



# Validity and Reliability of a Nonlinear Pedagogy Assessment Test (GPAI) in Invasion Games

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**Abstract.** The purpose of this study was to test the validity and reliability of the nonlinear pedagogy invasion Games Assessment Instrument Test (GPAI) in elementary school physical education. This research is a quantitative descriptive study using the observation method. Data collection techniques using test-retest. This research was conducted at Ungaran 1 Elementary School. The research subjects consisted of students with a total population of 89, and the research sample used random sampling of 27 students. Data were analyzed using Pearson correlation, and Cronbach's alpha was calculated to check each validity and reliability criterion. The result of the analysis is that the Pearson Correlation coefficient values for these variables have a Pearson Correlation coefficient value greater than 0.381, the conclusion is that the instrument items are valid. From these data, it is known that Cronbach's alpha coefficient values for these variables have a Cronbach's alpha coefficient value greater than 0.700, so the conclusion is that the instrument is reliable and can be used as a real data collection tool.

**Keywords:** GPAI, nonlinear pedagogy, validity, reliability.

## 1 Introduction

In interpreting the substance of sports education, there are three primary concepts: (1) Physical education is an educational sport; (2) Physical education aims to develop cognitive, psychomotor, and affective domains; and (3) the process of systematically learning physical education through sports and health physical activities [1], [2]. In recent decades, researchers and teachers have discussed the importance of cognitive, psychomotor, and affective skills that must exist in physical education learning, with these three areas to be implemented in the environment by students throughout their lives so that they are competent both now and in the future, which will come.

Nonlinear pedagogy is a new pedagogical approach with a theoretical foundation in ecological dynamics that provides a framework for scientists and practitioners to comprehend how functional movement can be taught to students. The Nonlinear Pedagogical Approach incorporates nonlinear learning into the learning process and supports physical education teaching with understanding principles [3], [4]. Effective teaching and learning requires providing information regarding learning

performance assessment, preparing lesson plans, delivering clear instructions, and providing feedback. Theoretically guided by an ecological dynamics framework, creating a perspective that conceptualizes etymological roots in education is "exducere", which means guiding individuals out of their world [5]. A teacher must guide, pay attention to, and encourage each student's exploration in order for them to acquire perceptions on everything that can support their behavior. This pedagogical approach can help students self-regulate in the environment and be more receptive to opportunities to behave appropriately.

Each of the aforementioned nonlinear models has three priorities in each learning domain [1]; 1) TGFU has the highest cognitive domain priority, followed by psychomotor and affective. 2) Cooperative Learning prioritizes cognitive and affective domains above psychomotor domains. 3) Sport Education has complex learning associated with the tasks performed by each learner, but rather contributes to the priority of the first domain being affective [6], the second domain being cognitive, and the third domain being psychomotor.

The cognitive process of decision making (Decision Making) is one of the most crucial aspects of physical education to master. Important aspects of the learning environment must include opportunities for student participation in decision-making [7], [8]. The acquisition of abilities is a component of the psychomotor aspect. Skills are actions or duties geared toward achieving the objectives of a sport. Motor skills require voluntary movements of the body, head, and limbs to achieve movement objectives, with the movements that occur constituting components of motor skills [9]. The affective aspect includes communication (Communication), which is a component of social skills (Social Skills). Communicating about social skills enables children to interact with their peers, the community, and the environment in which they reside [10].

An instrument is a tool used to assess or evaluate the abilities or skills of students. Meaning of the instrument is that which can be used to aid the evaluation process in order to achieve improved results. The instrument, also known as a tool, consists of a series of queries that are used to evaluate students' comprehension of the delivered material.

This study will utilize an instrument adapted with permission from the Game Performance Assessment Instrument for Invasion Games by Mitchell et al. (2013). Validation and dependability testing must be conducted in Indonesia.

## 2

## Method

This research is a quantitative descriptive study using the test-retest method. This research was conducted at Ungaran 1 elementary school in Yogyakarta, Indonesia.

### 2.1 Study Design

Observation and documentation are employed as data collection methods. Observation with assessment and documentation instruments were utilized to collect data for this study. In this investigation, information was obtained through observation.

## 2.2 Research Participants

The research subjects consisted of students with a total population of 89, and the research sample used random sampling of 27 students.

## 2.3 Data Collection and Instrumentation

Instrument menggunakan Game Performance Assesment Instrument for Invasion Games adapted with permission Mitchell et al. (2013).

## 2.4 Statistical Analysis

SPSS for Windows version 26 was used to analyze the data, and Pearson correlation and Cronbach's alpha were calculated to evaluate the validity and reliability of each criterion.

# 3 Result

The test results were analyzed using the SPSS for Windows version 26 program package. The results of the analysis are in the table 1.

**Table 1.** Instrument Validity Results

Variable	Pearson Correlation					Minimum Limit	Result
	Item						
Decision Making	0.796	0.823	0.549	0.854	0.704	0.381	Valid
Skill Acquisition	0.814		0.836		0.769	0.381	Valid
Communication	0.554	0.510	0.728		0.740	0.381	Valid

From these data, it is known that the Pearson Correlation coefficient values for these variables are greater than 0.381.

Reliability is synonymous with consistency and regularity. A research instrument is deemed to have a high reliability value if its experiments consistently measure the variable of interest [11]. The reliability of the instruments in this study was not tested on respondents because the research revealed facts in the field and the instruments referred to the Game Performance Assessment Instrument for ages 7–18, adapted with permission by Mitchell et al. (2013).

Internal consistency is the instrument's reliability in this study, as determined by the analysis of research data using the Alpha Cronbach formula with a minimal limit of 0.70 for the reliability coefficient [12]. The test results were analysed using the SPSS programme package for Windows version 23 to determine the value of the Cronbach's alpha coefficient. The results of the analysis are in the following table:

**Table 2.** Reliability Test Results

Variable	Cronbach's Alpha	Minimum Limit	Result
Decision Making	0.784	0.700	Reliable
Skill Acquisition	0.784	0.700	Reliable
Communication	0.784	0.700	Reliable

## 4

## Discussions

The criteria for the GPAI-based learning outcomes assessment instrument for nonlinear pedagogy in invasion games are based on the results of students' invasion-playing ability [13]. Assessment criteria must be explicit, meaningful, and credible for a skill evaluation to be effective. Physical education instructors must clearly describe the assessment objectives and criteria and utilise assessments that are developmentally and age-appropriate to ensure the educational nature of assessment beyond evaluation [14]. It is possible to motivate students to improve their motor skills through active participation by employing specific instructional strategies. In order to perceive the relationship between motor skill level and health, precise and exhaustive skill evaluations are becoming increasingly crucial [15]. Consider the use of scoring rubrics to be the most crucial aspect of accurate and consistent evaluation [16]. Utilising grading rubrics is crucial for understanding how to moderate student learning outcomes. Assessment is a continuous component of instruction that occurs throughout the learning process; its primary purpose is to provide students and instructors with feedback.

The GPAI is intended to measure game performance behaviours that demonstrate tactical understanding and a player's ability to solve tactical problems through the selection and application of appropriate skills. During brief contests, criteria such as decision-making, skill execution, support, and adjustment are sometimes evaluated via peer evaluation [17]. GPAI's adaptability is an advantage. This research has been adapted to invasion games and includes a student-friendly description and evaluation criteria.

The results of this study differ from those [18], [19], Students' game performance was evaluated using five GPAI game elements: decision-making, skill execution, support, game performance, and game involvement. In addition, Mitchell et al. [20] suggest seven tactical components (fundamental, adjustment, decision-making, skill execution, support, and communication) associated with successful game performance.

## 5

## Conclusion

Based on the findings of the research and the results of the data analysis, it has been determined that the developed instrument for assessing the learning outcomes of physical education on nonlinear pedagogy invasion in Junior High School based on

GPAI is valid and reliable, have a Pearson Correlation coefficient value greater than 0.381, and that the items of the instrument are valid. Cronbach's alpha coefficient values for these variables are greater than 0.700, so it can be concluded that the instrument is trustworthy and can be used as a genuine data collection tool.

This research can assist trainers and teachers in observing and documenting game performance behaviour. The observed aspects include behaviour that reflects the player's ability to solve tactical game problems by making decisions, performing body movements in accordance with the demands of the game circumstance, and executing the skill type that the player selects.

The researcher intends that the final product, an evaluation of physical education learning outcomes for invasion nonlinear pedagogy in GPAI-based junior high schools, will serve as a guide or reference for evaluating students' proficiency in invasion games. Suggestions for future research, it requires more time for the process of product development, identification, and validation. This GPAI-based nonlinear pedagogy invasion games earning outcome assessment tool must be redesigned so that it is more effective.

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