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The Effectiveness of Digital Tools on Student Engagement in Primary Classrooms

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ABSTRACT

This study looks at how digital tools work to get students excited about learning at the Junior Campus of private primary schools. The study was done over four weeks at this school, which has a lot of resources. We wanted to see how different kinds of tools like tablets and computers, projectors, audio and video tools, educational apps and websites and robotics affect how students, in Grades 1 to 3, behave, feel and think when they learn. The Junior Campus of this school is a special place to do this study because the classes are small, they have good technology, the staff is well-trained, and most of the students come from families that already have digital devices at home. Data were collected via a mixed-methods action research design through structured classroom observation, a teacher reflection journal, student engagement surveys, and samples of student work. Results indicate that all five categories of digital tools significantly improved student engagement over traditional instruction, with educational apps and robotics having the strongest effects on students' active learning engagement. The study ends with some context-sensitive recommendations for educators in private Junior Campus environments, aiming to optimise technology integration to optimise learning impact.

Keywords: *Digital tools, student engagement, action research, tablets, projectors, audio-visual tools, educational apps, robotics, technology integration, primary education.*

INTRODUCTION

The current educational context is defined by a peculiar status of private schools in terms of technology integration. Unlike public schools, private schools, especially those with dedicated Junior Campus facilities for early primary learners, often have the financial resources and institutional agility to invest in cutting-edge digital infrastructure, offer continuous training of the teaching staff, and maintain manageable student-to-device ratios. These conditions are a chance for us to do things right. They are also something we have to do. We have the chance to show people how to use technology in the best way with the best methods. We have to model practices in the use of educational technology. The need to show, via rigorous research, that investments in digital lead to real gains in student engagement and learning. It is in this setting that the current standard action research study was developed and carried out. The researcher, who was both a classroom teacher and professional researcher at the Junior Campus of a private primary school, noticed

that although the school had invested heavily in digital tools throughout all year levels, there was little systematic evidence (beyond anecdotal teacher observation) of how, and how well, these tools were affecting student participation on a day-to-day basis. The gap between what the institution could offer and what the evidence actually showed us made us realize we needed a proper, study-like approach to figure things out.

Research Questions

This study is guided by the following research questions:

- To what extent do digital tools enhance student engagement among Junior Campus learners in a private school setting?
- Which specific digital tools, tablets and computers, projectors, audio-visual tools, educational apps and platforms, and robotics produce the highest levels of student engagement in this context?
- How do the unique characteristics of the private school Junior Campus environment shape student responses to digital tools?
- What practical challenges and enabling factors affect the effective use of digital tools among early primary learners in a well-resourced private school?

Significance of this study

This study focuses on something that hasn't been explored much in education research: teachers looking into their own practice in private primary schools. Most research on technology in schools looks at public schools, but not many studies zoom in on private schools specifically. This is worth paying attention to because private schools often have better resources, which can mean both bigger opportunities and bigger responsibilities when it comes to using digital tools with students. The goal of this study is to be genuinely useful not just for researchers, but for everyday classroom teachers, curriculum coordinators, and school leaders working in similar private primary school settings. It's also meant to help university students who are training to become teachers and will likely be working in schools where technology plays a big role.

LITERATURE REVIEW

What Do We Mean by Student Engagement?

So what is student engagement? It's not one thing. It has three parts: how students act, how they feel and how they think. Behavioural engagement is about what you can see. Is the student paying attention? Are they joining in? Finishing their work? Emotional engagement is about whether students enjoy learning and feel like they belong. Cognitive engagement is about how students are thinking and how much effort they're putting in. All three of these matter a lot for students. They shape how children see themselves as learners and whether they grow to love learning over time.

Do Digital Tools Actually Help Students Engage?

Research says digital tools can help students engage. Only when used the right way.

These tools can boost motivation, help teachers cater to learners and make lessons more interesting. Just having technology in the classroom doesn't automatically mean students will be more engaged. What really

matters is how the teacher uses it. In schools, where there's usually better equipment and more training, the chances of getting technology right are higher. That still has to be done on purpose, not taken for granted.

What's Different About Private Schools?

Private primary schools, those with a Junior Campus, tend to have smaller classes, more devices, better facilities and tech support staff. All of this makes it easier to use technology in a personalised way. But researchers are clear: having resources doesn't automatically mean students will be more engaged. Without teaching, even the best technology can be a distraction.

That's why studying at school Junior Campuses is valuable. It lets us see what's possible when money and resources aren't a problem.

Specific Digital Tools Used in Junior Campus Settings

Tablets and Computers

Tablets and computers are common in resourced private primary schools. Research shows that when used with tasks and teacher guidance they help students learn at their own pace. This is especially helpful in the years when students can vary a lot in their reading and math abilities. Tablets are also easy for young children to use because of the touchscreen.

Projectors and Interactive Displays

Modern private school classrooms have projectors or interactive screens.

Research shows that displaying content visually helps young learners pay attention and understand concepts better. Teachers can also use these screens to show students how to do something on a device.

Audio-Visual Tools

Videos, animations and multimedia content work well in education. Research tells us that when information is delivered through sound and visuals, students understand it better and remember it longer.In schools, well-chosen videos and multimedia content can connect what students already know with what they're learning.

Educational Apps and Digital Platforms

Apps and online learning platforms are becoming popular in classrooms. Apps with game features, such as earning badges or getting feedback, keep young students motivated and focused. Private schools with Wi-Fi and one device per student can use these platforms for practice and working together.

Robotics

Robotics might seem advanced for children, but research shows it's a great way to build skills, like problem-solving and teamwork. Private schools often introduce robotics because they can afford the kits and dedicate time to it. Robotics is hands-on, fun and social, which means it often reaches students who struggle with lessons.

METHODOLOGY

Research Design

This study's methodology is action research through the cyclic model of planning, acting, observing and reflecting by Kemmis & Mc Taggart (1988). The action research methodology has been selected as the best process to utilize for the research of this study due to its basis in authentic classroom practice, being directly responsive to local needs identified by the participants, and producing findings that can be applied immediately to the improvement of teaching/learning within the context being studied. The action research design is particularly appropriate for the private Junior Campus because it allows teachers a certain degree of professional autonomy in the curriculum as well as the ability to complete systematic classroom-level inquiries.

Research Setting

The Junior Campus of a private co-educational school in Australia conducted an educational study. The Junior Campus provides facility, equipment, equipment and services specifically for children in grades 1-3 (approx. grades 1 - 8), with a purpose-built classroom, age-appropriate outdoor facilities for learning and developmental activities, and a library / technology facility specifically designed for The Junior Campus. The Junior Campus is a private fee-paying school that is registered with the appropriate national education authority. The junior school is committed to an innovative approach to education through the integration of digital literacy into all areas of learning starting in their first year of formal education.

Participants

All participants in the study were Grade Two students aged seven to eight years old (24) in a single Grade Two classroom comprised of 13 girls and 11 boys who had varying resources, ability levels and learning styles. Many of these children had access to digital devices in their homes which was consistent with the demographic profile of the school's catchment area community. Of the 24 students surveyed, 75% (18) reported they owned their own personal tablet device or device, and all students were already familiar with using a touch-screen device prior to the start of the study. Parents gave their written consent for students to participate in this study, and the Principal of the school gave his written Institutional Approval for the study to take place.

Duration and Implementation Schedule

For a period of four consecutive school weeks, the school incorporated the intervention into regular classroom activities and did not offer it as an additional or separate session from the regular classroom activities. Each week of the study demonstrated how students used various types of digital tools. Each week also had one common element, which was to keep the curriculum content the same throughout the entire study so that the measurement of student engagement could be based on reliable comparisons.

- Week One included the use of tablets and computers in literacy and numeracy lessons.
- Week Two included the use of audio-visual technologies (projector, etc.) for Science and Humanities and Social Science (HASS) classes.
- Week Three included the introduction of educational apps and online digital platforms for formative assessment and collaborative learning experiences.

- Week Four included the integration of robotics in STEM lessons and application of cross-curriculum in Mathematics and English.

Data Collection Instruments

The data were gathered using 4 instruments that could work together to give a better understanding of what was happening in the study by using multiple methods of data collection.

The following instruments were used to collect data:

- Structured Observation Checklist: The researcher used this checklist to take notes regarding certain observable behaviors which indicated students were engaged during their lessons. Some of the behaviors included: on-task behavior, voluntary participation, peer interaction and persistence with tasks.

- Teacher Reflection Journal: The researcher kept a journal for daily reflections. Here, the researcher documented observations of the students, any themes that emerged, noteworthy student responses and critical thinking about their instruction.

- Student Engagement Survey: This survey was given to students in the first week and in the last week of the study. The researcher used a simplified 5-point Likert scale with visual prompts (smiley faces) and written descriptions so that the survey items would be accessible to Grade 2 students.

- Student Work Samples and Activity Records: The researcher used these to collect samples of students' work weekly to assess the quality, creativity and depth of students' products during technology-integrated activities.

Data Analysis

The quantitative data collected from student engagement surveys were analyzed using descriptive statistics, including the mean and percentage change between pre and post-intervention responses. Qualitative data collected from the observation checklist and teacher reflection journal was analyzed using inductive thematic analysis, with codes and themes being assigned based on the data rather than a priori. Triangulation of the quantitative and qualitative data sources was used throughout the study to lend credibility and trustworthiness to the findings.

Ethical Considerations

The ethical guidelines of the standard federal educational research framework were followed in this research study. Informed consent was obtained from the parent(s) / guardian(s) of each participant. Students were informed that participating in the research study was entirely voluntary and any participation or non-participation will have no impact on their standing and/or experience in the school. All data collection instruments were reviewed and approved by the school's administration prior to being administered to students. All student names were replaced with pseudonyms during the data collection and storage process. All raw data were stored in a secure password protected digital folder that is accessible only by the researcher.

RESULTS AND DISCUSSIONS

Overview Engagement Findings

The results of the surveys conducted before the implementation of the intervention showed a moderately high level of engagement at baseline in this classroom, which would be expected in a private school setting where resources are abundant. The average level of engagement for all indicators at the beginning of the study was 3.4 out of 5; this indicates that, on average, students are engaged at a rate of over 70%. This baseline result is significantly higher than the average engagement level found in comparable studies conducted in public education settings. This high starting point may be due to the fact that students in this classroom have been using technology for quite some time; thus, they are comfortable with technology. Additionally, this classroom has a long-standing tradition of inquiry-based and interactive learning. After implementing the intervention for four weeks, the mean engagement level increased to 4.6 out of 5, a 35.3% increase from the already high level of engagement that was established prior to starting the current study**.**

The data obtained through behavioral observation supported and added to the survey results. On-task behaviour, voluntary verbal participation, student initiated peer collaboration, and the number of student generated questions all displayed a steady improvement over the four weeks. Journal entries made by the teacher also showed a distinct change in the overall classroom atmosphere as time went on. In the third week of the program, many students were taking the initiative to request that digital experiences continue after completion of class, and many students were also independently relating the technology tasks completed in class with their life experiences, both in the home and the larger community at large**.**

Engagement by Digital Tool Category

Tablets and computers –Week 1

Students' engagement immediately increased when tablets were introduced at the beginning of Week 1, especially when it came to perseverance in finishing individual assignments and autonomous work. In comparison to non-technology classes evaluated during the baseline period, the students used tablets at a significantly greater level of engaged time. Both advanced and developing pupils benefited from the opportunity to self-pace, or work at a personalised tempo when completing reading or numeracy assignments. When using tablets, students who previously needed constant reminders from their teachers were able to work independently for longer stretches of time.

The Teacher Reflective Journal said that three out of 24 students acted inappropriately by using their device in a way that wasn't assigned on the first day. By Day 2 of integrating tablets, the inappropriate behaviour on devices was almost eliminated! This supports research indicating that in order for students to effectively use tablets in the primary classroom, specific and clear behavior protocols must be present (Falloon, 2013), even in the case when students already have prior digital experience**.**

Projectors and Audio-Visual Tools – Week 2

The ability of excellent visual and audio-visual presentations to increase class participation was shown in Week 2. Compared to baseline classes, lessons presented on the interactive projector screen produced much greater rates of voluntary engagement during class discussions. With fewer instances of off-task behaviour and better eye contact with the display screen, students were clearly more engaged throughout the projected content. Students who usually struggled to maintain concentrate during teacher-led training seemed to be especially drawn in by the dynamic, visually rich quality of projected information**.**

Audio-visual content — including a curriculum-aligned animated documentary used in the Science unit on living things, and a set of narrated historical image sequences used in HASS — produced the most emotionally engaged student responses of the week. Students reacted with visible enthusiasm, asking detailed follow-up questions and, in several instances, requesting to revisit specific segments of video content to verify information they had discussed with a peer. This level of motivated re-engagement with learning content is a particularly meaningful indicator of deep cognitive Engagement.

Educational Apps and Digital Platforms- Week 3

The Week 3 intervention, which emphasised the use of educational games and apps, also produced the greatest overall cohort engagement statistics of the four-week trial. The gamified reading comprehension and math app used in this week produced high levels of motivation. Students demonstrated intrinsic goal-directed behavior (e.g., voluntarily repeating tasks, striving for a higher score, and self-monitoring their progress) in a manner that was infrequent during non-technology lessons. Students also appeared to react positively to immediate feedback in the form of in-app correction for errors by using them as an opportunity to learn rather than to be discouraged. Through the use of collaborative platform activities , students were able to produce shared digital work on the class's projector screen and inspire an incredibly high amount of peer interaction and deep academic discussion. The use of a digital platform in this study allowed students to participate in an anonymous or semi-anonymous way, thereby allowing those students who were typically reluctant to verbally participate in class discussions to do so confidently. These findings provide important insight regarding how educational technology can help to support equitable participation for students with social anxiety who do not feel comfortable within a traditional classroom setting.

Robotics – Week 4

The collaborative nature of the robotics activities — with students working together in groups of three or four to program and control their robots — encouraged students to foster higher-level interpersonal dynamics such as negotiations, allocating roles to each group member, mentoring one another, and collectively celebrating their successes. The teacher reflection journal contained multiple examples of students spontaneously developing cross-curricular connections to their robotics projects — e.g., use of mathematics to determine the distance traveled by their robot; use of the robot's journey for creative writing; and discussion of the use of robotic technology in real-world settings like industry and medicine. These unprompted interdisciplinary connections serve as an excellent indicator of deep cognitive engagement and intrinsic motivation towards intellectual curiosity.

DISCUSSION

This research project had good evidence from three different sources of data collection; they were all consistent in supporting the claim that implementing digital resources into a classroom at the Junior Campus of a Private Primary School greatly increased student engagement during a four-week period. By examining multiple viewpoints, we found concrete relationships between using technology as a pedagogical tool to support student engagement with curriculum content**.**

The high level of engagement achieved on the above tools and the very positive engagement level demonstrated by the user base in relation to each of the 5 tool categories exemplifies the respective advantages of the context of the private Junior Campus — well-established infrastructure, class sizes that are conducive to learning, students who have experience working digitally, and an established culture of innovation and inquiry. Furthermore, it is worth noting that the challenges experienced by teachers in these contexts — such as managing high levels of expectation from their students, designing digital tasks that meet the individual needs of their students, and staying in contact with parents — provide important

reminders that the availability of resources does not remove the necessity for teachers to be reflective and thoughtful in their teaching practice**.**

CONCLUSION AND RECOMMENDATIONS

The results of an action research project at a private primary school demonstrate the effectiveness of using purposeful integration of digital tools to enhance student engagement in the behavioural, emotional, and cognitive domains. The findings show that all five types of digital tools — including tablets/laptops/computers, projectors, audio/visual tools, educational apps and platforms, and robotics — resulted in significant increases in student engagement, which were measured in an environment with already high levels of student motivation and familiarity with digital technology. Educational apps and robotics were identified as the most influential contributors to developing deep, intrinsically motivated engagement among students. The use of projectors and audio/visual tools was identified as particularly successful in maintaining students' attention and emotional connection to curriculum content within the context of whole-class instruction.

The researchers concluded that the combination of outstanding infrastructure, small classes and intentional reflective teaching creates the exceptional conditions for successful research in an exclusive Junior Campus. The researchers also stated that simply having an abundance of resources does not guarantee the achievement of sustained academic success. Sustained engagement success will require ongoing teacher inquiry, instructional design that responds to student needs and evidence-based professional development practices.

RECOMMENDATION

This is a set of recommendations intended for educators, curriculum leaders and administrators working at private junior campuses**:**

- Integrate robotics into every subject area: Robotics provides extremely high engagement compared to general STEM engagement. Schools should no longer offer robotics programming only as stand-alone STEM sessions and should move toward providing meaningful integration of robotics into other subject areas such as English, Mathematics and the Arts.

- Invest in high-quality educational apps: Not all educational apps yield the same level of increased engagement. Schools should have a formal process for identifying and keeping only educational apps that yield authentic cognitive engagement as opposed to superficial gamification. The process should include teachers' input as well as input from the technology integration specialist and the students.

- Use projectors in an interactive (rather than passive) manner by having students contribute to, and interact with, projected material instead of just passively observing the display of projected material. Professional development for teachers should focus on building the capacity of teachers to support whole-class technology use in an interactive manner**.**

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