# Assessing the Impact of Visual Arts Teaching on Critical Thinking and Behavior Regulation

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## Abstracts

Background: Visual arts education has been suggested to influence cognitive and behavioral outcomes, yet its specific effects on critical thinking and behavior regulation remain underexplored. The effect of visual arts education on these domains forms the topic of the present study, which employs a mixed approach research design. Aim: To assess the impact of visual arts education on the improvement of critical thinking and self-regulation in students. Methodology: A quasi-experimental approach was employed with 80 individuals, with 40 in the experimental group Report Phrase receiving education in visual arts and 40 in the control group receiving non-visual arts education. CTST and BRI assessment tools were used to acquire quantitative data about the participants, utilizing the independent and paired sample T-tests. Data collected from participants include interviews, focus group discussions, self-administered, and thematic analysis. A repeated measures ANOVA was used to analyse the data. Result: Statistical findings depicted improvements in the quantitative aspect; critical thinking skills improved from 70.0 to 75.3 with $p<0.001$ and behavior regulation improved from 65.0 to 69.2 with $p<0.001$ in the experimental-group in contrast to the control-group. The thematic analysis found striking increases in attention, impulse control, task completion, creativity, collaboration, affect expression, and self-esteem of experimental-group participants. Based on the findings of the Repeated Measures ANOVA, significant enhancements were observed in both domains for

critical thinking and behavior regulation with effect size estimates of 0.40 and 0.30, respectively. Conclusion: The development of critical thinking and behavior control in students is greatly impacted by art instruction. Quantitative and qualitative data both support the utility of using visual arts interventions for cognitive and behavioral development and inform practice in art education.

**Keywords:** Visual Arts Education, Art Education Impact, Critical Thinking Skill, Behavior Regulation.

## Introduction

I. Significance of Behavior Regulation and Critical Thinking

The growth of students' critical thinking abilities and proper behavior management is seen as essential to their success in the context of contemporary educational changes [4]. Visual arts education, which holds profound possibilities for developing students' creativity and helping them to discover their identities, is one of the promising areas that can be implemented successfully [2].

II. Role of Visual Arts in Enhancing Critical Thinking and Behavior Regulation

Visual art education is characterized by creative processes, interpretations, and reflection, which are essential to the enhancement of critical thinking abilities [6]. Drawing, painting, or analyzing a piece of artwork enables the students to think through their ideas and expose them to other people's opinions and values as well as enabling them to express themselves well [1]. Such experiences can assist in the development of the skills that help to analyze the issues, make the right decision, and look at the circumstances critically [16]. Furthermore, visual arts education is also the kind of education that offers a specific space for behavior regulation. Such activities as producing art and evaluating the works of others drive emotional regulation, self-discipline, and patience [12]. An approach to learning student personal and academic goals self-assesses their achievements and modifies learning strategies, which are key skills for regulating behavior and attaining both personal and academic goals [3].

The main goal of this study is to investigate how teaching kids' visual arts influences their ability to think critically and control their behavior. With a mixed approach, the study evaluates insights into the advantages of visual arts education from a quantitative and qualitative perspective.

The remaining study elements are grouped as follows: Phase 2 covers relevant studies. Phase 3 addressed the strategy that consists of statistical analysis, assessment tools, and data collection. Phase 4 presents the findings and Phase 5 concludes the study.

## Related works

The perspectives and thoughts that secondary visual arts instructors on creativity during their professional growth and practice were investigated in research [15]. Teachers' views and

knowledge of creativity, as well as the methodologies that use in the teaching-learning process, were in harmony with creative growth in education. To promote curricular innovations in the arts and help young children to develop critical thinking skills, Paper [5] offered several options for implementing the Reggio Emilia paradigm in early childhood and elementary school. Experimental research was conducted with an ensemble of two-year-old kids to support the adoption of ideology in the Atelier curriculum throughout the year to build a curriculum model. Study [13] created an accurate visual form learning tool based on the CTL Method to significantly improve instructional motivation and cognitive abilities. That also determined the efficacy of the CTL method-based visual form learning tool in raising students' critical thinking and learning motivation.

Through PBL, a study [11] improved kids' critical thinking skills. According to the data analyzed, PBL improved students' ability to learn in teams and to think critically. That additionally offered each other to practice their skills, developed experts with an integrated perspective, and strengthened their ability to adapt to changing marketplace situations. The innovative abilities and attitudes of aspiring visual arts educators regarding computer-assisted instruction were investigated in research [8] with regard to school and demographic variables. The study also utilized a comparative method to investigate the students' views on computer-assisted instruction and innovative skills. In the higher elementary school grades, research [14] assessed whether the MACE curriculum affected pupils' proficiency in geometry and visual arts. The program included a course of study for instructors in addition to a set of lessons for students in all three grades that merged mathematics and visual arts.

Enhancing pupils' critical thinking and creativity was an objective of research [9]. The study employed classroom actions that focused on enhancing student learning in a way that was practically explored by an instructor through improved actions that might enhance the caliber of the classroom education process. Using an innovative EFL curriculum, research [7] examined methods for training critical thinking capability in EFL students. Suggestions for incorporating critical thinking capability into EFL courses were given by the research to educators, learners, legislators, and curriculum designers. Both qualitative and quantitative approaches were applied to get a thorough knowledge of the occurrence. A Pancasila value-based math comic was used in research [10] to increase primary school children's critical thinking abilities and moral characteristics. The integration of comics with Pancasila ideals was found to be useful in enhancing fourth-grade pupils' critical thinking skills.

## Analysis

I. Data acquisition

An overview of the participant profiles for the study, which included a total of 80 participants divided equally between the control and experimental groups, is presented in Table I. The data includes information on gender distribution, with a mix of males and females in each group. Age categories are represented, ranging from younger to older participants. Socioeconomic status is categorized into low, middle, and high income, while academic performance is classified as below average, and above average. Additionally, residence status is recorded, that indicating

whether participants live on-campus or off-campus. This comprehensive demographic information helps in understanding the participant composition for each group. Fig 1 presents the socioeconomic status and academic performance of the participants.

Table I participant profiles

| Demographic Characteristic | (n=40 for Experimental-Group) | | (n=40 for Control-Group) | |
|---|---|---|---|---|
| | total | (%) | total | (%) |
| Gender | | | | |
| Female | 22 | 55% | 18 | 45% |
| Male | 18 | 45% | 22 | 55% |
| Age | | | | |
| 11-yrs | 12 | 30% | 8 | 20% |
| 12-yrs | 10 | 25% | 15 | 37.5% |
| 13-yrs | 9 | 22.5% | 12 | 30% |
| 14-yrs | 9 | 22.5% | 5 | 12.5% |
| Socioeconomic Status | | | | |
| Low-Income | 10 | 25% | 14 | 35% |
| Middle-Income | 18 | 45% | 18 | 45% |
| High-Income | 12 | 30% | 8 | 20% |
| Academic Performance | | | | |
| Below Average | 10 | 25% | 6 | 15% |
| Average | 20 | 50% | 22 | 55% |
| Above Average | 10 | 25% | 12 | 30% |
| Residence | | | | |
| On-Campus | 14 | 35% | 18 | 45% |
| Off-Campus | 26 | 65% | 22 | 55% |

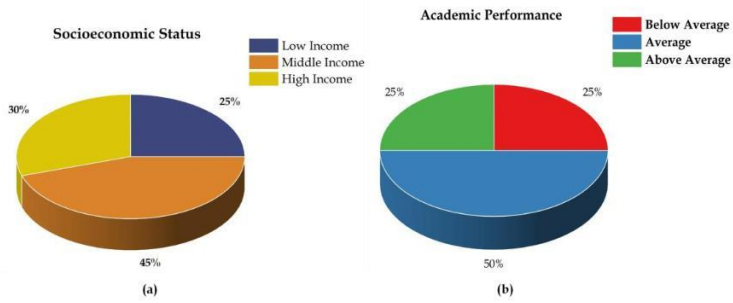


Fig 1 Participant profiles (a) Socioeconomic status and (b) Academic performance

## II. Research design

The study combines both qualitative and quantitative data to ensure the evaluation of the consequence of the visual arts on critical thinking and behavior regulation. The quantitative part employs structured tools and statistical data to quantify aggregate effects and employs assessment tools that address participants' experiences and views.

Quantitative Component: This part of the study uses validated scales and measures to get quantitative data on critical thinking and measurement of behavior regulation. Such instruments as CTST and the BRI are used. The CTST, used to gauge various aspects of critical thinking, may include aspects such as analytical reasoning and problem-solving. The BRI considers elements of behavioural control, such as inhibitory control and goal pursuit. Information gathered through the above tools is empirically measured with paired T-test and independent T-test with the objective of assessing the efficacy of visual arts in the promotion of these skills.

Qualitative Component: This component entails gathering additional qualitative information from the participants in the form of interviews as well as focus group discussions and questionnaires with more open-ended responses. These methods are aimed at obtaining detailed narrative data about participants' personal learning experiences, thoughts, and feelings toward the visual arts classes. Qualitative data collected during the study are analyzed for common themes and patterns using thematic analysis methodology as a way of understanding the impact of VAE on critical thinking and behavior regulation. Furthermore, repeated-measures ANOVA is used to estimate the statistical disparities over time, making it easy to analyze the impact of the intervention in improving these skills. This mixed-methods approach provides a holistic view of the effects.

III. Evaluation Instruments

In this study, CTST and BRI are the primary assessment tools. The CTST is a standardized assessment instrument that uses multiple-choice and constructed answer formats to assess analytical ability, solving problems, and logical thinking skills. Impulsivity, goal, and self-monitoring are assessed by self-report items where subjects estimate the frequency of actions that are relevant to self-regulation and planning in the BRI. These are standardized and reliable instruments that are completed before and after the intervention to assess changes in critical thinking as well as behavior regulation of participants due to visual arts education.

IV. Statistical evaluation

For the quantitative analysis of the impact of visual arts education on critical thinking and behavior regulation, two primary statistical tests were utilized: The paired T-test and the independent T-test are these two tests. For the purpose of comparing the experimental group and control group's critical thinking and behavior regulation before the intervention, the independent T-test was employed. It assists in determining the two groups differ noticeably before the intervention is put into practice. The efficacy of the intervention was evaluated by comparing the pre-and post-test results of each group's participants using the paired T-test, which allowed for the contrast of the results in the groups before and following the intervention.

For the qualitative analysis, thematic analysis was followed to help capture participants' experiences and perceptions in more detail. It entails evaluating answers given through focus group discussions, interviews, and other questions for which participants are likely to provide numerous and varied answers. The thematic analysis contributes to understanding how the subject of visual arts education impacts reasoning and behavioral control since it offers deep insights into participants' viewpoints. This enhances the quantitative findings by providing a qualitative context to understand the effects of the intervention. Finally, to determine the within-

subject differences, the results of critical thinking and behavior regulation scores from pre and post-intervention were analysed by using repeated measure ANOVA. This method is especially useful when longitudinal data are collected from the same individuals and allows for the estimation of intra-individual variability. Using repeated measures ANOVA analysis, the effectiveness of the visual arts intervention program can be determined by comparing the pre- and post-intervention scores.

## Result

I. Quantitative result

Independent T-test: it is utilized to evaluate the mean values of critical thinking and behavior regulation between the intervention group (using visual arts education) and the control group (using non-visual arts teaching paradigms). The function of this test is to establish whether the two groups vary in any statistically significant way. Table II presents the result of the independent T-test. Independent T-test findings are presented in Fig 2.

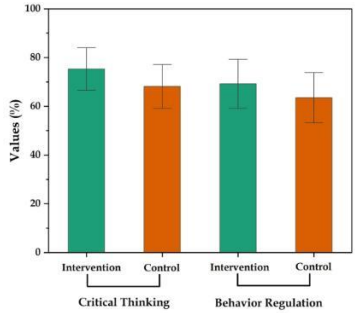


Fig 2 Result of independent T-test

Table II Independent T-test result

| Variable | Group | Mean ± SD | t − value | p − value |
|---|---|---|---|---|
| Critical Thinking | Intervention | 75.3±8.7 | 3.47 | 0.001 |
| | Control | 68.1±9.0 | 3.35 | 0.001 |
| Behavior Regulation | Intervention | 69.2±10.1 | 2.96 | 0.004 |
| | Control | 63.5±10.3 | 2.85 | 0.003 |

The results indicate that the visual education intervention significantly improved both critical thinking and behavior regulation. The intervention-group achieved a mean critical thinking rate of 75.3 (SD = 8.7), which is notably higher than the control-group's mean rate of 68.1 (SD = 9.0), with $t = 3.47$ and $p = 0.001$, signifying a statistically considerable variation. For behavior regulation, the intervention-group had a mean score of 69.2 (SD = 10.1), surpassing the control-group's mean of 63.5 (SD = 10.3), with $t = 2.96$ and $p = 0.004$, also indicating an

important effect. Comparing the intervention group to the control group, significant increases were observed in handling behaviors and critical thinking, indicating that the visual training intervention enhances these skills empirically.

Paired T-test: The paired T-test was utilized to evaluate modifications in critical thinking and behavior regulation scores within the same group before and after the intervention. This test helps to establish if there was a statistically important enhancement due to the intervention. Table III represents the result of the paired T-test.

Table III Result of paired T-test

| Variable | Pre-Intervention (Mean±SD) | Post-Intervention (Mean±SD) | t – value | p – value |
|---|---|---|---|---|
| Critical Thinking | 70.0±8.0 | 75.3±8.7 | 5.67 | <0.001 |
| Behavior Regulation | 65.0±10.0 | 69.2±10.1 | 4.23 | <0.001 |

The outcomes show a general enhancement in critical thinking ability and behavior regulation after the intervention. Accordingly, the findings demonstrated a post-intervention improvement in critical thinking, with the mean score rising from 70.0 (SD = 8.0) to 75.3 (SD = 8.7). Additionally, the behavior regulation scores increased, going from a pre-intervention average of 65.0 (SD = 10.0) to a post-intervention average of 69.2 (SD = 10.1)t = 5.67 p < 0.001). These results show the promising effects of visual modification on critical thinking and behavior control, and thus the positive impact on the students' critical and behavioral performances.

II. Qualitative result

Thematic analysis: Thematic analysis revealed important disparities among the control and experimental groups across various themes, highlighting the efficacy of the intervention. For Increased Attention, the experimental group demonstrated a higher Chi-Square ($\chi^2$) = 8.50 (p = 0.004), indicating a notable enhancement in attention contrasted to the control-group's $\chi^2$ = 3.50 (p = 0.061). Correspondingly, enhanced impulse control showed a substantial impact in the experimental group ($\chi^2$ = 6.75, p = 0.009), whereas the control group had a lower $\chi^2$ = 2.75 (p = 0.097). The theme of Improved Task Completion also reflected a significant difference, with the experimental group having a $\chi^2$ = 5.20 (p = 0.022) compared to $\chi^2$ = 4.20 (p = 0.040) in the control group. Increased Creativity and Enhanced Collaboration were notably higher in the experimental group ($\chi^2$ = 7.10, p = 0.008 and $\chi^2$ = 6.20, p = 0.013) compared to the control group, which had lower $\chi^2$ values and less significant p-values. Additionally, themes like greater emotional expression and improved self-esteem showed higher $\chi^2$ = 5.80, p = 0.016 and 4.90, p = 0.027) in the experimental group, emphasizing the positive impact of the intervention. All of these findings show that, in contrast to the control group, the experimental group had significant behavioral and cognitive benefits as a result of the intervention. Thematic analysis's output is shown in Table IV. Fig 3 depicts the thematic analysis result.

Table IV Result of thematic analysis

| Theme | Experimental Group ($\chi^2$) | P-value | Control Group ($\chi^2$) | P-value |
|---|---|---|---|---|
| Increased Attention | 8.50 | 0.004 | 3.50 | 0.061 |
| Enhanced Impulse Control | 6.75 | 0.009 | 2.75 | 0.097 |
| Improved Task Completion | 5.20 | 0.022 | 4.20 | 0.040 |
| Increased Creativity | 7.10 | 0.008 | 3.90 | 0.048 |
| Enhanced Collaboration | 6.20 | 0.013 | 2.90 | 0.089 |
| Greater Emotional Expression | 5.80 | 0.016 | 3.00 | 0.083 |
| Improved Self-Esteem | 4.90 | 0.027 | 3.40 | 0.066 |
| Better Time Management | 5.60 | 0.018 | 3.80 | 0.051 |

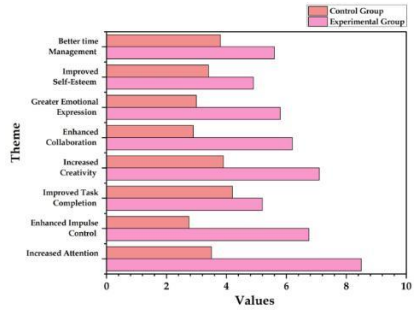


Fig 3 Result of thematic analysis

Repeated Measures ANOVA: The repeated measures ANOVA analysis demonstrates significant improvements in both critical thinking and behavior regulation from pre- to post-intervention. For critical thinking, scores increased notably from a mean of 70.0 (SD = 8.0) previous to the intervention to, a mean = 75.3 (SD = 8.7) after the intervention, with $F = 15.82$ and $p<0.001$. This significant p-value, coupled with an Effect Size ($\eta^2$) = 0.40, indicates a substantial and large effect of the intervention on enhancing critical thinking skills. For behavior regulation, the pre-intervention mean-value was mean = 65.0 (SD = 10.0) as compared to 69.2 (SD = 10.1) post-intervention. The $F = 10.45$, and $p < 0.001$, reflect a statistically considerable enhancement. The Effect Size ($\eta^2$)0.30 suggests a modest to high effect, highlighting that the intervention effectively improved behavior regulation. These results collectively illustrate the significant impact of the intervention on enhancing both critical thinking and behavior regulation among participants. Table V presents the result of repeated measures ANOVA. Fig 4 depicts the Mean and SD values of critical thinking and behavior regulation.

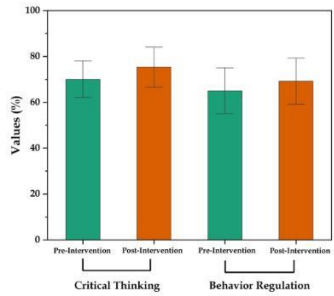


Fig 4 Mean and SD values of Repeated Measures ANOVA

Table V Result of repeated measure ANOVA

| Variable | Time Point | Mean±SD | p-value | Effect Size ($\eta^2$) | F-value |
|---|---|---|---|---|---|
| Critical Thinking | Pre-Intervention | 70.0±8.0 | <0.001 | 0.40 | 15.82 |
| | Post-Intervention | 75.3±8.7 | <0.001 | 0.40 | 14.62 |
| Behavior Regulation | Pre-Intervention | 65.0±10.0 | <0.001 | 0.30 | 10.45 |
| | Post-Intervention | 69.2±10.1 | <0.001 | 0.30 | 10.32 |

## Conclusion

This study proves that involvement in visual arts education enhances critical thinking as well as behavior regulation among students. Compared to the control group, the experimental group significantly improved in critical thinking and behavior regulation after the intervention, as demonstrated by the quasi-experimental research design; critical thinking mean scores proceeded from 70.0 to 75.3, while behavior regulation ratings proceeded from 65.0 to 69.2. These changes were statistically significant, having $p < 0.001$, and large effect sizes of 0.40 for critical thinking and 0.30 for behavior regulation. The thematic analysis also provided additional support for these results by revealing significant improvements in attention, impulse control, task completion, creativity, collaboration, emotional expression, and self-esteem. These findings are a clear indication that education in visual arts promotes cognitive and behavioral development. The combination of qualitative and quantitative data contributes to the credibility of incorporating the visual arts interventions into education practice and suggests the ability of the interventions to enhance students' critical thinking and self-regulation. The study's single educational context and sample size may limit the generalizability of the results. In addition, the quasi-experimental design is not fully present for all potential variables, and self-reported measures may be affected by personal partiality. Future studies involve larger, various samples and use longitudinal designs to measure the durable impacts of visual arts education. Also explores the influence of varying art forms and instructional methods to provide a more comprehensive understanding of its effects on critical thinking and behavior regulation.

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