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Integration of Lateral Thinking in Puzzle Games: Implications for Creativity and Problem Solving

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ABSTRACT
Creative thinking and problem-solving are essential skills that adolescents need to navigate the challenges of the 21st century. Unfortunately, formal education systems still tend to emphasize linear thinking and often fall short in providing space to nurture cognitive flexibility. One alternative approach that has shown promise is lateral thinking—a non-linear thinking method that can be effectively applied through puzzle games. This study aims to explore late adolescents' perceptions of the effectiveness of lateral thinking in puzzle games, as well as the potential of such games in fostering creativity and problem-solving skills. A descriptive qualitative approach was employed using Focus Group Discussion (FGD) as the primary method. Ten participants aged 17–22 took part in a structured discussion about their gaming experiences and their perspectives on the concept of lateral thinking. The data were analyzed thematically. The findings indicate that most participants viewed lateral thinking as an effective approach for tackling problems that require creative solutions. Puzzle games designed with contextual challenges, tiered reward systems, and engaging narratives were considered effective in stimulating idea exploration and flexible thinking. Social features such as multiplayer modes and strategy discussions were also seen as enhancing motivation and cognitive collaboration among players. Participants reported that they began applying alternative thinking patterns in real-life situations, such as when developing organizational strategies or resolving social conflicts. This suggests a transfer of skills from the gaming environment to real-world contexts. In conclusion, integrating lateral thinking into puzzle game design presents a relevant educational approach to enhance adolescents' thinking skills. These types of games hold great potential as enjoyable alternative learning tools that simultaneously build cognitive capacity.

KEYWORDS

Lateral Thinking, Puzzle Games, Problem Solving, Creativity, Late Adolescent

INTRODUCTION

Creative thinking and problem-solving have become essential competencies in modern life. People now face a variety of situations that cannot be resolved through linear methods. In this context, lateral thinking offers an alternative approach that draws on intuition, imagination, and unconventional perspectives. First introduced by Edward de Bono (1990), the concept has since been applied widely, from education to the workplace.

For late adolescents, developing creative thinking and problem-solving skills is particularly critical. At this developmental stage, they require holistic mental stimulation to reach higher-order cognitive maturation. Unfortunately, many formal education systems still emphasize linear reasoning and rote memorization, offering limited support for alternative ways of thinking. Consequently,

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adolescents often lack practice in approaching problems from multiple angles.

Digital technology, however, is already woven into adolescents' daily routines. Games, especially puzzle games, offer substantial potential as enjoyable yet educational non-formal learning media. Unlike titles centered on competition or motor skills, puzzle games push players to think analytically, experiment, and devise solutions. When designed with a lateral-thinking framework, such games can do more than nurture creativity; they can cultivate flexible and innovative thinking habits. Manik and Simanjuntak (2023) report that embedding alternative-thinking principles in digital games leads to higher cognitive engagement compared with passive learning approaches.

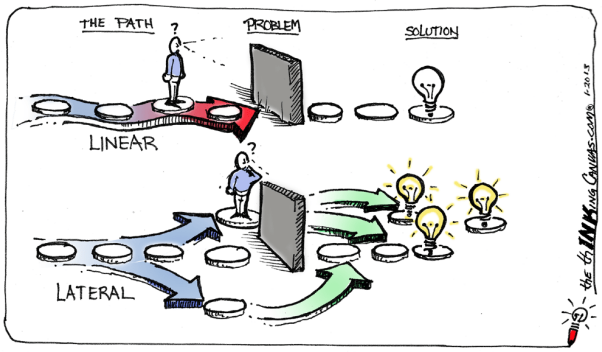

Figure 1. Lateral Thinking Concept (Source: thethinkingcanvas.com)

A number of studies have highlighted the potential of puzzle games to enhance thinking skills. For instance, Wouters (2013) found that educational games can significantly improve cognitive learning outcomes, especially when designed using challenge-based learning approaches. Furthermore, Iacovides (2015) emphasized that engagement in puzzle games promotes *meaningful learning*, as players are actively involved in problem-solving strategies.

Meanwhile, Suarta and Suwintana (2021) examined the use of logic-based puzzle games among high school students and found that such games can improve alternative-thinking abilities. According to Siregar (2022), puzzle-based games possess strong appeal because they evoke curiosity and encourage players to continuously experiment with new strategies.

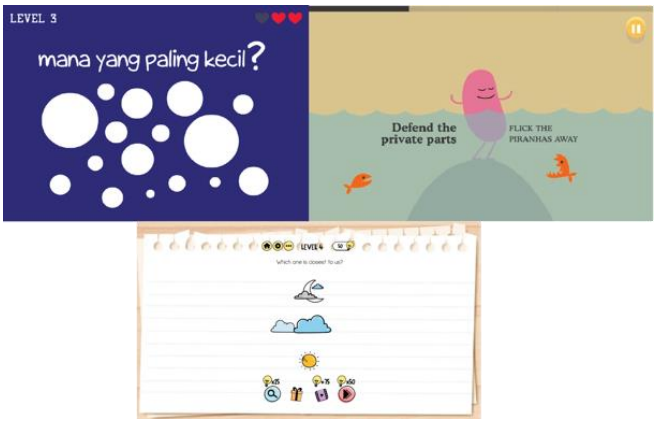

Figure 2. Examples of Puzzle Games (Source: author)

There is a noticeable gap in previous research, most studies have focused primarily on the general cognitive effectiveness of puzzle games, without specifically addressing the implementation of lateral thinking as a design framework. In addition, many studies continue to position games merely as supplementary tools within formal education, rather than as independent alternative media for fostering adolescents creative thinking skills.

This study aims to gather data on the preferences of its target (late adolescents) regarding puzzle games, lateral thinking, and creativity. The findings are expected to serve as user-centered

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insights that can inform the future design of puzzle games, particularly those aimed at enhancing creative thinking in late adolescence.

METHOD

This study employed a descriptive qualitative design with Focus Group Discussions (FGDs). The participants were ten late adolescents (aged 17–22) consisting of active high-school and university students from Universitas Pendidikan Indonesia (UPI) and Universitas Gadjah Mada (UGM). They were selected purposively, in line with Patton's (2002) recommendation that purposive sampling targets individuals whose characteristics match the study's objectives, in this case, active technology users with experience in puzzle or strategy games.

A sample of ten was deemed sufficient because the study is qualitative and purposively sampled. Guest, Bunce, and Johnson (2006) argue that thematic saturation can be reached with as few as 6–12 participants, while Nielsen (2000) notes that 5–10 users are enough to uncover most usability issues. Thus, ten participants are both representative and appropriate for the present research context.

Table 1. FGD Respondent Data

Name	Date of Birth	Occupation	University
Prathya Tyara Sagarmatha	Agustus 30, 2005	Student	UPI
Fatih Nibras Kaysan	March 9, 2005	Student	UPI
Muhammad Azril Ilham	March 4, 2005	Student	UPI
Cindy Subang Larang	July 1, 2005	Student	UPI
Raden Finka Kirana H.	March 8, 2004	Student	UGM
Keisya Ratu Aninda P. N.	Agust 21, 2004	Student	UPI
Akmal Hakim	July 31, 2004	Student	UPI
Sabily Agha	April 7, 2004	Student	UGM
Muhammad Rahardiyan Hakim	August 27, 2003	Student	UGM
M. Akmal Zaky Putra Kusumah	November 23, 2003	Student	UPI

The discussion was conducted in person within an informal yet structured setting, facilitated by open-ended questions exploring participants' understanding of lateral thinking, their experiences in solving problems through unconventional means, and their impressions of puzzle game designs that stimulate creative thinking. Each FGD session was audio-recorded and transcribed for further analysis. The data from the FGDs were analyzed using thematic analysis as outlined by Braun and Clarke (2006), which involves six phases: (1) familiarizing with the data through repeated reading of FGD transcripts; (2) generating initial codes from relevant data segments; (3) organizing codes into potential themes; (4) reviewing and refining the themes; (5) defining and naming the themes; and (6) producing the final report of findings.

RESULT AND DISCUSSION

1. Perception of Lateral Thinking

Most participants understood lateral thinking as the ability to think beyond conventional patterns. They regarded this approach as relevant for problems that require innovative solutions. As one participant expressed, *"It's really effective… it really helps generate unique outputs."* This aligns with Kiv, Kolesnykova, and Vinkovska (2024), who state that lateral thinking is a key component of creative thinking essential in problem-solving, scientific discovery, and everyday life emphasizing its importance across various life domains.

Lateral thinking was seen as effective in certain situations, though not necessarily superior to linear thinking in all cases. As one participant noted, *"It depends on the situation… if the solution needs to be innovative, then it's definitely effective."* Some also mentioned that ideas generated through lateral thinking are often not immediately accepted but tend to have longer-term impact. One

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participant explained, *"Unconventional thinking isn't always accepted at first… but the solution lasts longer."* These insights resonate with Edward de Bono (1990) view that lateral thinking emphasizes generating new solutions by shifting perspectives rather than relying solely on linear logic.

2. Puzzle Games and Creativity

Several participants mentioned that games such as *Quiz Parampaa*, *Dumb Ways to Die*, *Brain Tricky Puzzle*, and other exploration-based titles require players to think creatively under time pressure. These types of games encourage players to explore multiple possibilities before making decisions, which indirectly cultivates cognitive flexibility. As one participant noted, *"Puzzle games help sharpen our thinking patterns, not just solve questions."*

Participants also emphasized the importance of simple yet appealing visuals. One explained, *"For me, it's the simple visuals… because in puzzle games, the challenge itself is the main attraction… visuals that are easy on the eyes help us stay focused."* The aesthetic clarity of puzzle games was seen as supportive of concentration and problem-solving, aligning with the notion that minimal distraction fosters deeper engagement.

Furthermore, participants expressed the need for tiered missions and rewards, as these features can enhance motivation to think and play. As stated by one respondent, *"There has to be levels and rewards. Like, the levels should get harder and more challenging—but there should be rewards that are actually worth it."* This suggests that progression systems not only encourage sustained engagement but also support the development of strategic and creative thinking over time.

Figure 3. Puzzle Games: Quiz Parampaa, Dumb Ways to Die, dan Brain Tricky Puzzle
(Source: author)

3. The Relationship Between Games and Problem-Solving

Participants noted that puzzle games can gradually improve problem-solving skills. The presence of varied challenges and reward systems was seen as a trigger for intrinsic motivation. One participant remarked, *"Puzzle games really help with problem-solving… they can be applied to real life… what's being trained is the thinking pattern and framework—like we learn from puzzles, starting from the easy ones before moving to the hard ones."*

They also emphasized the importance of narrative and context in making puzzle games more applicable to real-life situations. Games with compelling storylines and flexible solution paths were considered to better reflect realistic problem-solving scenarios. As one respondent put it, *"The storyline is important… it's the core of a game… even if the visuals are simple, as long as the narrative is strong, the game sells—because it keeps players tuned in."*

Some participants suggested that future puzzle games should incorporate features like multiple endings or branching solutions. This would encourage players not only to seek the "correct answer"

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but also to understand the logic behind each decision. One participant elaborated, *"...the next level should depend on the choices we made in the previous one… so the story flows and stays challenging."*

These findings are consistent with Hutapea (2021), who found that participants' cognitive flexibility significantly increased after exposure to puzzle games that rely on non-linear logic.

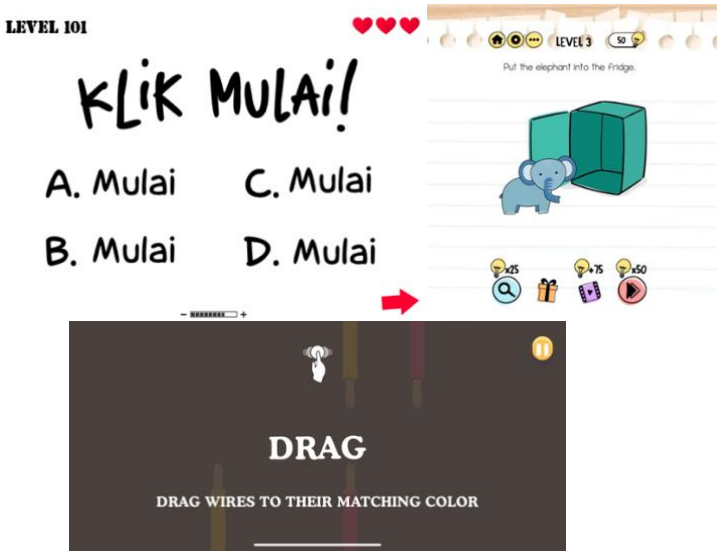

Figure 4. Example Questions in Puzzle Games (Source: author)

4. Preferences Toward Interactive and Social Features

Several participants expressed that interactive features, such as collaborative gameplay or the inclusion of leaderboards, increased their motivation to play. As one participant noted, *"When playing alone, it's just not as fun… I prefer playing together with others."*

Puzzle games that can be played with friends or allow for discussion and strategy-sharing were seen as more engaging and intellectually stimulating, as they promote the development of problem-solving skills from multiple perspectives. One respondent stated, *"Multiplayer puzzle games could be a strong selling point… solving things isn't always a solo activity—you can invite friends… it becomes a conversation topic, something that's trending, something worth discussing."*

These social elements also extend the function of games beyond entertainment, turning them into tools for communication and collaboration. As another participant mentioned, *"Games can be something to talk about when meeting up with friends…"*

CONCLUSIONS

The integration of lateral thinking concepts into puzzle game design offers an engaging and educational approach. By incorporating narrative elements, tiered challenges, and unexpected scenarios, games can serve as enjoyable training tools for enhancing creative thinking and problem-solving among adolescents. The findings of this study provide a foundation for the development of educational games that balance entertainment with cognitive enrichment.

The FGD results indicate that participants possess high potential and enthusiasm for engaging with unconventional thinking challenges. Therefore, game designers are encouraged to create gameplay scenarios that allow for exploration rather than presenting only single-solution answers. In doing so, puzzle games can not only entertain but also function as contextual learning tools that stimulate deeper cognitive engagement.

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