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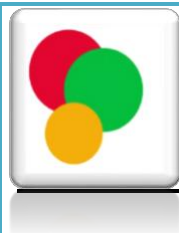
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Mobile Gamification for Early Literacy: An Analysis of Learning Outcomes and Engagement

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Article Information	ABSTRACT
   Corresponding Author: Jing Zhang 1809030129@stu.hrbust.edu.cn ORCID: https://orcid.org/0009-0009-8323-5457	This study aimed to evaluate the impact of gamified apps on phonemic awareness, vocabulary, and reading comprehension. The study aims to explore the relationship between engagement levels and literacy outcomes. A quasi-experimental design involving pretest and post-test assessments of 200 children aged 5 to 7 divided equally into experimental and control groups. The experimental group used gamified learning apps, while the control group engaged in traditional learning activities. Data were analyzed using paired t-tests, independent sample t-tests, ANCOVA, and multiple regression analyses. The findings revealed that the experimental group showed significant improvements in all literacy measures compared to the control group. Higher engagement with the gamified apps was positively associated with more significant literacy gains. The study concludes that gamified mobile learning apps enhance early childhood literacy by increasing engagement and motivation. These results have important implications for educators and policymakers, suggesting that integrating gamified elements into early childhood education can significantly improve literacy outcomes. Educational technology developers are encouraged to design engaging and motivational learning tools to maximize educational benefits. **Keywords:** Gamification, Early Childhood Literacy, Vocabulary Development, Reading Comprehension, Engagement

1. INTRODUCTION

The integration of gamification into mobile learning applications has become a radical revolution in initial literacy learning. The term "Gamification" refers to using game mechanics in areas unrelated to games, aiming to harness some of the motivational aspects promoted in game playing to learning environments (Zainuddin et al., 2024). This applies primarily to education at the initial stages of a child's learning when it is imperative, for instance, to sustain the child's attention and interest (Mandujano et al., 2023). Smartphones and tablet-based applications allow students to have a mobile form of learning whenever they articulate the courses preferred by more and more educational institutions (Huang & Zhou, 2021). Studies have shown that educational gamification solutions can enhance learners' motivation, engagement, and persistence (Koivisto & Hamari, 2019). Specific to gamification, apps in the domain of

early literacy involve points, badges, quest maps, and leaderboards as crucial components that form a good learning process (De-Marcos et al., 2014). The problems associated with early learners' classes, including short attention spans and inequality of interests, can be dealt with using gamification to enhance learning. Correspondingly, the use of mobile apps and their interactivity and integration of multimedia in games make it a versatile tool in early literacy learning that suits the different needs and requisites of the learners (Kapp, 2012). For instance, interactive storytelling programs and phonics games facilitate the learning of phonemic awareness and vocabulary (AlAwadhi and Al-Daihani, 2019). Given this flexibility, the following are key advantages: One can effectively meet the needs of the learners, especially those with special needs. It is possible to introduce various activities within the framework of the gamified apps, allowing working with the children's different learning rates and thus avoiding leaving some of them behind in terms of literacy development (Oliveira et al., 2023; Xu & Hamari, 2023). Among the primary benefits of using gamified learning is that it is the surest way of bringing about a sense of achievement and progress among the learners. If those children get the points or badges for the tasks they perform or the new skills attained, they stand to gain something tangible, which will be instrumental in bolstering their self-esteem and increasing their desire to learn (Nicholson, 2015).

In addition, introducing technologies in early childhood education has merits and demerits. Mobile learning apps may offer learners efficient and practical learning tools; however, there are issues related to learners' limited time in front of the screens at different ages, including early childhood (Oliveira et al., 2023; Cheong and Cheong, 2014). It is through screen time that various adverse effects, such as decreased physical activity, poor sleep quality, and behavioral problems, are associated (Hamari et al., 2014). Thus, parents and teachers must control and restrain the usage of such applications by focusing on encompassing these apps in learning processes (Rosli & Omar Zaki, 2023; Hanus & Fox, 2015).

The primary objective of this study is to evaluate the effectiveness of gamified mobile applications in enhancing early literacy skills, specifically focusing on phonemic awareness, vocabulary acquisition, and reading comprehension among children aged 5 to 7. By employing a quasi-experimental design, the research seeks to compare the learning outcomes of children using gamified apps with those engaged in traditional literacy activities, providing empirical evidence on the efficacy of gamification in early education. Additionally, the study aims to explore the relationship between engagement levels and literacy gains, addressing a critical gap in the understanding of how interactive and motivational elements of gamification contribute to improved educational outcomes. Moreover, investigating these objectives, the study seeks to contribute valuable insights into the pedagogical potential of gamified learning tools, offering practical implications for educators, policymakers, and technology developers in early childhood education.

2. LITERATURE REVIEW

Gamification, defined as applying game design elements in non-game contexts, has emerged as a transformative pedagogical strategy in education (Seaborn & Fels, 2015). Gamification leverages points, badges, leaderboards, and immediate feedback to foster engagement and sustain learner motivation (Hanus & Fox, 2015). In early childhood education, gamification also relates to a play-based paradigm in which the tasks and activities are learner-centered, fun, and purposeful, contributing to cognitive and socio-emotional development. Mobile applications are one of the tools that refer to digital gamified solutions as they can be easily accessed, involving and flexible (Hammedi et al., 2024). These apps are composed of smart learning functions and intelligent and adaptive feedback, which are personalized for the learner's

needs, making them particularly helpful for young and novice learners in developing foundational literacy functions (Hammedi et al., 2024).

2.1 Positive Impacts of Gamification on Students

Incorporating gamification into the classroom has shown many positive results for learners at different graded levels and fields of study. The first issue solved is that it increases engagement and motivation. The study of Jaskari and Syrjala (2023), which employed Self-Determination Theory (SDT), revealed that gamification fulfills the psychological need for autonomy, competence, and relatedness, enhancing engagement in learning activities. These are important in early childhood literacy because the motivational affordances keep children engaged and motivated to tackle complex elements of emergent literacy, such as word recognition and reading comprehension (Gee, 2003). The strengths of gamifying tools in increasing academic performance are reinforced in empirical studies. To illustrate, (Hamari et al., 2014) played a gamified learning environment that achieved more knowledge retention and task completion than in regular classrooms. Real-time feedback and rewards create a growth mindset, as students have features like that for real-time feedback and rewards to track their progress and know where they are lacking. It is excellent for young learners who can learn just by being rewarded immediately. Furthermore, gamifying tools allow learners to be included at different paces and learning styles (Hanus & Fox, 2015).

2.2 Negative Impacts of Gamification on Students

Although Gamification has numerous advantages, it faced criticism among researchers, and significant concern is that the reliance on extrinsic rewards may undermine intrinsic motivation, a phenomenon referred to as the "overjustification effect" (Zvereva et al., 2023). If learners begin to rely excessively on external rewards like points or badges, the long-term engagement of learners within the space can grow when they are present (Kashive & Mohite, 2023). In particular, the staying power one needs to acquire lifelong reading habits is closer to the bone in early literacy education, where permitting interest to lag once outside gamified contexts is pressing (Nacke & Deterding, 2017). In addition, there is a potential for cognitive overload if students are exposed to too many gamified applications with a complicated or defective interface. According to Cooper's (1990) Cognitive Load Theory, this overload could hinder learning by consuming cognitive resources that should be used during meaningful engagement with the material. Despite studies reporting that poorly implemented gamification can lead to distractions that impede the overall success of instructional activities (Mazarakis & Bräuer, 2023), gamification is still prevalent.

Gamification has also raised concerns about the possibility that competition between students may be heightened by gamification, making many students feel inferior or nervous if they cannot get high scores or accomplish game objectives. Negative emotions can reduce participation and erode self-esteem, erecting risks to the young learners' social-emotional development (Goldman, 2008). Additionally, gamification may be overdone, but measurable outcomes should be emphasized over more profound learning objectives. This reductionist approach has been criticized by critics, who argue that this will trivialize education and leave out how education and the holistic development of students are neglected (Zvereva et al., 2023).

2.3 Access to Gamification and Mobile Learning

Gamified mobile learning tools are widely uneven in access, and the barriers are socioeconomically- and culturally based (Nugroho, 2024). However, promising though gamification may

be for democratizing education, its success depends on access to digital resources, a crucial gap in very low-income and disenfranchised communities (Lopes et al., 2024). Gamified learning apps function better where parents have smartphones and tablets, allowing their children to utilize them throughout learning.

Where parents come from disadvantaged backgrounds, it might be difficult for the child to access these types of apps while learning, thus widening the digital divide (Hamari et al., 2014). Collectivist cultures may require adaptations to gamified designs emphasizing collaboration and shared achievements. Gamification design with cultural alignment achieves better results. Furthermore, gamified tools can be shaped by gender norms and stereotypes related to access and engagement. Based on research, boys are usually more attracted to competitive and action-oriented games, girls may prefer collaborative and story-related experiences, and there are diverse design strategies to make experiences inclusive (Liatukaitė, 2024). Additionally, learners in non-native language environments face hurdles due to language barriers (Lopes et al., 2024). Because many gamified apps are developed in English, they are unavailable to children in English-speaking regions unless a localized version is developed.

3. METHODOLOGY

3.1 Research Design

This study employed a quantitative research design to investigate the role of gamification in mobile learning apps on early childhood literacy development in China. A quasi-experimental design was utilized, incorporating both pretest and post-test measures to assess the impact of gamified learning applications. The independent variable in this study was the use of gamified mobile learning applications, while the dependent variables included various literacy outcomes such as phonemic awareness, vocabulary, and reading comprehension. The study involved two groups: an experimental group that used gamified learning apps and a control group that used traditional, non-gamified learning materials. This design facilitated a direct comparison between the two groups, thereby allowing for a robust evaluation of the effectiveness of gamification in enhancing early literacy skills. The experimental group interacted with mobile applications to engage children through game-like elements such as points, badges, and interactive narratives. In contrast, the control group continued conventional literacy activities, including story reading and phonics exercises, without including gamified elements.

3.2 Sampling and Sample Size

The study employed a stratified random sampling technique to ensure that the sample was representative of the diverse population of young learners in Nanjing, China. Schools from various socio-economic backgrounds across urban and rural areas were included to capture a broad spectrum of participants. This approach was crucial for obtaining a sample accurately reflecting the country's demographic diversity. The target sample size for the study was set at 200 children, with 100 allocated to the experimental group and 100 to the control group. This sample size was determined based on a power analysis conducted before the study, which indicated that 200 participants would provide sufficient statistical power to detect significant differences between the groups. The power analysis considered expected effect sizes, the standard deviation of outcomes, and the desired significance level to ensure the study was adequately powered to test the research hypotheses. To make both groups as homogenous as possible, the criteria used for stratification were age, gender, and socio-economic status. A more refined target population was children aged 5-7 years, boys and girls, from different socio-economic backgrounds.

This stratification was done in a way that separated the schools by different socio-economic statuses; they used household income, parents' education level, and the availability of educational resources. The schools were selected randomly in each bracket, and the children were randomly posted in either the experimental or control groups in each school.

3.3 Data Collection Procedure

Data collection in this study occurred in three phases: pretest, intervention, and post-test. Each phase was meticulously planned and executed to ensure the accuracy and reliability of the collected data, as well as the overall integrity of the study. In the pretest phase, baseline literacy skills of all participants were assessed using standardized literacy tests. These tests included the Phonemic Awareness Literacy Screening (PALS) and the Peabody Picture Vocabulary Test (PPVT) to evaluate phonemic awareness and vocabulary. The Early Grade Reading Assessment (EGRA) was also used to measure reading comprehension.

As for the intervention phase of the study, the experimental group used gamified mobile learning apps within a fixed amount of time, usually 30 minutes in real time. These were conducted parallel to the regular school program, meaning the child had a fixed and uninterrupted day to use the apps. The control group, however, had printed worksheets and storybooks for the same period instead of commonly used IT aids during learning. Cross-group equivalence was also ensured, and the teachers and parents of the learners were trained vigorously on how to implement and oversee the intervention. This training focused on using apps in the form of games, procedures for handling conventional physical materials, management of daily records, and other perceived behaviors. Logs were kept and documented in detail to document all the participants' daily activities during the intervention's implementation. In the case of the experimental group, usage data of the mobile apps were gathered using logs that contained information such as time spent on the apps, levels, and achievements.

In the post-test, the same standardized literacy tests were given at the pretest to determine any changes in literacy. This ensured that whichever differences were observed in performance could result from the intervention, not differences in the assessment instruments. Like in the pretests, post-tests were taken under similar circumstances, and the findings were documented in the slightest detail. Also, data collection in the form of self-administered questionnaires with questions created by the researcher was provided to the teachers and parents to establish their perception of the benefit accrued from the intervention. More importantly, the questionnaire was in Chinese, and after collecting the data, it was converted into English.

3.4 Reliability Analysis

The reliability of the engagement and motivation scales was assessed using Cronbach's alpha, a measure of internal consistency. Cronbach's alpha values above 0.70 were considered acceptable, indicating that the items within each scale consistently measured the same construct. The results from the pilot study indicated that the engagement and motivation scales had Cronbach's alpha values ranging from 0.78 to 0.85, demonstrating good reliability.

Table 1: Reliability Analysis of Engagement and Motivation Scales

Scale	Number of Items	Cronbach's Alpha
Engagement Scale	10	0.82
Motivation Scale	12	0.78
Overall	22	0.85

Table 1 indicates that Cronbach's alpha was performed in the reliability analysis of the engagement and motivation scale items to establish internal consistency. Regarding the validity part of the assessment, the engagement scale, which included ten items, had a Cronbach's alpha coefficient of 0. 82, which again portrays a high degree of internal consistency, and this means that all the items used in the study measure a common construct known as engagement. The motivation scale, which has 12 items, has a Cron Bach Alpha of 0.78, again showing good reliability and establishing that all the items consistently gauge the construct motivation. If combined, the overall reliability for the 22 items was 0 for the pilot and primary samples, which is 0.85, confirming high internal consistency across the engagement and motivation indicators.

Table 2: Feedback from Cognitive Interviews

Questionnaire Item	Feedback from Children	Revision Made
Enjoyment Item 1	"It's fun" vs "I have fun using the app"	Simplified wording to "I have fun using it."
Perceived Difficulty Item 3	"This part is hard to understand."	Added examples to clarify the question
Frequency of Use Item 2	"I don't know what 'frequency' means"	Reworded to "How often do you use the app?"

Table 2 shows the problems that could be encountered in the main study concerning the research instruments and procedures. The modifications based on the pilot study's findings made it possible to include the standardized tests and the developed questionnaires as feasible, valid and credible instruments for the target population. Thus, this preparatory phase helped considerably enhance the methodological reliability of the main study. The pilot study results supported how the standardized tests and the engagement and motivation questionnaires would map onto early literacy and the related concept in children of a young age. The reliability coefficients in the current study were relatively high, suggesting that the scales captured the intended constructs used in the main study.

3.5 Scales or Measurements

The study used standardized and custom-designed instruments to comprehensively measure literacy outcomes and other relevant variables. The selection of these instruments was guided by their established validity and reliability in assessing early childhood literacy skills and their appropriateness for the cultural and linguistic context of China. Phonemic awareness literacy screening (PALS) was utilized to assess phonemic awareness. PALS is a widely recognized tool that evaluates young children's understanding of the sound structure of language, which is a crucial component of early literacy development (Invernizzi et al., 2004). This assessment included tasks such as rhyme awareness, initial sound identification, and phoneme segmentation, providing a detailed picture of each child's phonemic awareness abilities. Vocabulary development was measured using the Peabody Picture Vocabulary Test

(PPVT), which assesses receptive vocabulary knowledge by requiring children to select pictures representing spoken.

The PPVT was chosen for its ease of administration and ability to provide a standardized measure of vocabulary that is comparable across different populations. Reading comprehension was evaluated using the Early Grade Reading Assessment (EGRA). EGRA is designed to measure a range of foundational reading skills, including letter recognition, familiar word reading, and reading comprehension through simple passages followed by comprehension questions. This instrument is suitable for early readers and has been adapted in various international contexts, ensuring its relevance to the study population. In addition to these standardized tests, custom-designed questionnaires were developed to assess engagement and motivation. These questionnaires included enjoyment, perceived difficulty, and Frequency of use of the gamified mobile learning apps. The engagement scale was based on established user engagement and flow theories, incorporating items that measured children's immersion, interest, and sustained attention while using the apps (Hamari et al., 2014).

Apart from those usual tests, questionnaires constructed and designed for the purpose were used to measure engagement and motivation. These questionnaires focused on enjoyment, perceived difficulty, and the Frequency of use of the mobile learning apps that incorporated gamification. The engagement scale was developed using previously proposed theories about user engagement and flow. It included items that assessed the level of children's immersion interest and time spent focused on the apps (Hamari et al., 2014).

The socio-economic status (SES) classification into low, middle, and high categories was based on a composite index constructed using household income, parental education level, and parental occupation, as these are widely recognized indicators of SES. Household income was categorized into tertiles based on the income distribution of the study population, with the lowest third classified as low SES, the middle third as middle SES, and the highest third as high SES. Parental education level was assessed by the highest level of education completed by either parent, with categories aligned to primary education or below (low), secondary education (middle), and tertiary education (high). Parental occupation was classified based on occupational prestige scores, distinguishing unskilled or manual labour (low), skilled or administrative work (middle), and professional or managerial roles (high).

3.6 Data Analysis Techniques

The analysis was done in several steps to determine the factors that impacted students' learning experiences in different higher-learning institutions. First, to obtain the mean, count, and percentage of the participant's demographic characteristics and initial literacy levels. This involved the computation of means, standard deviations, and frequencies on age, gender, socio-economic status and PALS, PPVT and EGRA score baselines. It is noted that several percentages and means are presented in the current tables, which allows the painting of a picture of the current sample and helps to compare the experimental and control groups right from the beginning.

The Analysis of Covariance (ANCOVA) procedure was used to partially out any possible covariates, including socioeconomic status, parental education, and home literacy environment. This way, ANCOVA enabled the researchers to make the most accurate estimation of the impact of the gamified learning intervention on literacy scores while excluding the effect of other variables. To conduct the engagement and motivation data analysis, questionnaire responses were analyzed through Exploratory Factor Analysis (EFA) to confirm the constructs of engagement and motivation derived from the developed

questionnaires. Cronbach's alpha was calculated to assess the internal consistency of the scales, ensuring the reliability of the measures used. In addition, this analysis offered a preliminary picture of whether increased levels of activation correlated with improved literacy learning – although the sample and design of this study were not well-suited to this question – and, therefore, potentially how and why gamification may boost learning. All the statistical analysis was attained using SPSS software; the significance criterion was $p < 0.05$.

3.7 Ethical Considerations

This study paid special attention to ethical issues because children under 7 years old were examined. Parental consent was sought for children and all participants; guardian consent was obtained if parents were not around. According to the research ethics, the work was coordinated under the recommendation of an institutional ethics review board. The aim was to protect the identity of participants with anonymity and confidentiality of all data being preserved while undertaking the analysis. Moreover, beneficence was observed in this research since the participants were not harmed. These stages involved subjecting the content to peers and other specialists like educational technology and child psychology authorities. Safeguards to the study were explained to the parents, including the possible risks involved, and they were given a choice to remove their children from the study at any one time at no charge. This was done to ensure that children's participation was voluntary and that the parents were comfortable with the safety and suitability of the study for their children.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 3 shows the demographic characteristics of the participants as mean. The experimental group determines standard deviations (N=100, mean =6.20 and S. D=0.82), followed by the control group total number of participants is N=100 (M=6.05 and S. D=0.79). About 51% of male and 49.0% of female participants are in the experimental group, and 53.0 vs 47.0% of males and females are in the control group, respectively. The socio-economic status of the participants indicates that about 34.0% are low-income, 44.0 % are middle, and 22.0% are high-income in the experiment group. The control group shows 32.0% low-income followed by 46.0% middle and 22.0% high-income students' respondents in this study.

Table 3: Demographic Characteristics of Participants

Characteristic	Experimental group (n=100)	Control Group (n=100)	Total sample (n=200)
Mean (S.D)	6.02 (0.82)	6.05 (0.79)	6.04 (0.80)
Gender			
Male (%)	51 (51%)	53 (53%)	104 (52%)
Female (%)	49 (49%)	47 (47%)	96 (48%)
Socio-economic Status			
Low (%)	34 (34%)	32 (32%)	66 (33%)
Middle (%)	44 (44%)	46 (46%)	90 (45%)
High (%)	22 (22%)	22 (22%)	44 (22%)

4.2 Baseline Literacy Scores

Table 4 shows the baseline literacy skills were assessed using three standardized tests: Phonemic Awareness Literacy Screening (PALS), Peabody Picture Vocabulary Test (PPVT), and Early Grade Reading Assessment (EGRA). The mean reported scores were closely appealed for PALS, PPVT, and EGRA, and the standard deviations presented a normal distribution with each group.

The minor baseline score disparity means that any variation in literacy performance after using the apps as intervention can, therefore, be attributed to the effects of the learning apps and not due to pre-intervention variation between the two sets of students. The baseline scores' means, standard deviations, and ranges are presented below.

Table 4: Baseline Literacy Scores

Test	Experimental group (n=100)	Control Group (n=100)	Total Sample (n=200)
PALS			
Mean (SD)	47.2 (6.8)	46.9 (7.1)	47.0 (6.9)
Range	30-60	29-60	29-60
PPVT			
Mean (SD)	98.5 (10.2)	99.1 (9.8)	98.8 (10.0)
Range	75-120	76-121	75-121
EGRA			
Mean (SD)	85.3 (11.5)	84.7 (11.9)	85.0 (11.7)
Range	60-100	58-102	58-102

4.3 Pretest and Post-test Comparisons

This section analyses the results of the paired sample t-tests to ascertain the difference between the experimental and control groups' pretest and post-test scores. They intended to evaluate the extent of the transition of phonemic awareness, vocabulary, and reading comprehension after the intervention times.

4.3.1 Changes in Literacy Outcomes Within the Experimental Group

To assess the effectiveness of the proposed integrated gamified mobile learning applications on the experimental group's literacy performance, paired sample t-tests were executed. The results indicated significant improvements in all three areas: phonemes, number of words, and reading skills. Table 5 presents the results of the paired sample t-test for the experimental group, highlighting significant improvements across all literacy measures. For the Phonemic Awareness Literacy Screening (PALS), the mean score increased from 47.2 (pretest) to 53.4 (post-test), with a mean difference of 6.2 (SD = 5.2, t = 9.52, $p < 0.001$). Similarly, vocabulary development, as measured by the Peabody Picture Vocabulary Test (PPVT), showed a mean increase from 98.5 to 104.3, yielding a mean difference of 5.8 (SD = 6.1, t = 7.55, $p < 0.001$). Reading comprehension, assessed using the Early Grade Reading Assessment (EGRA), demonstrated the most considerable mean difference of 6.8, with pretest and post-test means of 85.3 and 92.1, respectively (SD = 7.3, t = 8.79, $p < 0.001$). These results indicate statistically significant improvements in all literacy skills assessed following the intervention with gamified learning apps.

Table 5: Paired Sample T-test Results for Experimental Group

Test	Mean Pretest	Mean Post-test	Mean Difference	Standard Deviation	t-value	p-value
PALS	47.2	53.4	6.2	5.2	9.52	<0.001
PPVT	98.5	104.3	5.8	6.1	7.55	<0.001
EGRA	85.3	92.1	6.8	7.3	8.79	<0.001

4.3.2 Changes in Literacy Outcomes Within the Control Group

In the control group, paired sample t-tests were also carried out to establish if there were changes in literacy regarding traditional approaches. The results' analysis revealed slight enhancements in all three domains; however, the growth rates painted a less optimistic picture, indicating that the increase was less significant than the one observed in the experimental group. Table 6 presents the paired sample t-test results for the control group, indicating modest but statistically significant improvements across all literacy measures. For the Phonemic Awareness Literacy Screening (PALS), the mean increased from 46.9 (pretest) to 48.3 (post-test), with a mean difference of 1.4 (SD = 3.5, t = 2.83, p = 0.006). The Peabody Picture Vocabulary Test (PPVT) showed a mean increase from 99.1 to 100.4, with a mean difference of 1.3 (SD = 4.2, t = 2.15, p = 0.034). Similarly, the Early Grade Reading Assessment (EGRA) demonstrated a mean improvement from 84.7 to 86.1, yielding a mean difference of 1.4 (SD = 4.8, t = 2.29, p = 0.024).

Table 6: Paired Sample T-test Results for Control Group

Test	Mean Pretest	Mean Post-test	Mean Difference	Standard Deviation	t-value	p-value
PALS	46.9	48.3	1.4	3.5	2.83	0.006
PPVT	99.1	100.4	1.3	4.2	2.15	0.034
EGRA	84.7	86.1	1.4	4.8	2.29	0.024

4.4 Group Comparisons

Table 7 analysis sought to isolate the changes in literacy, as measured by the intention and post-test, that were statistically significant in terms of the effect of the gamified apps. Also, the analysis of effect sizes was performed to determine the size of these differences. Table 7 displays the results of the independent sample t-test comparing post-test scores between the experimental and control groups. For the Phonemic Awareness Literacy Screening (PALS), the experimental group achieved a higher mean score (M = 53.4, SD = 5.2) compared to the control group (M = 48.3, SD = 3.5), with a significant difference (t = 7.67, p < 0.001, Cohen's d = 1.09), indicating a large effect size. Similarly, for the Peabody Picture Vocabulary Test (PPVT), the experimental group had a mean score of 104.3 (SD = 6.1) versus 100.4 (SD = 4.2) in the control group, with a significant difference (t = 6.09, p < 0.001, Cohen's d = 0.86), representing a large effect size. The Early Grade Reading Assessment (EGRA) showed a mean score of 92.1 (SD = 7.3) for the experimental group compared to 86.1 (SD = 4.8) for the control group, with a significant difference (t = 5.71, p < 0.001, Cohen's d = 0.80), also reflecting a large effect size.

Table 7: Independent Sample T-test Results for Post-test Scores

Test	Group	Mean	Standard Deviation	t-value	p-value	Effect Size (Cohen's d)
PALS	Experimental	53.4	5.2	7.67	<0.001	1.09
	Control	48.3	3.5			
PPVT	Experimental	104.3	6.1	6.09	<0.001	0.86
	Control	100.4	4.2			
EGRA	Experimental	92.1	7.3	5.71	<0.001	0.8
	Control	86.1	4.8			

4.5 Analysis of Covariance (ANCOVA)

As a more statistically stringent method to establish causality and assess the influence of the game-based mobile learning apps on literacy while ignoring potentially confounding variables, an Analysis of Covariance (ANCOVA) was performed. It is a statistical method founded on variance and regression analysis, aiming to assess the impact of covariates, which impact the dependent variable. In this study, potential confounding variables were socio-economic status, parental education, and home literacy environment, which could, in themselves, moderate the literacy outcomes of the program. By adding these variabilities as covariates, ANCOVA brings the post-test scores back to a common baseline and adjusts for the confounding variables, which might have contributed to the difference between the scores of the experimental and the control groups during the pretest.

4.5.1 Controlling for Confounding Variables

Table 8 summarizes the ANCOVA results for literacy outcomes, comparing the adjusted post-test means between the experimental and control groups while controlling for pretest scores. For the Phonemic Awareness Literacy Screening (PALS), the adjusted mean for the experimental group was 53.1, significantly higher than the control group's 48.6 ($F = 65.23$, $p < 0.001$, partial $\eta^2 = 0.251$), indicating a large effect size. Similarly, for the Peabody Picture Vocabulary Test (PPVT), the experimental group's adjusted mean of 104 exceeded the control group's 100.7 ($F = 43.67$, $p < 0.001$, partial $\eta^2 = 0.182$), also reflecting a significant effect. The Early Grade Reading Assessment (EGRA) showed an adjusted mean of 91.8 for the experimental group compared to 86.4 for the control group ($F = 36.54$, $p < 0.001$, partial $\eta^2 = 0.158$), indicating a moderately large effect size.

Table 8: ANCOVA Results for Literacy Outcomes

Test	Group	Adjusted Mean	F-value	p-value	Partial η^2
PALS	Experimental	53.1	65.23	<0.001	0.251
	Control	48.6			
PPVT	Experimental	104	43.67	<0.001	0.182
	Control	100.7			
EGRA	Experimental	91.8	36.54	<0.001	0.158
	Control	86.4			

4.6 Exploratory Factor Analysis (EFA) for Engagement and Motivation

Table 9 used in data analysis was Exploratory Factor Analysis (EFA), which was used to establish the validity of the constructs of engagement and motivation; reliability analysis through the use of Cronbach alpha and t-tests was used to compare engagement and motivation of the experimental group with that of the control group. The EFA showed that two factors require extraction: engagement and motivation. For Engagement (Factor 1), the items included enjoyment and perceived difficulty. The Frequency of use ranged from Factor Loading 0. 72 to 0. 78. Thus, Factor 2, named "Motivation", concerned items related to intrinsic and extrinsic motivation and had factor loadings ranging from 0. 74 to 0. 81. These results validate the author's assertion that the questionnaire items suitably measured the envisaged constructs.

Table 9: Factor Loadings for Engagement and Motivation Constructs

Item	Factor 1 (Engagement)	Factor 2 (Motivation)
Enjoyment of the app	0.78	
Perceived difficulty	0.72	
Frequency of use	0.75	
Intrinsic motivation (enjoyment)		0.81
Intrinsic motivation (interest)		0.77
Extrinsic motivation (usefulness)		0.74
Extrinsic motivation (goal setting)		0.76

4.6.1 Comparative Analysis

To establish whether gamified apps impacted engagement and motivation scores, the independent samples t-test was employed to compare the experimental group's results with those of the control group, which learnt from conventional learning materials. Table 10 shows that the results of engagement observed in the experimental group were relatively higher than that of the control group, with a mean of 4. 20 (SD = 0. 65) for the experimental and 3. 75 (SD = 0. 70) for the control group t = 5. 34(p<0. 001). In the same regard, the mean motivation score of the experimental group was higher, as acknowledged through the mean score (M = 4. 35, SD = 0. 60), than that of the control group (M = 3. 90, SD = 0. 65) with t = 4. 99 (p < 0. 001).

Table 10: Independent Sample T-test Results for Engagement and Motivation Scores

Scale	Group	Mean	Standard Deviation	t-value	p-value
Engagement Scale	Experimental	4.2	0.65	5.34	<0.001
	Control	3.75	0.7		
Motivation Scale	Experimental	4.35	0.6	4.98	<0.001

4.7 Regression Analysis

To establish the impact of engagement levels on literacy, we undertook a series of multiple regression analyses. In these analyses, we sought to determine how the level of engagement with the given gamified mobile learning applications explained the variations in improvements in phonemic awareness, word recognition, and comprehension among the students.

4.7.1 Relationship Between Engagement and Literacy Outcomes

The regression analysis revealed that mobile learning apps incorporating games positively affected all three literacy domains. Table 11 shows phonemic awareness, the engagement coefficient was (B = 2. 35, SE = 0. 45, β = 0. 42) and was statically significant at (t (198) = 5. 22, p < 0. 001), which means that the higher engagement level is directly related to the higher improvements of Phonemic Awareness. The proposed model was capable of predicting 52% of the total variance of post-test PALS scores (R^2 = 0. 52, Adjusted R^2 = 0. 51). Table 12 shows vocabulary, the engagement coefficient (B = 1. 98, SE = 0. 50, β = 0. 38) was also significant, t (198) = 3. Students in the high treatment group had a higher vocabulary reception score than those in the low treatment group F = 96, p < 0. 001, indicating that a higher level of engagement would enhance vocabulary improvements.

The proposed model explained 46% of the post-test PPVT score (F = 29. 737; R^2 = 0. 46 adjusted R^2 = 0. 45). Table 13 shows Concerning the reading comprehension, data showed that engagement coefficient (B = 2. 45, p < 0. 001 denoting that the level of engagement has a positive correlation with the improvements of students' reading comprehension. The model accounted for 49 per cent of the change in the scores in the post-test EGRA, R^2 = 0. 49, Adjusted R^2 = 0. 48).

Table 11: Regression Analysis for Phonemic Awareness (PALS)

Variable	B	SE	B	t-value	p-value
Engagement	2.35	0.45	0.42	5.22	<0.001
Baseline PALS Score	0.78	0.1	0.6	7.8	<0.001
R^2 = 0.52					
Adjusted R^2 = 0.51					

Table 12: Regression Analysis for Vocabulary (PPVT)

Variable	B	SE	B	t-value	p-value
Engagement	1.98	0.5	0.38	3.96	<0.001
Baseline PPVT Score	0.84	0.12	0.65	7	<0.001
R^2 = 0.46					
Adjusted R^2 = 0.45					

Table 13: Regression Analysis for Reading Comprehension (EGRA)

Variable	B	SE	B	t-value	p-value
Engagement	2.45	0.55	0.4	4.45	<0.001
Baseline EGRA Score	0.7	0.14	0.55	5	<0.001
R^2 = 0.49					
Adjusted R^2 = 0.48					

4.8 Discussion

This study aimed to evaluate the effectiveness of gamified mobile learning apps in enhancing early childhood literacy development. The results offer thus strong support for the statement that the introduction

of the learning intervention based on gamification positively influenced phonemic awareness, with the effect size reflecting moderate to high improvements in vocabulary and reading comprehension among young first-graders. The experimental group using the game-based apps improved significantly on all the literacy indices compared to the control group, which carried out non-game-related activities. In addition, other significant and positive correlation findings included engagement levels and literacy, meaning that the more students' participation in the apps was enhanced, the better the literacy improvement. The improvements identified in the experimental group are noteworthy and result from the features of gamified applications, which incorporate active and motivational approaches to learning. The elements of points, badges, interactive narratives, and feedback might have helped keep and motivate the students' interest. This corresponds with the Self-Determination Theory (Deci & Ryan, 2013).

High engagement emerged as a significant predictor of literacy performance according to the regression analyses conducted in the study. A more substantial positive coefficient for the dependent variable, engagement across phonemic awareness, word, and reading comprehension, implies that students who played with the gamified apps more had a better improvement across the three. This is because students may need more motivation to participate in educational intercessions; therefore, experts must develop intercessions that will engage students and encourage results-oriented learning. It also accords with earlier findings stating that involvement is another crucial element in determining academic performance (Fredricks et al., 2004). This study also aligns with the previous work on gamification in education and its positive outcomes. Research in this area has revealed that learning enhanced through games positively impacts motivation, participation, and academic achievement (Denden et al., 2024). In extending the literature, this study hopes to contribute to knowledge in the field by presenting the positive effect of gamified mobile learning apps on early childhood literacy learning.

5. CONCLUSION AND RECOMMENDATIONS

This research aimed to assess the effects of mobile learning apps incorporating game design elements in young children's literacy learning in China. The studies prove that such game-based learning instruments improve core reading skills such as phonemic awareness, vocabulary, and reading comprehension. The experimental group that utilized the gamified apps significantly increased the mean scores of literacy skills compared to the control group, which went through the conventional activities. On this score, the presented outcomes confirm the efficiency of the gamified approach toward enhancing learning outcomes among students of a younger age. According to the study and results, engagement was also a significant predictor of literacy gains. It was also found that significantly higher levels of engagement in the gamified apps were highly correlated with the degree of improvement in literacy, proving that the use of related forms of interactive education, as in the case of gamification, can indeed capture the interest and sustain the learning interest of the children. This corroborates the concepts developed in motivational and engagement theories, thus promoting gamified aspects in educational interventions.

There are crucial practical implications of the facts; therefore, teachers are advised to adopt elements of games in learning activities to foster system interaction and thus raise the fun quotient of learning. Authorities should encourage the use of game-based learning applications, especially in less-provided districts, to advance learners' literacy comprehensively. Technology developers are encouraged to create stimulating educational applications appropriate to the student's cultural background and appropriate the age of students in schools. Nevertheless, there are significant limitations, such as the study duration and the cultural background. Further studies should look at the post-intervention utility of the

usage of gamification and, at the same time, control factors such as cultural differences and educational calendars to ensure the results obtained are consistent.

6. LIMITATIONS AND FUTURE STUDIES

Despite the significant findings demonstrating the effectiveness of gamified mobile learning apps in enhancing early childhood literacy development in China, several limitations must be acknowledged. Firstly, the duration of the study was relatively brief, spanning only three months. This limited study period might not capture the overall impact of the changes on the observed literacy levels and their sustainability. As a result of the brief nature of the studies considered, future research should aim to continue the investigations for a more extended period to estimate the long-term outcomes of the game-based learning approach to literacy acquisition. Second, it is evidenced that other factors could impact the research results besides the variables corrected by ANCOVA, including socio-economic status, parental education, and home literacy environment. Other limitations that may have influenced the findings include differences in the learners' learning styles, past technology literacy, and variances in teachers' application of the gamified apps. Subsequently, the same variables should be included in subsequent studies to improve the understanding of the factors that impact the efficiency of gamified learning.

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Enhancing Regional Elderly Care Through Vocational Nursing: A Strategic PEST-SWOT Analysis and Formation Logic

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Article Information	ABSTRACT
Article Type: Research Article **Corresponding Author:** Yong Zhou sxmu5203@foxmail.com **ORCID:** https://orcid.org/0009-0003-9247-8414	This study examines the development of higher vocational nursing professional groups (HVNPGS) in promoting regional elderly care through a PEST-SWOT analysis framework. The objective is to identify the internal and external factors influencing the sustainability and effectiveness of vocational nursing programs. Using a mixed-methods approach, the study combines qualitative data from interviews and focus groups with quantitative data from structured surveys conducted across various vocational nursing institutions. The PEST-SWOT analysis model was employed to evaluate the political, economic, social, and technological dimensions impacting the growth of HVNPGs. The findings reveal that political support, particularly government policies and financial subsidies, plays a critical role in the success of vocational nursing programs. Economic sustainability remains a challenge, especially in rural areas, while societal attitudes toward elderly care and nursing professions continue to affect program attractiveness. Technological integration offers opportunities for enhancing nursing education, though disparities in access present ongoing challenges. The study concludes that a comprehensive strategy addressing political, economic, societal, and technological factors is essential for the growth of HVNPGs. The implications suggest that policymakers and educators must prioritise funding, societal engagement, and technological infrastructure to ensure vocational nursing programs that can meet the increasing demands of elderly care. **Keywords:** Higher Vocational Colleges, Nursing Specialty Group, Regional Old-Age Care, PEST-SWOT Analysis

1. INTRODUCTION

The global healthcare system faces unprecedented pressure due to the rapidly ageing population (Navaneetham & Arunachalam, 2023). The proportion of the population aged 65 and older is projected to reach 16% by 2050, a significant increase from 9% in 2019 (Sleeman et al., 2019). This demographic shift is particularly concerning for countries with limited healthcare resources. Furthermore, the rising demand for long-term care for the elderly necessitates a substantial increase in qualified care specialists to meet the growing needs of this demographic (Martinez & Wolverton, 2009). Additionally, as the population ages, the prevalence of chronic diseases is increasing. This strains healthcare systems, as older adults require more frequent and complex care. In addition, the ageing population is more likely to experience functional decline, which can lead to a need for increased support with activities of daily living. Consequently, the

countries have focused on the importance of vocational education in the health sector to solve the respective challenges.

Higher vocational nursing professional groups (HVNPG) have become a key to solving the regional elderly care needs. Such groups of professionally trained nurses are in the best place to deliver quality specialised care to the elderly and, at the same time, help maintain the sustainability of the existing health facilities (Pavlopoulou, 2021). The HVNPG development and implementation process that would successfully address the needs of regions and countries is both elaborate and multifaceted. Due to this, its analysis should consider internal and external factors (Sargeant & Shang, 2024).

Vocational nursing programs allow students to acquire competency and learn how to integrate effective strategies into their practice after the training (Hashim, 2014). Many of these programs are developed to cater for regional requirements so that the graduates are adequately prepared for the requirements of regional health systems. However, the emergence and enduring nature of HVNPGs are determined by several key success factors such as handy, viable, natural, political support, economic sustenance, social acceptance, and technological innovation. They all impact the effectiveness of VE (vocational education) as a method of forming qualified personnel and the inclusion of such professional groups into the overall healthcare system (Zheng, 2015). Therefore, there is a need for broad frameworks like PEST-SWOT that can evaluate these factors into the proper perspective for formulating strategies in establishing HVNPGs that would encourage regional elderly care.

The primary objectives of this research are to examine the strengths and weaknesses followed by opportunities and threats for HVNPG development in the context of elderly care and to formulate strategic solutions that enhance the integration and sustainability of HVNPGs based on the regional healthcare system. In particular, this study examines the function of vocational nursing education in helping to meet regional elderly care needs. It intends to serve the needs of an ageing population through these programs, along with suggestions for optimisation (Matulodi, 2023; Boltz et al., 2024). This research seeks to contribute to more effective strategies for promoting sustainable elderly care models by identifying the key factors that lead to the success of HVNPGs.

This study is significant for policy and practice in vocational nursing education and elderly care. As the global population ages at an unprecedented rate, the need for specialised healthcare services is skyrocketing (Younis & Salih, 2024). Healthcare resources are often strained by complex, long-term care needed by elderly individuals. This condition urges healthcare systems to enhance their capacity and integrate innovative methods to meet these requirements. In order to enhance their capacity, one solution is to increase the number of healthcare workers who are well-suited to providing geriatric care. They can meet the unique needs of elderly patients, and this ensemble is called vocational nursing education (Currie et al., 2023). This research combines political, economic, social, and technological factors. It analyses strengths, weaknesses, opportunities, and threats to provide a distinct perspective on the relationship between vocational nursing education and the sustainability of elderly care.

2. LITERATURE REVIEW

Global society is undergoing a profound demographic shift, characterised by a significant increase in the average age. According to Rusli et al. (2023), the proportion of the population aged 65 and older is projected to reach 16% by 2050, a substantial increase from the 9% observed in 2019 (Navaneetham &

Arunachalam, 2023). The shifting demographics challenge healthcare systems since older people have more extensive and long-term medical needs (Kamau et al., 2023).

Higher vocational nursing programs (HVNPs) have taken an important place in this process, as it has been acknowledged that these programs can contribute to filling the gap in the regional disparities in the provision of health services par, particularly in Geriatric care (Chang et al., 2024). Vocational nursing education has now become one of the options for addressing the demand for elderly care services. These programs offer structured practical experience, where the graduates step into the healthcare environments directly, especially in geriatric care. The singular strength of vocational education is that it has local needs as the main prerequisite, so there would be no problems in offering care to ageing populations or whatever issues the specific region may have (Peng et al., 2023). In catering to elderly care, vocational nursing education has received wide acceptance in many countries, including China, Japan, and South Korea, as a strategy (Bae, 2023). Therefore, observing PEST analysis is crucial to appreciate the formation and the HVNPs' development in old age consideration. The vocational nurses' training, coupled with adequate support from the government signature to elderly care initiatives, has offered substantial efficiencies in all healthcare structures across these countries in contemporary periods (Ooijen et al., 2023).

According to Peng et al. (2023), a significant advantage of HVNPs is that they deliver clinical and practical training that may be easily transferred to the healthcare environment. The graduates of these programs are generally in a better position to address the direct requirements of elderly patients' care, especially in parts of the world where the existing healthcare systems have been stretched (Ijilmurun, 2023). Furthermore, the increasing use of elderly care in the vocational nursing curriculum means that students finish their courses equipped with adequate knowledge in handling the different challenges relating to the health of the elderly (Wang et al., 2024). Nevertheless, vocational nursing programs also have many liabilities, such as limited equipment and scarcity of medical personnel. In many regions, there is an inadequate supply of vocational nursing services and increased turnover and burned-out workers in the health sector (Guarnera et al., 2024). Additionally, the vocational nursing education system is highly diverse depending on available resources, such as updated training sessions and professional trainers (Cui et al., 2023).

The ageing population's increasing demand for home care services creates multiple opportunities for expanding and developing HVNPs. Since the world's population is getting older, the demand for qualified geriatric care is steadily increasing, positively affecting the demand for vocational nursing programs (Okur et al., 2023). Besides, advancements in technology in the health sector create chances to improve vocational nursing education by using digital health and telehealth. However, HVNPs have several threats, namely political and economic risks. Some HVNPs may find it challenging to run their programs due to unstable health financing and inadequate government funding for vocational education (Alshammari & Alenezi, 2023). Moreover, cultural perceptions of elderly care and the nursing profession may significantly threaten these programs because, in many cultures, both fields are considered less valuable (Muhalla et al., 2024).

In the context of increasing interest in enhancing elderly care and developing HVNPGs, distinctive gaps in the literature continue to exist regarding how HVNPGs may be effectively positioned and developed to meet region-specific elderly care demands. There is limited literature on the specific aspects of VN education, the translation of policies and best practices for nursing education in general, and the state of healthcare systems in general. However, the growing global demand for elderly care is significantly noted

by some scientific works (Møller & Wegener, 2024). Furthermore, as highlighted by Serafin et al. (2022), vocational nursing is accepted as a solution-oriented profession in many countries.

The pattern of formation of vocational nursing groups and the role of political, economic, social, and technical factors in vocational nursing and their interrelationship are inconclusive (Zalimiene et al., 2024). This implies that more studies must be conducted to determine the specific external and internal factors that affect the increased integration of HVNPGs into regional health systems.

Additionally, while the PEST-SWOT framework has been utilised in various fields to analyse external and internal factors, its application to vocational nursing education in elderly care remains limited. Existing studies focus on broader healthcare education strategies without a nuanced understanding of the challenges and opportunities vocational nursing programs face in addressing elderly care at the regional level (Drange & Ingelsrud, 2023). The impact of emerging healthcare technologies, such as telemedicine and digital health tools, on vocational nursing education has not been sufficiently studied. It leaves a gap in understanding how these technologies can be effectively integrated into nursing curricula to improve care for elderly patients (Vikström-Dahl et al., 2024). Furthermore, there is a lack of comprehensive strategic frameworks that address how vocational nursing programs can adapt and shape regional healthcare policies and social attitudes towards elderly care. Addressing these gaps is crucial for developing more targeted, sustainable, and region-specific vocational nursing programs to meet the growing demand for high-quality elderly care.

3. METHODOLOGY

3.1. Research Design

This study employs a mixed-methods research design, integrating both qualitative and quantitative approaches to comprehensively analyse the internal and external factors that affect the development of Higher Vocational Nursing Professional Groups (HVNPGs) in promoting regional elderly care. The mixed-methods design allows for a holistic understanding of the research problem by combining the strengths of both approaches, i.e., qualitative and quantitative. The qualitative data provides in-depth insights into the socio-political, economic, and cultural contexts influencing vocational nursing education, while quantitative data offers a structured analysis of measurable factors. The study's methodology is grounded in the PEST-SWOT framework, systematically analysing political, economic, social, and technological dimensions and strengths, weaknesses, opportunities, and threats associated with HVNPGs.

3.2. Data Collection

3.2.1 Qualitative Data Collection

Qualitative data was collected through Semi-structured interviews and focus group discussions conducted with participants such as vocational nursing educators, healthcare administrators, state and provincial-level government eldercare policymakers and representatives from nursing professional associations. The interviews were conducted with 25 participants from four states, from urban and rural areas, to obtain a view of the difficulties and possibilities of VN education in elderly care. Interviews were carried out with nursing professionals and vocational educators to reveal more about the internal and external factors established by PEST-SWOT. Moreover, due to the semi-structured nature of the discussion, the conversation was flexible. The important discussion areas, including political support for elderly care

initiatives, economic challenges and opportunities for vocational nursing programs, public perception of elderly care, and the use of technology in teaching nursing students, play a significant role. This was discussed comprehensively with all the participants.

3.2.2 Quantitative Data Collection

The quantitative component involved distributing structured questionnaires to vocational nursing institutions and regional healthcare facilities across various provinces. Three hundred responses were collected, with a response rate of approximately 80%. The questionnaire was designed to capture data on key variables identified in the PEST-SWOT framework, including political support (measured through policy implementation), economic sustainability (budgetary allocations and financial support), social acceptance (public perception of elderly care and nursing), and technological adoption (use of digital tools and telemedicine in nursing education and elderly care). The questionnaire utilised a 7-point Likert scale for most items, ranging from "strongly disagree" to "strongly agree," to gauge the respondents' perceptions of various external and internal factors impacting HVNPGs. Additionally, demographic variables such as the type of institution (public/private), geographic location (urban/rural), and years of operation were included to explore variations across different contexts.

3.3 Sampling and Participants

The qualitative and quantitative data collection participants were purposely selected with stakeholders in the nursing profession, vocational education and care of the elderly. To sample the qualitative part of the study, purposive sampling was employed to recruit 25 participants, 12 of whom were nursing educators, others in health care policy-making forums, and the rest of the participants were professionals in nursing in both urban and rural settings. The participants were selected based on their expertise in formulating and enacting vocational nursing programs and elderly care policies. To acquire quantitative data, the study adopted stratified random sampling to ensure an equal representation of the institutional and geographical structure of the sample population. Vocational nursing institutions and healthcare facilities were divided into two groups. They were categorised based on the institution's location (urban or rural) and whether they were a public or private institution. In this case, the adopted approach enabled the study to capture regional influences and assorted difficulties experienced by various kinds of institutions in implementing the vocational nursing program.

3.4 Data Analysis

The qualitative data was analysed using thematic analysis and transcription; the data was coded inductively to identify key themes that emerged from the interviews and focus group discussions. Themes were categorised based on the PEST-SWOT dimensions: political, economic, social, and technological factors, as well as strengths, weaknesses, opportunities, and threats focusing on HVNPGs. The thematic analysis helped identify recurring issues such as government policy gaps, funding challenges, societal undervaluation of elderly care, and greater technological integration in nursing education. These themes were then mapped onto the PEST-SWOT analysis framework to create a comprehensive picture of how internal strengths and weaknesses interact with external opportunities and threats in the development of HVNPGs.

The quantitative data was analysed by identifying prominent codes and patterns. Before the actual analysis of data, descriptive statistics were used to describe the respondents' demographic profile and get an overall idea about all the political, economic, social, and technological factors.

Subsequently, exploratory factor analysis (EFA) was employed to confirm the PEST-SWOT analysis's instrumentation and highlight the variables' ensuing relations. The correlation between internal environment strengths/weaknesses and external environment opportunities/threats was determined using Pearson correlation analysis. Regression analysis was then used to determine which factors influence the success of the development of HVNPGs, especially the political, economic, social, and technological factors related to the internal factors of vocational nursing programs.

4. RESULT & DISCUSSION

The PEST-SWOT analysis focuses on political, economic, social and technological factors within the context of vocational nursing programs that address the needs for elderly care services. The interviews and focus group discussions yielded several themes that involved government policy, funding, societal perception, and technology in vocational nursing education. Furthermore, the quantitative evidence affirms political support and technological integration as the research's significant predictors of the HVNPGs' effectiveness. The results from both databases are synthesised to provide insight into how these factors work for the development of vocational nursing programs and the ability of these programs to respond to the increasing needs for elderly care in the respective regions.

4.1 Qualitative Findings

Table 1 shows the common themes identified in the qualitative part of the investigation concerned with forming the HVNPGs in regional elderly care. These themes centered around four primary areas: political support, healthcare policies of vocational nursing programs and their economic viabilities, society's perceptions of elderly care and the nursing profession, and integrating technology in the delivery of nursing education. Political factors became potent, and the participants described government policy and financial incentives as crucial in developing HVNPGs. The social issue highlighted during the event included the unequal distribution of resources and funds, especially in rural areas. As for the social perception of elderly care (which was the topic of the last two questions), some regions still consider it a low-paid profession, while others view it as a necessary and important mission for their communities. The analysis also revealed that technological developments like telemedicine and digital health technologies were both opportunities and threats. Thus, vocational programs must prepare how to incorporate such technologies to enhance the overall quality of healthcare for the elderly.

Table 1. Summary of Themes

Themes	Key Insights
Political Support and Healthcare Policies	Government policies and financial incentives play a critical role in the growth of HVNPGs.
Economic Sustainability	Uneven resource distribution and funding, especially in rural areas, affects the sustainability of vocational nursing programs.

Societal Attitudes Toward Elderly Care and Nursing	There are varied social perceptions of the nursing profession, with some regions undervaluing elderly care while others see it as vital to community well-being.
Role of Technology in Nursing Education	Telemedicine and digital tools offer opportunities and challenges; vocational nursing programs must integrate these advancements into curricula.

4.1.1 Political Support and Healthcare Policies

Political support and health care policies are often key to forming and maintaining the HVNPGs, which is particularly crucial to the country's elderly care sector. Some research focuses on the government's role in influencing the development of vocational education to fit health requirements. Funding not only utilises grants for establishing vocational nursing schools but also unleashes resourceful staff, i.e., qualified nursing personnel who are well-equipped and trained in vocational nursing. Unfortunately, policies associated with vocational nursing differ a lot from one area to the other, and therefore, the quality and accessibility of vocational nursing education varies across different regions. Therefore, the absence of politics will undoubtedly affect the healthcare sector and the integration of vocational nursing as a significant component of its system.

Moreover, China's policies regarding public-private partnerships will help promote elderly care services, and this joint venture can bring about integral collaboration between vocational training and healthcare sectors. Significant legislative and financial support is necessary to meet the increasing consumer needs for professional elderly care services. However, the success of such policies depends on the compliance of numerous countries and regions with their respective policies and the political will of their governments.

4.1.2 Economic Sustainability

Table 2 illustrates the economic factors for identifying an HVNPG's prospects in establishing, expanding and providing elderly care. The funds provided to vocational nursing programs often determine the program's ability to produce skilled personnel to handle the profession and the programs' ability to deliver quality services. On the other hand, administrative areas with higher economic support enjoy greater capacity within the facilities, such as experienced staff and more program coverage that increases the quality of elderly care (Zhang et al., 2023). Nevertheless, the economic conditions in most areas (mainly rural) tend to worsen the situation by aggravating the inequality in resource distribution.

Fuchs et al. (2023) also establish that low-income areas have poor sustainable funding sources. This makes vocational nursing programs easily affected by budget cuts, leading to their poor ability to deliver consistent care services. The economically distressed students and other members of society also lack the required exposure to essential healthcare training materials, advanced technologies and adequately remunerated salaries of healthcare personnel. This presents a massive challenge to nursing programs in attracting competency-based healthcare forces. Hence, it requires enhancing the economic base of vocational nursing education so that the HVNPGs can exist and sustain the needs of elderly care.

Table 2. Summary of Economic Sustainability

Finding	Description
Economic Support for Vocational Nursing Programs	Public funds and subsidies are essential for sustainable vocational nursing programs, especially in underfunded regions.
Impact of Funding on Quality of Care	Regions with more substantial economic backing have better facilities and staff, providing higher-quality care for elderly populations.
Regional Disparities in Resource Allocation	Rural and low-income areas often experience inequities in resource allocation, which limits the reach and quality of vocational nursing programs.
Effect of Public-Private Partnerships	Public-private partnerships can bolster elderly care services by improving financial sustainability and collaboration with healthcare providers.
Challenges in Attracting Skilled Professionals	Inconsistent funding, particularly in rural areas, makes attracting and retaining skilled professionals difficult due to a lack of competitive salaries and resources.
Vulnerability to Budget Cuts in Low-Income Areas	Low-income regions are more vulnerable to budget cuts, which hinder the consistency and quality of vocational nursing programs.

4.1.3 Societal Attitudes Towards Elderly Care and Nursing

The overall social perception in deciding the form and functioning of HVNPGs comprises the perception of elderly care nursing and its impact and impression upon the profession, shown in Table 3. Thus, numerous areas are lacking, especially in nursing and elderly care, as this field is not valued enough to attract more people or receive more public support. It is also to be noted that in cultures where the support of older adults is believed to be the family's duty and not the professional workers, there is little call for the formal nursing programs that HVNPGs depend on for support. Gender biases also influence this societal undervaluation, given that nursing is associated with feminised labour; hence, a lower wage rate and less prestige are associated with it (Venables et al., 2023). On the other hand, in countries like Japan, where elderly care is the inherent culture of its society, and it embraces it with responsibility, nursing professionals get high respect and recognition, thus resulting in more people enrolling on vocational programs and healthier, enhanced professional development (Younis & Salih, 2024). Papaioannou et al. (2023) argue that such perceptions remain critical to transform in order to enhance the position of the nursing profession and to guarantee that HVNPGs will manage to address the growing needs of the elderly care services that are currently in high demand. Thus, society's perception is the key to increasing the competitiveness of nursing courses and the nursing courses' full inclusion in the healthcare systems that target the elderly population.

Table 3. Societal Attitudes Towards Elderly Care and Nursing

Finding	Description
Societal Perception of Nursing	Nursing is often undervalued, particularly in elderly care, affecting the demand for vocational programs.
Cultural Influence on Elderly Care	Formal nursing programs struggle to gain traction and respect in regions where family care is preferred.
Gender Bias in the Nursing Profession	The perception of nursing as a female profession leads to lower wages and diminished societal prestige.

Cultural Respect for Elderly Care in Japan	In Japan, cultural respect for elderly care improves nursing status, leading to higher professional recognition and enrollment.
Importance of Changing Societal Attitudes	Changing societal perceptions of nursing is essential to improve the status and attractiveness of the profession.

4.1.4 Role of Technology in Nursing Education

Table 4 presents the integration and innovative methods in nursing education as a way vocational nursing programs can adapt to the needs of current society. It requires upgrading how students are trained to meet the modern challenges in the ever-changing healthcare delivery system, especially for elderly care. Technical enhancement in telemedicine, electronic health records, and computerised simulation-related knowledge supports the training of nursing professionals and the acquisition of essential technical knowledge needed in the modern, technologically advanced systems of healthcare delivery (Alshammari & Alenezi, 2023). According to Castonguay et al. (2023), telemedicine enables nurses to offer care remotely, especially in rural or low-resource settings where elderly patients are less likely to access in-person services.

The application of simulation technology aids in enhancing the students' readiness as they join vocational nursing education by exposing them to real-life experiences bound to simulation-based learning environments (Hernon et al., 2023). However, Sharma and Sharma (2023) noted a problem of equitable distribution of technological resources since most rural or income-conscious institutions cannot afford the technological facilities for their implementation. This insufficient availability of technologies results in the gap between the number of resourceful urban programs and inadequately funded rural programs being brought up. This would eventually limit the successful coverage of the needs of elderly care across regions by vocational nursing education. Therefore, the possible implementation of technology to improve the training opportunity for nurses enriches the quality of training but is obstructed by the issue of inequality in the distribution of technology in different regions.

Table 4. Role of Technology in Nursing Education

Finding	Description
Impact of Telemedicine	Telemedicine enhances remote care delivery, particularly for elderly patients in underserved regions.
Use of Simulation Technology	Digital simulation tools improve student preparedness by replicating real-life healthcare scenarios.
Technological Disparities	Uneven access to technological resources in rural and low-income areas limits the integration of advanced tools.
Role in Elderly Care	Technology-driven nursing education is critical in preparing nurses for the complex needs of elderly care.
Infrastructure Challenges	Successful technology adoption in nursing education depends on overcoming regional infrastructure inequalities.

4.3 Quantitative Findings

4.3.1 PEST-SWOT Analytical Analysis Matrix

The PEST-SWOT analysis method is commonly used to formulate business strategies, evaluate management efficiency and implement countermeasures analysis. SWOT analysis is widely used in vocational education and subject teaching-related research. It aims to analyse the advantages and disadvantages in the development of vocational education, the opportunities and threats, and the qualitative analysis of things itself and the environment. In this study, the PEST-SWOT theory constructed the analysis matrix to systematically analyse elderly care in the areas promoted by the professional groups of higher vocational colleges. Refer to Table 5 for details.

Table 5. PEST-SWOT Analysis Matrix

SWOT PEST	Politics Contains Law	Economic	Society	Technology
Strength	S			
Weakness	W			
Opportunity	+P	+E	+S	+T
Threat	-P	-E	-S	-T

S: Strength; W: Weakness; P: Political Contains Law; E= Economics; S=Society; T: Technology O: Opportunity; T: Threat

4.3.2 PEST-SWOT Analytical Model

PEST analysis is often used to analyse the external environment and explore the macro environment adaptability of through politics, including law (P), economy (E), society (S), and technology (T). PEST is oriented to the macro environment and deconstructs the environment with distinct levels, but its advantages and disadvantages are unknown. PEST-SWOT analysis is the PEST method and SWOT analysis, from the object of the internal advantage (S) and disadvantage (W), to explore the things in the macro environment of political, economic, social and technical. These four levels reflect the opportunity (O) and threat (T), providing insight into the research object in the current environment that shows adaptability. Through these improved means to realise the transformation and upgradation, one can acquire the harmony of things and social conditions. This study formed the PEST-SWOT analysis model based on the analysis matrix (see Figure 1 for details).
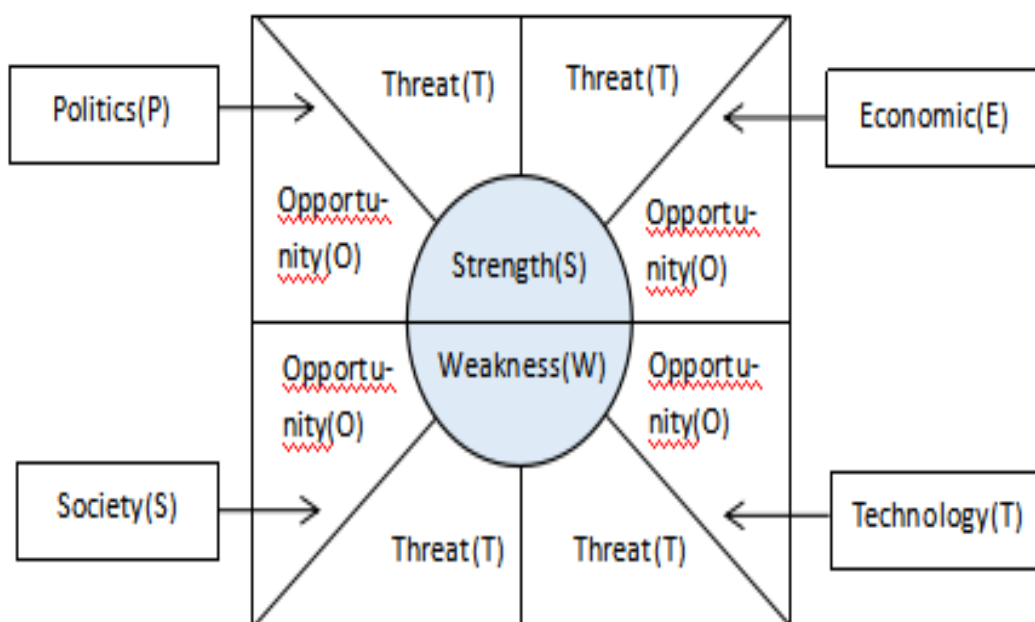
Figure 1. PEST-SWOT Analysis Model

The PEST-SWOT Analysis Model in Figure 1 highlights the interplay between political, economic, social, and technological factors, emphasising their impact on the strengths, weaknesses, opportunities, and threats higher vocational nursing professional groups (HVNPGs) face. To address this concern effectively, the framework must be expanded to provide a more detailed analysis of how these factors influence vocational nursing education. Politically, supportive legislation and policy reforms present opportunities to expand nursing programs, while inconsistent healthcare regulations could pose threats that require immediate policy alignment.

Economically, stable funding provides the financial foundation necessary for program expansion, whereas budget cuts in healthcare would need to be mitigated by exploring public-private partnerships and alternative funding sources. Societal attitudes towards nursing can either enhance or undermine its value, with regions undervaluing nursing calls for targeted public awareness campaigns. While technological advancements like telemedicine offer clear opportunities for integrating innovative tools into nursing curricula, disparities in technological access could hinder this progress. Prioritising activities like policy advocacy, securing funding, enhancing public perception, and bridging technology gaps should be key steps to mitigate threats and leverage opportunities. This structured approach will ensure more proactive responses to the identified factors.

4.3.3 PEST-SWOT Elements Analysis of Boosting Rural Old Vocational Nursing Care

According to the PEST-SWOT analysis matrix model, this study lists the nursing group of higher vocational colleges with its advantages and disadvantages. It also elucidates the higher vocational nursing professional group's opportunity and probability of being threatened by political (including law), economic, social, and technical factors. These factors are the four dimensions of stratification, which form a more complex concrete external environment analysis to derive a conclusion.

This study reveals higher vocational nursing professional groups' internal advantages and external opportunities. It also studies various combinations of internal advantages and external threats, internal disadvantages and external opportunities, internal disadvantages and external threat combination analysis. It implies a boost for higher vocational nursing professional groups with the rural revitalisation of social adaptation. This is done by coming forward with a comprehensive report, a dynamic grasp of the development trend of professional groups, and by providing a reference for the serviceability of higher vocational nursing professional groups for industrial optimisation (see Table 6).

Table 6. PEST-SWOT Analysis Matrix of the Construction of Nursing Professional Group to Promote Rural Elderly Care and Childcare

SWOT PEST		Politics (Contains Law) (P)	Economics (E)	Society (S)	Technology (T)
Internal Resources	S T R E N G T H	The nursing profession has a long history and solid foundation, is highly resource-open, and has formed a stable clustering effect. The various nursing professions are strongly interconnected and share expertise, creating a combined force of complementary professional knowledge and skills. The nursing profession's talent development model is mature. It benchmarks occupations, serves industries, and cultivates composite technical skilled personnel.			
	W E A K N E S S	The nursing profession's influence is limited by its level of education and geographical location, and it needs to improve its core competitiveness further. The "industrial chain" that the profession corresponds to has a large span and complex structure, and there may be a lag in internal updates and optimisation. Expanding the nursing profession's talent service area requires time for adjustment and adaptation.			
External Environments	O P P O R T U N I T Y	State and local governments promote the high-quality development of elderly care and childcare services, and the related policy support system is constantly being established and improved.	The overall regional economy is steadily and continuously growing, with special funds supporting and fiscal subsidies for constructing elderly care beds and childcare places.	Elderly care and childcare services are crucial to family happiness and are the foundation for ensuring and improving people's livelihoods.	The nursing profession has a mature knowledge and skills system, and the teacher team has comprehensive knowledge and abilities.
		It is strengthening the planning and layout of the elderly care and childcare industry, supporting social forces to establish elderly care and childcare institutions, activating regional resources, and establishing an "institution-led station" supply model for elderly care and childcare services.	Social forces establishing relevant institutions enjoy preferential policies such as land, financing, and investment, and multiple measures are taken to help struggling institutions, leading to a peak in the development of	"providing education for children and care for the elderly" is rooted in China's excellent traditional and advanced socialist culture.	The medical, childcare, and elderly care industries have complete industrial chains, strong technical expertise, and social forces with a specific service reserve.

		elderly care and childcare.		
	Increasing efforts to build the elderly care and childcare service team, setting up relevant courses, co-building internship and training bases, and strengthening the training and development of elderly care and childcare personnel.	With the new population structure, the demand for elderly care, childcare, and investment has increased.	The awareness of "integrating medical care with elderly care and blending health with elderly care" has been enhanced.	The medical and health system has established elderly care and childcare institutions with improved facilities, ensuring operational support and reliable service supply and providing standardised industry guidance.
	The elderly care and childcare industry has not yet been formally legislated, and ethical risks exist.	Residents' limited willingness to rely on social institutions for elderly care and childcare is affected by their consumption level.	There is no consensus on understanding the elderly care and childcare industry in society.	The industrial project is complex, and the relevant expert consulting capabilities are insufficient, making it difficult to promptly connect with industry service personnel.
T H R E A T	Localising policy documents for elderly care and childcare has a short implementation period, and the execution path is unclear.	The economic development level in different regions is unbalanced, and the industrial plasticity is low.	The new industry is in the promotion and construction stage, and society members' trust in it is low.	The relevant institutions established by social forces have lagging equipment, insufficient implementation capabilities, and experience.
	The comprehensive regulatory and field information disclosure systems for elderly care and childcare are incomplete, and the mechanism for responding to various risks is not sound.	The downward trend of the social economy has led to a lack of investment, and there is insufficient development momentum for the elderly care and childcare industry.	Social capital intervention may weaken the universality and public welfare of the elderly care and childcare industry.	There is no complete continuing education system for midwifery, childcare, and elderly care industries, and the technology support is weakening.

5. DISCUSSION

The quantitative and qualitative analysis results provide an in-depth analysis of the internal and external conditions for the development of higher vocational nursing professional groups (HVNPGs) in the nursing of the elderly. Using the PEST-SWOT framework, this study has provided a multidimensional understanding of the success and challenges of vocational nursing programs and the political, economic, social, and technological factors at play.

These findings further contribute to the existing literature on vocational nursing education and provide important information on how such programs can be optimised to respond more effectively to the needs of an ageing population. The qualitative analysis revealed four key themes: economic sustainability,

social attitudes towards caring for the elderly, and technology's function in nursing education. The quantitative results support these themes, as the PEST-SWOT framework used to systematically assess the strengths, weaknesses, opportunities, and threats facing HVNPGs were consistent with the themes. Government policies and financial subsidies to researchers and entrepreneurs were critical quantitative and qualitative data factors.

Chang et al. (2024) show that in strong states with abundant governmental backing, vocational nursing programs are more robust in light of policies tied to targeted financial incentives. The PEST SWOT analysis further reinforced these findings, which provided opportunities for state and local governments to encourage the high-quality development of elderly care services. However, the analysis also revealed that inconsistent policy implementation and weak legislative engagement can make rural residents particularly vulnerable.

HVNPGs are still an economic challenge, particularly in uneven resource distribution areas. Our quantitative analysis showed that variations in economic support influence the quality of vocational nursing programs and their ability to supply high-quality care for the elderly. This follows previous research (Ibrahim et al., 2024; Landsberger, 2024), which points to the continued need for sustainable financial investment in vocational nursing education. Qualitative and quantitative findings highlighted that HVNPGs require stronger public-private partnerships to improve their financial viability and position them to meet rural and low-income communities better. At the same time, the state and local governments are advertising elderly care services. In addition, the finding reflects that much more must be done to address economic disparities that inhibit vocational nursing programs from reaching and affecting more people.

A second crucial factor influencing the development of HVNPGs was a societal attitude towards elderly care and nursing. The cultural perception of elderly care and nursing differed significantly from region to region, as exhibited by the qualitative data. The perception that elderly care and nursing were primarily regarded as the responsibility of the family rather than a professional service also influenced the attitude towards this profession. Positive perceptions of nursing are typical in regions like Japan and are associated with stronger vocational nursing programs. In contrast, regions with lesser societal support find it difficult to draw and keep skilled professionals (Erlandsson et al., 2023). To improve the status of HVNPGs and accommodate the increasing demand for elderly care, it is important to change the social attitudes towards elderly care and nursing.

The key theme emerging from the qualitative and quantitative findings was technological advancement in healthcare. Technological tools such as telemedicine and simulation enhance training and prepare nursing professionals (Takanokura et al., 2023). Therefore, technological tools play an increasingly important role in nursing education. Along with these findings, there is a significant disparity in access to technological aids in urban and rural regions.

According to Haase et al. (2023), the distribution of technological resources is uneven. It restricts some vocational nursing programs from fully integrating digital tools into their curricula, resulting in substandard care for the elderly population. The qualitative and quantitative analyses noted that technological integration is a double-edged sword. Even advanced technology can significantly improve nursing education and care for the elderly. However, they must consider the infrastructural shortcomings that inhibit the whole industry from realising its potential.

6. CONCLUSION AND RECOMMENDATIONS

This study thoroughly examines internal and external factors in the differentiation and success of higher vocational nursing professional groups (HVNPG) within regional elderly care. The research leverages PEST-SWOT to identify and determine the key political, economic, social, and technological elements affecting vocational nursing education and its ability to respond to the emerging needs of elderly care services. These findings also emphasise that political support and economic viability are necessary to promote the growth of HVNPGs. However, social attitudes and technological gaps are important factors that must be overcome to maximise the performance of these institutions.

The study concluded that governments' political and financial backing and the fostering of public-private partnerships helped increase the extent and depth of vocational nursing education. Nevertheless, these programs are unsustainable when the economic support between these programs is unevenly distributed, especially in rural and low-income regions. Additionally, nursing is stymied by the societal undervaluation of the nursing profession coupled with gender biases that serve to limit the appeal of these programs to talented healthcare professionals. The technologies used in nursing education were also highlighted with advanced tools like telemedicine and digital simulations, which can offer great potential for training improvements. However, technological inequities hinder broader adoption in some regions.

6.1 Limitations and Future Directions

This study is based on qualitative and quantitative data from institutional stakeholders, nursing educators, healthcare administrators, and government officers. This data offers important guidance on organisational and policy-driven factors that help drive HVNPGs but does not account for the perspectives of nursing students or the elderly population that HVNPGs directly serve. Future research should include these key groups' experiences and perceptions to understand better the contextual challenges and opportunities for vocational nursing education and elderly care. Another limitation of this study is that the data collection was cross-sectional. The findings endorse the current status of vocational nursing programs and their position in elderly care, though they do not reflect long-term trends or the changing healthcare atmosphere. Longitudinal studies are required to understand how HVNPGs adjust to this rapid technological advancement and changes in therapeutic policies. Future research could look into different things, including how new healthcare technologies, like artificial intelligence and robotics, are changing the curriculum and practice of vocational nursing education in elderly care settings.

As healthcare technology advances into the future, future studies will also explore how vocational nursing programs can incorporate new digital tools and innovations in advancing the preparation of nurses to deal with the modern needs in healthcare. Finally, future research can address policy evaluation related to how government interventions and funding models affect the sustainability and scalability of HVNPGs in different regions. Future research can help fill these gaps, strengthening vocational nursing programs and elderly care services worldwide.

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Exploring Visual Art and Aesthetic Preferences Among 5–6-Years: Case Study of a Preschool from China

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Article Information	ABSTRACT
    Corresponding Author: Peng Yang 200128@yzpc.edu.cn **ORCID:** https://orcid.org/0009-0004-2054-6243	The present research investigates the aesthetic preferences and perceptions of children between 5 and 6 years inclined toward artworks. Special focus was given to emotional, sensory and cognitive factors that shape their engagement with visual art. The study aimed to investigate how these children who like artworks respond to specific artistic elements, such as color, subject matter and style, and how familiarity and novelty influence their preferences. The methodology for this study is purely qualitative, with eight children participating in an in-depth examination of individual children's responses to art within their naturalistic environment. The findings of the present research work show that children who prioritize aesthetics exhibit preferences due to their emotional responses toward vibrant colours, familiar subjects, and dynamic forms. Synesthesia revealed itself in this investigation through visual stimuli leading to sensory modality associations. Non-verbal expressions, such as facial reactions and body movements, provided valuable insights into their emotional engagement with the artworks. It is concluded by present research work that children's aesthetic development is shaped by a combination of familiarity, novelty, emotional resonance, and multisensory experiences, and the findings of present research have implications for art education, suggesting that incorporating both familiar and novel artistic elements can enhance young children's engagement with art and foster creativity. **Keywords:** Children's Aesthetic Preferences, Early Childhood Education, Emotional Responses,Visual Art

1. INTRODUCTION

Childhood aesthetics remains a major field of investigation within developmental psychological research and educational art studies. It focuses on understanding child art perception and appreciation to develop a psychological and cognitive explanation of their aesthetic sensibilities (Acer & Ömeroðlu, 2008). It developed people's ability to identify the artistic elements, which shapes their understanding of beauty and

cultural and creative aspects (Damon et al., 2021). The initial stages of children's early development hold essential value in developing artistic taste and lead to cognitive and emotional growth in children.

They start exercising artistic preferences between the ages of five and six, but further investigations are needed to understand their mechanisms of art perception and assessment methods (Chen, 2023). During the developmental stage of 5–6 years, they need special attention because of the transition from unstructured early childhood toward a period of emerging conceptional understanding of colour, shape and composition. Further, it investigated that young children prefer art that lacks depth, mainly when conducted outside Western countries with various artistic forms, thus creating an opening to expand scientific knowledge (Ardizzi et al., 2023).

The study of Marzidi et al. (2024) investigated the elements affecting artistic choices while evaluating visual art by exploring cognitive processes, emotional responses, and social influences on five and six-year-old children. They concentrated on the aesthetic taste preferences of older adolescents while overlooking younger participants and identifying the particular visual art elements that early-stage children are attracted toward, colours, shapes, figures, and styles to comprehend their aesthetic capabilities. Chheda-Kothary et al. (2024) argued the glance of young children genuinely experiencing art encounters as they assume that sensory preferences naturally correspond to adult standards of cognition. In this way, (Ardizzi et al., 2023) stated that children's aesthetic preferences among five to six-year-olds generate fresh insights regarding artistic appreciation growth patterns while offering better comprehension of their early aesthetic judgment functions.

Hempel (2021) focused on identifying the visual parts of artwork affecting the sensory tastes of children under 5–6 years old. Visual art is subjected to observational and experimental tasks to find features that affect visual art preferences and attract maximum viewing from children. The influence of aesthetic preference selection is assessed regarding the surrounding atmosphere where children are exposed to art, the social background characteristics, and the involvement of adult guidance. It has been stated that the art preferences of young children are based on a combination of inherent cultural factors and outside environmental influences, dictating the visual art that might interest them to understand the complete knowledge of aesthetic tastes and artistic assessment's intellectual and emotional steps.

Rosdiana and Pratiwi (2023) addressed a significant gap in knowledge deficit in the study of infant and preschooler taste preference development due to its being out of the focus of aesthetic research that usually studies children over 6 years along with adults by analyzing abstract and figurative paintings and symbols rather than restricting itself to one specific art form; within this framework, multiple evaluation techniques allow researchers to investigate children's responses to different artistic styles and materials. They investigated that psychological art evaluation models are combined with emotional aspects to connect quantitative and quantitative art appreciation methods in which children are involved in visual signal engagement. It expects to make groundbreaking developments in the fields of developmental psychology along with art education and cognitive science because it reveals new knowledge about how emotions combine with cognitive processes to affect early childhood aesthetic preferences.

A significant gap exists in understanding the aesthetic preferences and perceptions of 5–6-year-old children despite the aesthetic preferences because they primarily focus on older children or adolescents and frequently disregard the unique development time in early childhood because they generalize sensory preferences of young children based on adult cognitive criteria, neglecting to account for the distinct cognitive, emotional, and sensory experiences that moulded their aesthetic judgments. This study sought to

address this gap by focusing specifically on the preferences of children between the ages of 5 and 6, a crucial developmental period in their aesthetic development. It aims to investigate artwork's visual and sensory elements that mainly resonate in 5-6-year-old children by examining the role of emotional responses, cognitive processes, and contextual influences on their aesthetic preferences. It identified the specific features of visual art, such as color vibrancy, subject matter, and artistic style, captivating young children's attention and shaping their preferences through the combination of observational and experimental methods. Additionally, it explores how familiarity, novelty, and social context influenced these preferences by providing a comprehensive understanding of emotional and cognitive dimensions that intersected in the early stages of aesthetic development. Through this approach, the study contributed new insights into childhood aesthetics, with practical implications for art education and developmental psychology.

2. LITERATURE REVIEW

The evaluation of aesthetic preferences among young children has generated interest in both developmental psychology and art education, as it may provide insights into early cognitive, emotional, and cultural development (Wang, 2024). It indicates that even at a very young age, children will have such preferences when encountering visual art and that this preference is a combination of intrinsic developmental factors and external schemas (Wang et al., 2023). According to a growing knowledge base in this field, next to trim is known about the aesthetic preferences of children aged 5–6 years, when cognitive skills and emotional responses are developed. It is investigated that young children's aesthetic preferences regarding the attractive art aspects, the cognitive and emotional processes they use to evaluate the art components, and the influence of contextual circumstances on their preferences (Bally et al., 2023).

The development of aesthetics in children is examined as a domain where emotional, cognitive, and social variables influence the child's preferences (Zavareh & Hedayatzadeh, 2024). A child's emotional reaction to visual stimuli is fundamental to their aesthetic judgments. Even infants and toddlers can react emotionally to art. The preliminary findings suggested they favour particular colours or shapes that evoke pleasant feelings. Children's preferences and justifications for preferring or condemning anything become more apparent as they grow up. The developmental trajectory of these preferences indicates that emotional reactions have a dominant role in early childhood. As the child grows, cognitive processes allowing categorization, pattern recognition, and understanding of the ideas begin to influence the child's aesthetic evaluation. Thus, it is particularly noticeable between 4 and 7 when children become more sensitive to the complexity and organization of artworks (Xu et al., 2022). As a result, young children's preferences for aesthetics are often contingent on the emotional response to a visual stimulus, coupled with the development of a more sophisticated cognitive capacity, enabling a more refined assessment type (Ismail et al., 2021).

According to Korinth's (2024) research, the kind of art children are exposed to determines their choices. An example of this is abstract versus figurative art. Children prefer figurative art, mainly if the art includes familiar or recognizable objects such as animals or human figures. Development of a child's visual recognition skills renders their preference for figurative representation because familiarity with the subject matter enhances their emotional bonding to the artwork. Also, the ability to recognize human figures and link the figures to the individual experience may improve the emotional impact of the artwork displaying a person (Bara et al., 2021). However, abstract art is less popular since it lacks recognition and does not fit into children's emotional and cognitive frameworks.

According to Fingerhut et al. (2021), abstract art can gradually help kids become more tolerant and appreciative of nonrepresentational art's expressive potential, not simply new shapes and hues. It suggested that as kids experience and gain an understanding of many visual genres, their tastes change. Nakauchi et al. (2022) argued that social and cultural contexts are another important factor influencing children's aesthetic preferences and demonstrated the influence of external factors like family, people, and the educational environment on children's art preferences. For example, their parents' preferences and art discussions affect children's beliefs and perceptions of art. The broader cultural context of child development also influences his aesthetic preferences apart from family influences. Cultural differences in aesthetic development show that children from different cultural backgrounds will have different preferences for specific colours, themes, or styles in the art they encounter in their communities (Specker et al., 2021). Such cultural differences point out that aesthetic preferences are not caused only by universal cognitive or emotional processes but are also strongly associated with the child's social and cultural environment. In addition, formal art education in educational settings affects children's art preferences by offering them art tools to appreciate and critically think about various artistic industries and ideas. Although such contextual factors determine that children favour art, cognitive factors like age, developmental stage, and attention span also affect the assessment of art among young children (Wang et al., 2023).

At the critical time of mental development, when children begin to move from early childhood towards a period of understanding the outside world, it is primarily egocentric and concrete, into a time where they can begin to use more abstract concepts. In this way, Christensen et al. (2023) describe it as a critical point in a child's cognitive development. During this time, the children may not be able to see how complex compositions or nonrepresentational art are. However, their eyes are open to appreciate the combination of colours and visual organization. According to the research by Fingerhut et al. (2021), children who are already young prefer to compose in balanced forms and for harmonious colour contrasts. However, their knowledge of these elements could be easier than rational. It implies that children's preferences for art are not purely cognitive.

3. METHODOLOGY

3.1 Research Design

The study employed a qualitative case study approach to explore the aesthetic preferences and perceptions of 5-6-year-old children towards artworks. It allows a comprehensive, in-depth examination of children's responses towards art within their naturalistic environment, providing an understanding of young children's engagement with interpreting artworks. It also focuses on their preferences for artistic elements such as colour, subject matter and style. The study seeks to provide rich, detailed insights into the cognitive, emotional and social aspects of aesthetic development during early childhood. In response to the challenges of using semi-structured interviews with young children, the study adopts participant observation as the primary data collection method. It is often difficult to fully articulate the thoughts of young children in the developmental stage in an interview setting, but a more effective tool for capturing their natural reactions to artworks, as it allows to observe the children's non-verbal expressions and behaviours, such as facial expressions, body movements, and gestures. It provides valuable insights into their emotional engagement with the artworks and their preferences for colour, subject matter and artistic style.

The critical aspect of the study was the familiarization process to ensure that the children felt comfortable and open during the observation process. Since young children may be hesitant to engage with

unfamiliar adults, particularly in the context of an art-related activity, establishing trust and rapport with the participants was a key component of the research process. The researcher spent a few days in the preschool environment before the official observation sessions, engaging with the kids in a non-research setting to help them feel comfortable and familiar. The children could get used to the researcher's presence by playing with them, participating in everyday activities, and having informal chats. This procedure was crucial to encourage the kids to be more open and expressive during the art sessions. During the art observation sessions, the researcher also used a soft and unobtrusive approach, letting the kids engage with the pieces at their speed. In order to ensure that the children's reactions and preferences were sincere, the researcher's primary role was observational; they were not led or prodded in any way. As the kids engaged with the artwork, this method reduced discomfort and allowed them to communicate their choices orally and nonverbally.

3.2 Data and Sample

The study sample consisted of eight children 5-6 years old, and the purpose of such age range was to identify critical periods in children's aesthetic preferences, when their cognitive abilities begin to mature, allowing them to form more nuanced judgments about art. The children were recruited from local preschools in Qingzhen Guiyang, ensuring a diverse socio-cultural background to capture a broad spectrum of aesthetic experiences. The small sample size is appropriate for the study's exploratory nature, as it provides an in-depth examination of the individual preferences and perceptions of the children without overwhelming the research process with an impractically large dataset. Parental consent was obtained before the study, and the children were made aware of the nature of the study through age-appropriate explanations. The children were not selected based on their prior exposure to art, allowing the study to examine aesthetic preferences from a broad developmental perspective without biasing the sample based on familiarity with the art forms. The artworks used in the study were carefully chosen to reflect the developmental characteristics of aesthetic psychology in children aged 5-6. Se renowned artists selected six classic artworks based on their potential to engage young children, offering a balanced representation of color, style, and subject matter. The selected works included:

Morning in a Pine Forest (Ivan Shishkin)

Broadway Boogie Woogie (Piet Mondrian)

The Tooth Puller (Frans Hals)

Harlequin's Carnival (Joan Miró)

Starry Night (Vincent van Gogh)

Galeries Lafayette (Maurice Utrillo)

These artworks were chosen for their high artistic quality and prominence in the art world and their potential to appeal to children's developing aesthetic sensibilities. The variety of styles, colours, and subject matter that explore different aspects of art influences children's preferences.

Data analysis was a thematic approach for this study that identified and interpreted patterns in the children's responses. The thematic analysis focused on the richness of the data, allowing the researcher to explore how the data related to the research questions (Braun & Clarke, 2006). The data gathered from the participant observation, semi-structured interviews, and informal interactions were transcribed and analyzed to identify recurring themes and patterns that reflected the children's aesthetic preferences and

perceptions about them. The analysis began with initial coding, where the researchers went through the observational notes and searched for instances of data that mapped to the themes of interest. These included preferences expressed by the children concerning specific aesthetics (color, subject matter) and nonverbal cues (such as facial expressions, body movements, and vocalizations). The researchers also paid special attention to how the children might have imagined synesthetically, noting any visual/auditory, visual/gustatory, or visual/tactile synesthesia, as these provided further insights into the children's sensitivity to the artworks. After the initial coding, the next step involved grouping similar codes into more prominent themes. These themes were then analyzed about the research questions to better understand the children's aesthetic preferences and the cognitive and emotional processes that underlay their art evaluations.

3.3 Ethical Consideration

This study brings ethical considerations to the forefront; it is conducted using the participation of young children. Since informed consent was obtained from each child's parents or legal guardians before the study, they were fully informed about its purpose, procedures and risks. Age-appropriate explanations about the study were also given to the children, and their participation was voluntary, and they could withdraw at any time without consequence. In order to create a comfortable environment for children throughout the data collection process, efforts were made to create a respectful atmosphere. The children were made to feel at ease during the interviews in order to avoid any pressure to specify answers. Since the study is exploratory, the researchers encouraged the children to express their opinions open-mindedly and creatively. They were sensitive to the moods and facial expressions, indicating that the child did not want to participate or was not interested in the study. The study was kept confidential throughout. All written records and analyses of the children's identities were to be anonymized, and whatever information could identify the children was securely kept in memory of the applicable data protection regulations.

4. RESULTS AND DISCUSSION

4.1 Identified Themes

The analysis of the interviews with the children revealed several key themes that provide insight into their aesthetic preferences and perceptions of art. These themes reflect the cognitive, emotional, and sensory factors influencing their engagement with the artworks. The primary themes identified in the study include emotional responses to visual elements, preferences for specific colours and subject matter, sensory experiences such as synesthetic imagination, and the role of familiarity and novelty in shaping preferences. Additionally, non-verbal expressions such as facial reactions, body movements, and vocalizations were integral to understanding the children's aesthetic engagement. These themes offer a comprehensive understanding of the multifaceted ways in which children aged 5-6 perceive and respond to visual art, shedding light on the developmental process of aesthetic judgment in early childhood.

Table 1. Identified Themes

Theme	Description
Emotional responses to visual elements	Children's emotional reactions to various visual elements in the artworks, such as colour, shape, and form.
Preferences for specific colours and subject matter	Children's attraction to particular colours or subject matters, including preferences for recognizable figures or objects.
Sensory experiences such as synesthetic imagination	The presence of synesthetic experiences, where children link visual stimuli to other sensory modalities, such as sounds or touch.
The role of familiarity and novelty in shaping preferences	The balance between familiar and novel aspects in the artworks and how this influences their preferences.
Non-verbal expressions	Non-verbal cues like facial expressions, body movements, and vocalizations reflect the children's engagement and emotional responses to the artwork.

4.2 Emotional responses to visual elements

The research established emotional responses to visual elements as the foremost theme because it demonstrated robust emotional connections children (aged 5-6) show toward visual artworks. The children reacted with immediate, powerful emotions toward artistic features, including colour schemes, shape designs, and depiction content. Children experience profound emotional effects, often surging without inhibition because visual stimuli powerfully affect their aesthetic development. Many children demonstrated distinctive emotional preferences toward bright, joyful colours, which included yellow, red and orange because they evoked positive emotions, including happiness and excitement. Children's emotions toward blue or green colour palettes were generally flexible and included peaceful experiences; nevertheless, these tones could sometimes produce sadness or emotional tranquillity in response to artwork contexts.

The theme echoes findings from earlier research investigations about emotional reactions in children's aesthetic experiences. The research demonstrates that young children make aesthetic judgements through emotional reactions towards vibrant, vivid visual elements and recognizable familiar images (Zhang et al., 2021). Colour displays emotional importance because children immediately connect to it when they encounter visual art for the first time. Previous research confirms that children exhibit emotional reactions to visual aspects during their early aesthetic learning, yet their reactions differ based on their age group. Studies conducted previously show that children develop advanced emotional processing of colour and form throughout their growth as their ability to understand how these elements construct artwork meanings increases (Zito et al., 2021). The current investigation demonstrates that 5-6-year-old children mainly notice the emotional power of artistic elements instead of developing extensive interpretive skills. Children between 5 and 6 years old demonstrate preoperational thinking, according to Yuan et al. (2023), by focusing on sensory aspects of art since they are still developing conceptual abilities. During this study, child participants exhibited additional emotional reactions beyond basic colour and form responses—the artwork's content and visual elements directed children toward specific emotional connections with the artwork. The findings of Chitturi et al. (2022) receive validation through this research due to children's

explicit emotional response to visual features, which indicates that their aesthetic evaluation mostly depends on emotional perceptions rather than analytical assessments of complexity and quality in art. The intense emotional reactions of children developed when they viewed relatable subjects consisting of familiar animals or people but did not respond as intensely when viewing abstract or unfamiliar subjects. Research by Yang et al. (2021) confirms through their findings that children develop emotional connections more easily toward artworks that present familiar, recognizable figures or situations.

4.3 Preferences for specific colours and subject matter

The theme of preferences for specific colours and subject matter emerged as a critical aspect of the children's aesthetic responses to the artworks presented during the interviews. The study showed that children displayed distinct preferences for colours and artwork subjects because of their emotional responses to visual elements combined with their age-related brain functions. The children strongly preferred vivid, warm colours such as red, yellow and orange, which they linked to optimistic feelings, including joy, energy and warmth. The reactions to blue and green colours were neutral to positive yet mood-linked differently based on the artwork context researchers showed children.

Child colour preference research supports the discovered outcomes that Children's attracted toward bright, warm colours continue to appear in research studies because these hues symbolize warmth, vitality, and positive feelings. The human mind selects vivid colours based on developmental stages and psychological sources. Visual stimulation and emotional appeal in colours influence children under five to produce positive responses. These colour choices stem from the sensory reaction of vivid hues because such hues generate faster emotional responses than softer shades. According to Maule et al. (2023), colour is a crucial element that promotes children's aesthetic reactions, especially during early childhood, when their emotional response to visual stimuli reaches its peak intensity. The artwork subjects strongly shaped which colour the children chose to favour. The children preferred artworks that depicted familiar subjects, such as living beings or natural scenes, compared to abstract or unfamiliar scenes. Children had positive, enthusiastic feedback to the artwork Morning in a Pine Forest by Ivan Shishkin because it depicts playful bears within a beautiful forest. Research by Yuan et al. (2021) confirmed that children develop stronger positive emotions toward familiar characters which appear in artwork. The selected familiar subjects activate both cognitive performance and emotional involvement by enabling children to connect between art representations and their personal experiences.

People showed restrained reactions toward artistic pieces that employed unfamiliar abstract imagery. The children adopted a tepid response to examine Broadway Boogie Woogie by Piet Mondrian because it presents geometric patterns without despicable content. According to West et al. (2021) and previous studies, young children between 5-6 years of age have difficulty understanding abstract art because their cognitive abilities remain focused on recognizing familiar concrete images. Children demonstrate increased appreciation for familiar subject matter instead of abstract forms because they strongly depend on perceptual familiarity during aesthetic evaluations (San Alberto et al., 2022). The aesthetic judgment of children depends heavily on the subject matter because they need to understand and relate to what they see as much as they do to the artwork's formal elements.

4.4 Sensory experiences such as synesthetic imagination

The theme of sensory experiences, such as synesthetic imagination, emerged as a fascinating and unexpected aspect of the children's engagement with the artworks. Many child participants reported visual synesthesia when they experienced sensory stimulation in different modalities, producing gustatory and, auditory and tactile sensations. Synaesthesia occurs frequently in young children since their developing sensory functions create unexpected connections between sense perceptions. Synesthetic experiences described by children demonstrated different patterns but shared multiple standard connections between their sensory perception and art-related emotions and cognitive reactions. Several children relayed their experience matching particular colours with particular sounds and notes. According to children's reports, red activated a hearing experience similar to loud drums, whereas yellow produced a tone with high brightness. Research shows that these children's brain processes for visual colour perception included simultaneous auditory perceptions. Studies confirm that synaesthesia typically appears in minimal ways since early childhood when brain development shapes perceptual processes. Their sensory processing demonstrates that the children blend their everyday sensory experiences into holistic perceptions, which link perceptual categories without specific separation.

Children showed visual-gustatory synesthetic tendencies, which made them relate particular artistic elements to specific flavours. In Starry Night, the child observed swirling forms and colours that inspired them to think about "sweet chocolate" while they experienced "cold ice cream" when viewing Morning's light blue and white elements in a Pine Forest. The gustatory associations showed high sensory integration because visual elements and colours directly affected taste perception. Literature about synaesthesia contains limited discussion about this particular sensory experience, but it reveals both children's powerful sensory awareness and their imaginative approach to art. Some students connected their artwork perceptions to touch sensations after observing architectural elements and designs in the paintings (Kwon & Iedema, 2022). During Harlequin's Carnival observation by Joan Miró, children experienced "the angular shapes as sharp as knives." At the same time, another child saw in The Tooth Puller that the flowing lines felt as smooth as a blanket. The physical closeness of the children with different artworks demonstrates that they forfeited traditional observation behaviour to interact through multiple senses fully. Young children form their art judgments based on a broad spectrum of sensory experiences (Glasser, 2023). Children's sensory engagement with artwork appears in their responses through descriptions of touch because embodied sensory experiences heavily influence their world perception.

The synesthetic experiences described by children provide crucial information about their psychological development and mental processing abilities (Young, 2021). Children described sensory encounters that tied to their emotional responses because they reported that specific colours and shapes produced powerful sensory connections, which ranged from positive to adverse effects. The child who heard red like a loud drum percussion instrument simultaneously linked the colour to feelings of excitement, showing how their emotional reception improved because of their multiple sensory interactions with art. The research indicates that children base their aesthetic choices on visual recognition and combinations of emotional reactions and sensory experiences, which enriches their responsive behaviour. The synesthetic imagination theme is important because it shows how young children use their perceptions and emotions to understand art.

4.5 The role of familiarity and novelty in shaping preferences

The theme of the role of familiarity and novelty in shaping preferences emerged as a significant factor influencing the children's aesthetic responses to the artworks. Children aged 5-6 years chose familiar aspects of paintings more than unfamiliar ones, especially if they quickly recognized or connected the contents to their own experiences. The analysis showed that young children displayed explicit engagement toward unfamiliar artwork aspects simultaneously with their clear preference for familiar content in artworks. All interviews demonstrated that children preferred images they already knew. Works of art that displayed familiar entities, including animal and human figures and natural elements, received more intense positive feedback from participants. Most children are delighted to see playful bears in the Ivan Shishkin painting "Morning in a Pine Forest", expressing their happiness and joy about the animals shown in the artwork. Children naturally seek recognizable artwork content because developmental theories show their preference for familiar experiences. All children need to recognize the content of artwork to generate emotional and cognitive connections that create comfort and ease for their aesthetic experience. Children express positive emotions toward familiar artwork subjects; thus, recognition is crucial in their art appreciation through its connection to relatable content. According to the study findings, children showed interest in artworks that contained unfamiliar elements, and their attraction toward familiar subject matter was that dynamic compositions, along with abstract elements within artworks, became particular points of attraction for the children because these elements brought fresh visual experiences.

Their inclusion of recognizable components affected novelty elements in works of art. Children tended to engage more deeply with abstract works featuring recognizable elements (Brooks et al., 2023; Song et al., 2021). Damon et al. (2021) work children encountered child-like shapes that enabled them to find familiar patterns which helped them relate to the abstract artwork. Novelty shows its most significant engagement when familiar elements accompany new concepts, which enable children to handle unfamiliar artwork parts using their known knowledge viewpoints. How new pieces affect previously known material resonates with developmental theories (Min & Schwarz, 2022). He suggested that children learn through assimilation and alteration of understanding frameworks when processing new knowledge. The novelty and familiarity of the responses from the children gave researchers a significant understanding of their psychological responses. Familiar artistic works caused children to express joy and excitement, while novel artworks typically led them to respond with neutral emotions, from curiosity to confusion. The study's data matches the theory that children base their aesthetic choices on cognitive processes and emotional responses because familiar pieces create emotional safety, yet novel art generates curiosity and difficulty.

4.6 Non-verbal expressions

The theme of non-verbal expressions emerged as a crucial component of the children's engagement with art, providing insight into their emotional and cognitive reactions beyond verbal communication. During the interviews, children demonstrated many non-verbal actions and facial expressions supported by body movements and vocalizations, which helped researchers understand how they experienced and preferred the artworks. The non-verbal cues revealed direct emotional responses from children while looking at the artwork by providing an important understanding of their aesthetic reaction, which becomes essential since the children lack fully developed vocabulary skills to express their artistic choices effectively. Interviewers detected Facial expressions during the research period as the most visible non-verbal communication signals. The children showed evident facial emotions, which revealed their reactions toward the artwork through smiles, frowns and expressions of surprise. Many students reacted with immediate smiling and laughter to Morning in a Pine Forest by Ivan Shishkin because they found the bear

characters endearing. People viewed Piet Mondrian's Broadway Boogie Woogie with abstract geometric patterns and exhibited neither positive nor negative reactions because they used frowns and tilted their heads. Research data demonstrates the significant emotional reactions of children to visual elements because it demonstrates their deep sensory response to art. The researchers could read facial cues, which hinted that emotional responses were the main factors determining children's favourite artworks since faces provide authentic instant feedback regarding artwork taste.

Body movements were vital non-verbal communication methods that appeared throughout the interview. Artworks sparked children's physical interactions, including careful examination of details and neutral posture when confronted with confusing visual components and physical descriptions using their hands. Children expressed their understanding of the artwork through their dynamic hand movements that resembled the forms within the piece. According to this study, children demonstrate that they move through artworks rather than see them because their bodies transmit similar physical reactions to artistic content. Children demonstrated more substantial involvement by engaging in physical body movements because they wanted to reproduce the emotional and kinetic aspects of the pieces (García-Pinar, 2022; Isakova, 2021). Children experience aesthetic encounters through their physical body responses, demonstrating their multiple sensory engagement between vision and physical movements. As a key way through which the children communicated their responses to different artworks, the children used vocal expression.

4.7 Policy Implications

This research's results provide essential guidelines for early childhood education policies regarding curriculum integration of art education. The study confirms that children approach art through emotional and sensory processes and cognitive mental models of perception; thus, educators must adopt policies that deliver comprehensive artistic experiences appropriate for each stage of their development. The educational approach to art must evaluate the emotional multisensory bonding students show when encountering multiple artistic expressions. Teachers and educators should undergo training to identify when children show artistic feelings while teaching diverse artworks, which can spark their intellectual and emotional growth. A supportive network of policies should establish art as a vital instrument to improve students' social and emotional learning since art allows children to develop emotional abilities by engaging with visual content. Educational settings will experience substantial holistic growth in young children when environments are designed to promote both experiential and expressive art learning experiences.

4.8 Discussion

The study aimed to investigate 5 – 6-year-old children's aesthetic preferences and perceptions of artworks, focusing on how certain cognitive, emotional and sensory factors influenced children's engagement with art. The results of this study reveal in great detail how emotional responses, sensory experiences and interactions between familiar and novel elements combine to influence young children's aesthetic preferences. These findings fit with and add to previous research on aesthetic development in early childhood, providing a further understanding of how young children perceive, experience, and judge art. The most notable discovery of this study was how influential emotional responses to visual elements were on children's preferences for aesthetics. As expected, children reacted emotionally to differing artworks about color, form, and subject matter. It is consistent with previous research emphasizing that emotional responses are central to early childhood aesthetic development (Acer & Ömeroðlu, 2008). The children in this study were particularly drawn to vibrant, warm colours such as red, yellow, and orange, associating them with positive emotions like happiness and energy. This preference for bright, warm colours reflects

the emotional salience of colour, which has been well-documented in the literature. Furthermore, the children's responses to more fabulous colours like blue and green align with previous studies, indicating that children tend to associate these colours with calmer or more neutral emotional states (Marzidi et al., 2024).

Study findings match previous research about early childhood, favoring common themes in the visual appreciation of art. The artwork that children reacted to favourably most often depicted recognizable objects such as animals and human figures. The research data supports the findings from Chen (2023) because children have emotional attachments to artwork that shows relatable figures in scenes. The children experienced joy when viewing Morning in a Pine Forest by Ivan Shishkin because they recognized the playful bears in the painting, highlighting that familiarity determines aesthetic preferences. Children's attraction to recognizable artwork demonstrates their ability to understand art by connecting its content to personal experiences. It corresponds to Hempel's (2021) developmental theory about children of this age group focusing on concrete objects. The study proved that familiarity did not determine the entire pattern of children's preferences regarding artistic aesthetics. The reactions to the abstract artwork Broadway Boogie Woogie by Piet Mondrian were split or unenthusiastic among the children. A few children showed interest and curiosity toward the artworks, but some remained unclear or uninterested during the observation session. Research on abstract art preferences shows that children in the preoperational stage tend to dislike abstract art since they prefer concrete art (Ismail et al., 2021). This analysis shows that children displayed unremarkable or indifferent responses toward abstract art because their cognitive skills make non-representational art challenging to interpret during this developmental stage.

The research study discovered sensory experiences called synesthetic imagination as a novel finding. The children linked colour experiences to auditory and oral sensations and touch sensations based on their artistic engagement and processing. Research findings show young children interact with the world through multiple senses because their perception systems continue developing (Rosdiana & Pratiwi, 2023; Shem-Tov & Mor, 2024). The synesthetic experiences reported by children during this research demonstrate their vivid and inventive visual stimulus processing, including hearing loud drum sounds when they see red colours and tasting chocolate by observing swirling patterns. The discovery proves vital since it helps researchers grasp how simultaneous sensory input affects artistic and emotional acceptance during early childhood development. This study demonstrates synesthetic experiences within young children's aesthetic encounters, which should be incorporated while studying their responses to art. The study discovered that children revealed their emotional engagement with art through their non-verbal expressions, including facial reactions, body movements, and vocalizations. Through their non-verbal communications, children demonstrated emotional states better than through verbal comments, thus highlighting the importance of non-verbal signals for child aesthetic evaluation understanding.

5. CONCLUSION AND RECOMMENDATIONS

This study delivers critical findings about children aged 5-6 who view art as demonstrating intricate relationships between emotional reactions, sensory interactions, and intellectual development. Children primarily form their aesthetic experiences through emotional responses based on color preferences while processing subject matter and form features because familiarity is an essential factor in their choices. Research reveals that children establish connections between colours and sounds and tastes and touch sensations, which provides our comprehension of child-art engagement with new understanding. Children expose their emotional states and preferences through non-verbal communication, including facial

reactions, body movements, and vocalizations. These discovery results support existing research studies that show that early childhood aesthetic development consists of combined emotional and sensory encounters when children interact with art. The study highlights important conclusions about how early childhood education should support diverse artistic activities that enhance emotional growth and cognitive development. Studying synesthetic experiences in aesthetic development requires additional research to help establish educational approaches to cultivate creativity and emotional skills in young students.

6. LIMITATIONS AND FUTURE STUDIES

Eight children participated in this study, which used appropriate qualitative methods for case exploration but lacked a suitable representation of the broader 5-6-year-old age group. Future research needs to evaluate larger diverse participant groups that include children from different cultural backgrounds, socio-economic groups, and geographically dispersed regions to validate the identified results across multiple contexts. Children's preferences and responses tend to shift when they encounter artwork selection beyond traditional classical pieces, including contemporary and culturally unique art. Future research should investigate how young participants would respond by showing them artistic works from various styles within different media beyond the chosen classic sets. The study faces a significant limitation because the researchers might introduce interpretation bias when evaluating non-verbal responses from children. Adults can use non-verbal signals such as facial expressions and body movements to understand better how children feel when experiencing art. However, these readings may vary from interpreter to interpreter.

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