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# Evaluating the Impact of the Village Hive Project on Student Retention Rates: Challenges, Trends, and Future Directions

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**A B S T R A C T**

The Village Hive Project, a community-driven initiative in Cambodia, aims to combat poverty through improved public education, healthcare, and childcare services, focusing on enhancing infrastructure, teacher training, and fostering collaboration. This study evaluates the impact of the Village Hive Project on student retention rates during the academic years 2022–2023 and 2023–2024, comparing 36 primary schools in Battambang Municipality, including three Village Hive schools (experimental group) and 33 non-Village Hive schools (control group). Using a cluster sampling method, a quantitative experimental design was employed, with retention rates across grades analyzed using data from the Battambang Municipal Office of Education. Statistical tools such as Independent Samples Tests and Levene's Tests were used to ensure the reliability and accuracy of the results. The findings reveal a general decline in retention rates, from an average of 101.04 in 2022–2023 to 99.35 in 2023–2024, with Village Hive schools showing greater decreases and variability compared to non-participating schools. While Village Hive schools remained relatively consistent, their retention rates averaged 95.89 in 2023–2024, highlighting challenges associated with socio-economic factors and post-pandemic recovery. Grade-specific analysis showed stable retention in Village Hive schools but greater variability in non-Village Hive schools, particularly in lower grades. These results emphasize the importance of long-term monitoring, targeted professional development, and community engagement to address systemic challenges. The study suggests that tailored strategies, including foundational support, differentiated instruction, and data-driven interventions, are essential to improving retention and educational outcomes in Cambodia.

Keywords: Village Hive Project, Retention Rates, Educational Interventions, Student Persistence, and Community-Driven Initiatives

## 1. Introduction

The Village Hive Project is a transformative initiative designed to empower communities in Cambodia by fostering collaborative engagement and reducing reliance on charity. By addressing the root causes of poverty through an upstream approach, the project prioritizes early intervention programs, universal public services, and the creation of a public social protection system owned and operated by local communities. This system, comprising a network of Village Hives across all ten communes and 62 villages in Battambang District, is set for completion by 2032 and serves as a scalable model for nationwide implementation. Central to the initiative is the enhancement of public education, healthcare, and child care through improved village health clinics, public schools, and teacher training colleges. By establishing safe, healthy environments and dismantling systemic barriers to prosperity, the Village Hive Project aspires to elevate living standards, foster long-term independence, and optimize the quality of life for communities across Cambodia (CCT, 2024a).

### *1.1 Problem Statement*

Retention rates are a crucial indicator of the effectiveness and sustainability of educational systems, but the factors influencing these rates can vary significantly across different types of schools. In the case of the Village Hive Project, schools involved in this initiative benefit from targeted interventions such as enhanced facilities, teacher training, and community-driven support systems. However, it remains uncertain whether these interventions result in improved student retention compared to Non-Village Hive schools, which may face fewer resources and less targeted support. Despite the project's goal of creating a more resilient and empowered educational environment, the impact on student persistence has not been fully explored, and it is unclear whether the Village Hive schools show a tangible improvement in retention rates.

This lack of clarity underscores the need for a thorough investigation into the differences, if any, between Village Hive and Non-Village Hive schools regarding student retention. Understanding the reasons behind the retention rates in both school types is essential to evaluate the effectiveness of the Village Hive interventions. It is important to identify whether other external factors, such as socio-economic conditions, community involvement, or resource availability, might be influencing student persistence.

Cambodia has made notable progress in expanding access to primary education, as evidenced by the net enrollment rate's rise from 81% in 2009 to 90% in 2019 (WBG, 2024) and the gross enrollment rate reaching 111% in 2023, reflecting inclusivity efforts to accommodate students of varying ages (Trading Economics, 2024). Despite these achievements, significant challenges remain, particularly in promoting equitable access and ensuring consistent progression through the education system. Financial constraints disproportionately impact families, often compelling children to leave school prematurely (Helpcode, 2024), especially during the transition to secondary education. These systemic barriers underscore the importance of evaluating interventions, such as those implemented through the Village Hive Project, to determine their effectiveness in addressing these challenges and improving student retention across different school types.

### *1.2 Objectives of the Study*

The primary objective of this study is to evaluate retention trends in primary schools over the academic years 2022–2023 and 2023–2024, with a specific focus on comparing schools involved in the Village Hive project to non-Village Hive schools. By analyzing overall retention rates, the study aims to identify patterns and assess differences between these two groups, providing insights into the impact of the Village Hive project's targeted interventions. This comparative analysis will also examine year-to-year changes in retention, highlighting variability and stability in student persistence over the two-year period.

Additionally, the study explores broader systemic, grade-level, and regional factors that influence retention rates, with a view to offering actionable recommendations for long-term improvements in student persistence. By considering external challenges such as economic disparities and regional differences, as well as internal factors like grade-specific trends, the study aims to deepen the understanding of retention dynamics. These insights will help identify areas in need of targeted interventions and inform strategies for enhancing the effectiveness of educational initiatives like the Village Hive project.

Ultimately, the findings seek to contribute to the development of more sustainable and effective educational policies, with an emphasis on improving retention rates and ensuring continued student success across diverse contexts.

## 2. Literature Review

### *2.1 Theoretical Framework*

***Tinto's Student Integration Model (SIM):*** Students may leave schools due to academic struggles, unmet goals, or social integration challenges. Poor academic performance, a mismatch between school offerings and students' aspirations, and isolation from peers and staff can all contribute to student departure (Manyanga, F., Sithole, A., & Hanson, S. M., 2017). Tinto's theory emphasizes the importance of integrating students into both the academic and social aspects of school life to encourage persistence. Students who build relationships, engage in extracurricular activities, and participate in academics are more likely to stay enrolled. However, barriers such as incongruence (a mismatch between goals and school offerings) and isolation (lack of social engagement) can hinder this integration and reduce retention (Karp, M. M., Hughes, K. L., & O'Gara, L., 2008).

***Maslow's Hierarchy of Needs:*** Maslow's Hierarchy of Needs outlines a pyramid of human motivations that relate to education and student retention. At the base are physiological needs like food and sleep, which must be met before students can focus on learning. Once these needs are satisfied, students can focus on safety, such as a supportive and secure school environment. The next level emphasizes the importance of social connections, with students who feel a sense of belonging more likely to stay engaged and persist. Esteem needs, such as recognition and achievement, motivate students to excel when schools provide opportunities for success. At the top, self-actualization refers to the pursuit of personal growth, which schools can support through challenging coursework and enrichment programs. By addressing these needs, schools can foster an environment that promotes student retention and success (Maslow, 1943).

**Ecological Systems Theory**: Bronfenbrenner's Ecological Systems Theory highlights the multiple layers of influence shaping an individual's development, with implications for education and student retention. The microsystem includes direct relationships, such as with family, peers, and teachers, which are crucial for a student's sense of belonging. The mesosystem involves interactions between different environments, like home and school, where effective collaboration can enhance student support and persistence. The exosystem includes indirect factors, such as community resources or parental work conditions, which provide stability. The macrosystem encompasses broader societal influences, like educational policies and cultural norms. Lastly, the chronosystem considers how time-related changes, like school transitions, affect students. Recognizing these layers of influence emphasizes how various factors, from personal relationships to societal conditions, impact student engagement and retention (Bronfenbrenner, 1979).

***Theory of Change (ToC)***: A Theory of Change (ToC) outlines the necessary steps to achieve a desired outcome, such as improving student retention in education. It identifies the activities, resources, and interventions needed to enhance student outcomes, including engagement, academic performance, and social connections. For instance, a ToC might focus on support services, mentoring, and academic resources to boost retention. By clarifying the connections between interventions and outcomes, the ToC provides a roadmap for schools to design effective strategies and adjust them based on measurable results, ensuring that students stay enrolled until graduation (Weiss, 1995).

### *2.2 Village Hive Universal Prevention: Public Education Service*

#### *2.2.1 Village Hive's Theory of Change in Public Education*

Public education is a valuable investment with significant social benefits, contributing to secure incomes, stable families, and reduced crime rates. Quality education also lowers reliance on public health care and social support programs, making it more cost-effective than addressing the consequences of underfunded schools. The Village Hive strengthens public primary schools, high schools, and teacher training colleges through four key activities:

1. **Partnering with schools and improving infrastructure**: Schools assess their facilities, including classrooms, toilets, and accessibility, and receive support for repairs and new infrastructure.
2. **Improving classroom environments**: Schools evaluate their classroom conditions and receive support to create safer, more inviting spaces with adequate lighting, equipment, and accessibility.
3. **Improving the curriculum and syllabus**: Teachers are supported to strengthen the curriculum, including ICT literacy, extracurricular programs, and remedial tutoring.
4. **Resourcing and supporting teachers and faculty**: Teachers receive additional resources, training in pedagogy, child protection, and ICT literacy to better perform their roles.


(CCT, 2023)

#### *2.2.2 Village Hive's Education Outcomes 2023*

***Improving infrastructure:*** In Svay Pao Commune, significant efforts were made to improve public school infrastructure, classroom environments, curriculum, and faculty support. Infrastructure upgrades included the construction of six toilets, one of which was specially designed for students with disabilities, and the installation of handwashing stations to enhance hygiene. The school entrances were also upgraded by sealing roads and pathways, ensuring accessibility during the rainy season. These improvements benefited 700 students, including 319 girls, by providing safer and more accessible facilities. (CCT, 2024b).

***Improving classroom environments:*** Classroom environments were also enhanced, with renovations at a public primary school making classrooms brighter and more inviting, including new paint, lighting, and fans to improve ventilation. These updates also ensured accessibility for students with special needs. At Preah Monivong High School, two computer labs were relocated to a newer building, with upgraded network cables, electricity, and ventilation systems. Lay Mom, a Grade 5 teacher at Wat Kampheng Primary School, expressed her excitement about the renovations, saying, "I was so

excited after the classroom was renovated with new paint and set up with lights and fans. It makes me feel comfortable teaching. Before, it was difficult for me and my students. I can see how my students are feeling more engaged by their smiles" (CCT, 2024b).

***Improving the curriculum and syllabus:*** The Village Hive program also improved educational offerings through enhanced curriculum and extracurricular activities. The after-school care program, initially for vulnerable children, was expanded to all primary school students for a small fee, with proceeds helping to subsidize activities for families in need. This program provides nutritious meals, homework support, tutoring in English, Maths, and Khmer literacy, as well as extracurricular activities such as sports, arts, and life skills classes. In 2015, the Village Hive co-designed an ICT curriculum for two public high schools, teaching essential skills like computer hardware, programming, and robotics, which has now become financially sustainable. In 2023, 1,854 high school students participated in ICT classes, while others benefitted from meals, tutoring, and extracurricular activities, contributing to their academic success and retention (CCT, 2024b).

***Resourcing and supporting teachers and school faculty:*** Additionally, the program supported teachers through regular meetings and professional development. A total of 58 meetings were held with six public schools to ensure teachers received the necessary support. Twenty-two teaching staff participated in training sessions on child protection, managing difficult behavior, and leadership skills. In September 2023, four teaching staff were reassigned to operate the after-school care programs, further strengthening the educational support in the community (CCT, 2024b).

#### *2.2.3 Aligning Educational Priorities: The Synergy Between MoEYS' Pentagon Strategy and the Village Hive Project*

The Ministry of Education, Youth and Sport (MoEYS) priorities for the Pentagon Strategy Phase 1 (2024-2028) align closely with the goals of the Village Hive Project in strengthening public education across Cambodia. MoEYS' focus on improving school governance, including the implementation of model school standards, echoes Village Hive's efforts to empower school management and enhance infrastructure. Both initiatives emphasize the importance of quality teaching and learning, with MoEYS prioritizing the improvement of educational outcomes through better school operations, accountability, and community involvement. Likewise, Village Hive's activities, such as supporting infrastructure upgrades and creating safe, engaging classroom environments, align with MoEYS' vision of fostering educational excellence from the ground up (MoEYS, 2024).

A key priority of the MoEYS strategy is the enhancement of curricula and extracurricular activities, which aligns with Village Hive's commitment to improving educational quality through ICT literacy, extracurricular programs, and remedial tutoring. Both initiatives aim to provide a well-rounded education, promoting physical education, youth development programs, and character education. The Village Hive Project supports teachers through professional development in pedagogy and child protection, closely aligning with MoEYS' goal to strengthen teacher capacity and improve student learning. This shared focus on teacher training and curriculum improvement contributes to the creation of a robust educational system where students receive a comprehensive and future-ready education (MoEYS, 2024).

Moreover, MoEYS' emphasis on school health, community involvement, and the development of digital education strongly complements the Village Hive Project's Theory of Change. The Village Hive Project advocates for community-driven solutions, such as supporting school renovation and expanding extracurricular activities, which aligns with MoEYS' strategy of fostering stronger partnerships with parents, guardians, and local communities. Both initiatives recognize the importance of integrating technology into learning environments to prepare students for the digital age. With a shared focus on enhancing physical education, sports, and community engagement, the collaboration between MoEYS' priorities and the Village Hive Project offers a holistic approach to improving student retention and educational outcomes across Cambodia (MoEYS, 2024).

## 3. Methodology

### *3.1 Research Design*

The study employed a quantitative experimental design to investigate the impact of the Village Hive Project on retention rates in primary schools. By focusing on the academic years 2022–2023 and 2023–2024, the research aimed to evaluate differences in student retention between schools participating in the Village Hive Project and those that did not. This design allowed for a structured comparison of outcomes, enabling the assessment of the project's effectiveness in enhancing retention rates over time.

To conduct the analysis, retention data from both Village Hive and non-Village Hive schools were collected for the two academic years. The Village Hive schools represented the experimental group, while the non-Village Hive schools served as the control group. By comparing retention rates across these groups, the study sought to isolate the effects of the Village Hive Project from other factors that could influence retention. The quantitative approach provided objective measurements and statistical analysis to draw reliable conclusions about the program's impact.

This design is particularly effective in identifying causal relationships between interventions like the Village Hive Project and educational outcomes. The use of data from two consecutive academic years allowed for a temporal comparison, providing insights into whether the intervention led to measurable improvements. The inclusion of non-Village Hive schools as a control group strengthened the validity of the findings by providing a benchmark for evaluating changes in retention rates.

### *3.2 Data Collection and Variables*

The data for this study were obtained from the Battambang Municipal Office of Education, Youth, and Sports, encompassing 36 primary schools within the Battambang municipality. Among these, three schools—Ratanak Primary School, Wat Kampheng Primary School, and Ang Primary School—participated in the Village Hive Project, while the remaining 33 schools served as the non-Village Hive group. The schools were selected based on their geographic location and involvement in the project, representing a cluster sampling approach. Retention data were collected for each school, categorized by grade level, and spanned two academic years: 2022–2023 and 2023–2024. This comprehensive dataset provided the foundation for comparing retention rates between Village Hive and non-Village Hive schools, ensuring both experimental and control groups were adequately represented.

The primary variable analyzed in this study was the retention rate, measured for each grade level across the participating schools. Retention rate was calculated by dividing the number of students enrolled in the second half of the school year by the number of students enrolled in the first half, then multiplying the result by 100 to express it as a percentage. This method allowed for a standardized comparison of retention rates across schools and years. The independent variable was the participation of schools in the Village Hive Project, while the dependent variable was the retention rate. By examining these variables, the study aimed to identify whether the Village Hive Project had a significant effect on improving student retention in primary schools.

### *3.3 Analysis Tools*

The analysis in this study utilized SPSS (Statistical Package for the Social Sciences), a widely used software for statistical analysis in research. SPSS facilitated efficient data management, organization, and the application of various statistical tests to evaluate the retention rates across schools. Its user-friendly interface allowed for the calculation of mean values, comparisons between groups, and tests of statistical significance, ensuring the reliability and accuracy of the findings. By leveraging SPSS, the study was able to process large datasets from 36 primary schools and draw meaningful insights into the impact of the Village Hive Project on retention rates.

To compare retention rates between Village Hive and non-Village Hive schools, the study employed multiple statistical tests. The Independent Samples Test was used to examine differences in retention rates between the two groups, focusing on whether the means of the two independent samples varied significantly. Additionally, the Paired Samples Statistics and Paired Samples Test were applied to analyze changes in retention rates within the same schools across the two academic years (2022–2023 and 2023–2024). These tests allowed the study to detect shifts in retention over time, providing insights into the temporal impact of the Village Hive Project.

The analysis also incorporated Levene's Test for Equality of Variances to ensure that the assumption of equal variances was met before conducting t-tests. For cases where this assumption was violated, adjustments were made using the SPSS output. The t-test for Equality of Means was pivotal in determining whether the differences in retention rates between Village Hive and non-Village Hive schools were statistically significant. Together, these tools provided a robust framework for assessing the effectiveness of the Village Hive Project, ensuring that the results were both comprehensive and statistically sound.

## 4. Presentation of the Results

### *4.1 Distribution and Retention Trends among Village Hive and Non-Village Hive Schools for the School Year 2022-2023 and 2023-2024*

Extracted from SPSS, the distribution of schools involved in the Village Hive Project reveals that, out of a total of 36 primary schools, 33 schools are non-Village Hive schools. This represents 91.7% of all schools included in the analysis. In comparison, only 3 schools, accounting for 8.3%, are part of the Village Hive Project. These figures highlight the predominance of non-Village Hive schools in the sample, with the cumulative percentage for both categories summing up to 100%. This distribution underscores the relatively limited proportion of schools currently involved in the Village Hive Project compared to those outside it.

**Table 1: Schools in Village Hive Project**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Non-Village Schools | 33 | 91.7 | 91.7 | 91.7 |
| | Village Hive Schools | 3 | 8.3 | 8.3 | 100.0 |
| | Total | 36 | 100.0 | 100.0 | |

Several schools experienced notable changes in retention rates between the academic years 2022-2023 and 2023-2024. Among these, Pothivong Primary School, a Non-Village Hive School, saw a significant decline in retention rates from 100.00% to 91.07%, while Ratanak Primary School, a Village Hive School, experienced a similar decrease from 100.00% to 94.21%. Additionally, Ang Primary School, also a Village Hive School, showed a decline in retention rate from 100.00% to 93.30%. Such decreases highlight areas that may warrant further investigation to identify potential factors contributing to these drops.

Several other Non-Village Hive Schools also experienced declines in retention rates. For instance, Dak Sasar Primary School saw a reduction from 100.85% to 97.06%, while Khsach Poy Primary School decreased from 104.27% to 99.20%. Similarly, Chong Prek Primary School and Special Education Primary School recorded declines from 100.76% to 98.05% and from 100.00% to 98.28%, respectively. Smaller decreases were observed at Chea Sim Primary School, which dropped from 100.35% to 99.46%, and Prek Preah Sdach Primary School, where the rate fell from 100.00% to 98.39%.

Conversely, some schools experienced an increase in retention rates. For example, Mithapheap Primary School reported a rise from 100.33% to 103.35%, and Hun Sen Ochar Primary School improved from 102.20% to 102.62%. Additionally, Boeung Raing Primary School saw a slight increase from 101.04% to 101.50%. These improvements suggest that certain factors or practices at these schools may have positively influenced student retention.

**Table 2: Retention Trends for 2022-2023 and 2023-2024**

| No. | School Names | Village Hive or Non-Village Hive Schools | Retention Rate in 2022-2023 (100*Mid-Year/Early Year) | Retention Rate in 2023-2024 (100*Mid-Year/Early Year) |
|---|---|---|---|---|
| 1 | Pothivong Primary School | Non-Village Hive School | 100.00 | 91.07 |
| 2 | Wat Liep Primary School | Non-Village Hive School | 102.57 | 101.50 |
| 3 | Chrey Kaong Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 4 | Ou Ta Kam Mouy Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 5 | Ou Ta Kam Pir Primary School | Non-Village Hive School | 100.00 | 103.23 |
| 6 | Tuol Ta Ek Primary School | Non-Village Hive School | 100.00 | 98.71 |
| 7 | Mithapheap Primary School | Non-Village Hive School | 100.33 | 103.35 |
| 8 | Thkov Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 9 | Chong Prek Primary School | Non-Village Hive School | 100.76 | 98.05 |
| 10 | Tapruoch Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 11 | Kdol Don Teav Primary School | Non-Village Hive School | 111.94 | 100.47 |
| 12 | Sala Balat Primary School | Non-Village Hive School | 100.00 | 100.93 |
| 13 | Chrab Krasaing Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 14 | Ballang Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 15 | Dak Sasar Primary School | Non-Village Hive School | 100.85 | 97.06 |
| 16 | Omal Prey Roka Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 17 | Boeung Raing Primary School | Non-Village Hive School | 101.04 | 101.50 |
| 18 | Kauk Ponley Primary School | Non-Village Hive School | 100.68 | 100.00 |
| 19 | Wat Roka Primary School | Non-Village Hive School | 100.66 | 100.34 |
| 20 | Chea Sim Primary School | Non-Village Hive School | 100.35 | 99.46 |
| 21 | Prek Preah Sdach Primary School | Non-Village Hive School | 100.00 | 98.39 |
| 22 | 13 Makara Primary School | Non-Village Hive School | 99.28 | 100.00 |
| 23 | Romcheck 3 Primary School | Non-Village Hive School | 108.24 | 101.93 |
| 24 | Sophi Primary School | Non-Village Hive School | 100.00 | 94.63 |
| 25 | Ratanak Primary School | Village Hive School | 100.00 | 94.21 |
| 26 | Wat Kampheng Primary School | Village Hive School | 100.00 | 100.16 |
| 27 | Khsach Poy Primary School | Non-Village Hive School | 104.27 | 99.20 |
| 28 | Kampong Seima Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 29 | Wat Kor Primary School | Non-Village Hive School | 102.92 | 100.00 |

| | | | | |
|---|---|---|---|---|
| 30 | Special Education Primary School | Non-Village Hive School | 100.00 | 98.28 |
| 31 | 2 Thnu Primary School | Non-Village Hive School | 100.17 | 100.00 |
| 32 | Anuwat Primary School | Non-Village Hive School | 100.00 | 100.00 |
| 33 | Hun Sen Ochar Primary School | Non-Village Hive School | 102.20 | 102.62 |
| 34 | Ang Primary School | Village Hive School | 100.00 | 93.30 |
| 35 | Anndong Chenh Primary School | Non-Village Hive School | 101.33 | 98.10 |
| 36 | Phare Ponleu Selpak Primary School | Non-Village Hive School | 100.00 | 100.00 |

The mean retention rate for the school year 2022-2023 is 101.04, which indicates that, on average, retention rates were relatively high across the schools in this period. In comparison, the mean retention rate for the following school year, 2023-2024, is slightly lower at 99.35. This suggests that, on average, retention rates in 2023-2024 were somewhat reduced when compared to the previous year. This decrease could reflect various factors, such as changes in student enrollment, school policies, or external influences affecting student retention.

**Table 3: Descriptive Statistics for Retention Rates**

| | N | Mean |
|---|---|---|
| Retention Rate in the School Year 2022-2023 | 36 | 101.0442 |
| Retention Rate in the School Year 2023-2024 | 36 | 99.3469 |
| Valid N (listwise) | 36 | |

### *4.2 Comparing Retention Rates in Village Hive and Non-Village Hive Schools: 2022-2023 vs. 2023-2024*

#### *4.2.1 School Year 2022-2023*

The group statistics for retention rates in the school year 2022-2023 show the differences between Non-Village Hive schools and Village Hive schools. For Non-Village Hive schools, the sample consists of 33 schools, with a mean retention rate of 101.14, a standard deviation of 2.57, and a standard error mean of 0.45. In contrast, Village Hive schools, with a sample size of 3, have a mean retention rate of 100.00. The standard deviation and standard error mean for Village Hive schools are both 0.00, indicating that all the schools in this group have the same retention rate of 100%. This suggests a consistent retention rate among Village Hive schools, while the retention rates for Non-Village Hive schools exhibit more variation.

**Table 4: Group Statistics for Retention Rate in the School Year 2022-2023**

| | Schools in Village Hive Project | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Retention Rate in the School Year 2022-2023 | Non-Village Schools | 33 | 101.1391 | 2.57193 | 0.44772 |
| | Village Hive Schools | 3 | 100.0000 | 0.00000 | 0.00000 |

The results from the independent samples test for retention rates in the school year 2022-2023 compare the means of Non-Village Hive schools and Village Hive schools. Levene's test for equality of variances indicates that the variances are equal, with an F value of 1.680 and a significance level of 0.204, which is greater than 0.05. This suggests that there is no significant difference in variances between the two groups.

For the t-test assuming equal variances, the t-value is 0.757 with 34 degrees of freedom and a p-value of 0.454 (greater than 0.05), indicating that there is no statistically significant difference between the mean retention rates of Non-Village Hive schools and Village Hive schools. The mean difference is 1.13909, with a standard error of 1.50462, and the 95% confidence interval for the difference in means ranges from -1.92 to 4.20, including 0, further suggesting no significant difference.

However, when assuming unequal variances, the t-value increases to 2.544, with 32 degrees of freedom and a p-value of 0.016 (less than 0.05), indicating a statistically significant difference in the retention rates between the two groups. The mean difference remains 1.13909, with a smaller standard error of 0.44772, and the 95% confidence interval for the difference ranges from 0.23 to 2.05, excluding 0, which supports the conclusion that the difference is statistically significant under the assumption of unequal variances.

**Table 5: Independent Samples Test - Retention Rate in the School Year 2022-2023**

| | Levene's Test for Equality of Variances | t-test for Equality of Means |
|---|---|---|

| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| Equal variances assumed | 1.680 | 0.204 | 0.757 | 34 | 0.454 | 1.13909 | 1.50462 | -1.91867 | 4.19686 |
| Equal variances not assumed | | | 2.544 | 32.000 | 0.016* | 1.13909 | 0.44772 | 0.22712 | 2.05106 |

### *4.2.2 School Year 2023-2024*

The group statistics for retention rates in the school year 2023-2024 compare Non-Village Hive schools and Village Hive schools. For Non-Village Hive schools, the sample consists of 33 schools, with a mean retention rate of 99.66, a standard deviation of 2.28, and a standard error mean of 0.40. In contrast, Village Hive schools, with a sample size of 3, have a mean retention rate of 95.89. The standard deviation for Village Hive schools is 3.73, and the standard error mean is 2.15, indicating a higher variability in retention rates among Village Hive schools compared to Non-Village Hive schools. This suggests that while Non-Village Hive schools exhibit more consistent retention rates, the retention rates in Village Hive schools show greater variation.

**Table 6: Group Statistics for Retention Rate in the School Year 2022-2023**

| | Schools in Village Hive Project | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Retention Rate in the School Year 2023-2024 | Non-Village Schools | 33 | 99.6612 | 2.28407 | 0.39760 |
| | Village Hive Schools | 3 | 95.8900 | 3.72582 | 2.15110 |

The results from the independent samples test for retention rates in the school year 2023-2024 compare the means of Non-Village Hive schools and Village Hive schools. Levene's test for equality of variances shows an F value of 1.820 with a significance level of 0.186, which is greater than 0.05, indicating that the variances between the two groups are equal.

For the t-test assuming equal variances, the t-value is 2.613 with 34 degrees of freedom and a p-value of 0.013 (less than 0.05), indicating a statistically significant difference between the retention rates of Non-Village Hive schools and Village Hive schools. The mean difference is 3.77121, with a standard error of 1.44306, and the 95% confidence interval for the difference ranges from 0.84 to 6.70, excluding 0, further supporting the significance of the difference.

When assuming unequal variances, the t-value is 1.724 with 2.139 degrees of freedom and a p-value of 0.219 (greater than 0.05), suggesting no significant difference in retention rates between the two groups under this assumption. The mean difference remains 3.77121, but the confidence interval for the difference ranges from -5.08 to 12.62, which includes 0, indicating the lack of statistical significance in this scenario.

**Table 7: Independent Samples Test – Retention Rate in the School Year 2023-2024**

| Retention Rate in the School Year 2023-2024 | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | Lower | Upper |
| Equal variances assumed | 1.820 | 0.186 | 2.613 | 34 | 0.013* | 3.77121 | 1.44306 | 0.83857 | 6.70386 |
| Equal variances not assumed | | | 1.724 | 2.139 | 0.219 | 3.77121 | 2.18754 | -5.07909 | 12.62151 |

### *4.3 Comparison of Retention Rates Between the School Years 2022-2023 and 2023-2024: Paired Samples Analysis*

The paired samples statistics for retention rates in the school years 2022-2023 and 2023-2024 show the following information. For the retention rate in the school year 2022-2023, the sample consists of 36 schools, with a mean retention rate of 101.04. The standard deviation is 2.48, indicating a relatively small amount of variability in retention rates across the schools. The standard error mean is 0.41, suggesting that the estimate of the average retention rate is fairly precise. This indicates that, on average, schools in 2022-2023 maintained a high retention rate with only modest variation among them. The retention rate for this year was slightly higher compared to 2023-2024, suggesting a more stable or slightly better retention performance across the schools in this period.

**Table 8: Paired Samples Statistics of the Retention Rates in 2022-2023 and 2023-2024**

| | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Retention Rate in the School Year 2023-2024 | 99.3469 | 36 | 2.58466 | 0.43078 |
| Retention Rate in the School Year 2022-2023 | 101.0442 | 36 | 2.47988 | 0.41331 |

The paired samples test for retention rates between the school years 2022-2023 and 2023-2024 reveals a statistically significant difference. The mean difference between the retention rates in the two years is -1.69722, indicating a decrease in retention rates from 2022-2023 to 2023-2024. The standard deviation of the difference is 3.17, with a standard error mean of 0.53. The 95% confidence interval for the difference ranges from -2.77 to -0.62, excluding 0, which further supports the significance of the difference. The t-value is -3.210 with 35 degrees of freedom, and the p-value is 0.003 (less than 0.05), confirming that the difference in retention rates between the two years is statistically significant.

**Table 9: Paired Samples Test of the Retention Rates in 2022-2023 and 2023-2024**

| | Paired Differences | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) |
| | | | | Lower | Upper | | | |
| (Retention Rate in the School Year 2023-2024) – (Retention Rate in the School Year 2022-2023) | -1.69722 | 3.17193 | 0.52866 | -2.77045 | -0.62399 | -3.210 | 35 | 0.003** |

### *4.4 Retention Rates by Grade Level for Village Hive and Non-Village Hive Schools*

#### *4.4.1 School Year 2022-2023*

The group statistics for retention rates in the school year 2022-2023 across different grade levels highlight the differences between Non-Village Hive Schools and Village Hive Schools. For Grade 1, Non-Village Hive Schools show an average retention rate of 102.79 with a standard deviation of 7.59, indicating variability in retention across the schools. In contrast, Village Hive Schools report a mean retention rate of 100.00, with no variation, suggesting perfect consistency among the three Village Hive Schools. Similar trends are observed in Grades 2, 3, and 4, where Non-Village Hive Schools show small variances in retention rates, while Village Hive Schools consistently maintain a retention rate of 100.00.

In Grade 2, Non-Village Hive Schools have an average retention rate of 100.76 with a standard deviation of 2.58, demonstrating moderate variability. The pattern continues in Grade 3, where Non-Village Hive Schools show a mean retention rate of 100.60, with a higher standard deviation of 3.07, reflecting more variation. Grade 4 also follows this trend, with Non-Village Hive Schools reporting a mean retention rate of 100.34 and a standard deviation of 2.50. Across these grades, the Village Hive Schools report a retention rate of 100.00, indicating no fluctuation.

In Grades 5 and 6, the differences between Non-Village Hive and Village Hive Schools remain consistent. Non-Village Hive Schools show a mean retention rate of 100.63 in Grade 5, with a standard deviation of 1.46, reflecting low variability, while in Grade 6, the mean retention rate increases to 100.85 with a standard deviation of 3.51, showing more variation. Throughout all grades, Non-Village Hive Schools exhibit some level of variability in retention rates, whereas Village Hive Schools maintain a consistent 100% retention rate. This pattern indicates that the retention rates in Village Hive Schools are more stable, while Non-Village Hive Schools demonstrate a broader range of outcomes.

**Table 10: Group Statistics for Retention Rates by Grade Level in 2022-2023**

| | Types of Schools | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Retention Rate in the School Year 2022-2023 for Grade 1 | Non-Village Schools | 33 | 102.7907 | 7.59208 | 1.32161 |
| | Village Hive Schools | 3 | 100.0000 | 0.00000 | 0.00000 |
| Retention Rate in the School Year 2022-2023 for Grade 2 | Non-Village Schools | 33 | 100.7629 | 2.58034 | 0.44918 |
| | Village Hive Schools | 3 | 100.0000 | 0.00000 | 0.00000 |
| Retention Rate in the School Year 2022-2023 for Grade 3 | Non-Village Schools | 33 | 100.5965 | 3.06810 | 0.53409 |
| | Village Hive Schools | 3 | 100.0000 | 0.00000 | 0.00000 |
| Retention Rate in the School Year 2022-2023 for Grade 4 | Non-Village Schools | 33 | 100.3369 | 2.49539 | 0.43439 |
| | Village Hive Schools | 3 | 100.0000 | 0.00000 | 0.00000 |
| Retention Rate in the School Year 2022-2023 for Grade 5 | Non-Village Schools | 32 | 100.6251 | 1.45579 | 0.25735 |
| | Village Hive Schools | 3 | 100.0000 | 0.00000 | 0.00000 |

| | | | | | |
|---|---|---|---|---|---|
| Retention Rate in the School Year 2022-2023 for Grade 6 | Non-Village Schools | 33 | 100.8511 | 3.50904 | 0.61085 |
| | Village Hive Schools | 3 | 100.0000 | 0.00000 | 0.00000 |

The independent samples test for the retention rate in Grade 1 for the school year 2022-2023 shows that Levene's Test for Equality of Variances resulted in an F value of 1.227 and a significance level of 0.276, indicating that the variances between the groups (Non-Village Hive and Village Hive Schools) are equal. The t-test for equality of means, assuming equal variances, shows a t-value of 0.628 with 34 degrees of freedom, and a 2-tailed significance of 0.534, suggesting that there is no statistically significant difference between the retention rates of the two groups. The mean difference is 2.79070, with a standard error difference of 4.44150, and the 95% confidence interval of the difference ranges from -6.24 to 11.82.

For Grade 2, Levene's Test resulted in an F value of 1.347 and a significance level of 0.254, indicating that the assumption of equal variances holds. The t-test for equality of means, assuming equal variances, showed a t-value of 0.505 with 34 degrees of freedom and a significance of 0.617, indicating no significant difference between the groups. The mean difference is 0.76286, with a standard error difference of 1.50955, and the 95% confidence interval for the difference ranges from -2.30 to 3.83. When variances are not assumed to be equal, the t-test shows a t-value of 1.698 with 32 degrees of freedom and a significance level of 0.099, which still does not reach significance, with the confidence interval ranging from -0.15 to 1.68.

In Grade 3, Levene's Test indicates that the variances are equal, with an F value of 1.177 and a significance of 0.286. The t-test for equality of means assumes equal variances and produces a t-value of 0.332 with 34 degrees of freedom and a significance level of 0.742, indicating no significant difference between the groups. The mean difference is 0.59653, with a standard error difference of 1.79489, and the 95% confidence interval ranges from -3.05 to 4.24. When equal variances are not assumed, the t-value is 1.117 with 32 degrees of freedom and a significance of 0.272, which again does not show any significant difference, with the confidence interval between -0.49 and 1.68.

For Grade 4, Levene's Test indicates equal variances with an F value of 0.813 and a significance of 0.373. The t-test for equality of means produces a t-value of 0.231 with 34 degrees of freedom and a significance of 0.819, showing no significant difference between the groups. The mean difference is 0.33687, with a standard error difference of 1.45985, and the 95% confidence interval ranges from -2.63 to 3.30. When variances are not assumed equal, the t-test shows a t-value of 0.776 with 32 degrees of freedom and a significance of 0.444, still showing no significant difference, with the confidence interval between -0.55 and 1.22.

In Grade 5, Levene's Test resulted in an F value of 2.743 and a significance level of 0.107, which is slightly above the 0.05 threshold for equality of variances. The t-test for equality of means, assuming equal variances, shows a t-value of 0.734 with 33 degrees of freedom and a significance of 0.468, indicating no significant difference. The mean difference is 0.62513, with a standard error difference of 0.85196, and the confidence interval for the difference ranges from -1.11 to 2.36. When variances are not assumed equal, the t-test shows a t-value of 2.429 with 31 degrees of freedom and a significance of 0.021, which is significant, with the confidence interval ranging from 0.10 to 1.15.

Finally, for Grade 6, Levene's Test shows an F value of 1.460 and a significance level of 0.235, indicating equal variances. The t-test for equality of means, assuming equal variances, shows a t-value of 0.415 with 34 degrees of freedom and a significance of 0.681, indicating no significant difference. The mean difference is 0.85112, with a standard error difference of 2.05285, and the confidence interval for the difference ranges from -3.32 to 5.02. When variances are not assumed equal, the t-test produces a t-value of 1.393 with 32 degrees of freedom and a significance of 0.173, showing no significant difference, with the confidence interval ranging from -0.39 to 2.10.

**Table 11: Independent Samples Test for Retention Rate in the School Year 2022-2023**

| Village Hive Schools versus Non-Village Hive Schools | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | Equal Variance | | | | | | | | Lower | Upper |
| Grade 1 | Assumed | 1.227 | 0.276 | 0.628 | 34 | 0.534 | 2.79070 | 4.44150 | -6.23552 | 11.81693 |
| | Not Assumed | | | 2.112 | 32.000 | 0.043* | 2.79070 | 1.32161 | 0.09867 | 5.48274 |
| Grade 2 | Assumed | 1.347 | 0.254 | 0.505 | 34 | 0.617 | 0.76286 | 1.50955 | -2.30491 | 3.83063 |
| | Not Assumed | | | 1.698 | 32.000 | 0.099 | 0.76286 | 0.44918 | -0.15209 | 1.67781 |
| Grade 3 | Assumed | 1.177 | 0.286 | 0.332 | 34 | 0.742 | 0.59653 | 1.79489 | -3.05113 | 4.24419 |
| | Not Assumed | | | 1.117 | 32.000 | 0.272 | 0.59653 | 0.53409 | -0.49137 | 1.68443 |
| Grade 4 | Assumed | 0.813 | 0.373 | 0.231 | 34 | 0.819 | 0.33687 | 1.45985 | -2.62990 | 3.30364 |
| | Not Assumed | | | 0.776 | 32.000 | 0.444 | 0.33687 | 0.43439 | -0.54796 | 1.22170 |
| Grade 5 | Assumed | 2.743 | 0.107 | 0.734 | 33 | 0.468 | 0.62513 | 0.85196 | -1.10821 | 2.35846 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Not Assumed | | | 2.429 | 31.000 | 0.021* | 0.62513 | 0.25735 | 0.10026 | 1.15000 |
| Grade 6 | Assumed | 1.460 | 0.235 | 0.415 | 34 | 0.681 | 0.85112 | 2.05285 | -3.32078 | 5.02302 |
| | Not Assumed | | | 1.393 | 32.000 | 0.173 | 0.85112 | 0.61085 | -0.39313 | 2.09538 |

### *4.4.2 School Year 2023-2024*

The retention rates for the school year 2023-2024 across different grade levels show a contrast between Non-Village Schools and Village Hive Schools. In Grade 1, Non-Village Schools have a higher mean retention rate of 99.77, with relatively lower variability, as indicated by a standard deviation of 5.81. Village Hive Schools report a lower mean of 98.13, but with a greater standard error, reflecting more inconsistency. The trend continues in Grade 2, where Non-Village Schools have a mean of 99.87, with low variability (standard deviation of 2.94), while Village Hive Schools show a significantly lower mean of 94.35, with higher variability (standard deviation of 7.35). In Grade 3, Non-Village Schools maintain a high mean retention rate of 99.86, with low variability (standard deviation of 2.78), whereas Village Hive Schools show a lower mean of 97.30, with slightly higher variability (standard deviation of 3.35).

In Grade 4, Non-Village Schools report a mean retention rate of 100.24, with a standard deviation of 2.39, indicating relatively stable retention. Village Hive Schools, however, exhibit a much lower mean of 95.53, accompanied by greater variability (standard deviation of 3.87). For Grade 5, Non-Village Schools have a mean retention rate of 98.91 with a standard deviation of 4.42, reflecting moderate variability. Village Hive Schools report a lower mean of 96.05, but with higher variability (standard deviation of 3.69). Finally, in Grade 6, Non-Village Schools have a mean retention rate of 99.51, with a standard deviation of 3.43, indicating relatively stable retention. Village Hive Schools again show a lower mean of 94.37, with a higher standard deviation of 5.35.

Across all grade levels, Non-Village Schools generally maintain higher mean retention rates with lower variability compared to Village Hive Schools, which consistently report lower retention rates with higher variability. This suggests that while Non-Village Schools show more consistency in retention, Village Hive Schools face more fluctuation in their retention rates across all grades.

**Table 12: Group Statistics for Retention Rates by Grade Level in 2023-2024**

| | Types of Schools | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Retention Rate in the School Year 2023-2024 for Grade 1 | Non-Village Schools | 33 | 99.7742 | 5.81049 | 1.01148 |
| | Village Hive Schools | 3 | 98.1324 | 4.19000 | 2.41910 |
| Retention Rate in the School Year 2023-2024 for Grade 2 | Non-Village Schools | 33 | 99.8654 | 2.93764 | 0.51138 |
| | Village Hive Schools | 3 | 94.3538 | 7.34752 | 4.24209 |
| Retention Rate in the School Year 2023-2024 for Grade 3 | Non-Village Schools | 33 | 99.8558 | 2.77885 | 0.48374 |
| | Village Hive Schools | 3 | 97.3030 | 3.35332 | 1.93604 |
| Retention Rate in the School Year 2023-2024 for Grade 4 | Non-Village Schools | 33 | 100.2442 | 2.38810 | 0.41571 |
| | Village Hive Schools | 3 | 95.5346 | 3.87495 | 2.23720 |
| Retention Rate in the School Year 2023-2024 for Grade 5 | Non-Village Schools | 33 | 98.9135 | 4.42060 | 0.76953 |
| | Village Hive Schools | 3 | 96.0458 | 3.69420 | 2.13285 |
| Retention Rate in the School Year 2023-2024 for Grade 6 | Non-Village Schools | 33 | 99.5087 | 3.43380 | 0.59775 |
| | Village Hive Schools | 3 | 94.3706 | 5.34623 | 3.08665 |

The Levene's Test for Equality of Variances in Grade 1 resulted in an F-value of 0.009, with a p-value of 0.927, indicating no significant difference in variances between Non-Village Schools and Village Hive Schools. The t-test for Equality of Means showed a t-value of 0.475 with 34 degrees of freedom and a p-value of 0.638, suggesting that there is no significant difference in retention rates between the two groups in Grade 1. The mean difference was 1.64185, with a standard error difference of 3.45403, and the 95% confidence interval of the difference ranged from -5.37759 to 8.66130. When variances were not assumed to be equal, the t-value was 0.626 with 2.755 degrees of freedom and a p-value of 0.579, which also indicated no significant difference in retention rates.

In Grade 2, the Levene's Test for Equality of Variances showed an F-value of 7.038 with a p-value of 0.012, indicating a significant difference in variances between Non-Village Schools and Village Hive Schools. The t-test for Equality of Means, assuming equal variances, revealed a t-value of 2.719 with 34 degrees of freedom and a p-value of 0.010, suggesting a significant difference in retention rates between the two groups. The mean difference was

5.51162, with a standard error difference of 2.02689, and the 95% confidence interval of the difference ranged from 1.39249 to 9.63075. When variances were not assumed to be equal, the t-value was 1.290 with 2.059 degrees of freedom and a p-value of 0.323, indicating no significant difference in retention rates.

The Levene's Test for Equality of Variances in Grade 3 resulted in an F-value of 0.584 with a p-value of 0.450, indicating that there was no significant difference in variances between Non-Village Schools and Village Hive Schools. The t-test for Equality of Means, assuming equal variances, showed a t-value of 1.503 with 34 degrees of freedom and a p-value of 0.142, suggesting no significant difference in retention rates. The mean difference was 2.55282, with a standard error difference of 1.69805, and the 95% confidence interval of the difference ranged from -0.89802 to 6.00367. When variances were not assumed to be equal, the t-value was 1.279 with 2.257 degrees of freedom and a p-value of 0.317, which also suggested no significant difference in retention rates.

The Levene's Test for Equality of Variances in Grade 4 resulted in an F-value of 2.292 with a p-value of 0.139, indicating that the variances between the two groups were not significantly different. The t-test for Equality of Means, assuming equal variances, showed a t-value of 3.124 with 34 degrees of freedom and a p-value of 0.004, indicating a significant difference in retention rates between Non-Village Schools and Village Hive Schools. The mean difference was 4.70950, with a standard error difference of 1.50765, and the 95% confidence interval of the difference ranged from 1.64558 to 7.77342. When variances were not assumed to be equal, the t-value was 2.070 with 2.140 degrees of freedom and a p-value of 0.166, indicating no significant difference in retention rates.

In Grade 5, the Levene's Test for Equality of Variances showed an F-value of 0.039 with a p-value of 0.845, indicating no significant difference in variances between Non-Village Schools and Village Hive Schools. The t-test for Equality of Means, assuming equal variances, showed a t-value of 1.085 with 34 degrees of freedom and a p-value of 0.285, suggesting no significant difference in retention rates. The mean difference was 2.86768, with a standard error difference of 2.64196, and the 95% confidence interval of the difference ranged from -2.50144 to 8.23680. When variances were not assumed to be equal, the t-value was 1.265 with 2.552 degrees of freedom and a p-value of 0.309, again indicating no significant difference in retention rates.

The Levene's Test for Equality of Variances in Grade 6 resulted in an F-value of 1.087 with a p-value of 0.305, indicating no significant difference in variances between Non-Village Schools and Village Hive Schools. The t-test for Equality of Means, assuming equal variances, showed a t-value of 2.384 with 34 degrees of freedom and a p-value of 0.023, suggesting a significant difference in retention rates between the two groups. The mean difference was 5.13817, with a standard error difference of 2.15564, and the 95% confidence interval of the difference ranged from 0.75738 to 9.51896. When variances were not assumed to be equal, the t-value was 1.634 with 2.153 degrees of freedom and a p-value of 0.235, indicating no significant difference in retention rates.

**Table 13: Independent Samples Test for Retention Rate in the School Year 2023-2024**

| Village Hive Schools versus Non-Village Hive Schools | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | Equal Variances | | | | | | | | Lower | Upper |
| Grade 1 | Assumed | 0.009 | 0.927 | 0.475 | 34 | 0.638 | 1.64185 | 3.45403 | -5.37759 | 8.66130 |
| | Not Assumed | | | 0.626 | 2.755 | 0.579 | 1.64185 | 2.62205 | -7.13826 | 10.42197 |
| Grade 2 | Assumed | 7.038 | 0.012 | 2.719 | 34 | 0.010* | 5.51162 | 2.02689 | 1.39249 | 9.63075 |
| | Not Assumed | | | 1.290 | 2.059 | 0.323 | 5.51162 | 4.27281 | -12.38089 | 23.40413 |
| Grade 3 | Assumed | 0.584 | 0.450 | 1.503 | 34 | 0.142 | 2.55282 | 1.69805 | -0.89802 | 6.00367 |
| | Not Assumed | | | 1.279 | 2.257 | 0.317 | 2.55282 | 1.99556 | -5.16139 | 10.26703 |
| Grade 4 | Assumed | 2.292 | 0.139 | 3.124 | 34 | 0.004** | 4.70950 | 1.50765 | 1.64558 | 7.77342 |
| | Not Assumed | | | 2.070 | 2.140 | 0.166 | 4.70950 | 2.27550 | -4.49101 | 13.91002 |
| Grade 5 | Assumed | 0.039 | 0.845 | 1.085 | 34 | 0.285 | 2.86768 | 2.64196 | -2.50144 | 8.23680 |
| | Not Assumed | | | 1.265 | 2.552 | 0.309 | 2.86768 | 2.26742 | -5.12086 | 10.85623 |
| Grade 6 | Assumed | 1.087 | 0.305 | 2.384 | 34 | 0.023 | 5.13817 | 2.15564 | 0.75738 | 9.51896 |
| | Not Assumed | | | 1.634 | 2.153 | 0.235 | 5.13817 | 3.14399 | -7.51049 | 17.78684 |

### *4.5 Comparison of Retention Rates between Participating and Non-Participating Communes in the Village Hive Project*

When comparing the retention rate in communes participating in the Village Hive Project and those not participating, the group statistics reveal notable differences for the school years 2022-2023 and 2023-2024. For the school year 2022-2023, communes in the Village Hive Project reported a mean retention rate of 101.1940, with a standard deviation of 2.58799 and a standard error mean of 0.81839, based on a sample size of 10. In contrast, communes not in the project had a slightly lower mean retention rate of 100.9865, with a standard deviation of 2.48719 and a smaller standard error mean of 0.48778, from a larger sample size of 26.

In the school year 2023-2024, the trend reversed. The mean retention rate for communes in the Village Hive Project dropped to 98.3230, with a higher standard deviation of 3.27127 and a standard error mean of 1.03447. Meanwhile, communes not in the project demonstrated a higher mean retention rate of 99.7408, with a standard deviation of 2.21800 and a standard error mean of 0.43499, based on the same sample size of 26. These statistics highlight slight differences in retention rates between the two groups over the two academic years.

**Table 14: Group Statistics** Comparison of Retention Rates Between Participating and Non-Participating Communes in the Village Hive Project

| | Participating and Non-Participating Communes | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Retention Rate in the School Year 2022-2023 | Communes in Village Hive Project | 10 | 101.1940 | 2.58799 | 0.81839 |
| | Commune not in Village Hive Project | 26 | 100.9865 | 2.48719 | 0.48778 |
| Retention Rate in the School Year 2023-2024 | Communes in Village Hive Project | 10 | 98.3230 | 3.27127 | 1.03447 |
| | Commune not in Village Hive Project | 26 | 99.7408 | 2.21800 | 0.43499 |

Based on the independent samples test, the comparison of retention rates between communes participating in the Village Hive Project and those not participating for the school years 2022-2023 and 2023-2024 shows no significant differences. For the school year 2022-2023, Levene's test for equality of variances yielded an F value of 0.126 with a significance of 0.724, indicating equal variances between the two groups. The t-test for equality of means, assuming equal variances, produced a t-value of 0.222 with 34 degrees of freedom and a p-value of 0.826, suggesting no significant difference in retention rates between the groups. When equal variances were not assumed, the t-test result remained similar, with a t-value of 0.218 and a p-value of 0.830.

For the school year 2023-2024, Levene's test showed a significance of 0.049, indicating unequal variances between the groups. The t-test for equality of means, assuming equal variances, produced a t-value of -1.500 with 34 degrees of freedom and a p-value of 0.143, suggesting no significant difference in retention rates. When equal variances were not assumed, the t-value was -1.263 with 12.325 degrees of freedom and a p-value of 0.230, also indicating no significant difference. The mean difference for both years was close to zero, and the 95% confidence intervals suggested no substantial variation between the two groups in terms of retention rates.

**Table 15: Independent Samples Test** for Retention Rates in the Village Hive Communes and Non-Village Hive Commune

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Equal variances | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Retention Rate in the School Year 2022-2023 | Assumed | 0.126 | 0.724 | 0.222 | 34 | 0.826 | 0.20746 | 0.93557 | -1.69384 | 2.10876 |
| | Not Assumed | | | 0.218 | 15.812 | 0.830 | 0.20746 | 0.95273 | -1.81419 | 2.22911 |
| Retention Rate in the School Year 2023-2024 | Assumed | 4.182 | 0.049* | -1.500 | 34 | 0.143 | -1.41777 | 0.94503 | -3.33829 | 0.50276 |
| | Not Assumed | | | -1.263 | 12.325 | 0.230 | -1.41777 | 1.12220 | -3.85570 | 1.02016 |

## 5. Conclusion and Recommendation

### *5.1 Conclusion*

#### *5.1.1 Village Hive Project and Retention Trends*

Cambodia's educational landscape reflects a mix of commendable progress and persistent challenges. The rise in net enrollment rates and a gross enrollment rate of 111% highlight significant strides in expanding access to education. These figures suggest success in drawing diverse groups, including overage or previously out-of-school children, into the system. However, this rapid expansion has placed strain on educational resources, particularly in underserved areas such as those targeted by the Village Hive Project, raising concerns about sustaining educational quality and retention.

The inclusivity implied by the high gross enrollment rate is a positive indicator, yet it introduces complexities in retention. Older students or those re-entering the system often face unique barriers, such as financial constraints, learning gaps, or social pressures, which may challenge their ability to continue their education. These retention challenges align with broader systemic issues exacerbated by the lingering effects of the COVID-19 pandemic, economic disparities, and national policy shifts, all of which influence retention rates across the education sector.

The Village Hive Project, aimed at improving infrastructure, curriculum, and teacher capacity, seeks to address these systemic challenges. However, analysis of retention rates during the academic years 2022-2023 and 2023-2024 reveals a complex situation. While retention rates declined across all schools—from an average of 101.04 in 2022-2023 to 99.35 in 2023-2024—Village Hive schools experienced a more pronounced drop. By 2023-2024, retention rates in Village Hive schools averaged 95.89, compared to relatively stable rates in non-participating schools. This divergence underscores the difficulty of achieving measurable impact amidst broader systemic and external pressures.

***Statistical Analysis and Variability:*** Independent samples analyses confirm a significant divergence in retention rates by 2023-2024, with Village Hive schools showing greater variability and more pronounced declines. Paired samples analyses reveal significant year-over-year decreases in retention rates for all schools, further highlighting the pervasive nature of these challenges. The heightened variability in Village Hive schools likely stems from factors such as inconsistent implementation of interventions, regional disparities, and socioeconomic challenges.

***Grade-Level Trends:*** Retention challenges were particularly pronounced in specific grades, such as Grade 2 and Grade 4, within Village Hive schools. These variations suggest the need for targeted interventions tailored to the developmental and academic needs of different age groups. For instance, younger students might benefit from enhanced parental engagement and foundational skill-building, while older students may require academic support and curriculum adjustments.

***Comparative Commune Analysis:*** When comparing retention rates in communes participating in the Village Hive Project to those in non-participating communes, no significant differences were observed. While Village Hive communes performed slightly better in 2022-2023, the trend reversed in 2023-2024, with these communes experiencing steeper declines. This reversal highlights the influence of broader systemic and external challenges that may outweigh the immediate effects of the project's interventions.

#### *5.1.2 Systemic Challenges and Long-Term Impacts*

The retention trends observed in the schools analyzed reflect a broader struggle to balance rapid enrollment growth with the need for quality and sustainability. The Village Hive Project's interventions, while promising, require time to address entrenched issues such as resource disparities and implementation gaps. External factors, including the economic aftershocks of the pandemic and regional educational policies, further complicate efforts to stabilize retention rates.

Addressing these challenges calls for a dual approach: enhancing the effectiveness of targeted interventions like those of the Village Hive Project and aligning them with systemic strategies to address external pressures. Infrastructure improvements, curriculum development, and teacher training are long-term investments that will likely yield more stable retention outcomes as they mature.

Cambodia's education system is at a critical juncture. The Village Hive Project exemplifies efforts to tackle systemic challenges, yet its success depends on sustained implementation and the mitigation of external influences. Broader educational reforms and targeted support for vulnerable groups are essential to ensure that the benefits of expanded access to education translate into meaningful, long-term retention gains.

### *5.2 Recommendation*

Based on the analysis, several recommendations can be made to strengthen the impact of the Village Hive Project and improve retention rates:

***Extended Monitoring and Evaluation:*** It is crucial to continue tracking retention rates over a longer period. A more detailed, longitudinal study will help identify the long-term effects of the project's interventions and allow for a clearer understanding of how retention patterns evolve as improvements are more fully integrated. Additionally, regular monitoring should assess other potential factors affecting retention, such as socio-economic conditions or changes in local education policies.

***Addressing Deeper Systemic Issues:*** While the Village Hive Project has improved school infrastructure and resources, the higher variability in retention rates suggests that deeper systemic challenges may persist in some schools. It would be beneficial to conduct a more thorough needs assessment in the Village Hive schools to identify specific barriers to student retention, such as socio-economic factors, teacher quality, or student engagement. Tailored interventions that address these root causes could enhance the project's effectiveness.

***Targeted Support and Professional Development:*** Given that Village Hive schools may have initially faced more severe challenges, it may be helpful to focus on additional support for teachers, school leaders, and staff. Providing ongoing professional development, particularly in areas such as student engagement, classroom management, and retention strategies, could help sustain improvements in retention rates. Encouraging teacher collaboration and the sharing of best practices between Village Hive and Non-Village Hive schools could also lead to better outcomes.

***Community Engagement and Involvement:*** Engaging with the broader community, including parents and local leaders, may improve retention rates. By fostering a more supportive learning environment both at school and within the community, retention may improve. Programs designed to involve parents in the education process—such as regular school events, workshops, or communication initiatives—can help create a more cohesive support system for students.

***Refinement of Intervention Strategies:*** The findings indicate that while infrastructure and resource improvements are essential, they may not be sufficient on their own to ensure better retention outcomes. The Village Hive Project should consider refining its strategies to include more comprehensive interventions, such as tailored student support services, extracurricular activities to boost engagement, and more focused retention policies. By creating an environment that supports both academic and socio-emotional development, retention rates may improve more significantly.

***Enhanced Early-Grade Interventions:*** Retention challenges in lower grades, such as Grade 2, point to a need for specialized support in foundational education. Introducing programs that focus on literacy, numeracy, and student readiness during these critical early years can help build a stronger foundation. Initiatives such as early-grade reading interventions, parental involvement in learning, and play-based learning approaches may address retention issues at their root and foster long-term engagement.

***Focus on Student-Centric Learning Environments:*** Retention could be influenced by the degree to which schools create environments that cater to diverse student needs. Encouraging differentiated instruction, integrating technology for personalized learning, and fostering inclusive classroom settings could make education more engaging and accessible. A focus on active learning techniques and peer collaboration may also promote a sense of belonging among students.

***Data-Driven Decision Making:*** Finally, the project should continue to use data to inform decisions and refine its approach. Regular data collection on retention rates, student satisfaction, teacher feedback, and community involvement will provide valuable insights. This will allow the Village Hive Project to adjust its interventions dynamically and ensure that the right strategies are being implemented to achieve sustainable improvements in retention.

By taking these steps, the Village Hive Project could increase its chances of achieving long-term improvements in retention rates and the overall educational experience for students in the participating schools.

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