2025 SCIENCELINE
Journal of Educational and Management Studies
Volume 15, Issue 4: 43-53; December 25, 2025

ISSN: 2322-4770

DOI: https://dx.doi.org/10.54203/jems.2025.6

Fostering creative skills through digital learning platforms: a single-case study of a 5-year-old participant

Jesus Parena Santillan[1], and Jolly Ramos Santillan[2]

[1] *Teacher Education Department, University of Camarines Norte – Daet, Camarines Norte, Philippines*
[2] *Sarah Jane Ferrer High School, Department of Education Division of Camarines Norte, Brgy. Guinacutan Vinzons Camarines Norte, Philippines*

Email: jesussantillan@cnsc.edu.ph

ABSTRACT

This study examined the impact of self-directed learning through digital platforms on the creative and design skills of a 5-year-old child participant, using Minecraft and YouTube tutorials as primary tools. A qualitative single-case study design was employed to explore the participant's independent learning patterns and creative outputs over one month. Data collection methods included observations, semi-structured interviews, and analysis of creative works. Thematic and content analyses revealed notable development in the participant's creativity and problem-solving abilities through engagement with Minecraft and tutorial-based learning. Parental involvement was identified as critical in balancing screen time and guiding digital engagement, emphasizing the dual role of technology in early childhood education. Findings highlight the potential of digital platforms to foster creativity and support early learners in developing essential skills, with implications for integrating responsible digital practices into early childhood education frameworks.

Original Article

PII: S232247702500006-15

Rec. 28 September, 2024
Acc. 28 November, 2025
Pub. 25 December, 2025

Keywords

Digital literacy, Parental involvement, Early childhood development, Creative skills, Problem-solving

INTRODUCTION

Digital technologies have become integral to contemporary education, reshaping how children learn, explore, and develop foundational skills. In early childhood, the rise of interactive digital platforms has opened opportunities for young learners to engage with content autonomously, supporting creativity, problem-solving, and exploratory learning. As educational systems continue to integrate technology, understanding how children independently interact with digital tools—and how these interactions influence developmental skills—remains an important area of inquiry.

In the Philippines, digital engagement has expanded rapidly. High mobile connectivity and active internet use among Filipinos have positioned digital platforms as accessible learning resources for children (Kemp, 2024). The country's growing video-game and digital media landscape further reflects the increasing presence of technology in children's daily environments (Statista, 2024). Alongside these trends, however, emerge persistent challenges such as unequal access, excessive screen time, and concerns over the cognitive and social impacts of prolonged digital exposure (Allison Academy, 2023).

Screen-time data highlight these complexities. Filipino children spend notably more hours on digital devices than the global average (Howarth, 2024), intensifying debates about the balance between risks and benefits. Yet, research also suggests that when guided appropriately, digital tools—such as educational videos, interactive applications, and game-based learning environments—can enhance early literacy, numeracy, creativity, and digital literacy skills (Castro, 2020; Mansoor, 2023). Minecraft, in particular, has been recognized internationally for its open-ended, design-oriented environment that supports spatial reasoning, creative construction, and problem-solving (Kidas, 2023; JetLearn, 2023).

Despite the growing interest in digital learning, a gap persists in understanding how young children use digital platforms independently, and how such self-directed engagement contributes to the development of creative and design skills. Existing literature emphasizes creativity as a critical early-childhood competence linked to cognitive development and later academic success, yet studies rarely explore how these skills emerge through child-initiated digital activities.

To cite this paper: Santillan JP, and Santillan JR (2025). Fostering creative skills through digital learning platforms: a single-case study of a 5-year-old participant. *J. Educ. Manage. Stud.*, 15(4): 43-53. DOI: https://dx.doi.org/10.54203/jems.2025.6

This qualitative case study addresses this gap by examining the self-directed learning patterns of a five-year-old child participant who regularly engaged with Minecraft and YouTube tutorials. These platforms were selected due to their accessibility, popularity, and demonstrated educational potential. By documenting the child participant's independent learning behaviors and analyzing his creative outputs, the study aims to illustrate how digital environments can function as meaningful spaces for early creative development.

The study also recognizes inherent limitations, including its single-case design, the one-month duration of observation, and the involvement of parent-researchers, which may introduce interpretive bias despite the use of triangulation strategies. Nonetheless, the study's exploratory nature offers insights relevant to early childhood education, digital pedagogy, and parental digital mediation.

Objectives

Generally, the study explored how self-directed learning through digital platforms influences the development of creative and design skills in early childhood, using the experiences of a five-year-old child participant engaging with Minecraft and YouTube tutorials. Specifically, the study aimed to:

1. Document the child participant's independent learning patterns while using Minecraft and YouTube tutorials.
2. Present the participant's creative outputs as evidence of self-directed digital learning.
3. Analyze how daily self-directed digital engagement contributes to the development of creative and design skills in early childhood.

Philosophical stance

This study is grounded in a constructivist philosophical stance, which posits that learning is an active, contextualized process of constructing knowledge through experience and interaction (Narayan, 2013). This perspective underpins the exploration of how a 5-year-old child engages with self-directed learning through digital platforms such as Minecraft and YouTube tutorials, focusing on the development of creative and design skills.

The constructivist stance emphasizes the learner's autonomy and the importance of their experiences in shaping understanding and skill acquisition. It aligns with the study's focus on documenting independent learning patterns, interpreting creative outputs, and analyzing the child's interaction with digital platforms as a dynamic, self-guided process. The child actively constructs knowledge by interacting with Minecraft's open-ended virtual environment and accessing diverse resources on YouTube, reflecting core constructivist principles (Narayan, 2013).

Additionally, the study acknowledges philosophy behind the Self-Determination Theory (SDT) as a philosophical lens to understand motivation. SDT highlights the fulfillment of intrinsic psychological needs—competence, autonomy, and relatedness—as essential to engagement and personal growth (Ryan & Deci, 2000). In this context, the child's use of Minecraft demonstrates how these needs are met through autonomous exploration, task mastery, and interactive engagement, fostering sustained creativity and learning. Intrinsic motivation, driven by the inherent satisfaction of engaging with Minecraft, encourages exploration and skill development without reliance on external rewards (Urhahne & Wijnia, 2023).

The integration of multimedia learning principles within this philosophical stance further underscores the constructivist view. Multimedia Learning Theory suggests that combining visual and auditory elements enhances knowledge construction and retention (Mayer, 2014). Minecraft's multimedia environment and the supplementary use of YouTube tutorials allow the child to interact with information through multiple modalities, reinforcing creative and design skills (WInspire, 2019).

This study adopts an interpretivist approach, seeking to understand the child's unique experiences and creative outputs. The philosophical stance serves as a foundation for exploring how digital tools and self-directed learning processes contribute to early childhood development, offering insights into the interplay between motivation, autonomy, and creativity.

METHODOLOGY

Research design

This study employed a qualitative single-case study design to examine how self-directed learning through digital platforms influences the development of creative and design skills in early childhood. A case study approach is appropriate when the goal is to understand a phenomenon within its real-life context, particularly when the boundaries between the phenomenon and the context are not clearly distinguishable (Yin, 2018). This design allowed for an in-depth exploration of the child participant's learning processes using naturally occurring data from daily digital engagement. The case study framework also enabled the use of multiple data sources, observations, interviews, and creative

outputs, to capture the complexity and contextual nuances of the child participant's self-directed learning experiences (Creswell, 2013). This holistic and flexible design was necessary to understand how creative skill development unfolds through sustained interaction with Minecraft and YouTube tutorials.

Participant

The study focused on a single five-year-old child participant who regularly engaged with Minecraft and YouTube tutorials. The participant was selected through purposive sampling based on the following criteria: 1) Regular and sustained use of digital platforms for creative or learning purposes; 2) Engagement with both Minecraft and tutorial-based content on YouTube; and 3) Demonstrated interest in construction, design, and exploratory play. The participant met these criteria and provided a rich example of early self-directed learning in a digital environment, making the case suitable for exploratory qualitative analysis. Although the participant is the child of the parent-researchers, neutral terminology is used throughout the manuscript to maintain objectivity and comply with double-blind review standards.

Data collection

Data were collected over one month using three primary methods: Firstly, the Naturalistic Observations**,** Daily observations were conducted to document the child participant's independent learning patterns, digital engagement behaviors, exploration processes, and emerging creative strategies in Minecraft. Field notes captured duration of play, task choices, problem-solving attempts, and spontaneous comments related to design decisions. Secondly, the Semi-Structured Parent-Researcher Interviews**,** were conducted between the parent-researchers to record shared observations, clarify interpretations, and document the participant's learning routines. Interview prompts focused on frequency of digital use, types of tutorials viewed, observed behavioral changes, and perceived development in creative skills.

Lastly, the Creative Output Analysis, artifacts generated by the participant—including Minecraft builds, interior and exterior designs, screenshots, drawings, and unfinished structures—were collected. These creative outputs served as tangible evidence of skill development and were analyzed for complexity, originality, structure, and progression over time. The triangulation of these methods strengthened the reliability of findings and supported a comprehensive understanding of the participant's learning experiences (Bhat, 2023).

Data analysis

The study used the two complementary analytic procedures: Firstly, thematic Analysis Observation notes and interview transcripts underwent thematic analysis following established qualitative procedures (Valcheva, 2021; Collaborators, 2024). The process included:

1. **Initial coding** (open coding) to categorize repeated behaviors, motivations, and learning patterns;
2. **Axial coding** to identify relationships among codes;
3. **Theme development**, merging related categories into broader patterns related to self-directed learning, creativity, and digital engagement. Coding was conducted manually, with both parent-researchers reviewing and validating the coded segments to ensure consistency. Next, the Content Analysis of Creative Outputs, the creative artifacts were examined using content analysis to evaluate: Level of structural complexity; Originality of designs; Use of spatial organization; and, Application of concepts learned from tutorials. This method enabled the assessment of how the participant transferred digital knowledge into creative production (Timar, 2024). Patterns in the progression of builds were compared across the one-month period to identify developmental changes. The use of both analytic approaches strengthened methodological rigor by providing converging evidence from both behavioral and artifact-oriented data.

Ethical considerations

Parental permission was secured for the child participant, and age-appropriate assent was obtained in accordance with recommendations for research involving children (HHS.gov, n.d.). Then, the confidentiality and anonymity were upheld by removing all identifying information, limiting dissemination of identifiable images, and referring to the child impersonally as "the child participant." Because the parent-researchers conducted observations, reflexive notes were maintained to minimize interpretive bias. Triangulation and collaborative coding were used to enhance trustworthiness. All procedures adhered to ethical guidelines for privacy, safety, and protection of minors in research contexts (Smyth & Weindling, 1999). These safeguards ensured that the participant's welfare and privacy were prioritized throughout the study.

RESULTS AND DISCUSSION

The case of the child participant's self-directed learning through digital platforms

This case study explored the self-directed learning patterns of a five-year-old child participant who engaged extensively with Minecraft and YouTube tutorials. His learning experience reflects contemporary approaches in early childhood digital learning, where gameplay and instructional media intersect to support cognitive development, creativity, and problem-solving (Stingray Productions, 2019; Cryptozoology, 2023; TheCh0pper, 2019). The child participant's engagement with digital platforms stemmed from a strong, pre-existing interest in construction. Even before using Minecraft, he frequently interacted with vehicles, construction toys, and drawing activities. As noted by his parent,

"In his early years, we noticed that he had a keen interest in trucks and construction equipment like bulldozers and backhoes. In fact, those are the types of toys he has at home."

This intrinsic interest served as an anchor for his later digital exploration. When he began using Minecraft, its building-oriented gameplay naturally aligned with his established preferences. Notably, he downloaded the game independently and used YouTube tutorials to learn building strategies and interior design techniques. According to the parent,

"One day, he showed us a house he had built in the game. We were amazed at how well it was designed. This made us curious about how he learned to do it without anyone teaching him. That's when we started to observe."

This pivotal moment marked the start of intentional observation and documentation.

Emergent themes in the child participant's digital engagement and learning patterns

Learning Patterns

The child participant demonstrated consistent self-directed learning through daily engagement with Minecraft and YouTube tutorials. His digital use was not limited to entertainment; instead, it became a tool for exploring structures, experimenting with design concepts, and expressing creativity. These patterns align with constructivist perspectives wherein children actively construct knowledge through exploration and purposeful activity.

Screen time and digital engagement

During the observation period, the participant used digital devices for approximately seven hours daily, divided between Minecraft gameplay and tutorial viewing. Although high, this screen exposure reflected his deep engagement with digital learning tasks. As the parent noted:

"During this vacation period, since his routine changed, he often uses the phone... Minecraft is really what he loves to play." While this intensive exposure facilitated skill development, it also highlighted the challenge of balancing meaningful digital use with health considerations. This finding supports research emphasizing parental responsibility in regulating screen time to protect children's well-being (Przybylski et al., 2020).

Creative activities beyond digital play

Before his digital engagement, the child participant actively drew vehicles and played with construction toys. This foundational interest in design and structure transferred naturally into Minecraft. His offline and online behaviors illustrate how intrinsic interests can guide children's digital learning trajectories and reinforce their motivation to explore more complex tasks.

Self-directed learning behaviors

A major theme was the participant's autonomy in navigating digital tools. He independently downloaded Minecraft, searched for tutorials, and applied new techniques to his own builds. This behavior reflects early manifestations of self-directed learning-initiative, resource-seeking, and independent task completion—consistent with Morris (2019) and Lasala (2023). The participant's actions show how digital tools can support emergent self-regulation and problem-solving in early childhood.

Motivations for digital engagement

The child participant's deep and sustained engagement was strongly driven by intrinsic motivation, particularly his interest in construction, architecture, and building designs. Motivational theories (Ryan & Deci, 2000) suggest that such interest-based engagement leads to deeper and more persistent learning, which was evident in the participant's ongoing play and continuous improvement of his designs.

Initiative and responsibility

Even with parental screen-time limits, the participant demonstrated initiative in planning his digital activities. He often decided when to start new builds, selected which tutorials to follow, and showed responsibility in exploring digital tools. This observation supports the idea that children, even at an early age, can develop foundational self-regulation skills when provided with autonomy and guided boundaries (Choy et al., 2024). This qualitative case reveals the multifaceted role of digital platforms in supporting early creative development. The child participant's learning experiences highlight:

1. *Creativity fostered through active digital construction.* Minecraft's open-ended design allowed the participant to experiment, revise, and produce

increasingly complex structures. His process of creating buildings, designing interiors, and integrating elements from tutorials showcases the platform's potential to support creativity and spatial reasoning.

2. ***Technology-enabled autonomous learning.*** The participant's reliance on self-chosen tutorials and experimentation demonstrates how digital tools can scaffold self-directed learning. His ability to translate instructional content into novel designs illustrates the active, constructive nature of digital learning.

3. ***Digital engagement shaped by personal interests.*** The child's prior fascination with construction directly influenced the complexity and ambition of his digital creations. This supports motivational research emphasizing the role of interest in sustaining learning.

4. ***The central role of parental mediation.*** Despite the child's autonomy, parental involvement remained essential—particularly in regulating screen time, providing feedback, and ensuring safe digital engagement. This aligns with research emphasizing informed, balanced digital parenting practices (Ancho & Park, 2023).

5. ***The need for screen-time balance.*** The participant's extended daily screen use highlights the tension between meaningful digital learning and potential developmental risks. The case demonstrates how digital creativity can flourish alongside vigilant parental guidance. This case study shows that young children can effectively use digital platforms, particularly Minecraft and YouTube, as tools for creative expression, problem-solving, and autonomous learning. The child participant's experiences illustrate how intrinsic motivation, accessible digital tools, and supportive parental mediation interact to cultivate early creative development. While the results cannot be generalized to all children, they offer meaningful insight into how digital platforms may enrich early childhood learning when used responsibly.

Creative works as evidence of the effectiveness of self-directed learning

This study examined the creative works of the child participant as concrete evidence of the effectiveness of his self-directed learning through Minecraft. Self-directed learning enables learners to assume responsibility for their own learning processes, often within problem-based and exploratory contexts that promote creativity (Lemmetty & Collin, 2020). Prior research indicates that self-directed learning is positively associated with enhanced creative performance and independent problem-solving (Lektorich, 2023). During the one-month observation period, the child participant produced more than 288 structures in Minecraft. These works included buildings inspired by YouTube tutorials he viewed as well as structures modeled after real places he had visited. Samples of these creations are shown in Figures 2–6.

The role of technology in supporting self-directed learning is reinforced by Lasala (2023), who emphasized that digital tools provide flexible environments that adapt to the learner's pace and interests. Such tools encourage independent exploration and sustained engagement. In this study, Minecraft functioned as an open-ended digital space where the child participant actively experimented with structures, layouts, and interior designs, translating tutorial knowledge into original creations. His process illustrates how technology can stimulate curiosity, creativity, and skill development in early childhood.

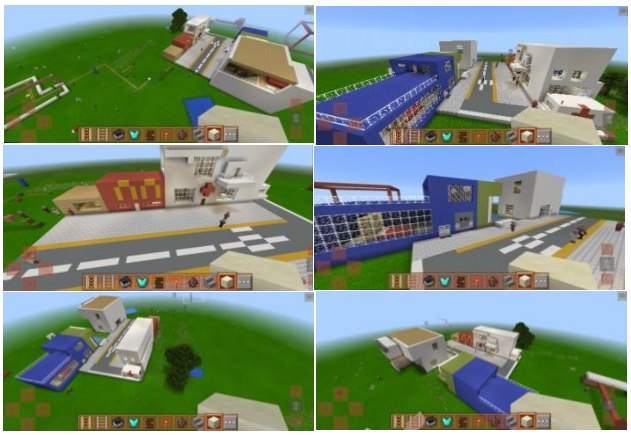

Figure 2. Omo city

The first major creative output, "Omo City," was inspired by a city featured in one of the child participant's YouTube videos. The city features a hospital with a parked ambulance, a McDonald's restaurant, a blue police station with a functioning jail cell, two modern houses (one with a swimming pool and another resembling a museum), and a commercial marketplace adjacent to the restaurant. Notably, the child participant also created a functional amusement park with a roller coaster and a public swimming pool resembling a resort. All human figures and characters within the city were also designed by him, each assigned a specific role within the community. He explained enthusiastically:

"This is where people come to have fun… and the police station is here to keep everyone safe."

Omo City demonstrates his ability to replicate and expand ideas drawn from digital content and real-

life settings. These structures reflect an emerging understanding of urban design, spatial organization, and functional planning. This aligns with research showing that sandbox digital environments like Minecraft support young children's creative growth and problem-solving (Lektorich, 2023).

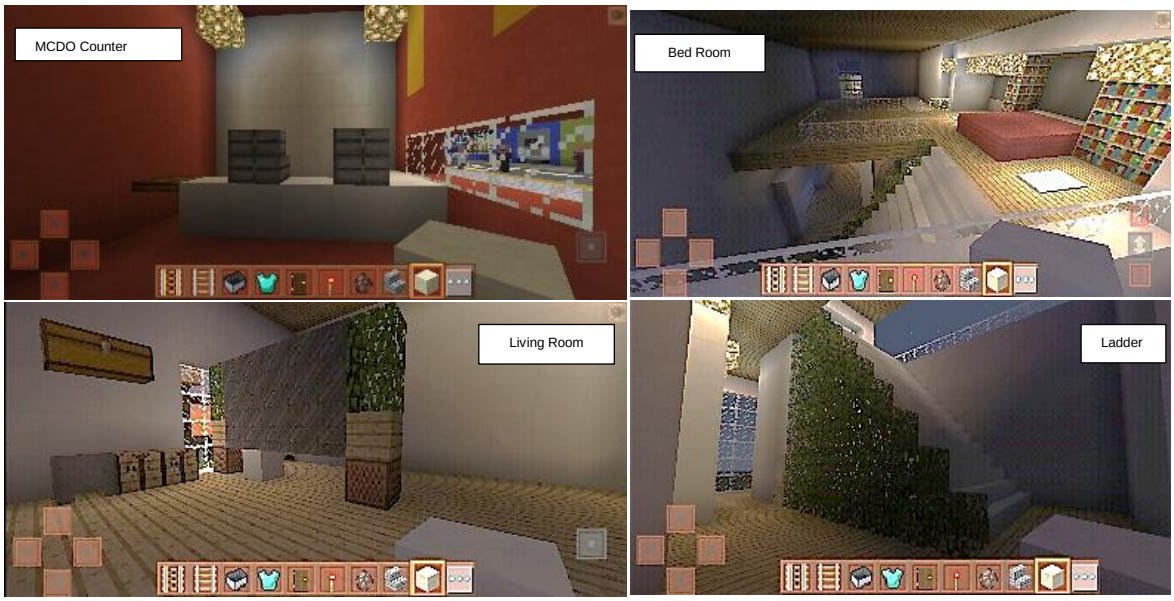

Figure 3. His sample interior designs of his house and restaurant.

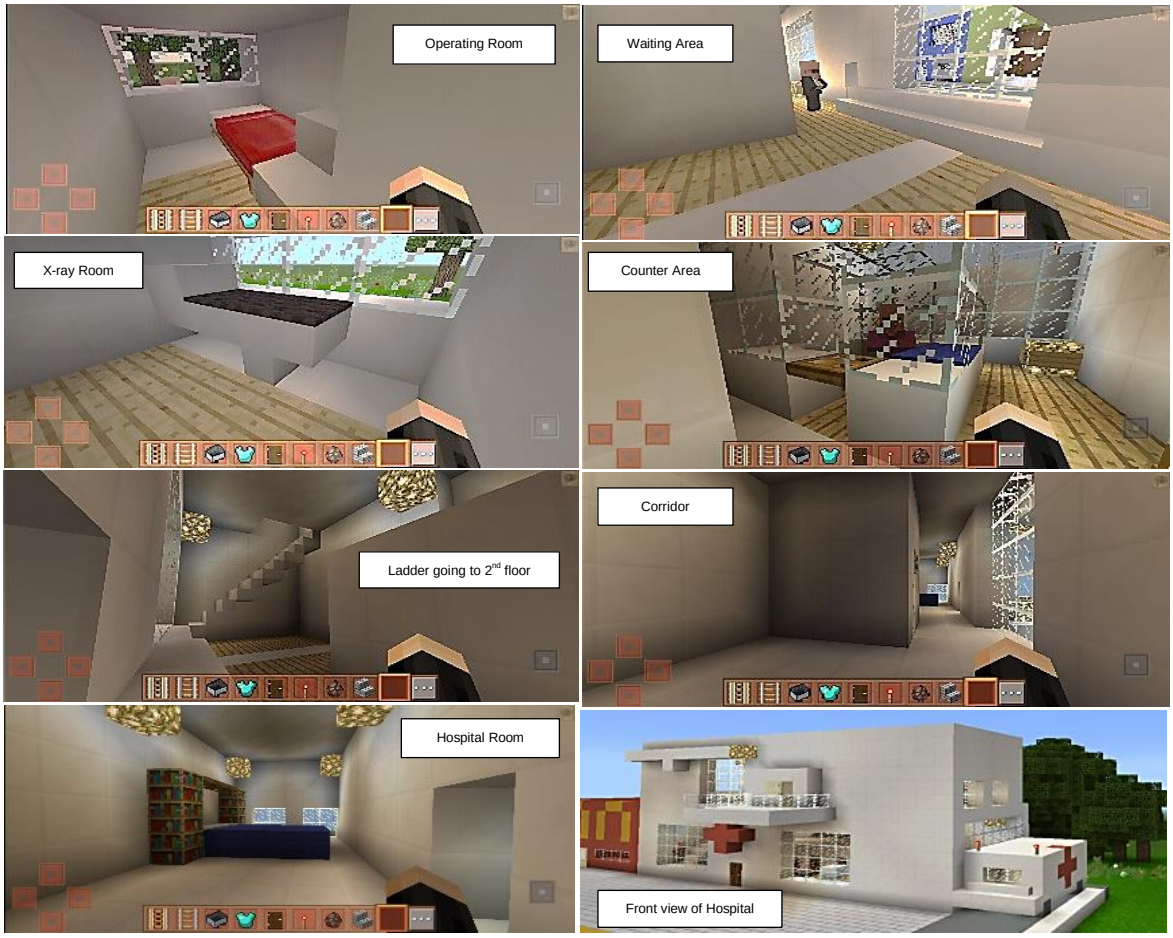

Figure 4. His interior design of hospital.

The interior designs created by the child participant further demonstrate creativity and attention to detail (Figures 3 and 4). Inside the houses, he built bedrooms, windows, and a library area. When asked about it, he commented: *"The library has books to read before sleeping."* This reflects early imaginative reasoning about how spaces function. Figure 3 shows his restaurant interior, including a counter inspired by real establishments the child participant has seen when ordering food. Figure 4 highlights the interior layout of the hospital in Omo City. Without any formal instruction, he was able to include essential hospital areas such as a waiting area, X-ray room, operating room, patient room, hospital counter, and even the interior of the ambulance. These details were learned entirely through YouTube tutorials and self-guided exploration. His ability to transfer tutorial knowledge into accurate, functional digital representations indicates emergent higher-order thinking and creativity—consistent with literature showing that digital platforms promote design thinking in young learners (education.minecraft.net., n.d.; Cappetta, 2024). Among the 288 outputs produced, several were modern architectural structures. These buildings displayed significant design diversity—featuring glass facades, extended balconies, roof decks, and varied color palettes. All houses also included interior layouts, demonstrating an understanding of spatial flow and functional design.

These works suggest that the child participant's creativity expanded through iterative exploration, experimentation, and refinement—all hallmarks of creative development in self-directed learning environments. The diversity of his designs supports theories suggesting that creativity flourishes through repeated exploration and flexible, non-linear learning experiences, as seen in Figure 5.

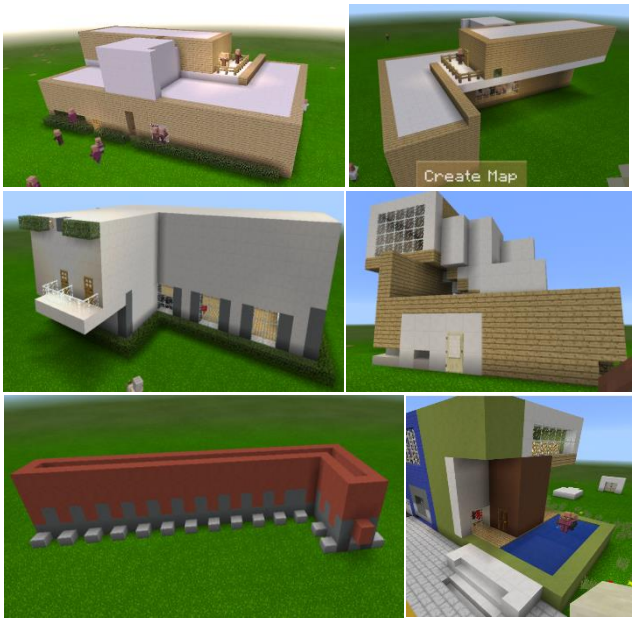

Figure 5. His sample modern house designs.

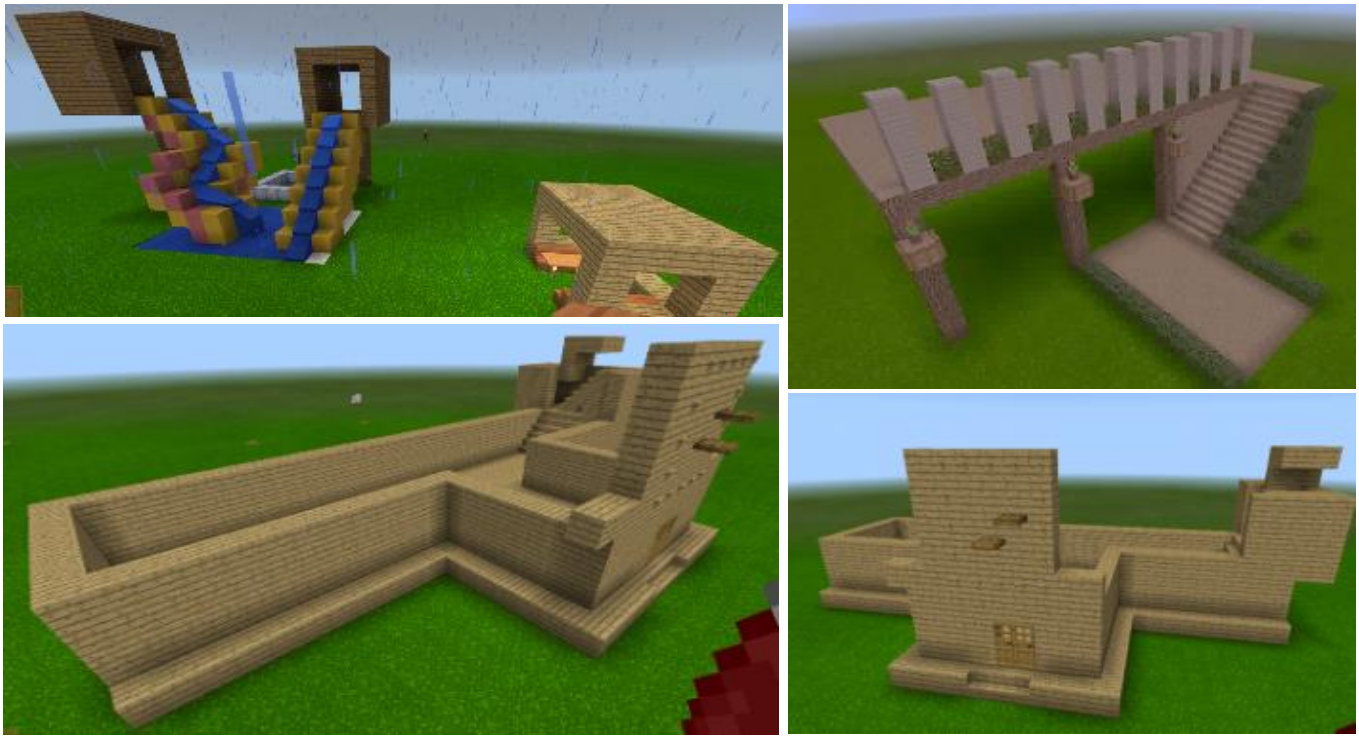

Figure 6. His sample random unfinished structures.

Figure 6 shows several unfinished structures, which provide additional insight into the child participant's learning process. These incomplete projects reveal his experimentation with new design ideas and building techniques. Such unfinished outputs are typical in creative self-directed learning, indicating ongoing exploration rather than failure. They highlight how the participant tests possibilities, evaluates outcomes, and shifts between projects, an essential part of early creative development.

This implies that the child's creations, including a detailed hospital interior and various modern building designs, highlight his growing creativity and advanced skills. His use of YouTube tutorials and Minecraft for self-directed learning has enabled him to replicate and innovate complex designs. The diversity in his 288 outputs, including fully designed and partially unfinished structures, reflects his creativity and exploration. This underscores the effectiveness of self-directed learning in enhancing young learners' creativity through hands-on experimentation.

Meanwhile, the following emerged themes during the qualitative analysis as supplementary findings of the study on research objective 2 of the study.

1. Development of Creativity Through Minecraft. Minecraft served as a rich environment for the child participant to explore both exterior and interior design. The variety and complexity of his creations illustrate the platform's capacity to promote early architectural thinking, spatial reasoning, and imaginative construction.

2. Expression of Satisfaction and Parental Support. The child participant consistently sought parental recognition for his creations. This feedback loop between creation and parental validation contributed positively to his motivation and sustained engagement. As the parent noted:

"Obviously, based on his outputs, we can see that his creativity has significantly developed in constructing both the exterior and interior designs of his projects."

Furthermore, parental mediation was approached constructively:

"We notice that every time he builds a project in Minecraft, he happily shows it to us… We always commend his impressive outputs. But if his work needs improvement, we give recommendations in a positive way to encourage him to strive for better results."

This highlights how parental involvement, through affirming feedback and supportive guidance, can reinforce children's creative learning, consistent with digital parenting literature (Geere, 2023). Collectively, the child participant's creative works, including the detailed Omo City, modern houses, a functional hospital with complete interiors, and various unfinished structures, demonstrate advanced creativity, problem-solving, and design skills for his age. His reliance on YouTube tutorials and self-initiated experimentation within Minecraft serves as clear evidence of successful self-directed learning.

The breadth and depth of his 288 outputs highlight the effectiveness of digital platforms in supporting autonomous, interest-driven creativity in early childhood. These findings emphasize the potential of self-directed digital learning to foster innovation, exploration, and early architectural thinking—especially when complemented by supportive parental guidance.

The Effect of daily self-directed learning on the development of creative and design skills in early childhood

This section examines how daily self-directed learning through digital platforms contributed to the development of creative and design skills in the child participant. Self-directed learning theory suggests that young learners benefit from autonomy, interest-driven exploration, and independent decision-making (Knowles, 1975; Gureckis & Markant, 2012). Within digital environments, constructivist perspectives also emphasize active experimentation and iterative design as foundations for creativity (Piaget, 1973; Resnick, 2017). These frameworks guided the analysis of the child participant's engagement with Minecraft and YouTube tutorials.

The child participant interacted daily with Minecraft, supplementing his play with YouTube tutorials that demonstrated building strategies, interior layouts, and design techniques. Over the one-month period, his creative outputs expanded from basic structures to more complex architectural forms such as hospitals, roller coasters, restaurants, and multi-level buildings. This trajectory reflects growing spatial reasoning, design planning, and problem-solving abilities. As the parent noted:

"From day to day, we have truly seen improvements in his work… He builds restaurants, hospitals, forests, buildings that look like buses and airplanes, and even functional roller coasters."

Thematic analysis generated six themes that describe how daily self-directed learning shaped the child participant's creative and design development:

1. Influence of Minecraft and YouTube Tutorials. Daily exposure to tutorials and in-game building tools supported the child participant's ability to visualize structures, transfer learned techniques, and generate increasingly diverse creations. This aligns with research showing that digital platforms can scaffold design thinking and creativity in young learners (Nebel et al., 2016).

2. Improvements in planning and execution. The participant demonstrated advancements in planning room layouts, organizing space, and applying interior design concepts. His progress is reflected in the parent's statement:

"His knowledge of design patterns for both the exterior and interior of buildings has become commendable at his age."

3. Preparation for future learning. Skills developed—such as spatial awareness, representation, and iterative refinement—are foundational for later STEM learning and digital literacy. These observations resonate with theories emphasizing early exposure to technologically mediated problem-solving (Bers, 2018).

4. Self-directed learning and autonomy. The child participant's capacity to choose tutorials, experiment independently, and revise his work illustrates early self-regulation. While autonomous, the process remained guided by parental monitoring, consistent with research on digital governance in early childhood (Livingstone & Blum-Ross, 2020).

5. Balancing screen time. Although digital engagement fostered creativity, parents faced challenges regulating extended screen time. This theme highlights the need for balanced routines, integrating digital and offline experiences for holistic development.

6. Recommendations for Enhancing Digital Learning. Parents emphasized tools that could help manage screen time more constructively. This reflects broader discussions on designing child-friendly digital ecosystems that emphasize safety, autonomy, and meaningful learning.

The child participant's daily engagement with Minecraft and tutorial-based learning contributed to observable improvements in creativity, problem-solving, and design ability. He demonstrated an emerging capacity to plan structures, interpret models from videos, and adapt concepts to create novel designs. These outcomes illustrate how self-directed digital learning can serve as a productive environment for creative development, particularly when supported by appropriate parental mediation.

At the same time, the findings underscore the importance of caution. As a single-case study, the results cannot be generalized to all children. The child participant's strong intrinsic interest in construction and highly supportive home environment likely influenced his progress. Thus, the findings should be interpreted as exploratory rather than definitive.

Nevertheless, the case highlights broader implications for early digital pedagogy such as digital tools can complement creative development, self-directed learning may foster autonomy and design thinking, and, parental digital governance remains essential in ensuring balanced and meaningful engagement.

CONCLUSION AND RECOMMENDATIONS

This single-case study explored how self-directed learning through digital platforms, specifically Minecraft and YouTube, influenced a 5-year-old child participant's creativity and problem-solving skills. The findings suggest that such learning is most effective when the child's interests guide exploration, supported by accessible learning resources at home and school. Parental guidance emerged as a key factor in balancing digital engagement to ensure educational benefits. While these findings are exploratory and context-specific, they underscore the potential of integrating digital platforms thoughtfully into early childhood education and highlight the importance of aligning practices with modern learning frameworks and digital pedagogy.

To enhance children's digital learning, it is recommended to encourage structured engagement with educational platforms such as Minecraft and YouTube, guided by parental support to ensure balanced and meaningful use. Early digital literacy and self-directed exploration should be promoted within a safe and guided environment, with technological safeguards implemented to manage screen time and responsible use. Collaboration between educators and parents is essential to maximize the educational potential of digital tools and to inform curriculum development that aligns with modern learning frameworks. Finally, the study's findings can serve as a foundation for developing a self-directed learning framework for early childhood education, supporting future research and practical applications in digital pedagogy.

DECLARATIONS

Corresponding author

Correspondence and requests for materials should be addressed to Jesus Parena Santillan; E-mail: jesussantillan@cnsc.edu.ph; ORCID: 0000-0002-6976-7790

Data availability

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Supplementary Information

The online version contains unpublished supplementary materials to be requested (if needed)

Authors' contribution

J.P. Santillan, and J.R. Santillan contribute to the research, data analysis, and manuscript writing.

Funding support

The author declares no financial or non-financial interests that may have influenced the work reported in this manuscript.

Ethical approval

Ethics Committee Approval: The research study underpinning this publication received ethics approval from the Institutional Technical Evaluation Committee of Camarines Norte State College University, Daet, Camarines Norte, Philippines.

Informed consent

Prior to the commencement of the study, informed consent was obtained from all participants, including students, parents, and teachers. Each participant was provided with a clear explanation of the study's purpose, procedures, potential risks, and benefits. They were informed of their right to withdraw from the study at any time without penalty. Consent forms were signed by parents or guardians for student participants, and verbal or written consent was obtained from teachers involved in the study.

Competing interests

The authors declare no competing interests in this research and publication.

REFERENCES

Statista. (2024). *Video Games - Philippines | Statista Market Forecast*. https://www.statista.com/outlook/dmo/digital-media/video-games/philippines

Urhahne, D., & Wijnia, L. (2023d). Theories of Motivation in Education: an Integrative Framework. *Educational Psychology Review*, 35(2). https://doi.org/10.1007/s10648-023-09767-9

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Narayan, R., Rodriguez, C., Araujo, J., Shaqlaih, A., & Moss, G. (2013). Constructivism—Constructivist learning theory. In B. J. Irby, G. Brown, R. Lara-Alecio, & S. Jackson (Eds.), *The handbook of educational theories* (pp. 169–183). IAP Information Age Publishing.

Morris, T. H. (2019). Self-directed learning: A fundamental competence in a rapidly changing world. *International Review of Education*, 65(4), 633–653. https://doi.org/10.1007/s11159-019-09793-2

Mayer, R. E. (2014). The Cambridge Handbook of Multimedia Learning. In *Cambridge University Press eBooks*. https://doi.org/10.1017/cbo9781139547369

Strumińska-Kutra, M., & Koładkiewicz, I. (2017). Case Study. In *Springer eBooks* (pp. 1–31). https://doi.org/10.1007/978-3-319-65442-3_1

Lemmetty, S., & Collin, K. (2020). Self-Directed Learning in Creative Activity: An Ethnographic Study in Technology-Based Work. *Journal of Creative Behavior/the Journal of Creative Behavior*, 55(1), 105–119. https://doi.org/10.1002/jocb.438

Lektorich, Brooke. (2023). Empowering Students: How to Foster Self-Directed Learning. *Education World*. https://www.educationworld.com/teachers/empowering-students-how-foster-self-directed-learning

HHS.gov. (n.d.). *Research with Children FAQs*. https://www.hhs.gov/ohrp/regulations-and-policy/guidance/faq/children-research/index.html

Smyth, R. L., & Weindling, A. M. (1999). Research in children: ethical and scientific aspects. *Lancet*, 354, SII21–SII24. https://doi.org/10.1016/s0140-6736(99)90253-2

Przybylski, A. K., Orben, A., & Weinstein, N. (2020). How much is too much? Examining the relationship between digital screen engagement and psychosocial functioning in a confirmatory cohort study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 59(9), 1080–1088. https://doi.org/10.1016/j.jaac.2019.06.017

Choy, Y. N., Lau, E. Y. H., & Wu, D. (2024). Digital parenting and its impact on early childhood development: A scoping review. *Education and Information Technologies*. https://doi.org/10.1007/s10639-024-12643-w

Heitner, D. (2023). *Growing up in public: Coming of age in a digital world*. TarcherPerigee.

Iwasa, Y., Hihara, S., Ishizaki, K., Yasui, G., Hiro, M., & Sugimura, K. (2023). Identity development and online and offline prosocial behaviors among early and middle adolescents. *Frontiers in Psychology*, 14. https://doi.org/10.3389/fpsyg.2023.1148347

TheSchoolRun . (n.d.) *Learning through Minecraft*. https://www.theschoolrun.com/learning-through-minecraft

education.minecraft.net. (n.d.). *Teaching Creativity with Minecraft*. https://education.minecraft.net/en-us/blog/teaching-creativity-with-minecraft

wikibooks.org. (n.d.). *Simple Guide to Minecraft/Creative - Wikibooks, open books for an open world*. https://en.wikibooks.org/wiki/Simple_Guide_to_Minecraft/Creative

Daniela, L. (2022). *Inclusive Digital Education*. Springer Nature. http://books.google.ie/books?id=BayXEAAAQBAJ&printsec=frontcover&dq=DIGITAL+LEARNING+FOR+EVERY+CHILD:+CLOSING+THE+GAPS+FOR+AN+INCLUSIVE+AND+PROSPEROUS+FUTURE&hl=&cd=3&source=gbs_api

Ancho, I., & Park, S. (2023). School – Parental Engagement of Filipino Women Married to Koreans: Inputs for Policy Formulation. *Recoletos Multidisciplinary Research Journal*, 11(1), 71–83. https://doi.org/10.32871/rmrj2311.01.01

Lasala, N. J. (2023). Development and Validation of E-SelfIMo: E-Learning Self-Directed Interactive Module in Earth Science. *Recoletos Multidisciplinary Research Journal*, 11(1), 85–101. https://doi.org/10.32871/rmrj2311.01.07

Alton, L. (2014, November 5). *10 Reasons Why Minecraft Is Beneficial for Your Kids*. LifeHack. https://www.lifehack.org/articles/technology/10-reasons-why-minecraft-beneficial-for-your-kids.html

Schöning, M. (2015, April 8). *Children in Charge: Self-Directed Learning Programs*. Edutopia. https://www.edutopia.org/blog/children-in-charge-self-directed-learning-mirjam-schoning

Jordan, B. (2018, September 19). *How Minecraft Teaches Problem Solving Skills to Kids of All Ages*. iHomeschool Network. https://ihomeschoolnetwork.com/minecraft-teaches-problem-solving/

WInspire. (2019, April 1). *Citation and Referencing for beginners* [Video]. YouTube. https://www.youtube.com/watch?v=U3ntLOPqCpg

TheChopper. (2019, July 7). *ULTIMATE MINECRAFT STARTER GUIDE! Learn Everything 2019 Tutorial* [Video]. YouTube. https://www.youtube.com/watch?v=e-LpPTnme_M

Stingray Productions. (2019, August 14). *MINECRAFT | How to Make and Use Banner Patterns! 1.14.4* [Video]. YouTube. https://www.youtube.com/watch?v=2X3n3tZPhxU

Castro, R. (2020, April 7). Educational apps can benefit young children, study finds. *FIU News*. https://news.fiu.edu/2019/educational-apps-can-benefit-young-children,-study-finds

Bryant, J., Child, F., Dorn, E., & Hall, S. (2020, June 12). *New global data reveal education technology's impact on learning*. McKinsey & Company. https://www.mckinsey.com/industries/education/our-insights/new-global-data-reveal-education-technologys-impact-on-learning

Valcheva, S. (2021, April 12). *Qualitative Data Analysis Methods And Techniques*. Blog for Data-Driven Business. https://www.intellspot.com/qualitative-data-analysis-methods/

Team, S. T. (2022, March 17). *How to Balance Screen Time with Other Activities During COVID-19*. Screen Time. https://screentimelabs.com/blog/how-to-balance-screen-time-with-other-activities-during-covid-19/

Greene, V. (2023, April 21). *Advantages of Self Directed Learning: Does Limitless Access Give Us Limitless Potential?* NovoEd. https://novoed.com/resources/blog/self-directed-learning/

Kidas (2023, June 1). *8 Benefits of Minecraft for Kids - Kidas*. https://getkidas.com/eight-benefits-of-minecraft-for-kids/

Allison Academy. (2023, July 4). *Advantages and disadvantages of technology in education*. Allison Academy. https://www.allisonacademy.com/students/education/technology-in-education/advantages-and-disadvantages-of-technology-in-education/

Marc. (2023, August 21). *How Does Minecraft Teach Problem Solving? (be surprised..)*. FunTech Blog. https://funtechsummercamps.com/blog/how-does-minecraft-teach-problem-solving/

Geere, D. (2023, September 22). Parental Controls in Minecraft. *Minecraft.net*. https://www.minecraft.net/en-us/article/parental-controls

Bhat, A. (2023, October 31). *Qualitative Data Collection: What it is + Methods to do it*. QuestionPro. https://www.questionpro.com/blog/qualitative-data-collection-methods/

Cryptozoology. (2023, November 26). *10 Must Know Minecraft Path Designs! (Tutorial)* [Video]. YouTube. https://www.youtube.com/watch?v=PwpNQZYb_OA

JetLearn. (2023, November 27). *Minecraft: Exploring the Incredible Benefits of Minecraft*. https://www.jetlearn.com/blog/exploring-benefits-of-minecraft

Mansoor, F. (2023, December 12). *The 12 Best Educational Game Apps Kids Will Love (2023 Reviews & Rankings)*. MyeLearningWorld. https://myelearningworld.com/best-educational-game-apps/

Minecraft. (2024, February 6). *Parents' Guide to Minecraft* [Video]. YouTube. https://www.youtube.com/watch?v=PHTYQoBn-VU

Stanford University. (2024, February 14). *How technology is reinventing K-12 education*. https://news.stanford.edu/stories/2024/02/technology-in-education

Kemp, S. (2024, February 20). *Digital 2024: The Philippines — DataReportal – Global Digital Insights*. DataReportal – Global Digital Insights. https://datareportal.com/reports/digital-2024-philippines

Timar, A. (2024, February 28). *Mastering Qualitative Data Analysis: Step-by-Step Process & 5 Methods*. Thoughts About Product Adoption, User Onboarding and Good UX | Userpilot Blog. https://userpilot.com/blog/how-to-analyse-qualitative-data/

Cappetta, K. (2024, February 28). *Unlocking Creativity: How Minecraft Can Foster Imagination and Innovation in the Classroom - MakerKids*. MakerKids. https://makerkids.com/unlocking-creativity-how-minecraft-can-foster-imagination-and-innovation-in-the-classroom/

Collaborators, Q. (2024, April 17). *Qualitative Data Analysis: What is it, Methods + Examples*. QuestionPro. https://www.questionpro.com/blog/qualitative-data-analysis/

vanderbilt.edu. (2024, May 7). *6 Trends Shaping the Future of Education*. https://blog.peabody.vanderbilt.edu/the-peabody-blog/6-trends-shaping-the-future-of-education

The Interaction Design Foundation (TIDF). (2024, June 4). *What is Motivation?* https://www.interaction-design.org/literature/topics/motivation

UoPeople, W. O. (2024, June 19). *Discovering the Importance of Technology in Education*. University of the People. https://www.uopeople.edu/blog/the-growing-importance-of-technology-in-education/

Howarth, J. (2024, June 24). *Alarming Average Screen Time Statistics (2024)*. Exploding Topics. https://explodingtopics.com/blog/screen-time-stats

ATLAS.ti. (2024, July 10). *What is a Case Study? | Examples, Definition & Process*. https://atlasti.com/guides/qualitative-research-guide-part-1/case-studies

Shad, A. A. (2023b, February 26). *Digital Customer Engagement Is Here to Stay: 6 Ways to Embrace It*. Thoughts About Product Adoption, User Onboarding and Good UX | Userpilot Blog. https://userpilot.com/blog/digital-customer-engagement/

Staff, C., & Staff, C. (2021a, May 6). *The Importance of Technology in Education in the Philippines*. ChildHope Philippines. https://childhope.org.ph/importance-of-technology-in-philippine-education/