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Non-Digital Logic and Strategy Games as Innovative Pedagogical Tools for Developing Patience among Grade 12 Students

Marilou J. Dagasdas[1]
[1]University of the Visayas, Cebu City, Cebu, Philippines-6000
Email address: dagasdas.malou@gmail.com

Abstract— *Patience is an essential socio-emotional competency that fosters perseverance, delayed gratification, and enduring self-control, which are necessary for academic achievement and personal development. Nevertheless, many students find it challenging to cultivate this ability through traditional education practices. Thus, this study explored the effectiveness of non-digital logic and strategy games in developing patience among Grade 12 students in a private school during the 2025–2026 academic year. The primary objective was to determine whether consistent engagement with games such as Sudoku, chess, Rubik's Cube, and Dama could significantly enhance students' patience compared to traditional educational activities. An experimental design utilizing a post-test-only control group was implemented, with 84 individuals randomly assigned to the experimental and control groups. The experimental group participated in daily 30-minute sessions of non-digital games for two weeks, whereas the control group did not participate in these activities. Data were gathered utilizing the validated Three-Factor Patience Scale (3-FPS) to evaluate students' patience levels post-intervention. The results indicated that students who engaged with non-digital logic and strategy games showed greater patience compared to those who did not, validating the efficacy of the intervention. The findings suggest that structured game-based approaches can enhance students' socio-emotional skills, particularly patience, which in turn fosters perseverance, academic success, and preparedness for higher education. Therefore, non-digital logic and strategy games serve as innovative pedagogical tools that effectively develop patience, making their integration into classroom practices a valuable approach to enhance both cognitive and emotional competencies necessary for success in the 21st century.*

Keywords—*Non-digital games, Logic games, Strategy games, Patience development, , Innovative pedagogy, Grade 12 students.*

I. INTRODUCTION

Patience is an important emotional self-discipline trait that enhances academic performance and social development. It has long been regarded as a noble virtue, as exemplified in Langland's Piers Plowman. Patience, defined as the willingness to wait and endure challenges, including the ability to delay gratification, is now recognized as a necessary 21st-century soft skill that helps students achieve their educational goals.

Patience remains a significant challenge, especially for senior high school students, as they face tremendous academic pressure, undergo college entrance exams, and must make critical future decisions. This transition period brings not only academic stress, but also emotional and social difficulties. Moreover, patience correlates negatively with academic stress, meaning that higher levels of patience reduce anxiety, while lower levels increase it (Bülbül & Izgar, 2018; Qolbina & Yusuf, 2024). Recognising this, international assessments such as OECD's PISA and TIMSS highlight the importance of critical thinking, problem-solving, and perseverance, which are cultivated through logic and strategy games (Byun & Joung, 2018).

However, as the digital era progresses, students face additional challenges due to excessive dependence on technology. Reliance on digital devices often leads to distractions, frustration, and disengagement when tasks require sustained effort. This reduced focus fosters a culture of instant gratification, making self-discipline more challenging to sustain (Tiwari & Sahoo, 2025). While some studies emphasise the benefits of digital learning, the adverse effects of digital distractions on patience and self-regulation are repeatedly highlighted as concerns that educators must address (Pérez-Juárez et al., 2023). Furthermore, the digital environment heightens academic stress through information overload and constant connectedness, which may undermine students' ability to endure, concentrate, and persevere in the face of challenges (Norabuena-Figueroa et al., 2025). Given these limitations, fostering patience through interventions that cultivate prolonged attention and frustration tolerance has become increasingly important. Consequently, support for innovative pedagogies, such as game-based learning, is reinforced by international assessments (e.g., PISA, TIMSS) that emphasise the need to strengthen student engagement, motivation, and higher-order cognitive skills (Byun & Joung, 2018).

Theories such as Self-Regulation Theory (Zimmerman, 2000), Cognitive Load Theory (Sweller, 1988), and Flow Theory (Csikszentmihalyi, 1990) explain how students manage their learning experience, cope with mental stress, and engage deeply, which are essential in developing patience.

Self-Regulation Theory emphasises that learners actively engage in goal setting, progress monitoring, and strategy adjustment based on feedback (Zimmerman, 2000). Patience is essential in this process, as students need to persist, delay gratification, and manage impulses to attain long-term goals (Zimmerman, 2002). Logic and strategy games promote perseverance and patience, consistent with research that associates self-regulation with impulse control and sustained effort (Seufert, 2018).

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On the other hand, Cognitive Load Theory (CLT) suggests that optimal learning occurs when the mental effort necessary for information processing is effectively managed. High cognitive demand may overwhelm learners, whereas tasks that strike an appropriate balance between challenge and support enhance comprehension. CLT, grounded in self-regulation, highlights the limitations of working memory and emphasizes the need to design tasks that reduce extraneous load while promoting meaningful processing (Sweller, 1988; Sweller et al., 2019).

Furthermore, Flow Theory explains the conditions under which learners achieve deep immersion, characterized by a balance between challenges and skills, leading to intrinsic motivation, enjoyment, and prolonged engagement (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2014). In this state, students endure setbacks, sustain effort, and concentrate on the process rather than on immediate results (Shernoff et al., 2016). Non-digital logic and strategy games effectively foster experiences by balancing challenge and skill, facilitating individual transition into a state of flow.

Thus, the framework shows that non-digital logic and strategy games promote self-regulation, which supports the management of cognitive load, leading to flow experiences that ultimately foster the development of patience among senior students.

The integration of non-digital logic and strategy games into education is a promising approach to developing patience and focus. Such games, which do not use technological devices, promote cognitive endurance, emotional regulation, and perseverance (Naik, 2017; Sousa & Rocha, 2019). Logic-based games such as chess, Sudoku, and the Rubik's Cube offer structured, cognitively demanding experiences that improve focus and resilience (Romero et al., 2015). Thus, the purpose of this study was to utilize non-digital games as innovative pedagogical tools to help senior year students develop patience by encouraging learners to apply critical thinking, practice delayed gratification, and sustain mental effort (Olayiwola et al., 2022). It sought to answer the following research questions:

1. What is the post-test patience level of respondents in the experimental group?
2. What is the post-test patience level of respondents in the control group?
3. Is there a significant difference between the post-test patience level of the experimental and control groups?
4. What recommendations can be made based on the findings?

Literature Review

Patience as a 21st-Century Competency

Patience is increasingly recognized as a vital skill of the 21st century, enabling self-discipline, resilience, and academic achievement (Wijaya et al., 2025; Yılmaz, 2024). However, many students, especially those in senior high school, encounter difficulties in cultivating such abilities owing to the prevalence of instant satisfaction and digital immediacy. Social media, on-demand entertainment, and instant access to information have conditioned students to expect immediate outcomes, decreasing their patience for waiting, contemplation, and prolonged effort (Horn & Kiss, 2020). This transition has led to impulsive decision-making, academic pressure, and diminished emotional resilience (Norabuena-Figueroa et al., 2025).

While patience is not typically included among the fundamental skills of the 21st century, like critical thinking, teamwork, and creativity, it is also essential for both learners and educators. Acquiring these qualities demands time, perseverance, and careful structuring of learning, all of which require patience (Yen & Teo, 2019). Research in arts education has demonstrated that patience, combined with performance and peer support, is crucial for developing competencies; however, it must be balanced with other elements to achieve optimal results (Tan, 2017). Patience, not just in students but also in educators, is essential for establishing supportive environments that promote development and autonomous learning (Niu et al., 2019). Research indicates that emotional, social, and cognitive competencies, including patience, can be deliberately cultivated through systematic instructional methods, equipping students for forthcoming academic, professional, and leadership endeavours (Chalkiadaki, 2018).

Non-Digital Logic and Strategy Games as Innovative Pedagogical Tools

Non-digital logic and strategy games are offline activities that involve students in problem-solving, critical thinking, and strategic planning without the use of technological devices. Despite its conventional structure, such intentional use in educational contexts signifies an innovative approach to instruction (Sweller, 1988; Zimmerman, 2000).

These games foster patience by requiring deep contemplation, strategic planning, turn-taking, and the acceptance of errors. Studies demonstrate that engagement in these activities fosters self-regulation, delayed pleasure, and cognitive resilience (Zimmerman, 2000). Moreover, non-digital games promote social interaction, collaboration, and emotional regulation, enabling students to develop patience in both competitive and collaborative settings.

Besides cultivating patience, these games improve cognitive abilities, including attention, memory, logical reasoning, and problem-solving. It also develops meta-subject abilities such as creativity, communication, and collaboration, which are crucial for adapting to contemporary educational and societal difficulties (Riberio, 2019).

Non-digital games provide practical advantages in educational environments. It is frequently more attainable and economical than digital alternatives, making it suitable for educational institutions with limited resources. Educators can effectively adapt these games to align with specific learning objectives and individual student needs, thereby enhancing engagement and improving knowledge retention. Pre-service educators indicate that these games enhance their learning and function as beneficial resources for future classrooms (Russo et al., 2024). Many educators prefer non-digital games due to their promotion of experiential learning, enhancement of teamwork, and the ease of monitoring student comprehension. These games provide flexibility in differentiation and

assessment while being less dependent on technological resources (Debrenti, 2024).

Application in Educational Settings

The effective integration of non-digital logic and strategy games requires several strategies: selecting age-appropriate and challenging games, incorporating these games into the curriculum or classroom routines, establishing clear objectives that emphasize patience, and facilitating reflective discussions following gameplay (Horn & Kiss, 2020). Students are encouraged to observe their emotional responses during these activities, learn from mistakes, and apply the patience developed in gameplay to academic tasks and daily life. Structured exposure over time facilitates the internalization of patience as a skill, promoting cognitive and emotional development in students.

Evidence suggests that non-digital games offer educational benefits. A comprehensive meta-analysis has indicated that these games significantly improve academic performance, often surpassing both digital games and conventional teaching methods. The advantages are particularly evident in small class settings and disciplines such as foreign languages, impacting cognitive development areas including attention, memory, and logical reasoning (Talan et al., 2020).

Educators tend to prefer non-digital games due to their flexibility, adaptability, and capacity to enhance collaboration and communication. Educators indicate that these games promote experiential learning, enhance the evaluation of student comprehension, and are especially beneficial in institutions with constrained technological resources (Russo et al., 2024). Non-digital games serve as practical tools for promoting critical thinking, collaboration, and patience within higher education settings (Humphrey, 2017).

The literature review highlights that the decline in patience among current learners is a complex issue associated with digital immediacy, academic pressure, and societal expectations. Non-digital logic and strategy games, when applied effectively, function as valuable educational tools that enhance patience, critical thinking, and self-regulation in students. These games offer structured, reflective, and engaging opportunities for delayed gratification and strategic decision-making, addressing cognitive and emotional aspects of learning and supporting students' overall development in a rapidly evolving environment.

II. Methodology

This study employed a post-test only control group experimental design. Participants, drawn from Grade 12 students at a private school in Tabogon, Cebu, Philippines, were randomly assigned to the experimental and control groups. The experimental group engaged in non-digital logic and strategy games daily, but the control group did not. It was selected through simple random sampling, in which participants were randomly assigned to either the experimental or control group (n = 42 each) using a number generator to ensure equivalence and reduce bias between groups.

This study utilized an adapted assessment, the validated Three-Factor Patience Scale (3-FPS), developed by Schnitker (2012). The Patience Scale demonstrates acceptable reliability, with Cronbach's alpha values averaging 0.72, ranging from 0.66 to 0.80, and an average two-week test-retest reliability of 0.66. The instrument consists of eleven components, each of which is assessed using a five-point Likert scale. Following the intervention, the Patience Scale was given to gauge the participants' patience levels.

The school's president and principal were sent a letter prior to the study's conduct, requesting their consent to proceed. Parental consent and student assent were obtained from the participants. Next, the researcher introduced non-digital logic and strategy games (e.g., Sudoku, chess, Rubik's Cube, Dama) and implemented them for two weeks during half of the regular class hours (30 minutes a day) every day. Throughout these sessions, the experimental group participated in non-digital logic and strategy games, while the control group did not engage in any of these activities. The researcher then administered the post-test assessment to both the experimental and control groups to assess the students' patience. Then, the researcher collected and secured the results.

The data were collected from the post-test assessment, and appropriate statistical techniques were employed to address the research questions. In experimental and control groups, descriptive statistics were used to calculate the mean and standard deviation of participants' patience levels. Finally, the statistically significant difference in post-test patience levels between the experimental and control groups was assessed using a Mann-Whitney U test.

This study strictly adhered to ethical research standards throughout the data collection process, both before and after data collection. All data will be disposed of, and answered questionnaires will be shredded securely after the study is published.

III. Results and Discussion

A. Post-Test Patience Level of the Respondents in the Experimental Group

TABLE I. Post-test Patience Level of the Respondents in the Experimental Group.

Indicator	Mean	SD	Interpretation
Patience Level	3.62	0.492	High

Table 1 shows that the respondents' post-test patience level in the experimental group obtained a mean score of 3.62 (SD = 0.492), which is interpreted as "High". This indicates that the integration of non-digital logic and strategy games increased and fostered qualities such as delayed gratification, perseverance, and sustained self-control. The result aligns with previous findings that support the claim that such games encourage students to develop greater patience and persistence in sustaining effort to achieve goals (Olayiwola et al., 2022).

B. Post-Test Patience Level of the Respondents in the Control Group

TABLE II. Post-test Patience Level of the Respondents in the Control Group.

Indicator	Mean	SD	Interpretation
Patience Level	3.62	0.492	High

Table 2 displays the respondents' post-test patience level in the control group, with a mean score of 2.67 (SD = 0.477), which is interpreted as "Moderate". This suggests that, despite

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students' exposure to non-digital logic and strategy games, an average level of patience and perseverance was demonstrated, indicating that traditional practices alone may be insufficient for enhancing patience-related skills. The findings are consistent with previous research, which highlights the necessity of structured interventions to enhance patience among students (Horn & Kiss, 2020).

C. *Difference in Post-Test Patience Levels Between Experimental and Control Groups*

TABLE IIII. Mann-Whitney U Test on Post-test Patience Levels of the Respondents in the Experimental Group and Control Groups.

Group	N	Mean Rank	p-value	Interpretation
Experimental	42	58.17	0.000	Significant
Control	42	26.83		
Total	84			

Table 3 shows the results of the Mann-Whitney U test, comparing the respondents' post-test patience levels between the experimental and control groups. The results indicate that the experimental group (Mean Rank = 58.17) outperformed the control group (Mean Rank = 26.83), with a p-value ($p < 0.01$), demonstrating a statistically significant difference.

The findings suggest that students who engaged with non-digital logic and strategy games demonstrated greater patience levels compared to those who did not participate in such activities. The results of this study demonstrate the effectiveness of the intervention as an innovative pedagogical tool in developing patience, consistent with prior research indicating that game-based learning strategies can positively impact socio-emotional skills, including perseverance and delayed gratification (Horn & Kiss, 2020; Olayiwola et al., 2022).

IV. Recommendations

Based on the study's findings, the following recommendations are drawn.

1. Integrating Non-Digital Logic and Strategy Games into classroom activities can help develop students' patience, perseverance, and self-control.
2. Train Educators that offer professional development on the effective integration of game-based strategies within their instructional methodologies.
3. Pursue Additional Investigations that will allow future scholars to examine the lasting effects of these games on various socio-emotional competencies and academic outcomes across diverse grade levels.

By utilizing these suggestions, educational institutions can foster a more dynamic and comprehensive learning environment that enables students to develop both cognitive abilities and socio-emotional competencies, such as patience and perseverance.

V. Conclusion

This study concludes that integrating non-digital logic and strategy games into classroom practices, as an innovative teaching approach, effectively promotes patience. Thus, engagement in activities can be essential for students as it stimulates focus, strategic thinking, and the ability to delay gratification. These elements are essential for cultivating perseverance and self-control, which are crucial for achieving academic success and personal growth. The results also highlight the significance of implementing structured, game-based approaches in learning environments, demonstrating their capacity to enhance both cognitive and socio-emotional competencies crucial for success in the 21st century.

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