Role-Playing Games as a Psychometric Tool for the Analysis of Personality Profiles and Academic Performance in Basic Education

Waldir Siqueira Moura, Federal University of Rio de Janeiro, Brazil
Edgar Delbem, Federal University of Rio de Janeiro, Brazil
Angélica Fonseca da Silva Dias, Federal University of Rio de Janeiro, Brazil
Juliana Baptista dos Santos França, Federal University of Rio de Janeiro, Brazil

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Abstract

This study investigates whether structured decisions made in a role-playing game can generate psychometrically interpretable student profiles associated with academic performance in basic education. The proposed Psychogenesis-RPG is an analogue game-based assessment comprising 40 character-customisation items distributed across eight behavioural dimensions. An observational and correlational design was employed with students from the final years of basic education, while an age-eligible subsample completed the 16 Personality Factor Questionnaire (16PF) to examine convergent evidence. The analytical framework combines ordinal scoring, internal consistency, rank-order correlations, and profile comparison. Results indicate that game-derived behavioural profiles provide meaningful educational information and complement conventional academic indicators without replacing standardised psychological assessment. The study contributes to educational psychometrics and Learning Analytics by proposing a practical framework for formative student profiling through structured role-playing decision-making.

Keywords: role-playing games, game-based assessment, educational psychometrics, personality profiles, academic performance, student profiling, basic education, learning analytics

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Introduction

Academic performance is one of the most visible indicators used to evaluate student progress in basic education. Grades, test scores, attendance records, and completion rates provide important evidence about learning outcomes, but they reveal comparatively little about the behavioural processes through which those outcomes are produced. Two students with similar grades may differ substantially in planning, persistence, autonomy, willingness to collaborate, tolerance for uncertainty, or capacity to adapt when a task becomes difficult. Conversely, students with similar behavioural tendencies may attain different outcomes because of contextual, instructional, or socioeconomic conditions. Academic performance should therefore be interpreted not as an isolated expression of ability, but as the result of interactions among cognitive, motivational, behavioural, social, and environmental factors.

This multidimensional perspective has increased interest in student profiling within Educational Data Mining and Learning Analytics. These fields seek to transform traces of learning activity into interpretable evidence capable of supporting feedback, monitoring, instructional adaptation, and early intervention (Baker & Inventado, 2014; Siemens & Long, 2011). In digital learning environments, profiling commonly relies on interaction logs, task-completion sequences, response times, navigation patterns, and participation records. Such evidence can reveal regularities that are not immediately visible in final grades. Nevertheless, the implementation of data-intensive educational analytics remains uneven in basic education, particularly in institutions with limited technological infrastructure or restricted access to specialised assessment systems.

The practical value of student profiling also depends on how profiles are conceptualised. When behavioural indicators are treated as fixed categories, they may reinforce deterministic interpretations, reduce complex students to simplified labels, or encourage educational decisions based on unstable evidence. A more appropriate formative approach treats profiles as provisional representations of observable tendencies within a specific context. From this perspective, profiling is not intended to establish who a student permanently is. Instead, it provides hypotheses about how the student tends to approach decisions, interact with others, organise tasks, or respond to uncertainty under the conditions in which the evidence was collected.

Game-based assessment offers a promising means of producing such evidence. Games require participants to make decisions under rules, allocate resources, select strategies, respond to consequences, and negotiate relationships between immediate and delayed objectives. Role-playing games are particularly relevant because they situate decisions within a narrative and invite players to express preferences through character construction, group roles, strategic choices, and responses to hypothetical events. These features create a structured but contextually meaningful environment in which behavioural tendencies can be elicited without reproducing the format of a conventional personality questionnaire.

The educational use of games has traditionally emphasised motivation, engagement, content learning, and collaborative problem solving. Research on gamification and game-based learning indicates that appropriately designed game elements can influence participation and motivation, although their effects depend on instructional context, learner characteristics, and alignment between mechanics and pedagogical objectives (Deterding et al., 2011; Hamari et al., 2014; Sailer et al., 2017). Less attention has been given to the use of games as measurement environments capable of producing psychometrically interpretable indicators. In such

environments, choices are not merely part of gameplay; they constitute observable responses from which inferences about tendencies or constructs may be developed.

This measurement perspective requires caution. A decision made in a role-playing task cannot automatically be interpreted as evidence of a stable personality characteristic. The relationship between game behaviour and psychological constructs depends on the design of the task, the clarity of the response alternatives, the consistency of item functioning, and the theoretical basis connecting observable choices to the intended dimension. Game-based assessment must therefore be supported by explicit scoring rules, standardised administration, reliability evidence, and empirical relationships with external variables.

Psychometric instruments such as the 16 Personality Factor Questionnaire provide established procedures for assessing personality-related constructs. Their standardisation, normative frameworks, and professional administration requirements support controlled psychological interpretation. At the same time, these characteristics may limit their routine use as formative educational tools, particularly when schools seek rapid, accessible, and context-sensitive evidence for pedagogical planning. Game-based instruments should not be viewed as substitutes for standardised personality inventories. Their potential lies instead in generating complementary indicators under ordinary educational conditions and in identifying patterns that may warrant closer pedagogical observation.

The present study examines this possibility through Psychogenesis-RPG, an analogue role-playing assessment based on structured character-customisation decisions. The instrument comprises 40 forced-choice items distributed across eight dimensions: Avatar Identity and Aesthetics, Preferred Role in Team/Narrative, Strategic Orientation, Tolerance for Risk and Uncertainty, Self-Control and Planning, Sociability and Interaction, Exploration and Curiosity, and Empathy and Other-Focus. Each item presents four ordered alternatives representing increasing levels of the tendency associated with its target dimension. Responses are aggregated into dimension-level scores intended to describe relative differences among participants rather than establish clinical or diagnostic categories.

Unlike research centred exclusively on the psychometric validation of a new instrument, this study focuses on the educational meaning of the profiles generated through RPG decisions. Its central concern is whether variation in these profiles is associated with students' academic performance and whether particular dimensions provide information that is not apparent from grades alone. For example, Self-Control and Planning may be related to the organisation and completion of academic tasks, while Exploration and Curiosity may be associated with engagement in open-ended activities. Sociability and Interaction may have particular relevance in collaborative learning contexts, whereas Tolerance for Risk and Uncertainty may influence how students respond to unfamiliar or complex tasks.

These relationships should not be assumed to be uniform or linear. A high score in a particular dimension is not necessarily advantageous in every educational context. Greater tolerance for uncertainty may support experimentation and problem solving, but may also be associated with impulsive decisions when planning is limited. Strong self-control may support consistency and task completion, yet excessive rigidity may reduce adaptability in activities requiring exploration. Similarly, sociability may facilitate collaborative work without necessarily predicting performance in individual assessments. The value of a dimensional profile therefore lies in the configuration of tendencies and their interaction with instructional demands, rather than in the presumption that higher scores always represent superior educational functioning.

The analysis of academic performance also demands methodological restraint. Grades are influenced by curriculum, teacher expectations, assessment formats, attendance, prior knowledge, learning opportunities, and institutional practices. Associations between RPG-derived profiles and academic results cannot be interpreted as causal effects or direct measures of intelligence. Instead, they provide evidence about whether students occupying different positions in behavioural dimensions also tend to differ in selected educational indicators. Such relationships may support the formative interpretation of the instrument, but they do not establish that personality profiles determine academic achievement.

To examine the psychometric plausibility of the game-derived indicators, the study combines internal and external forms of evidence. The complete school sample supports the examination of response distributions, dimensional variability, reliability, and associations with academic indicators. An age-eligible subsample is additionally compared with theoretically corresponding dimensions of the 16PF. Because the instruments employ different measurement systems, the comparison is based on rank-order relationships rather than direct score equivalence. The original validation sample comprises 44 students aged between 14 and 17 years, while direct comparison with the 16PF is restricted to the 13 participants meeting its recommended age conditions.

By integrating psychometric analysis and academic evidence, this study addresses a gap between game-based assessment and school-based decision support. Existing work frequently examines whether games improve learning or engagement. The present investigation asks a different question: whether decisions produced within a role-playing structure can function as interpretable data about how students approach educational situations. This distinction positions the RPG not only as an instructional resource but also as a structured environment for eliciting behavioural evidence.

Research Objective

The general objective of this study is to investigate whether structured decisions made in a role-playing game can generate reliable and educationally interpretable personality-related profiles associated with academic performance in basic education.

More specifically, the study examines:

- the internal functioning and reliability of the eight Psychogenesis-RPG dimensions;
- the distribution of game-derived profiles across students and school grades;
- the relationships between dimensional scores and academic-performance indicators;
- the convergence between selected Psychogenesis-RPG dimensions and theoretically corresponding 16PF factors;
- the potential and limits of using RPG-derived profiles for formative educational decision-making.

Research Questions

The study is guided by the following research questions:

- RQ1. To what extent do structured role-playing decisions generate internally coherent and differentiated student profiles?
- RQ2. Which Psychogenesis-RPG dimensions are associated with academic performance in basic education?

- RQ3. Do students with different global formative classifications exhibit distinct academic-performance patterns?
- RQ4. Do game-derived dimensions present rank-order convergence with theoretically corresponding factors of the 16PF?
- RQ5. How can RPG-derived profiles complement conventional academic indicators without producing deterministic or diagnostic classifications?

Contributions

This study makes four principal contributions:

1. First, it reframes the role-playing game as a psychometric data-generation environment, rather than treating it exclusively as a motivational or instructional strategy. The decisions embedded in character construction are operationalised as observable indicators linked to explicit behavioural dimensions.
2. Second, it connects game-derived profiling to academic-performance analysis. This connection enables examination of whether dimensions such as planning, exploration, sociability, empathy, and tolerance for uncertainty provide complementary information about student functioning.
3. Third, the study proposes an analytical framework that integrates ordinal scoring, dimensional reliability, external convergence, academic indicators, and profile comparison. The framework is designed for pilot and school-based research contexts in which sample sizes, infrastructure, and access to standardised psychological instruments may be restricted.
4. This study establishes clear ethical and interpretive boundaries. Psychogenesis-RPG profiles are treated as context-dependent formative indicators. They are not intended to define fixed personality types, establish diagnoses, determine educational placement, or replace professional psychological assessment. Their purpose is to enrich pedagogical understanding by combining structured game decisions with other sources of educational evidence.

Related Work and Theoretical Foundations

Research on digital games in education has traditionally focused on their capacity to improve motivation, engagement, and learning outcomes. Over the last two decades, numerous studies have demonstrated that appropriately designed game environments can increase participation, persistence, and enjoyment while supporting the acquisition of disciplinary knowledge. These effects, however, are neither universal nor independent of instructional context. Their magnitude depends on the alignment between game mechanics, learning objectives, student characteristics, and pedagogical implementation (Deterding et al., 2011; Hamari et al., 2014; Sailer et al., 2017).

As the field matured, researchers began recognising that educational games produce considerably more information than final scores alone. Every decision made during gameplay constitutes a behavioural event capable of revealing aspects of planning, exploration, collaboration, persistence, adaptation, and problem-solving. Consequently, games gradually evolved from being viewed exclusively as instructional interventions to becoming environments capable of generating educational evidence.

This transition gave rise to the concept of Game-Based Assessment, in which gameplay is treated as a structured source of observable behavioural indicators rather than merely a vehicle

for content delivery. Within this perspective, player choices become assessment data, enabling researchers to investigate constructs that are difficult to observe through conventional examinations or self-report questionnaires. Unlike traditional tests, game-based assessments capture behaviour while decisions are being produced, thereby reducing dependence on retrospective self-evaluation and increasing ecological validity.

The emergence of stealth assessment further expanded this perspective. Instead of interrupting gameplay to administer external questionnaires, assessment is embedded directly within the game mechanics, allowing behavioural evidence to accumulate naturally throughout interaction (Shute, 2011). Although many stealth-assessment systems rely on complex computational models and digital log data, their underlying principle is broader: meaningful behavioural information can be inferred from structured decision-making when supported by an explicit measurement framework.

Despite these advances, relatively few studies have investigated analogue games as psychometric environments. Most published work continues to focus on digital platforms because they facilitate automatic data collection and large-scale analytics. Nevertheless, analogue games possess important methodological advantages in school settings. They require minimal technological infrastructure, are easily implemented in classrooms with limited resources, permit direct observation of participant behaviour, and reduce technological barriers that frequently affect digital educational interventions. These characteristics make analogue role-playing games particularly attractive for basic education, where feasibility often determines whether an assessment instrument can be adopted routinely.

Role-Playing Games as Behavioural Decision Environments

Role-playing games occupy a distinctive position within game-based education because they organise player behaviour around narrative decision-making rather than competition alone. Instead of rewarding isolated correct answers, RPGs require participants to construct identities, assume social roles, negotiate objectives, manage uncertainty, and make successive decisions whose consequences emerge throughout the narrative.

From an educational perspective, this structure creates repeated opportunities for observing behavioural tendencies under controlled conditions. Decisions concerning leadership, cooperation, planning, exploration, empathy, or risk-taking are not requested through direct questions but emerge from contextualised situations requiring participants to select among multiple plausible alternatives. Consequently, RPGs may reveal patterns that remain less evident when students simply describe themselves through conventional personality inventories.

The educational literature has predominantly examined RPGs as instructional strategies. Previous investigations have reported improvements in motivation, creativity, collaboration, historical understanding, language development, and problem-solving. These studies generally evaluate learning gains or participant engagement rather than the psychometric properties of decisions generated during gameplay. The possibility that RPG decisions themselves may constitute measurable behavioural indicators has received considerably less attention.

This distinction is fundamental. When an RPG is designed for learning, decisions primarily serve the progression of the narrative. When designed for assessment, the narrative becomes a structured context through which theoretically relevant behaviours can be elicited

systematically. Under these conditions, each decision contributes to a predefined measurement model, allowing individual responses to be aggregated into interpretable dimensions representing broader behavioural tendencies.

Psychogenesis-RPG adopts this second perspective. Character customisation is not merely an aesthetic component of gameplay but the central assessment mechanism through which students express preferences regarding identity, planning, collaboration, uncertainty, exploration, and interpersonal interaction. Each response therefore functions simultaneously as a narrative choice and as an observable behavioural indicator. The resulting profile is interpreted not as a fictional description of the created character but as evidence concerning the student's preferred decision patterns within the structured environment provided by the assessment.

Personality-Related Tendencies and Academic Performance

Academic achievement is influenced by a wide range of interacting variables that extend beyond cognitive ability alone. Research in educational psychology consistently demonstrates that planning, self-regulation, persistence, cooperation, motivation, curiosity, emotional regulation, and adaptive decision-making contribute substantially to students' educational trajectories. These characteristics influence how learners organise their study routines, respond to challenges, collaborate with peers, and maintain engagement throughout the learning process.

Personality research provides one framework for understanding these behavioural differences. Trait models describe relatively stable patterns through which individuals perceive situations, regulate behaviour, and interact with their environment. Although no single personality dimension determines educational success, combinations of behavioural tendencies frequently influence how students approach academic tasks.

For example, students exhibiting stronger planning and self-regulation often demonstrate greater consistency in homework completion and long-term projects. Curiosity and exploratory behaviour may facilitate inquiry-based learning and creative problem-solving. Empathy and sociability can influence participation in collaborative activities, whereas tolerance for uncertainty may become particularly relevant during open-ended investigations requiring experimentation and adaptation.

These relationships should not be interpreted deterministically. Educational performance emerges through continuous interactions among individual characteristics, teaching practices, curriculum design, family context, socioeconomic conditions, and institutional opportunities. Behavioural tendencies therefore represent one component of a considerably broader educational system rather than isolated predictors of achievement.

Accordingly, the present study adopts a probabilistic rather than deterministic interpretation of personality-related profiles. The objective is not to predict grades directly from RPG decisions but to examine whether systematic associations emerge between behavioural dimensions and educational indicators. Such associations may support pedagogical reflection while recognising that educational outcomes remain context-dependent and subject to multiple interacting influences.

Educational Psychometrics Beyond Conventional Questionnaires

Psychometric assessment in educational contexts has traditionally relied on questionnaires, rating scales, structured inventories, and standardised psychological tests. These instruments offer important advantages, including established theoretical foundations, normative interpretation, and well-developed statistical methodologies. However, they also depend heavily on self-report, verbal comprehension, and respondents' capacity to evaluate their own behaviour accurately.

Game-based assessment introduces a complementary measurement paradigm. Instead of asking participants how they usually behave, it observes the decisions they make while interacting with structured situations. The resulting evidence is behavioural rather than declarative. This distinction does not eliminate measurement challenges, but it provides an alternative source of information that may complement conventional psychometric procedures.

The use of behavioural evidence also aligns with contemporary conceptions of validity, which emphasise that score interpretation should be supported by multiple sources of evidence rather than by a single statistical coefficient. Response processes, internal score structure, relationships with external variables, and theoretical coherence collectively contribute to the validity argument. Consequently, game-derived measures should not be evaluated solely according to whether they reproduce questionnaire scores. Their value depends on whether the behavioural indicators they generate correspond coherently to theoretically meaningful constructs and contribute useful information for the intended educational purpose.

Within this framework, Psychogenesis-RPG is not proposed as an alternative personality inventory. Rather, it functions as a structured behavioural assessment whose educational utility depends on three complementary conditions: internally coherent dimensions, theoretically interpretable behavioural indicators, and meaningful relationships with external educational variables. These variables include both established psychometric measures and academic-performance indicators, allowing the instrument to be evaluated simultaneously from psychological and educational perspectives.

Research Gap and Conceptual Framework

The literature reviewed above reveals an important gap. Existing research demonstrates that games can enhance motivation, engagement, and learning. Educational psychometrics demonstrates how behavioural constructs may be measured reliably. Learning Analytics shows the value of behavioural data for educational decision-making. Nevertheless, these research traditions have developed largely independently.

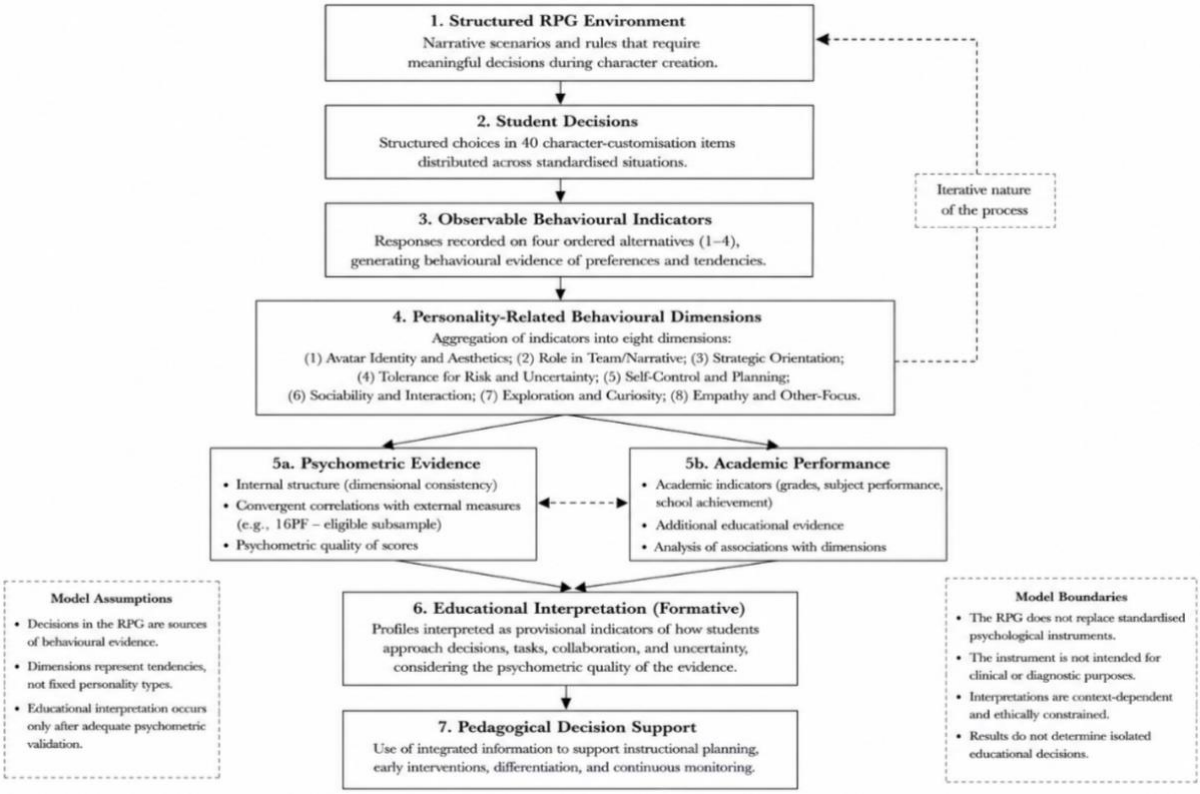
Few studies investigate whether structured role-playing decisions can simultaneously satisfy psychometric requirements and generate educationally meaningful profiles associated with academic performance. Even fewer examine analogue RPGs designed specifically as behavioural assessment instruments suitable for routine classroom implementation.

The present study addresses this gap by integrating these three perspectives into a single analytical framework. Rather than treating games as instructional interventions alone or psychometrics as questionnaire-based assessment alone, the proposed framework conceptualises the role-playing environment as a controlled source of behavioural evidence. Student decisions are transformed into dimensional indicators through predefined scoring

procedures, examined psychometrically through reliability and convergent analyses, and interpreted educationally through their relationships with academic performance.

Figure 1

Conceptual Model From the RPG Environment to Educational Interpretation



The figure 1 summarises the conceptual model adopted throughout this investigation. The model proposes that structured RPG decisions generate observable behavioural indicators, which are aggregated into personality-related dimensions. These dimensions constitute the primary analytical unit and are subsequently examined in relation to academic performance and external psychometric evidence. Educational interpretation is therefore situated at the final stage of the process and remains explicitly bounded by the psychometric quality of the generated scores.

Research Design, Analytical Framework and Findings

This study adopted an observational, correlational, and cross-sectional research design to investigate whether behavioural decisions produced during a structured role-playing game are associated with measurable differences in students' academic performance. Unlike intervention studies that evaluate learning gains following gameplay, the present investigation conceptualises the role-playing environment as a behavioural assessment context in which each decision constitutes observable evidence of individual tendencies relevant to educational functioning.

The research was conducted in a private educational institution offering both the final years of Basic Education and Upper Secondary Education. Participation was voluntary and authorised by the school administration, students, and their legal guardians whenever required. All procedures complied with ethical principles governing educational research involving human

participants. The assessment formed part of a broader investigation into game-based psychometric profiling and educational decision support.

The complete sample consisted of 44 students aged between 14 and 17 years, representing different school years within Basic Education. Because one component of the study involved comparison with the Sixteen Personality Factor Questionnaire (16PF), only participants meeting the recommended age requirements for that instrument composed the convergent-validation subsample (n = 13). Consequently, analyses involving academic performance and behavioural profiling used the entire sample, whereas direct psychometric convergence with the 16PF was restricted to the eligible subgroup.

This distinction reflects the different purposes of the analyses. School-wide profiling sought to examine relationships between game-derived behavioural tendencies and educational indicators, while convergent analysis investigated whether the dimensions extracted from the RPG demonstrated theoretically coherent relationships with an established personality assessment.

Psychogenesis-RPG Assessment Framework

The assessment environment was based on Psychogenesis-RPG, an analogue role-playing instrument specifically designed to elicit behavioural preferences through structured character customisation rather than through explicit self-report.

Participants completed 40 forced-choice items, organised into eight behavioural dimensions, each represented by five independent decision scenarios:

- Avatar Identity and Aesthetics;
- Preferred Role in Team and Narrative;
- Strategic Orientation;
- Tolerance for Risk and Uncertainty;
- Self-Control and Planning;
- Sociability and Interaction;
- Exploration and Curiosity;
- Empathy and Other-Focus.

Each item presented four response alternatives ordered according to increasing expression of the target behavioural tendency. Rather than identifying correct or incorrect answers, the instrument records individual preferences under standardised hypothetical situations. Consequently, the assessment captures how students tend to approach decision-making within a controlled narrative environment instead of evaluating factual knowledge or academic competence.

Individual item responses were transformed into ordinal scores ranging from one to four. Dimension scores corresponded to the arithmetic mean of the five items composing each behavioural construct, producing continuous indices varying between 1.00 and 4.00. The global behavioural profile was obtained by averaging the eight dimension scores, generating a single summary indicator describing the participant's overall decision pattern within the assessment.

Neither dimensional nor global scores were interpreted as fixed personality traits. Throughout this investigation they are understood as behavioural tendencies expressed under the specific contextual conditions created by the role-playing environment.

Academic Performance Indicators

To examine the educational relevance of the behavioural profiles, Psychogenesis-RPG scores were analysed together with students' academic records routinely produced by the school.

Academic performance was considered a multidimensional educational outcome rather than a direct measure of cognitive ability. School achievement reflects interactions among prior knowledge, instructional quality, motivation, attendance, study habits, family context, assessment practices, and behavioural self-regulation. Consequently, no assumption was made that behavioural dimensions should individually predict grades.

Instead, academic indicators were used as external educational criteria for investigating whether systematic behavioural differences identified through the RPG corresponded to observable differences in school performance.

This perspective aligns with contemporary educational psychometrics, which emphasises the examination of relationships between behavioural measures and meaningful external educational variables rather than assuming direct causal effects.

Discussion and Conclusions

From a psychometric perspective, the results provide encouraging evidence that behavioural choices produced in a structured role-playing environment can generate internally coherent dimensions and demonstrate theoretically consistent relationships with external personality measures. The convergent analyses with the age-eligible subsample completing the 16 Personality Factor Questionnaire support the interpretation that selected RPG dimensions capture behavioural tendencies conceptually related to established personality constructs. Importantly, these associations were interpreted as evidence of convergent validity at the level of rank ordering rather than as proof of score equivalence between instruments. Such an approach recognises that the RPG and the 16PF differ fundamentally in measurement philosophy, administration procedures, and intended educational purposes.

This study demonstrates that structured role-playing games may function as psychometrically informed environments for generating behavioural evidence relevant to educational practice. By transforming character-customisation decisions into multidimensional behavioural indicators, the proposed framework extends the educational role of RPGs beyond motivation and engagement toward formative student profiling. The findings suggest that behavioural tendencies expressed through gameplay are associated with meaningful educational differences and may complement conventional academic indicators without replacing established psychometric instruments or professional psychological assessment. As educational systems increasingly seek personalised approaches capable of recognising the complexity of student development, game-based behavioural assessment offers a promising pathway for integrating psychometric rigour, pedagogical relevance, and practical applicability within the everyday reality of Basic Education.

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Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The authors declare that generative artificial intelligence (ChatGPT, developed by OpenAI) was used solely to assist in translating the original manuscript from Portuguese into English. The use of this technology was strictly limited to language translation and linguistic refinement to ensure clarity, fluency, and conformity with academic English.

The authors confirm that all ideas, study design, methodology, data collection, analyses, interpretations, discussions, and conclusions are entirely their own and were developed through the original conduct of the research. The authors carefully reviewed and edited the translated manuscript and assume full responsibility for the accuracy, integrity, and final content of the submitted work.

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