

## **An Investigation of the Effects of Philosophy for Children-Based Digital Storytelling on the Creative and Critical Thinking Skills of Six-Year-Old Children**

Emine Özaydın<sup>1</sup> & Sema Büyüктаşkapu Soydan<sup>2</sup>

The aim of this study is to examine the effect of a Philosophy for Children-Based Digital Storytelling Program on the creative and critical thinking skills of six-year-old children. The research was designed using a pretest-posttest control group experimental model. The study group consisted of 40 preschool children aged six, including 20 in the experimental group (11 girls, 9 boys) and 20 in the control group (8 girls, 12 boys). The experimental group participated in the Philosophy for Children-Based Digital Storytelling Program for 12 weeks, three days a week. Meanwhile, the control group continued with the standard preschool curriculum. To measure children's critical thinking skills in the study, the Critical Thinking Scale through Philosophical Inquiry was used, and to measure their creative thinking skills, the Integrated Creative Test was utilized. It was found that the post-test mean scores of the experimental group, which received the Philosophy for Children-Based Digital Storytelling Program, significantly differed in favor of the experimental group compared to the control group in both critical and creative thinking scales. These results indicate that Philosophy for Children-Based Digital Storytelling is effective in enhancing the creative and critical thinking skills of 6-year-old children.

**Keywords:** Philosophy for children; digital storytelling; creative thinking skills; critical thinking skills.

### **Article Information:**

Research Article

Submitted: October, 2025

Revised: February 20, 2026

Accepted: April 03, 2026

### **How to cite:**

Özaydın, E., & Büyüктаşkapu Soydan, S. (2025). An Investigation of the Effects of Philosophy for Children-Based Digital Storytelling on the Creative and Critical Thinking Skills of Six-Year-Old Children. *Journal of Inquiry Based Activities*, 16(1), 17-39.

### **Introduction**

One of the goals of education in a developing and changing world is to equip children with 21st-century skills. Among these skills, critical thinking, creativity, collaborative learning, and problem-solving stand out (Murat, 2018). Critical thinking, which influences people's knowledge-based reasoning and conscious decision-making processes, is defined as a thinking process involving logical inference, questioning, judgment, and discernment based on factual evidence (Alsaleh, 2020; Elder & Paul, 2020). Creative thinking, a fundamental skill playing a

---

<sup>1</sup> Ministry of National Education, Istanbul, Türkiye. ORCID ID: <https://orcid.org/0009-0007-5266-8183> E-mail: [ekaracelik3@gmail.com](mailto:ekaracelik3@gmail.com)

<sup>2</sup> Necmettin Erbakan University, Faculty of Education, Konya, Türkiye. ORCID ID: <https://orcid.org/0000-0003-0232-3818> E-mail: [sema.soydan@erbakan.edu.tr](mailto:sema.soydan@erbakan.edu.tr)

crucial role in children's cognitive, emotional, and social development (Nikkola et al., 2022), enables them to approach problems from multiple perspectives (Ahmadi et al., 2017) and generate new ideas by combining imagination and elements from past experiences (Ershadi & Winner, 2020). Therefore, it's defined as a process of producing innovative and effective ideas, formed through the interaction between an individual's cognitive abilities and their environment (Hod-Shemer, 2024). In an international research project covering 11 countries, which highlighted the value of developing creativity and critical thinking at an early age, it was emphasized that fostering critical thinking and creativity in children can contribute to individuals' well-being and intellectual development (Vincent-Lancrin et al., 2019). A review of the literature shows that critical and creative thinking are often inextricably intertwined, with creative thinking often considered an umbrella skill encompassing critical thinking (Baker, Rudd & Pomeroy, 2001; Vincent-Lancrin et al., 2019). The fundamental difference between these two skills is that creative thinking is divergent, while convergent thinking dominates critical thinking (Baker et al., 2001). Accordingly, it is stated that critical thinking focuses on reasoning, while creative thinking focuses on imagination. Furthermore, it is emphasized that creative thinking supports artistic expression (Resnick & Robinson, 2017; Robinson & Aronica, 2015), whereas critical thinking focuses on using cognitive skills to reach a desired evidence-based outcome (Halpern, 2014). For this reason, both creative and critical thinking are seen as a critical foundation for cognitive development and future success.

Despite the known benefits of creative and critical thinking skills, early childhood educators often hold misconceptions about their role in developing these abilities. Many educators perceive creative thinking as an innate trait rather than a skill to be fostered (Kampylis et al., 2009); some also associate it more with artistic expression than with cognitive processes (Ata-Akturk & Sevimli-Celik, 2023; Rubenstein et al., 2018). Even when educators acknowledge the importance of creative thinking, they may lack the necessary methods and strategies to effectively promote it in preschool curricula (Ata-Akturk & Sevimli-Celik, 2023). Furthermore, an educator needs to clearly understand how to teach critical thinking to a child and articulate this clearly to students (Elder & Paul, 2020).

Given the incorrect or limited knowledge and the need for evidence-based methods and strategies in supporting creative and critical thinking skills, it's both necessary and important to explore practical and innovative methods to foster these skills in young children. A review of the literature reveals that innovative practices like digital story creation facilitate children in constructing information in a way that's meaningful to them, thereby enhancing their creativity, exploration, and critical thinking skills (Hull & Katz, 2006). A study investigating the differences between digital stories created by young children and those created using a traditional approach found that aspects such as creativity, imagination, and the expression of ideas and thoughts were facilitated and developed when Web 2.0 tools were utilized. In contrast, children in the traditional storytelling group tended to focus on drawing pictures rather than designing and meaningfully connecting their verbal stories (Bratitsis et al., 2012).

To support the development of children's 21st-century skills through digital storytelling, similar to all other learning processes, it's essential to provide space and time for children to interpret

characters (in pictures) based on their experiences and gradually introduce them to the characteristics they attribute to these characters (emotions, objects, scenes). Additionally, it's crucial to use traditional storytelling patterns (e.g., drawing, story wall) where appropriate (Leinonen & Sintonen, 2014). Furthermore, the literature emphasizes that when creating digital stories with children, teachers should prioritize the composition of the story as a verbal narrative, keeping technology in the background. Attention should be paid to stages such as image selection, script creation, discussing the script with children, incorporating emotions, adding children's voices, and the teacher's arrangement of the creation (O'Byrne et al., 2018). Various studies focusing on developing children's storytelling skills in preschool education recommend a range of verbal scaffolding techniques, including explicit instructions on structural elements of stories, modeling, repeated readings of stories, and visual aids like pictures and puppets (Vretudaki, 2022). All these techniques aim to introduce children with the structural elements of stories and help them understand how necessary these are and how to use them (Pesco & Gagné, 2017). Lever and Sénéchal (2011), in their study aiming to enhance children's understanding of story structure and content through dialogic reading, found that comments, questions, and discussions related to the structural elements of stories during reading improved children's ability to retell stories they heard and produce new, original stories.

Based on this information, our study utilized the Philosophy for Children (P4C) method to support children's story retelling skills. This involved engaging children in comments, questions, and discussions while stories were read aloud. The P4C method was also chosen because it's a teaching approach that enables children to think critically and creatively and view events from a broader perspective. P4C contributes to children becoming inquirers by providing opportunities for critical thinking and conceptual analysis (Fletcher et al., 2021). This method is based on the educator facilitating children's thinking and questioning about a story, case study, problem, or stimulus. Through P4C, children learn that there isn't just one correct answer and that many different ideas can exist. Instead of seeking a single right answer, children acquire numerous skills such as generating ideas, defending their ideas, and thinking critically (Ab Wahab et al., 2022; Ventista, 2018; Wu, 2021).

Considering the literature on both the Philosophy for Children (P4C) method and digital storytelling, it is believed that an educational approach simultaneously utilizing these two methods will enhance young children's critical and creative thinking skills. Therefore, the aim of this study is to investigate the effect of a P4C-based digital storytelling program, implemented with preschool children, on their creative and critical thinking skills.

## **Method**

### **Research Model**

This quantitative study, which aimed to investigate the effect of Philosophy for Children (P4C)-based digital storytelling on children's critical and creative thinking skills, utilized a pre-test/post-test control group quasi-experimental design (Karasar, 2014).

### **Participants**

The study group in this research consisted of 6-year-old children attending a preschool education institution in Turkey. The experimental group included 11 girls and 9 boys, while the control group comprised 8 girls and 12 boys.

### **Data Collection Tools**

#### **Hybrid Creativity Test (HCT)**

Developed by Lee and Lee (2002), this scale consists of two sections: creative thinking ability and creative personality. The creative thinking ability section has two sub-areas: language and drawing. Scoring in the HCT occurs in these two areas, paralleling the test structure.

The sub-factors of the linguistic domain of creativity are comprised of four factors: imagination, fluency, flexibility, and originality. Each sub-factor has its own scoring system. In the imagination dimension, points are awarded for each expanded imaginative thought based on a real situation. Fluency measures the number of thoughts and methods used to solve a problem in a given situation. For flexibility, points are awarded based on the number of answers given. In terms of measuring originality, one point is added to the total score when a child deviates from conventional thinking and produces unique and innovative ideas. The drawing domain consists of one element. The sub-factors of the drawing domain are comprised of a total of six sub-factors: continuity and connection, completion, adding new elements, theme, and unusual dimension. The child's drawing is evaluated separately for each sub-dimension. The child's scores vary according to the details of the picture they draw. To determine the reliability score of the test, the Cronbach's alpha reliability coefficient was found to be 0.837 (Yuvacı, 2017).

#### **Critical Thinking Scale through Philosophical Inquiry**

Developed by Karadağ and Yıldız Demirtaş (2017) to assess the critical thinking skills of preschool children, this scale is a 5-point Likert-type scale consisting of 38 items. Completed by teachers, this scale allows for the evaluation of teachers' observations regarding the critical thinking skills of children within a study group. As a result of the exploratory factor analysis conducted to ensure the scale's construct validity, it was revealed that the scale consists of three sub-dimensions: "Philosophical Inquiry," "Language and Cognitive Skills," and "Formulating Question." The internal consistency coefficients for these sub-factors and the overall total of the test were calculated as .974, .955, .983, and .986 respectively, indicating a high level of reliability (Karadağ & Demirtaş, 2018).

#### **Education Program**

The researcher obtained a P4C educator training certificate. Six books were selected from those recommended for P4C programs and read to the children using the P4C method. The second stage of the program involved children creating their own stories. During this phase, children were asked to modify elements within the stories they had critically listened to. These elements were as follows: *Ish (Creatrilogy)*: Talent, Character reactions, Main character's reaction to the event; *The Secret Sky Garden*: Setting, Main character's perspective, Inclusion of supporting characters in the story; *The Most Magnificent Thing*: Main character's best friend, Setting,

Supporting characters' perspectives on the event; You Can Never Run Out of Love: An unending element featured on each page; The Missing Piece: Colors of page illustrations, Main character's shape, Supporting characters; The Void: The location of the void within the child, The way the child fills the void within themselves, People who help the child fill the void within themselves. Children were then asked to illustrate the stories they had created. In the third stage of the program, the process of transferring to a digital environment, the Storyjumper digital storytelling application was utilized. The illustrations of the children's newly created stories, incorporating the modified elements, were transferred to the digital platform, and the story narration was done by the children themselves. Thus, each child re-created their story in a digital environment using the digital storytelling technique, having re-written the story they listened to from a philosophical perspective.

The researcher holds a certified Philosophy for Children (P4C) practitioner certificate. Six children's books were selected from those recommended in P4C curricula and were read to the children in accordance with P4C pedagogy. In the second stage of the program, children were encouraged to create their own stories to support their creative and critical thinking skills. During this stage, the children were asked to reconstruct specific elements within the stories they had critically listened to. The story elements requested to be modified are specified below:

- **Ish (Creatrilogy):** Talent, character reactions, and the protagonist's response to the event.
- **The Secret Sky Garden:** Setting, the protagonist's perspective, and the inclusion of supporting characters in the story.
- **The Most Magnificent Thing:** The protagonist's best friend, setting, and the perspectives of supporting characters regarding the event.
- **You Can Never Run Out of Love:** A continuous element appearing on every page of the story.
- **The Missing Piece:** The colors of the page illustrations, the shape of the protagonist, and supporting characters.
- **The Void:** The position of the "void" within the child's inner world, how the child fills this void, and the people who support the child during this process.

Following this stage, the children were asked to illustrate the stories they had created. In the third stage of the program, the story creation process was transferred to a digital medium using the Storyjumper digital storytelling application. The drawings belonging to the children's reconstructed stories were uploaded to the digital platform, and the narrations were recorded by the children themselves. Throughout this process, each child rewrote the story they had heard from a philosophical perspective and reproduced their story in a digital environment through the digital storytelling technique.

### **Data Analysis**

For descriptive statistics, mean  $\pm$  standard deviation, median (M), and interquartile range (IQR) values were used. The normality of data distribution was assessed using the Shapiro-Wilk

normality test, and the homogeneity of variances was evaluated with Levene's test. Upon assessing whether the data met the prerequisites for parametric tests, it was determined that the data did not conform to a normal distribution. For numerical variables, comparisons between two independent groups were performed using the Mann-Whitney U test. The Wilcoxon test was used for within-group comparisons. Group-time interaction was evaluated based on the differences between pre-test and post-test scores. A p-value of  $< 0.05$  was considered statistically significant.

### Findings

This section presents the comparisons between the pre-test scores of the experimental and control groups and the post-test scores obtained from the scales, aiming to determine the effect of the P4C-Based Digital Storytelling Program on the critical and creative thinking skills of six-year-old preschool children.

Pre-test and post-test results for both groups were compared, and between-group differences were evaluated. Based on the test results, group and time interactions, inter-group differences, and effect sizes (ES) for changes over time were calculated. The values in Table 1 (see appendix) are presented as mean  $\pm$  standard deviation (Mean $\pm$ SD) and median (IQR). The Wilcoxon test (Z) was used for within-group analyses, and the Mann-Whitney U test (Z) was used for between-group analyses. Additionally, in the analyses, the p-value indicates significance levels, and the effect size (ES) demonstrates the magnitude of the changes.

For Philosophical Inquiry, the experimental group's pre-test score was  $51.40 \pm 15.00$ , which increased to  $83.65 \pm 8.42$  in the post-test. This increase was statistically significant ( $Z = -3.923$ ,  $p = 0.000$ ,  $ES = 0.877$ ). In the control group, the pre-test score was  $47.60 \pm 11.39$ , increasing to  $51.90 \pm 12.82$  in the post-test. This increase was also significant, but the effect size was lower compared to the experimental group ( $Z = -3.592$ ,  $p = 0.000$ ,  $ES = 0.803$ ). The experimental group's post-test scores were significantly higher than the control group's ( $Z = -5.137$ ,  $p = 0.000$ ,  $ES = 0.812$ ). The experimental group showed greater development in philosophical inquiry skills compared to the control group. The high effect sizes indicate that the intervention had a substantial impact on this skill.

For Language and Cognitive Skills, the experimental group's pre-test score was  $55.45 \pm 10.91$ , which increased to  $73.60 \pm 5.13$  in the post-test ( $Z = -3.729$ ,  $p = 0.000$ ,  $ES = 0.834$ ). The control group's pre-test score increased from  $53.65 \pm 14.01$  to  $56.55 \pm 11.4$  in the post-test. This increase was significant but at a lower level than the experimental group ( $Z = -2.615$ ,  $p = 0.009$ ,  $ES = 0.585$ ). In post-test scores, the experimental group performed significantly better than the control group ( $Z = -4.929$ ,  $p = 0.000$ ,  $ES = 0.779$ ). The experimental group also showed greater development in the language and cognitive skills sub-dimension compared to the control group. These results indicate a positive contribution of the intervention to these skills.

For Formulating Questions, the experimental group's pre-test score was  $13.9 \pm 4.39$ , which increased to  $23.65 \pm 2.66$  in the post-test ( $Z = -3.831$ ,  $p = 0.000$ ,  $ES = 0.857$ ). The control group's pre-test score was  $12.5 \pm 2.91$ , remaining almost the same at  $13.1 \pm 3.04$  in the post-test, showing

no significant change ( $Z=-1.436$ ,  $p=0.151$ ,  $ES=0.321$ ). Between-Group Comparison: The difference in post-test scores between the experimental group and the control group was significant ( $Z=-5.375$ ,  $p=0.000$ ,  $ES=0.850$ ). While the experimental group showed significant development in question-formulating skills, there was no significant change in the control group. The high effect size in the experimental group indicates the strong impact of the intervention on this skill.

For Critical Thinking Skills Total, the experimental group's pre-test score was  $120.75\pm 28.61$ , increasing to  $180.9\pm 15.14$  in the post-test ( $Z=-3.922$ ,  $p=0.000$ ,  $ES=0.877$ ). The control group's pre-test score was  $113.75\pm 25.13$ , becoming  $121.55\pm 23.42$  in the post-test ( $Z=-3.815$ ,  $p=0.000$ ,  $ES=0.853$ ). Between-Group Comparison: The experimental group performed significantly better than the control group in post-test scores ( $Z=-5.136$ ,  $p=0.000$ ,  $ES=0.812$ ). In terms of the total score on the Critical Thinking Scale through Philosophical Inquiry, the experimental group showed significant development compared to the control group. The overall effect of the intervention is strongly evident in both group and time contexts.

According to the data obtained from Table 1, the Philosophy for Children-Based Digital Storytelling Program was effective in the experimental group, leading to significant development in all sub-dimensions compared to the control group. The high effect sizes indicate a strong impact of the intervention. Developments in the control group were limited and generally quite low when compared to the experimental group's development. The statistical significance of both time and group effects indicates that the intervention had a positive impact on critical thinking skills. These results demonstrate that the Philosophy for Children-Based Digital Storytelling Program is an effective method for developing individuals' critical thinking skills.

Here's an overview of the statistical notation used: TI refers to Test Statistics, where  $Z$  denotes the Mann-Whitney U Test, and  $Z^*$  signifies the Wilcoxon Test. The symbols †, ¥, and & indicate between-group comparison, within-group comparison, and between-group comparison of pre- and post-test score differences, respectively. ES (Effect Size) quantifies the magnitude of changes. Summary statistics are presented as mean  $\pm$  standard deviation (Mean $\pm$ SD) and median (IQR), depending on data normality.

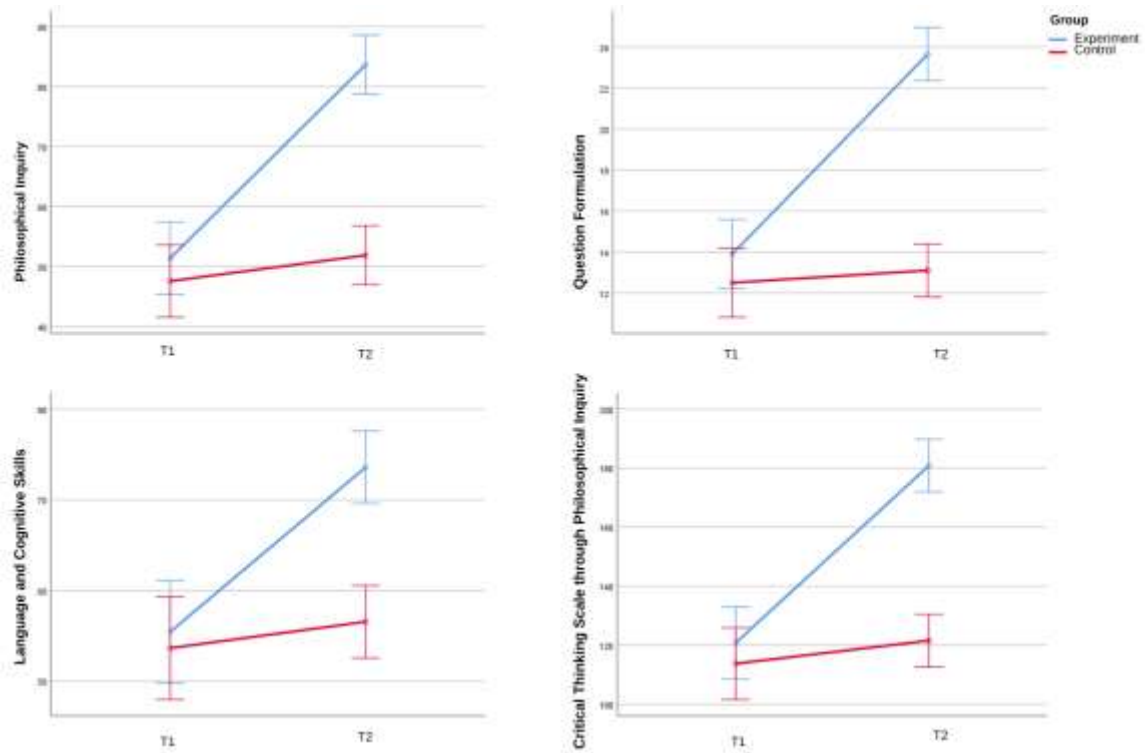
Statistically significant differences were found between the experimental group ( $n=20$ ) and the control group ( $n=20$ ), and these differences are detailed across the sub-dimensions of hybrid creativity. The experimental group showed a significant increase in hybrid creativity sub-dimensions in post-test results.

In the experimental group, hybrid creativity sub-dimensions showed a significant increase in post-test results. In the Imagination sub-dimension, no significant difference was found between the experimental group ( $1.65\pm 0.88$ ) and the control group ( $1.25\pm 0.44$ ) ( $p=0.126$ ). A significant difference was found in favor of the experimental group ( $3.40\pm 2.01$ ) ( $p=0.000$ ,  $ES=0.599$ ). Imagination scores in the experimental group significantly increased over time ( $p=0.001$ ,  $ES=0.726$ ). A positive effect was observed on the imagination skills of individuals in the experimental group throughout the study process. In the Flexibility sub-dimension, the

difference between the groups was not statistically significant in the pre-test ( $p=0.066$ ). A statistically significant difference was found in favor of the experimental group ( $p=0.000$ ,  $ES=0.660$ ). Flexibility scores in the experimental group were found to have significantly increased ( $p=0.001$ ,  $ES=0.768$ ). Flexibility skills appear to have been developed in the experimental group. In the Fluency sub-dimension, there was a significant difference between the experimental group ( $6.00\pm 2.10$ ) and the control group ( $2.55\pm 1.19$ ) ( $p=0.000$ ,  $ES=0.772$ ). The experimental group's fluency scores were found to be even higher in the post-test ( $p=0.000$ ,  $ES=0.824$ ). There was a significant improvement in fluency skills in the experimental group ( $p=0.000$ ,  $ES=0.812$ ). The interventions in the experimental group led to a significant increase in fluency skills. In the Originality sub-dimension, there was no difference between the groups in the pre-test ( $p=0.971$ ). Post-test results showed a very high increase in originality scores in the experimental group ( $p=0.000$ ,  $ES=0.916$ ). Within-group change indicated that the experimental group showed significant development in terms of originality ( $p=0.000$ ,  $ES=0.880$ ). Originality was one of the areas most affected by the interventions in the experimental group. In the Continuity and Cohesion sub-dimension, no difference was found between the groups in the pre-test ( $p=0.175$ ). A significant difference emerged in the experimental group ( $p=0.000$ ,  $ES=0.673$ ). The experimental group showed significant development in this sub-dimension ( $p=0.001$ ,  $ES=0.775$ ). The continuous and independent thinking skills of individuals in the experimental group were developed. In the Completion sub-dimension, no difference was found between the groups in the pre-test ( $p=0.188$ ). A significant difference was found in favor of the experimental group ( $p=0.000$ ,  $ES=0.609$ ). A significant increase in completion skills was observed in the experimental group ( $p=0.001$ ,  $ES=0.717$ ). Completion skills were evaluated as a developmental process for the experimental group. In the Adding New Elements sub-dimension, no difference was found between the groups in the pre-test ( $p=0.255$ ). A significant difference was found in the experimental group ( $p=0.001$ ,  $ES=0.503$ ). A marked improvement in the skill of adding new elements was observed in the experimental group ( $p=0.000$ ,  $ES=0.845$ ). The ability of individuals in the experimental group to add new elements to creative processes increased. In the Theme sub-dimension, no difference was found between the groups in the pre-test ( $p=0.094$ ). Although significant differences were found when group and time interactions were examined separately, an evaluation could not be made based on these differences because the combined group x time interaction was not found to be significant. In the Unusualness sub-dimension, a difference was found between the groups ( $p=0.003$ ). The Unusualness scores obtained in the experimental group's pre-test ( $Z=-3.547$ ,  $p=0.000$ ) and post-test ( $Z=-5.055$ ,  $p=0.000$ ) differed according to the groups. It was determined that the experimental group had a higher average Unusualness score than the control group in both pre-test and post-test. While no difference was observed in the control group between pre-test and post-test ( $Z^*=-1.414$ ,  $p=0.157$ ), the experimental group showed a difference between pre-test and post-test ( $Z^*=-3.207$ ,  $p=0.001$ ). In the Hybrid Creativity total score, the difference between the experimental group ( $18.05\pm 4.27$ ) and the control group ( $12.80\pm 2.55$ ) was significant ( $p=0.000$ ,  $ES=0.634$ ). The experimental group's overall hybrid creativity scores were found to be much higher than those of the control group ( $p=0.000$ ,  $ES=0.842$ ). Hybrid creativity

skills in the experimental group showed a significant increase ( $p=0.000$ ,  $ES=0.877$ ). The interventions in the experimental group comprehensively developed hybrid creativity.

Overall, the experimental group showed significant development in hybrid creativity and its sub-dimensions. These results indicate that the Philosophy for Children-Based Digital Storytelling Program is an effective method for developing individuals' creative thinking skills.



**Figure 1**

*Temporal Change of the Critical Thinking Scale through Philosophical Inquiry in Study Groups*

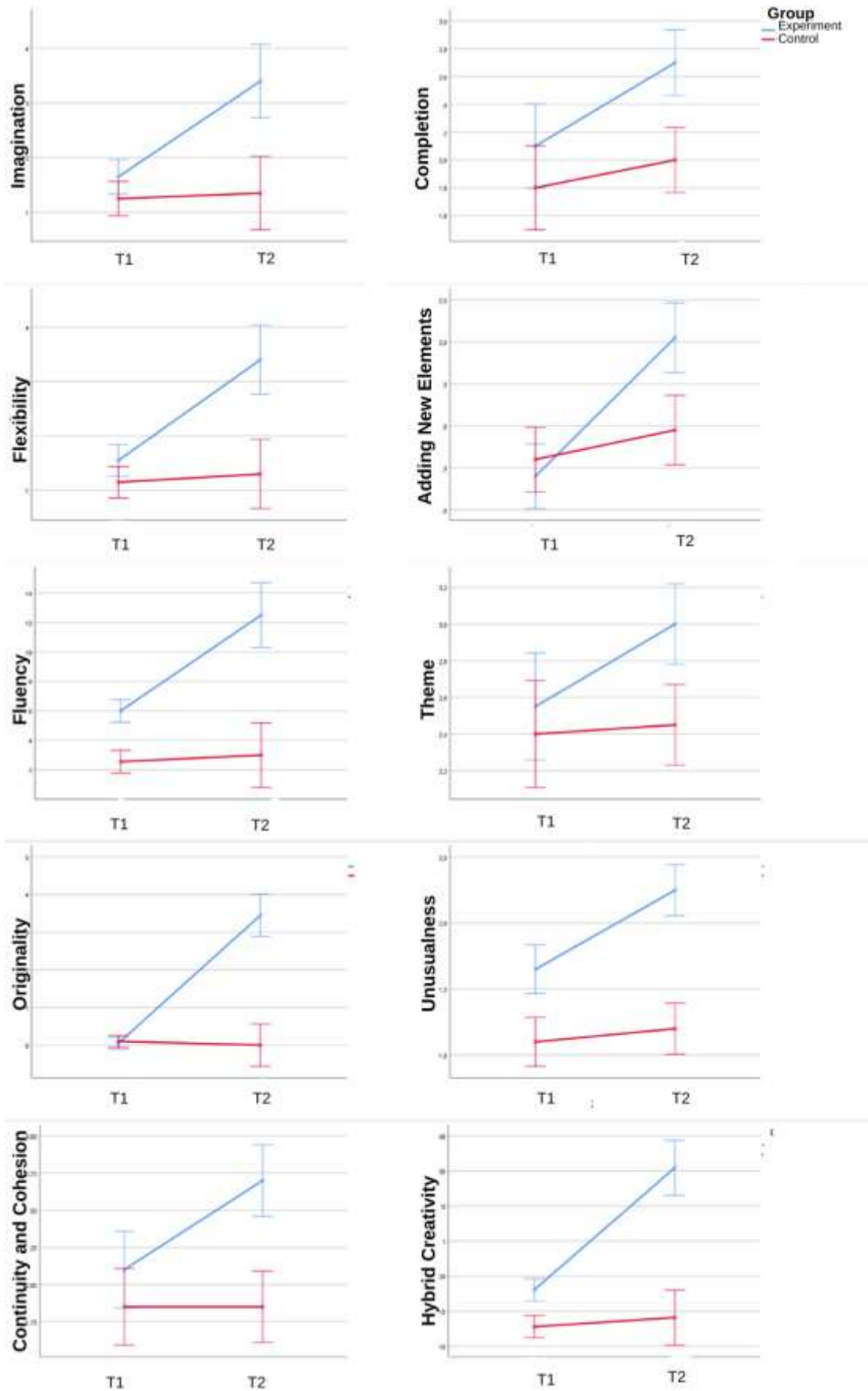


Figure 2. Change Over Time of the Hybrid Creativity Test in Study Groups

## Discussion

This research primarily reveals that the combined use of philosophy for children and digital storytelling methods can support children's critical thinking and creative thinking skills. It also shows that combined use of P4C and digital storytelling methods can enhance the effectiveness of preschool programs. According to the findings of this study, children who participated in the Philosophy for Children-Based Digital Storytelling Program have higher critical thinking skills compared to children who received preschool education but did not participate in this specific program.

Numerous studies exist that reveal that inquiry-based teaching can help develop critical thinking skills (Greenwood, Austin, Bacon & Pike, 2022; Siddiqui, Gorard & See, 2019; Strasser & Bresson, 2017). Garcia-Moriyon et al. (2005), in their meta-analysis of 18 studies related to P4C, determined that the P4C program helps develop children's cognitive skills and higher-order thinking skills. Karadağ and Demirtaş (2018), in their research examining the impact of the Philosophy with Children Teaching Program on the Critical Thinking Skills of Preschool Children, determined that the program increased children's critical thinking skills. A study by Kanat (2020) found that a critical thinking education program positively contributed to the moral judgments and critical thinking skills of 5-6 year old children. Research by Dirican and Deniz (2019), aimed at determining the effect of philosophy activities prepared for preschool children on their philosophical attitudes and behaviors, concluded that philosophy education activities increased children's philosophical attitude and behavior scores. Zulkifi and Hashim (2020) investigated the effectiveness of P4C in developing critical thinking among students. The study showed that the experimental group's reasoning and critical thinking skills improved. Işıklar & Öztürk (2022) found that the P4C curriculum led to developments in philosophical inquiry-based critical thinking and problem-solving skills in children aged 5-6. Zengin (2022), in their study aiming to determine views on P4C, found that primary school teachers believed elementary students could engage in philosophy, and that philosophy education would enable children to develop critical thinking skills, mental inquiry skills, and respect for different ideas. Sare et al. (2016), in their study examining the effect of philosophical group discussions using the P4C program on verbal reasoning skills, showed that when children in the experimental group were asked to justify their views, they provided more justifications in terms of comparison, analogy, reasoning, "therefore" statements, and causal connections than children in the control group. This result indicates that implementing P4C-based weekly philosophical group discussions in preschool educational institutions contributes to fostering verbal reasoning skills, thereby promoting the four basic language skills and academic success. In their 2021 study, Priyanti and Warmansyah aimed to develop children's critical thinking skills through an inquiry-based learning method. Their findings revealed that the inquiry-based learning method was effective and could enhance collaboration, creation, communication, and critical thinking skills in early childhood. Akkocaoğlu-Çayır (2015) found that philosophy education for children encouraged 3rd-grade primary school students to utilize higher-order thinking skills like problem-solving and critical thinking. Güven (2019) discovered that philosophical studies conducted using the creative drama method led children to engage in advanced dialogues during

discussions, supporting their critical, creative, and collaborative skills through philosophy for children.

Papadopoulos and Bisiri's (2020) educational program, designed to foster critical thinking in preschool children by encouraging them to critically analyze content presented through folk tales, fairy tales, and games using multi-literacy pedagogy, was found to develop critical thinking through the communicative aspects of children's interactions. These research results, demonstrating that children's critical thinking skills can be supported through the P4C program, support our finding that the Philosophy for Children-Based Digital Storytelling Program increases critical thinking skills.

According to the results obtained in the research, children participating in the Philosophy for Children-Based Digital Storytelling Program have higher creative thinking skills compared to children who received preschool education but did not participate in this program. Furthermore, it was found that there was no difference between the pre-test and post-test mean scores of the control group children in the Hybrid Creativity Test's sub-dimensions of imagination, flexibility, fluency, originality, continuity and cohesion, unusualness, and completion. In their study, Apriani et al. (2025) investigated the impact of reading Siproman digital comics, created using Autodesk-SketchBook, on critical thinking and creative thinking skills. Their work indicates that Siproman digital comics are effective in developing students' critical and creative thinking skills. Bedir-Erişti (2016) determined that the digital storytelling approach positively affected the creativity of primary school students. Yang, Chen & Hung (2022) examined the effectiveness of digital storytelling techniques in foreign language education on learners' English speaking and creative thinking. They concluded that digital storytelling enhanced students' creative thinking, supporting their proficient English speaking and fostering a unique learning environment.

Talan's (2019) meta-analysis on the digital storytelling method in education showed that the digital storytelling method positively influenced various variables such as learning level/achievement, attitude, and motivation. Ghaedi (2015) found that the P4C program, applied to 5-6 year old children in their study, helped develop children's creative thinking. Mohammadi et al. (2019) investigated the effect of the P4C program on the creativity of preschool children. The study confirmed the program's reliability in developing creativity and its four core components: originality, elaboration, fluency, and flexibility. Iranian studies examining the effect of the P4C program on creativity in school-aged children have shown that implementing this program has a positive effect on developing creativity (Hosseini and Hejazi, 2014; NADERI et al., 2012). These research results, which reveal that children's creative thinking skills can be supported through digital storytelling and the P4C program, support our finding that the Philosophy for Children-Based Digital Storytelling Program increases creative thinking skills.

### **Conclusion and Recommendations**

The study concludes that Philosophy for Children-Based Digital Storytelling is effective in fostering creative and critical thinking in 6-year-old children. The combined use of these two

techniques yields effective results in supporting creative and critical thinking skills, which are among the most crucial 21st-century skills for children today, offering significant insights for professionals in the field. Therefore, this study is believed to contribute to the necessary pedagogical practices for providing support that can facilitate the emergence of creative and critical thinking skills. The proposed pedagogical approach leverages existing practices in a novel way to best support the development of critical and creative thinking skills in young children.

Furthermore, the findings provide strong evidence supporting the conclusion that preschool children engage in critical and creative thinking under specific pedagogical conditions. Thus, it's recommended that early childhood educators be informed about the positive impact on children of incorporating philosophy workshops and digital storytelling activities together. It's also suggested that future research determine whether this approach has a lasting effect in early childhood education and if it is effective in other educational stages. This could increase awareness about the potential use of programs that integrate philosophy workshops and digital storytelling activities not only in preschool education but also in other educational levels.

### References

- Ahmadi, N., & Besançon, M. (2017). Creativity as a stepping stone towards developing other competencies in classrooms. *Education Research International*, 2017, 1–9. <https://doi.org/10.1155/2017/4282505>
- Akdemir, S., & Saban, A. (2020). İlkokul dördüncü sınıfta felsefe temelli çocuk kitapları aracılığıyla değer öğretimine ilişkin bir eylem araştırması. *Eğitimde Nitel Araştırmalar Dergisi*, 8(2), 431–461. <https://doi.org/10.14689/issn.2148-2624.1.8c.2b.18m>
- Akkocaoğlu Çayır, N., & Akkoyunlu, B. (2016). Çocuklar için felsefe eğitimi üzerine nitel bir araştırma. *Turkish Online Journal of Qualitative Inquiry*, 7(2), 97–133. <https://doi.org/10.17569/tojqi.91449>
- Alsaleh, N. J. (2020). Teaching critical thinking skills: Literature review. *Turkish Online Journal of Educational Technology*, 19(1), 21–39. Available online: <http://files.eric.ed.gov/fulltext/EJ1239945.pdf> (accessed on 30 December 2025).
- Apriani, S. P., Supriyanti, S., & Rusdi, R. (2025). Development of digital comics Siproman to improve students' critical thinking and creative thinking skills. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 11(1), 237–252. <https://doi.org/10.22219/jpbi.v11i1.39563>
- Ata-Akturk, A., & Sevimli-Celik, S. (2023). Creativity in early childhood teacher education: Beliefs and practices. *International Journal of Early Years Education*, 31(1), 95–114. <https://doi.org/10.1080/09575146.2021.1922922>
- Baker, M., Rudd, R., & Pomeroy, C. (2001). Relationships between critical and creative thinking. *Journal of Southern Agricultural Education Research*, 51(1), 173–188.

- Baki, Y., & Feyzioğlu, N. (2017). The effects of digital stories on the writing skills of 6th grade students. *International Online Journal of Educational Sciences*, 9(3), 686–704. <https://doi.org/10.15345/iojes.2017.03.013>
- Bedir Erişti, S. D. (2016). Participatory design based digital storytelling and creativity indicators in elementary school. *Turkish Online Journal of Qualitative Inquiry*, 7(4), 462–492. <https://doi.org/10.17569/tojq.28031>
- Bratitsis, T., Kotopoulos, T., & Mandila, K. (2012). Kindergarten children's motivation and collaboration being triggered via computers while creating digital stories: A case study. *International Journal of Knowledge and Learning*, 8(3–4), 239–258. <https://doi.org/10.1504/IJKL.2012.051563>
- Dirican, R., & Deniz, Ü. (2019). Felsefe etkinliklerinin okul öncesi dönem çocuklarının felsefi tutum ve davranışlarına etkisinin incelenmesi. *Kastamonu Eğitim Dergisi*, 28(1), 421–430. <https://doi.org/10.17556/erj.661726>
- Elder, L., & Paul, R. (2020). *Critical thinking: Tools for taking charge of your learning and your life*. Foundation for Critical Thinking.
- Ershadi, M., & Winner, E. (2020). Children's creativity. In *Encyclopedia of Creativity* (Vol. 1, pp. 144–147). Elsevier.
- Fletcher, N. M., Gregory, M. R., Shea, P., & Sykes, A. (2021). The story circle as a practice of democratic, critical inquiry. *Childhood and Philosophy*, 17, 1–42. <https://doi.org/10.12957/childphilo.2021.55722>
- García-Moriyón, F., Rebollo, I., & Colom, R. (2005). Evaluating philosophy for children: A meta-analysis. *Thinking: The Journal of Philosophy for Children*, 17(4), 14–22. <https://doi.org/10.5840/thinking20051743>
- Ghaedi, Y., Mahdian, M., & Khoshnavay Fomani, F. (2015). Identifying dimensions of creative thinking in preschool children during implementation of philosophy for children (P4C) program: A directed content analysis. *American Journal of Educational Research*, 3(5), 547–551. <https://doi.org/10.12691/education-3-5-2>
- Greenwood, R., Austin, S., Bacon, K., & Pike, S. (2022). Enquiry-based learning in the primary classroom: Student teachers' perceptions. *Education*, 50(3), 404–418. <https://doi.org/10.1080/03004279.2020.1840606>
- Güven, B. (2019). *Çocuklarla yapılan felsefe eğitiminde yaratıcı drama yönteminin kullanılması* (Yüksek lisans tezi). Ankara Üniversitesi.
- Hod-Shemer, O. (2024). *Promoting creative thinking in early childhood*. Cambridge Scholars Publishing.
- Hosseini, A., & Hejazi, E. (2014). Effectiveness of implementing philosophy for children program on students' creativity. *Scientific Journal of Pure and Applied Sciences*, 3(6), 375–380.

- Hull, G., & Katz, M. (2006). Crafting an agentic self: Case studies of digital storytelling. *Research in the Teaching of English, 41*(1), 43–81.
- Işıklar, S., & Öztürk, Y. A. (2022). The effect of philosophy for children (P4C) curriculum on critical thinking through philosophical inquiry and problem solving skills. *International Journal of Contemporary Educational Research, 9*(1), 130–142.  
<https://doi.org/10.33200/ijcer.942575>
- Kanat, K. (2020). *Sokratik yöntemle göre hazırlanan eleştirel düşünme eğitim programının çocukların eleştirel düşünme becerilerine ve ahlaki yargı düzeylerine etkisi* (Doktora tezi). Gazi Üniversitesi.
- Karadağ, F., Demirtaş, V. Y., & Yıldız, T. (2017). Development of critical thinking scale through philosophical inquiry for children 5–6 years old. *International Online Journal of Educational Sciences, 9*(4), 1025–1037. <https://doi.org/10.15345/iojes.2017.04.015>
- Kayaalp, M. (2021). *İlkokul 2. sınıf Türkçe dersinde çocuklar için felsefe eğitimi uygulamaları* (Yüksek lisans tezi). Anadolu Üniversitesi.
- Leinonen, J., & Sintonen, S. (2014). Productive participation: Children as active media producers in kindergarten. *Nordic Journal of Digital Literacy, 9*(3), 216–236.  
<https://doi.org/10.18261/ISSN1891-943X-2014-03-04>
- Lever, R., & Sénéchal, M. (2011). Discussing stories: On how a dialogic reading intervention improves kindergartners' oral narrative construction. *Journal of Experimental Child Psychology, 108*(1), 1–24. <https://doi.org/10.1016/j.jecp.2010.07.002>
- Lipman, M. (2003). *Thinking in education*. Cambridge University Press.
- Lipman, M., Sharp, M. A., & Oscanyan, F. S. (1980). *Philosophy in the classroom*. Temple University Press.
- Mohammadi, F., Keramati, H., Farzad, V., & Arabzadeh, M. (2019). The effectiveness of the philosophy for children program in fostering preschool children. *Thinking and Children, 10*(1), 213–236.
- Naderi, E. (2012). The study of the effect of “philosophy for children (P4C)” on developing creativity of male high school students. *Thinking and Child: Human Sciences, Research and Cultural Studies, 3*(1).
- Nikkola, T., Reunamo, J., & Ruokonen, I. (2022). Children's creative thinking abilities and social orientations in Finnish early childhood education and care. *Early Child Development and Care, 192*(6), 872–886.  
<https://doi.org/10.1080/03004430.2020.1803271>

- O’Byrne, W. I., Houser, K., & Stone, R. (2018). Digital storytelling in early childhood: Student illustrations shaping social interactions. *Frontiers in Psychology*, 9, Article 2749. <https://doi.org/10.3389/fpsyg.2018.02749>
- Papadopoulou, I., & Bisiri, E. (2020). Fostering critical thinking skills in preschool education: Designing, implementing and assessing a multiliteracies-oriented programme based on intercultural tales. *Multilingual Academic Journal of Education and Social Sciences*, 9(2), 1–19. [10.5455/ijsm.post-radiation-breast-angiosarcoma](https://doi.org/10.5455/ijsm.post-radiation-breast-angiosarcoma)
- Pesco, D., & Gagné, A. (2017). Scaffolding narrative skills: A meta-analysis of instruction in early childhood settings. *Early Education and Development*, 28, 773–793. <https://doi.org/10.1080/10409289.2017.1280345>
- Priyanti, N., & Warmansyah, J. (2021). Sorgulayıcı öğrenme yoluyla erken çocukluk döneminde eleştirel düşünme becerilerinin geliştirilmesi. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(2), 2241–2249. <https://doi.org/10.31004/obsesi.v5i2.1168>
- Resnick, M., & Robinson, K. (2017). *Lifelong kindergarten: Cultivating creativity through projects, passion, peers, and play*. MIT Press.
- Robinson, K., & Aronica, L. (2015). *Creative schools: Revolutionizing education from the ground up*. Penguin.
- Rubenstein, L. D., Ridgley, L. M., Callan, G. L., Karami, S., & Ehlinger, J. (2018). How teachers perceive factors that influence creativity development: Applying a social cognitive theory perspective. *Teaching and Teacher Education*, 70, 100–110. <https://doi.org/10.1016/j.tate.2017.11.012>
- Säre, E., Luik, P., & Tulviste, T. (2016). Improving preschoolers’ reasoning skills using the philosophy for children programme. *Trames: A Journal of the Humanities and Social Sciences*, 20(3), 273–287. <https://doi.org/10.3176/tr.2016.3.05>
- Siddiqui, N., Girard, S., & See, B. H. (2019). Can programmes like philosophy for children help schools to look beyond academic attainment? *Educational Review*, 71(2), 146–165. <https://doi.org/10.1080/03054985.2018.1445199>
- Strasser, J., & Bresson, L. M. (2017). *Big questions for young minds: Extending children’s thinking*. National Association for the Education of Young Children.
- Şavşet, S., & Öncü, E. Ç. (2022). Sorgulama tabanlı eklettik okul öncesi eğitim etkinliklerinin etkisinin incelenmesi. *Akademik Sosyal Araştırmalar Dergisi*, 10(124), 317–338. <https://doi.org/10.16990/ASOS.14441>
- Talan, T. (2019). Dijital öyküleme yöntemi ile ilgili yapılan çalışmalara sistematik bir bakış. *7. Uluslararası Öğretim Teknolojileri ve Öğretmen Eğitimi Sempozyumu Bildiri Kitabı* (ss. 692–709).

Ventista, O. M. (2018). A literature review of empirical evidence on the effectiveness of philosophy for children. In *Parecidos de familia: Propuestas actuales en filosofía para niños* (ss. 448–469).

Vincent-Lancrin, S., González-Sancho, C., Bouckaert, M., de Luca, F., Fernández-Barrera, M., Jacotin, G., & Vidal, Q. (2019). *Fostering students' creativity and critical thinking: What it means in school*. OECD Publishing. <https://doi.org/10.1787/bbdb2260-en>

Vretudaki, H., & Tafa, E. (2022). Personal and fictional narratives development in kindergarten children: The effects of an intervention programme. *Early Child Development and Care*, 192, 2545–2558. <https://doi.org/10.1080/03004430.2021.2003361>

Wu, C. (2021). Training teachers in China to use the philosophy for children approach and its impact on critical thinking skills: A pilot study. *Education Sciences*, 11(5), Article 206. <https://doi.org/10.3390/educsci11050206>

Yang, Y. T. C., Chen, Y. C., & Hung, H. T. (2020). Digital storytelling as an interdisciplinary project to improve students' English speaking and creative thinking. *Computer Assisted Language Learning*, 35(4), 840–862. <https://doi.org/10.1080/09588221.2020.1750431>

Zengin, E. (2022). Can philosophy education for children (P4C) practices be done in primary schools? A qualitative research on teachers in primary schools. *International Journal of Psychology and Educational Studies*, 9(3), 1099–1110. <https://doi.org/10.52380/ijpes.2022.9.3.844>

Zulkifli, H., & Hashim, R. (2020). Philosophy for children (P4C) in improving critical thinking in a secondary moral education class. *International Journal of Learning, Teaching and Educational Research*, 19(2), 29–45. <https://doi.org/10.26803/ijlter.19.2.3>

### Appendix

**Table 1.**

*Results for the Comparison of Pre-test and Post-test Scores Regarding Groups' Critical Thinking Skills (n=40)*

Groups		TS <sup>†</sup>			TS <sup>&amp;</sup>			x	
Experimental Group (n=20)	Control (n=20)	Group	(Group)	(Group Time)					
Mean ±SD	Median (IQR)	Mean ±SD	Median (IQR)	Z	p	ES	Z	p	ES

Philosophical Inquiry	Pre	51.40±15.00	49 (18)	47.60±11.39	47 (15.25)	-0.488	0.626	0.077	-5.268	.000	.833																																																																																																																																		
	Post	83.65±8.42	86 (8.25)	51.90±12.82	53.5 (19.25)	-5.137	0.000	0.812					Z*	<b>-3.923</b>		<b>-3.592</b>								TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.000</b>								ES	<b>.877</b>		<b>.803</b>								Language and Cognitive Skills	Pre	55.45±10.91	52 (15.5)	53.65±14.01	56 (17.75)	-0.352	0.725	0.056	-4.120	.000	.651	Post	73.60±5.13	75 (0)	56.55±11.4	58 (17)	-4.929	0.000	0.779		Z*	<b>-3.729</b>		<b>-2.615</b>								TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.009</b>								ES	<b>.834</b>		<b>.585</b>								Formulating Questions	Pre	13.9±4.39	12.5 (6.25)	12.5±2.91	12.5 (5)	-0.578	0.563	0.091	-4.951	.000	.783	Post	23.65±2.66	25 (1.75)	13.1±3.04	14.5 (4.75)	-5.375	0.000	0.850		Z*	<b>-3.831</b>		<b>-1.436</b>								TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.151</b>			
	Z*	<b>-3.923</b>		<b>-3.592</b>																																																																																																																																									
TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.000</b>																																																																																																																																									
	ES	<b>.877</b>		<b>.803</b>																																																																																																																																									
Language and Cognitive Skills	Pre	55.45±10.91	52 (15.5)	53.65±14.01	56 (17.75)	-0.352	0.725	0.056	-4.120	.000	.651																																																																																																																																		
	Post	73.60±5.13	75 (0)	56.55±11.4	58 (17)	-4.929	0.000	0.779					Z*	<b>-3.729</b>		<b>-2.615</b>								TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.009</b>								ES	<b>.834</b>		<b>.585</b>								Formulating Questions	Pre	13.9±4.39	12.5 (6.25)	12.5±2.91	12.5 (5)	-0.578	0.563	0.091	-4.951	.000	.783	Post	23.65±2.66	25 (1.75)	13.1±3.04	14.5 (4.75)	-5.375	0.000	0.850		Z*	<b>-3.831</b>		<b>-1.436</b>								TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.151</b>																																																										
	Z*	<b>-3.729</b>		<b>-2.615</b>																																																																																																																																									
TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.009</b>																																																																																																																																									
	ES	<b>.834</b>		<b>.585</b>																																																																																																																																									
Formulating Questions	Pre	13.9±4.39	12.5 (6.25)	12.5±2.91	12.5 (5)	-0.578	0.563	0.091	-4.951	.000	.783																																																																																																																																		
	Post	23.65±2.66	25 (1.75)	13.1±3.04	14.5 (4.75)	-5.375	0.000	0.850					Z*	<b>-3.831</b>		<b>-1.436</b>								TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.151</b>																																																																																																																	
	Z*	<b>-3.831</b>		<b>-1.436</b>																																																																																																																																									
TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.151</b>																																																																																																																																									

	ES	<b>.857</b>										
				.321								
Critical Thinking Skills Total	Pre	120.75±28 .61	110.5 (28.75)	113.75±25 .13	116.5 (26.5)	- 0.054	0.95 7	0.00 9				
	Post	180.9±15.14	186 (11.5)	121.55±23 .42	123 (31.75)	- 5.136	0.00 0	0.81 2	- 5.146	.00 0	.81 4	
	Z*	<b>-3.922</b>		<b>-3.815</b>								
TS <sup>‡</sup> (Time)	p	<b>.000</b>		<b>.000</b>								
	ES	<b>.877</b>		<b>.853</b>								

**Table 2.**

Results for the Comparison of Pre-test and Post-test Scores Regarding Groups' Creative Thinking Skills (n=40)

	Groups				TS <sup>†</sup>			TS <sup>&amp;</sup>			
	Experimental Group (n=20)	Control Group (n=20)	Group	Media n (IQR)	Z	p	ES	Z	p	ES	
Imagination	Pre	1.65 ± 0.88	1 (1)	1.25 ± 0.44	1 (0.75)	-1.530	0.126	0.242			
	Post	3.40 ± 2.01	3 (2.75)	1.35 ± 0.59	1 (1)	-3.787	0.000	0.599	-3.552	.000	.562

	Z*	<b>-3.246</b>									
TS <sup>¥</sup> (Time)	p	<b>.001</b>									
	ES	<b>.726</b>									
Flexibility	Pre	1.55 ±0.83	1 (1)	1.15 ±0.37	1 (0)	-1.839	0.066	0.291			
	Pos t	3.40 ±1.90	3 (2.75)	1.30 ±0.57	1 (0.75)	-4.173	0.000	0.660	-4.074	.000	.644
	Z*	<b>-3.436</b>									
TS <sup>¥</sup> (Time)	p	<b>.001</b>									
	ES	<b>.768</b>									
Fluency	Pre	6.00 ±2.10	6 (4)	2.55 ±1.19	2 (1)	-4.883	0.000	0.772			
	Pos t	12.5 ±6.63	12 (11.5)	3.00 ±1.78	2.5 (2)	-5.210	0.000	0.824	-4.076	.000	.644
	Z*	<b>-3.633</b>									
TS <sup>¥</sup> (Time)	p	<b>.000</b>									
	ES	<b>.812</b>									

Originality	Pre	0.05 ± 0.22	0 (0)	0.1 ±0.45	0 (0)	- 0.03 6	0.97 1	0.00 6	- 5.73 8	.00 0	.90 7
	Pos t	3.45 ±1.76	3 (3)	0.00 ±0.00	0 (0)	- 5.79 5	0.00 0	0.91 6			
Z*		<b>-3.935</b>		-1.000							
TS <sup>‡</sup> (Time)		p		.000		.317					
ES		<b>.880</b>		.224							
Continuity and Cohesion	Pre	2.10 ± 0.64	2 (0.75)	1.85 ± 0.49	2 (0)	- 1.35 7	0.17 5	0.21 5	- 3.39 3	.00 1	.53 6
	Pos t	2.70 ± 0.47	3 (1)	1.85 ± 0.59	2 (0)	- 4.25 4	0.00 0	0.67 3			
Z*		<b>-3.464</b>		0.001							
TS <sup>‡</sup> (Time)		p		<b>.001</b>		.999					
ES		<b>.775</b>		.000							
Completi on	Pre	2.10 ± 0.72	2 (1)	1.80 ± 0.62	2 (0)	- 1.31 6	0.18 8	0.20 8	- 2.21 8	.02 7	.35 1
	Pos t	2.70 ± 0.47	3 (1)	2.00 ± 0.56	2 (0)	- 3.85 1	0.00 0	0.60 9			

	Z*	<b>-3.207</b>										
TS <sup>¥</sup> (Time)	p	<b>.001</b>										
	ES	<b>.717</b>										
Adding New Elements	Pre	0.40 ± 0.88	0 (0)	0.60 ± 0.82	0 (1)	- 1.13 9	0.25 5	0.18 0				
	Pos t	2.05 ± 0.89	2 (2)	0.95 ± 0.94	1 (2)	- 3.18 2	0.00 1	0.50 3	- 3.95 7	.00 0	.62 6	
	Z*	<b>-3.780</b>										
TS <sup>¥</sup> (Time)	p	<b>.000</b>										
	ES	<b>.845</b>										
Theme	Pre	2.55 ± 0.76	3 (1)	2.40 ± 0.50	2 (1)	- 1.28 6	0.19 9	0.20 3				
	Pos t	3.00 ± 0.00	3 (0)	2.45 ± 0.69	3 (1)	- 3.34 6	0.00 1	0.52 9	- 1.67 2	.09 4	.26 4	
	Z*	<b>-2.251</b>										
TS <sup>¥</sup> (Time)	p	<b>.024</b>										
	ES	<b>.503</b>										

Unusualness	Pre	1.65 ± 0.49	2 (1)	1.10 ± 0.31	1 (0)	- 3.54 7	0.00 0	0.56 1	- 3.01 7	.00 3	.47 7
	Post	2.25 ± 0.44	2 (0.75)	1.20 ± 0.41	1 (0)	- 5.05 5	0.00 0	0.79 9			
Z*		<b>-3.207</b>		-1.414							
TS <sup>‡</sup> (Time)		p		<b>.001</b>		.157					
ES		<b>.717</b>		.316							
Creative Thinking Skills Total	Pre	18.05± 4.27	17.5 (7.75)	12.80 ± 2.55	13 (3.75)	- 4.00 8	0.00 0	0.63 4	- 5.22 1	.00 0	.82 5
	Post	35.45± 11.83	33 (20.5)	14.10 ± 3.29	13.5 (4)	- 5.32 3	0.00 0	0.84 2			
Z*		<b>-3.922</b>		<b>-2.118</b>							
TS <sup>‡</sup> (Time)		p		<b>.000</b>		<b>.034</b>					
ES		<b>.877</b>		<b>.474</b>							