistently use what they know in real-life situations (M = 3.23), analyze data well to come up with useful solutions by tracking their own performance metrics such as heart rate or distance covered to determine improvement (M = 3.11),

If the indicator "Demonstrates effective processing and use of information by analyzing previous plays or tactics during sports activities to refine their approach in future matches" obtained the lowest mean rating of 3.05, it suggests that students may be struggling with higher-order thinking skills (HOTS) in this specific context. More specifically: Difficulty in Analyzing Past Performance: Students might find it challenging to reflect on and evaluate past plays or strategies critically. Limited Strategy Refinement: They may lack the ability to adapt and adjust their approach based on prior experiences, which is essential for improving future performance. Gap in Decision-Making and Tactical Thinking: This could indicate a need for more practice or guidance in strategic thinking and decision-making within sports contexts.

In essence, this highlights an area where targeted interventions, such as teaching strategies for reflection and analysis or fostering tactical thinking, could help students develop their higher-order thinking skills more effectively.

(M = 3.05). Furthermore, they strongly believe that

students develop creative solutions to issues by developing their own fitness routines to meet specific health goals (M = 3.64) and demonstrate good analytical skills across multiple tasks by adopting their own sports equipment for different weather and environment (M = 3.52).

Kwangmuang et al. (2021) define higher-order thinking as the ability to analyze, evaluate, and create, all of which are necessary for effective problem solving. However, in the context of PE, these skills are frequently overshadowed by traditional assessment methods that focus on physical performance rather than cognitive characteristics.

To create a climate conducive to higher-order thinking, instructors should use novel assessment tools like reflective diaries and scenario-based evaluations. These tactics can help children improve their problem-solving skills, preparing them for difficult problems in sports and everyday life. Adopting such techniques is critical to improving HOTS evaluation in different courses (Salinas-Navarro et al., 2024).

2) Critical Thinking Skill

Table 3 shows how teachers evaluated PE students' higher-order thinking skills in terms of critical thinking. Based on the tabulated data, it produced a composite mean score of 3.17 with a standard deviation of 0.90, indicating an average rating. This means that the students can effectively study reports and data to extract crucial information using health data to extract key insights for better decision making (M = 3.25), apply logical thinking to solve problems. In case of injury the student decides the best course of action such as applying first

aid or seeking medical attention (M = 3.21), and evaluate the information they receive to make sound decisions, assessing the reliability of fitness myths and health tips through research and decisions (M = 3.15). According to their responses, item 3 had the greatest mean score of 3.25, while item 1 had the lowest mean score. The low mean rating of 3.10 “Shows an ability to reason through complex problems logically by analyzing different playing strategies in games or evaluate the rules of a sport to identify strength and weaknesses” This critical thinking indicator suggests that students or participants may struggle with applying logical reasoning to complex problems, particularly in the context of evaluating strategies in games or assessing sports rules. This could imply the following: Need for Targeted Skill Development: There may be a gap in participants' ability to analyze and evaluate situations critically, pointing to a need for more structured activities or training focused on developing these specific higher-order thinking skills

(HOTS). Limited Exposure to Complex Scenarios: Participants may not have sufficient experience or practice in engaging with real-world or simulated scenarios that require deep analysis and logical reasoning. Teaching or Training Approach: The methods used to teach or encourage critical thinking might need to be revisited. Interactive methods, like game-based learning or scenario analysis, could be more effective. Assessment Design: If the low score stems from the assessment method itself, it may indicate a need to redesign tasks or questions to better align with participants' learning levels and encourage meaningful engagement. This result serves as a signal to educators, trainers, or curriculum designers to prioritize critical thinking activities that specifically challenge participants to reason through complex problems logically. Implementing strategies like peer evaluations, guided analysis, or reflective discussions could help bridge this gap.

Table 3. Assessment of Higher Order Thinking Skills in terms of Critical Thinking Skill

Indicators	Mean	SD	Verbal Interpretation	Rank
1. Shows an ability to reason through complex problems logically by analyzing different playing strategies in games or evaluate the rules of a sport to identify strength and weaknesses	3.10	1.11	Good	5
2. Reflects thoughtfully and insightfully on their learning process by making a journal of their own physical activities Identifying what works and what could be improved	3.13	1.12	Good	4
3. Effectively analyzes reports and data to extract key information using game footage or health data to extract key insights for better decision making	3.25	1.19	Good	1
4. Evaluates the information they encounter to form sound judgements by assessing the reliability of fitness myths and health tips through research and decision	3.15	1.13	Good	3
5. Demonstrates logical thinking in addressing challenges. In case of injury the students decide the best course of actions such as applying first aid or seeking medical attention	3.21	1.11	Good	2
COMPOSITE MEAN	3.17	0.90	Good	

Legend: 1.00-1.50: Poor (Very Low); 1.51-2.50: Fair (Low); 2.51-3.50; Good (Average); 3.51-4.50: Very Good (High); 4.51-5.00: Excellent (Very High).

To promote critical thinking, teachers may use a variety of pedagogical tactics that enable students to analyze, evaluate, and create rather than simply recollect material. For example, using problem-based learning in athletics forces students to think critically about plans and tactics, which fosters deeper cognitive skills (Ahmed, 2024). However, many teachers may have insufficient training in measuring these higher-order skills, resulting in an average assessment of students' critical thinking ability.

Lastly, as stated by Baena-Morales et al. (2023), to improve teacher assessment of students' critical thinking in physical education, professional development activities may focus on transformative teaching techniques that promote cognitive engagement alongside physical competency. Future study should look on effective assessment approaches that effectively capture critical thinking in PE settings in order to improve educational results.

7. Conclusion

(1) The average assessment of higher-order thinking skills may suggest that present teaching practices prioritize basic skills over fostering analysis, evaluation, and innovation. The techniques and procedures used to measure higher-order

thinking may not sufficiently capture these talents, resulting in average assessments.

(2) The consistent assessment across genders suggests that teachers are applying the same criteria and expectations in evaluating higher-order thinking skills, indicating an equitable teaching approach. This finding might indicate that, within the observed group, both male and female students exhibit similar levels of higher-order thinking skills in PE-related activities, suggesting that gender does not play a significant role in their cognitive performance in this context.

(3) The assessment of teaching strategies used by teachers for developing higher-order thinking skills (HOTS) is average suggests that there's room for improvement in instructional methods to better foster students' critical thinking, analysis, and problem-solving abilities. This may also indicate that while some effective strategies are being employed, there's inconsistency in their application, and students are not consistently benefiting from enhanced cognitive skills development.

(4) The discovered positive connection indicates that effective teaching practices considerably improve students' higher order thinking skills. Teachers that use tactics that promote analysis, evaluation, and invention assist students in

developing critical thinking, problem-solving skills, and independent thought processes. This highlights the significance of carefully developed training techniques that focus on higher-level cognitive skills.

8. Recommendation

(1) The teachers may integrate activities that encourage critical thinking, problem solving, and decision-making. This could involve team strategy meetings, game analysis, and peer feedback.

(2) The school administrators may provide teachers with training focused on developing higher-order thinking skills. Workshops and courses can help teachers learn how to implement and assess these skills effectively.

(3) The teachers may develop alternative assessment methods that focus on evaluating higher-order thinking skills, such as project-based assessments, reflective journals, and oral presentations.

(4) The school may implement regular reviews of assessment tools and methods to ensure they remain relevant, current, and free from any potential bias, adapting as necessary to ongoing educational insights.

(5) The school administrator may develop and integrate activities in the PE curriculum that further challenge and enhance higher-order thinking skills for all students, ensuring that they cater to a broad spectrum of interests and abilities.

(6) The department head may organize workshops and training sessions focused on teaching methods that enhance HOTS, such as inquiry-based learning, project-based learning, and the use of real-world problem solving in the curriculum.

(7) The teachers may integrate more tasks that require analysis, evaluation, and creation rather than mere recall of facts. Encourage interdisciplinary projects that require students to synthesize information from different subjects.

(8) The teachers may implement assessment methods that evaluate not just content knowledge but also a student's ability to apply, analyze, and create based on that knowledge

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