JOURNAL OF EDUCATIONAL RESEARCH & PRACTICE

Journal of Educational Research & Practice
2022, Volume 12, Issue 1, Pages 94–110
DOI: 10.5590/JERAP.2022.12.1.08

Original Research

WALDEN UNIVERSITY

Elementary Teachers' Use of 1:1 Tablets in Lesson Planning and Presentation on a Western Pacific Island

Sinton Soalablai, EdD
Regional Educational Laboratory (REL) Pacific, Republic of Palau
https://orcid.org/0000-0003-1224-0725

Andrea M. Wilson, PhD
Walden University, Minneapolis, Minnesota, United States
https://orcid.org/0000-0002-1471-654X

Beate Baltes, EdD
Walden University, Minneapolis, Minnesota, United States
https://orcid.org/0000-0001-9225-5307

Contact: *ssoalablai@mcrelpalau.org*

Abstract

The Ministry of Education on a Western Pacific island invested in an expensive 1:1 tablet program providing elementary teachers and students with a tablet but had not determined if the program produced desired positive changes in the teachers' instructional practices of lesson planning and lesson presentation. Guided by experiential learning theory, this causal–comparative study's purpose was to determine if the 1:1 tablet program resulted in changes in elementary teachers' use of technology in their lesson planning and lesson presentation practices. We analyzed pre and postimplementation lesson planning and lesson presentation data, collected from 63 elementary teachers, using repeated measures *t*-tests. Results showed teachers' use of technology in lesson planning and lesson presentation increased significantly following implementation of the 1:1 tablet initiative. These findings suggest that the 1:1 tablet program created an environment that positively supported technology-driven instruction for teachers as well as students. In light of these results, the 1:1 tablet program appears to be a worthwhile initiative for the education system on the island that should be continued and possibly expanded even if public financial resources are scarce.

Keywords: *1:1 tablets, lesson planning, lesson presentation, elementary education, Western Pacific Island*

Date Submitted: November 11, 2021 | Date Published: June 10, 2022

Recommended Citation

Soalablai, S., Wilson, A. M., & Baltes, B. (2022). Elementary teachers' use of 1:1 tablets in lesson planning and presentation on a Western Pacific island. *Journal of Educational Research and Practice, 12*, 94–110. https://doi.org/10.5590/JERAP.2022.12.1.08

Note: Sinton Soalablai, EdD, conducted this study while affiliated with Walden University as a doctoral candidate.

Introduction

The Ministry of Education on a Western Pacific island (MOEWPI) is a governmental agency for a small and isolated island school system with 3,100 students and 280 teachers who are part of a population of 20,000 people (MOEWPI, 2018). MOEWPI spent $750,000 on a 1:1 tablet program, which provided a tablet to each teacher and each student at the elementary school level. The elementary school covers grades 1 to 8 for ages 6 to 13 years old, and high school includes grades 9 to 12 for ages 14 to 17 years old (MOEWPI, 2018). This initiative was poised to become the MOEWPI's primary technology effort over the upcoming years, but the level of teachers' use of technology for lesson planning and lesson presentation had not been determined by MOEWPI leadership prior to this study. The present study addressed this gap in applied research and practice for the MOEWPI by investigating whether teachers' use of technology in lesson preparation and presentation changed after the rollout of the 1:1 tablet program. Results of this study aided MOEWPI in determining the success of the initiative to allow for meaningful prioritizing of funds and other resources.

The MOEWPI (2017b) leadership sought to implement an ambitious 10-year Master Plan 2017–2026 in which key priorities compete for limited financial resources. In the plan, technology for curriculum improvements received 30% of the available funds, whereas pedagogical in-service training for teachers received only 7% based on internal financial records. Teacher training and development are shown to be more critical to student success than technology (Lawrence et al., 2018). This is true especially in isolated or underserved school districts like the MOEWPI, where most teachers (92%) have little to no formal teacher training requiring them to learn instructional pedagogy and methodology while on the job or through in-service training. Consequently, pedagogical in-service training would seem to be a more urgent need for immediate funding, which might require a more substantial proportion of available resources to undertake (Ra et al., 2016; Wade et al., 2013) than other initiatives, thereby contesting the funding allocations of the current 10-year Master Plan. Thus, to justify the high percentual allocation of funds to the 1:1 tablet program, the MOEWPI leadership needed to determine if teachers were sufficiently using the tablets to work with students.

With the 1:1 tablet initiative, the MOEWPI leadership attempted to bring itself to the forefront of educational technology in the region and, therefore, provided 163 elementary teachers and their students with a tablet. The MOEWPI's director of curriculum and instruction stated that the intent of the 1:1 tablet initiative was to increase the level of technology used by teachers in lesson planning and lesson presentation and continue to provide students with reinforcement and practice activities using modern devices instead of the increasingly outdated computer labs. The 1:1 tablet program was implemented with the assumption that teachers would learn, prepare, and present their lessons through experience from using the tablets. According to the MOEWPI's director of curriculum and instruction, in this sense, the 1:1 tablet program depended somewhat on experiential learning (see Kolb, 1984) to increase teacher use of technology in lesson planning and presentation. However, the results of this initiative were unknown prior to completion of the present study.

Literature Review

Teachers' use of technology in the classroom is directly linked to experiential learning. Teachers must learn by doing. They must first learn to use the technology themselves; then they learn to apply, adjust, and extend that use within the day-to-day operations of the classroom (see Kay & Ruttenberg-Rozen, 2019; Paulus et al., 2020; Starkey, 2020). Therefore, Kolb's (1984) experiential learning theory (ELT) was employed as the theoretical lens through which to investigate whether the 1:1 tablet program produced changes in the level of teachers' use of technology in lesson planning and presentation. ELT is a concept of learning whereby learners learn from experience and apply them in a real-world situation (Bishop et al., 2015; Chorazy & Klinedinst, 2019; Paulus et al., 2020). As such, the learning cycle model of the ELT applies to all learning contexts (Kolb & Kolb, 2018) and is the model that guided the implementation of the MOEWPI's 1:1 tablet program.

Prior to initiation of the program that is the focus of the present study, MOEWPI teachers and students had limited access to 1:1 technology and other technology-based instructional supports. To address this access issue, a 1:1 tablet program was implemented to ensure every MOEWPI elementary teacher and student had access to technology that would enhance teaching and learning. Access is critical for the success of any program or model (Harris et al., 2016; Solano et al., 2017; Statti & Torres, 2020). Yet, the primary challenge is not merely the availability of the technology in the classroom but how teachers use and integrate it to improve their instructional practices (Kalonde, 2017). With the implementation of the 1:1 tablet program across all elementary schools and the supportive elements that accompanied the rollout, MOEWPI leaders anticipated improvement in the teachers' use of technology that would reinforce their instructional efforts with students.

1:1 Technology Use in Schools

The speed with which schools in the United States and many parts of the world implement technology in education environments continues to increase (Aufenanger, 2015; Breyer, 2020; Cole & Sauers, 2018; Holen et al., 2017; Tinmaz & Ozturk, 2019). Several reviews of research and empirical studies (e.g., Fleischer, 2012; Harper, 2018; Paulus et al., 2020; Starkey, 2020; Sung et al., 2016) have examined how various technologies affect teachers' and students' learning and technology use in the classroom. Like other forms of technology, 1:1 technology, whereby each teacher and each student have their own device, is changing the way teachers teach and students learn. Individual technology is known to increase student engagement, collaboration, teacher–student interaction, and personalized learning (De Bruyckere et al., 2016; Harper, 2018; Soffer & Yaron, 2017; Wright, 2018). If technology is well designed and applied, it offers many benefits to student learning and teacher performance and can expand and amplify teaching practices (Office of Educational Technology [OET], 2017). Technology in schools has changed how students learn beyond teacher instruction and textbooks as well as how teachers assess students (Kalonde, 2017). Mobile technology has unique advantages for supporting interactive activities where technology applications provide teacher-to-student and student-to-student interactions in terms of mobility and functionality in creating a learning environment (Kim et al., 2019; Shamir-Inbal & Blau, 2016; Sung et al., 2016). Varier et al. (2017) added that 1:1 technology provides easy and quick access to learning that otherwise would be nearly impossible with dedicated computer labs.

With access to 1:1 technology, teachers and students are experiencing shifts in their roles. Harper (2018) concluded that technology encourages collaboration between teachers and students. Collaboration between teachers in the same classrooms, the same school, or other classrooms around the world is now possible with technology and that technology allows the opportunity to improve communication, teaching, and learning (Harper, 2018; Raja & Najmonnisa, 2018; Soffer & Yaron, 2017). Students have changed the way they access knowledge, while teachers have shifted their role to be facilitators for learning (Gherardi, 2017; Varier et al., 2017).

Technology encourages independent learning provided teachers receive adequate training and experience with the device and technology use is reflected in teachers' lesson planning and instructional practices. With the assistance of technology, teachers can more easily provide personalized learning that meets the needs of different student learning styles and different abilities; however, this approach may take time and considerable technical and pedagogical knowledge (Blundell et al., 2020; Byers et al., 2018). Wright (2018) asserted that personalized learning allows more free time and resources for teachers to work one-on-one with each student when they are not on computers. Technology encourages individual learning and reflection, where students can learn useful lifelong skills (Kopevev et al., 2020; Sert & Boynuegri, 2017; OET, 2017).

Barriers to Successful Implementation of 1:1 Technology

Several barriers exist in the 1:1 technology implementation. Fransson et al. (2018), Jack and Higgins (2019), Soffer and Yaron (2017), and others identified barriers that must be overcome in 1:1 technology

implementation, challenges that remain relevant to the success of any 1:1 technology program today. The barriers identified included time, access, resources, expertise, and support. To date, researchers continually find similar barriers to successful 1:1 technology implementation in schools (Fransson et al., 2018; Harper, 2018; Harris et al., 2016; Jack & Higgins, 2019; Lawless, 2016; Lewis, 2016; McClure & Pilgrim, 2020; Nicholas & Fletcher, 2017; Paulus et al., 2020; Soffer & Yaron, 2017; Swallow, 2015).

According to Kalonde (2017), technology access is just the beginning. For example, Natia and Al-hassan (2015) investigated the extent to which school administrations promote teaching and learning through the use of technology in Ghanaian Basic Schools. They found that while Ghana public schools already had a technology policy in place, the challenges were the lack of adequate infrastructure and teacher training on integrating technology in schools. Moreover, Niederhauser and Lindstrom (2018) indicated that overcoming the barrier of technology access is not sufficient to produce meaningful change in instructional pedagogy. Ditzler et al. (2016) stated that teachers' knowledge, unfamiliarity, and comfort level with technology influence how they use it in the classroom. As such, teachers need time to learn, experience, and reflect on the technical and pedagogical uses of technology, which is consistent with Kolb's (1984) experiential learning theory.

Challenges in education systems include the absence of leadership visions, teacher training on technology, and classroom support for teachers (Dinc, 2019; Niederhauser & Lindstrom, 2018; Paulua et al., 2020; Sheppard & Brown, 2014; Tosuntas et al., 2019). Limited access to the internet and lack of instructional devices can prohibit teachers from using technology in the classroom (Barbera et al., 2015). While good teaching goes beyond merely presenting information to students, support from the district leadership as well as professional development is essential to the success of any 1:1 technology program (McClure & Pilgrim, 2020; Niederhauser & Lindstrom, 2018; Paulus et al., 2020; Williams-Britton, 2021).

Leadership in Technology Implementation

While technology becomes ubiquitous in the schools, the role of the school leaders needs to change if they are to meet the demands of the new learning environment. School leadership is a critical component to guide the teaching-learning process and prepare students with relevant 21st-century skills for an economically driven, global workplace (Niederhauser et al., 2018). For example, in a phenomenological study that explored school superintendents' perceptions related to 1:1 initiative, Cole and Sauers (2018) highlighted themes related to vision by focusing on infrastructure and providing needed support for teachers and students before the rollout. Leaders need to create a vision with relevant stakeholders to meet the needs of all learners (Fleischer, 2012; Lamb, 2018; Niederhauser et al., 2018) that emphasizes the development and training of new pedagogies with 1:1 technology (Lawless, 2016). In addition, school leaders need to nurture a culture of growth and change that is beneficial to students and teachers.

Simply adding technology in the classrooms will not change the teaching and learning culture that may lead to improvement (Niederhauser et al., 2018). By creating a culture of teaching, whereby teachers and students interact with one another, with the technology and with the content, schools will make instructional delivery more meaningful than the curriculum alone (Mohale, et al., 2020; Soebari & Aldridge, 2015). Mitchell et al. (2016) asserted that having the technological resources available to teachers is not enough for them to know how those resources should work in the classroom. To overcome barriers to successful implementation of 1:1 technology programs, researchers posited that school leaders need to plan and carry out learning strategies to support teachers (Niederhauser et al., 2018; Paulus et al., 2020; Simmons & Martin, 2016), conduct reviews of the relevant literature (Chang, 2019), and provide cohesive policy implementation (Gherardi, 2017). According to Keane and Keane (2017), delegated leadership, adequate infrastructure, knowledgable teachers, and appropriate professional learning are drivers for the success of 1:1 technology initiatives.

Leaders need to provide a context where technology programs have the potential to change the instructional behavior of teachers (Niederhauser et al., 2018). The success of 1:1 and other technology initiatives is

dependent on the program's context (Fleischer, 2012; Niederhauser et al., 2018). Thus, the role of leadership is critical in helping teachers develop new learning experiences that create a safe culture and ideal classroom environment for students. As technology continues to increase in schools, school leaders must prepare for such an environment in the classrooms (Cole & Sauers, 2018). As student achievement remains the goal of 1:1 technology programs, leaders may focus on teachers in providing time for more experience in planning for student-centered learning (Francom, 2016). School leaders must, therefore, identify and implement an experiential teaching and learning framework that can create a safe space where teachers and students practice, experience, and reflect on what they learn with the 1:1 technology in a continuous cycle (e.g., Kolb, 1984; Morris, 2020). While school leaders are role models to all learners, Gherardi (2017) recommended that they model flexibility that allows teachers to be open with their frustrations with 1:1 technology initiatives. Leaders should approach this new learning environment with a holistic view.

Professional Development for Technology Integration

Professional development on the use of 1:1 technology is an essential strategy for supporting teachers' learning (Hall & Trespalacios, 2019; Paulus et al., 2020). One of the essential functions of school leadership is to address the ongoing availability of professional development for teachers; however, many teachers are not receiving professional development to support the use of technology. Yet, too often, school leaders provide teachers insufficient professional development and ongoing support in technology-driven practices; therefore, school administrators must understand how to effectively engage their teachers (Gonzales, 2020; OET, 2017; Zagami et al., 2018). According to a report from a U.S. sample of 1,200 teachers on technology in schools by The Common Sense, only 4 out of 10 teachers received professional development that supports their educational use of technology (Vega & Robb, 2019). Perhaps one of the most crucial obstacles to the success of 1:1 technology implementation in schools is a lack of adequate professional development of teachers.

To prepare students for college and career, teachers need to know more about various forms of teaching and pedagogies (Darling-Hammond et al., 2017). For 1:1 technology programs to be successful, teachers must continue to learn about effective technical and pedagogical approaches to using technology in the classrooms (Niederhauser et al., 2018; Paulus et al., 2020). Ongoing professional support is a crucial factor in a successful 1:1 technology implementation (Lewis, 2016). Professional development about 1:1 technology implementation has been a common theme among researchers (Hassler et al., 2018; Kim et al., 2019; Koh et al., 2017; Parrish & Sadera, 2018). As new technology continues to develop, the need for ongoing teacher development will never end.

Longstanding recommendations that emerged from prior research include providing instructional quality via technology and expecting teachers to effectively use technology (OET, 2017); however, teachers still face challenges with technology as an instructional tool. An enduring problem to 1:1 technology implementation is the lack of support for teachers. One-to-one technology implementation is a time-consuming endeavor that imposes additional workload on participants (Barbera et al., 2015); therefore, teachers need time to learn and support each other (Lamb, 2018). For example, creating an infrastructure that supports teachers' work is necessary for enhanced and sustainable use of technology (Camburn & Han, 2015; Hill & Valdez-Garcia, 2020). Providing support for teachers to further their professional learning and skills (Hall & Trespalacios, 2019; Karolcik et al., 2016), as well as their attempts to change their practices (Romero & Vasilopoulos, 2020; Soebari & Aldridge, 2015), are essential for successful 1:1 technology integration and other improvements to instructional practice.

Teachers' attitudes and beliefs are essential in influencing the adoption and acceptance of 1:1 technology programs. With professional development, teachers' perceptions may determine their challenges for successful technology implementation (Kim et al., 2019). Thus, teachers need to be viewed as individuals with specific beliefs, knowledge, and experience (Abbott, 2016). For example, in their study, Kimmons and Hall (2016) indicated that teacher beliefs were driven by their daily classroom practices rather than being part of an

institution. Principals' roles can contribute to the effective integration of technology in the classrooms. Alghamdi and Prestridge (2015) and Kallio and Halverson (2020) found that when principal and teacher beliefs are in alignment for learning technology, a transformation of teachers' practices occurs, shifting to student-centered teaching and learning. Teachers are more likely to adopt and integrate technology if they believe it has the potential to improve teaching and learning (Chikasa et al., 2014; Mwapwele et al., 2019; Powers et al., 2020). For the successful implementation of 1:1 technology, effective teacher professional development and learning must take teachers' attitudes toward and beliefs about technology into consideration.

When adopting technology in the classroom, leaders must also be mindful of what their instructional goals are, how technologies will enable them to reach those goals, and how technology can help students make connections to those goals. In addition, for success in implementing technology in the schools, leaders can help determine implementation challenges and inform strategies for future development by understanding students' and teachers' perceptions of how they use various technology (Ditzler et al., 2016; Niederhauser et al., 2018; Siefert et al., 2019).

Purpose of the Study and Research Questions

In recent years, the MOEWPI invested heavily in an expensive 1:1 tablet program but had not determined if the program produced the expected positive changes in elementary teachers' lesson planning and instructional delivery. Therefore, the purpose of this quantitative, causal–comparative study was to determine if the 1:1 tablet program resulted in positive changes to the level of elementary teachers' use of technology in their lesson planning and presentation. The following research questions guided the study:

Research Question 1: What is the difference in the level of teachers' use of technology in lesson planning as measured by the CIOT before and after they received tablets through the 1:1 tablet program?

Research Question 2: What is the difference in the level of teachers' use of technology in lesson presentation as measured by the CIOT before and after they received tablets through the 1:1 tablet program?

Methods

According to Wade et al. (2013), Onalan and Kurt (2020), and Woods (2020), personal computers and technology provide opportunities to strengthen and expand teachers' options when planning and delivering the course content. With the present study, the MOEWPI's needs were addressed through the comparison of the level that teachers used technology in lesson planning and lesson presentation as measured by the Classroom Instruction Observation Tool (CIOT) before and after adoption of the 1:1 tablet program. The CIOT was a preexisitng evaluation instrument already in use by the MOEWPI for several years as a means to measure teachers' performance in critical areas. Given its long-standing, practical application in the MOEWPI, the CIOT was determined to be the best choice for assessing the potential effects of the 1:1 tablet program as technology use in lesson planning and lesson presentation were addressed within the instrument. For the CIOT, all teachers were required to prepare and submit lessons plans to the school office. In addition, teachers were observed by trained administrators who rated teachers' performance in relevant areas during the delivery of instruction.

Participants

The population for this study was the group of MOEWPI elementary teachers who had received tablets through the 1:1 tablet program. Investigating this group allowed for analysis of the level of teachers' use of

technology by providing a matched sample with the preassessment observations conducted in 2015 before the tablets were distributed and the postassessment observation conducted in 2018 after all the teachers had been trained and used the tablets for at least 1 year. The deployment of the program relied on the tablets as stand-alone systems not dependent on the internet or external resources, which decreased confounding factors that might be expected when such devices are internet dependent.

The final sample of 63 elementary teachers included those who had CIOT scores before and after they received program tablets. A power analysis for repeated measures *t*-test with an effect size of 0.5, the alpha error probability of 0.05, and a sample size of 63 resulted in an observed power of 0.97 for this study. The teachers in the final sample all came from MOEWPI's elementary schools, as by 2018, the 1:1 tablet program was targeting only elementary schools. In elementary schools, the school environment, language, and curriculum are similar, offering an inherent degree of control within this design. The educational level of these teachers was not high, with 1.3% having had preservice training (i.e., in pedagogy and methodology and a degree from teacher college; MOEWPI, 2017a).

Instrumentation

The data source for the study was the archival data of elementary school teacher observations performed by the MOEWPI's Bureau of Curriculum and Instruction (BCI), the office which administers the CIOT, the official form used in the MOEWPI's teacher observation process. The instrument was used for all elementary school teachers before, during, and after the deployment of the 1:1 tablet program. It was developed and used by BCI content coordinators who are trained to use it to observe teachers. BCI collects and maintains the data from the form and uses the data for need sensing and development of intervention and in-service activities.

The CIOT is a measurement tool for rating teachers on 30 items covering the desired teacher traits or behavior. Each item is rated using the following scale: 1 = not observed, 2 = needs improvement, 3 = shows progress, 4 = meets standard, and 5 = exceeds standard. This study focused on two items related to technology: (a) the plan provides meaningful ways that students can integrate technology or manipulatives into their learning and activities, and (b) instruction uses a variety of ways to meet individual learning styles using media and manipulatives when appropriate. While these two items were the focus of the present study, we must note that the observers were trained to focus on the teachers' technology use in the classroom rather than the use of manipulatives or other media when completing ratings.

Data Collection

The data collection was conducted at the schools by BCI content coordinators independent from the local school principals and the MOEWPI leadership. An observation protocol was followed by the assigned observers to ensure the CIOT measures were valid and reliable across observers. There were five trained observers from the BCI who conducted teacher observations using the CIOT, which were used for the results in this study. The observers were former classroom teachers with years of experience and training in various content areas and were supervised by the chief of teacher training. The observers conducted the observations with particular focus on the use of technology in the classrooms.

Data Analysis

An ex post facto, causal–comparative research design, involving the statistical analysis of archival data, was employed to test for significant differences between levels of teacher use of technology before and after the deployment of the MOEWPI's 1:1 tablet program. The archival data set consisted of the 63 eligible records where the elementary teacher was observed using the CIOT in 2015 and again in 2018.

To test statistical assumptions, the Shapiro-Wilk test was used to determine normality. Analysis revealed that the distribution of scores in each data set was not normal and violated the assumption of normality. However, in a *t*-test, the study sample size of 63 elementary teachers adequately addresses the violation of the assumption of normality. According to Ghasemi and Zahediasl (2012), sample size greater than 30 or 40 will not violate assumptions of normal distribution. In a series of simulations, Poncet et al., (2016) found that the power of a *t*-test remained robust in comparing normal versus nonnormal data and in comparing against the nonparametric test. Snijders (2011) stated that the *t*-test is robust against nonnormality except for cases with serious outliers. The data for this study had no outliers (scores are restricted to 1 to 5), and the sample is moderately large. The repeated measures *t*-test was sufficiently robust in this situation and the results are suitable for MOEWPI decision-making and budget prioritization.

Results

Research Question 1

What is the difference in the level of teachers' use of technology in lesson planning as measured by the CIOT before and after they received tablets through the 1:1 tablet program? The Research Question 1 sample size was 63 and the scores are limited to a range of 1 to 5. The pretest had a mean of 0.92 (*SD* = 0.98). The posttest had a mean of 1.33 (*SD* = 1.00). There was an increase in the mean score between the pre and posttest of 0.41 or 10%. The two-tailed repeated measures *t*-test analysis determined that the increase was statistically significant ($t(62) = 2.514$, $p < .05$). The teachers therefore significantly increased the level of their use of technology in lesson planning.

Research Question 2

What is the difference in the level of teachers' use of technology in lesson presentation as measured by the CIOT before and after they received tablets through the 1:1 tablet program? The Research Question 2 sample size was 63 and the scores are limited to a range of 1 to 5. The pretest had a mean of 2.48 (*SD* = 1.544). The posttest had a mean of 3.10 (*SD* = 1.174). There was an increase in the mean score between the pretest and posttest of 0.52 or 15%. The two-tailed repeated measures *t*-test analysis determined that the increase was statistically significant ($t(62) = 3.070$, $p < .05$). The teachers therefore significantly increased the level of their use of technology in lesson presentation.

With respect to the study overall, results show that there was a 10% increase in the level of teacher use of technology in lesson planning and a 15% increase in the level of teacher use of technology in lesson presentation after only one year of consistent, posttraining tablet implementation. The analysis showed that the increase in the ratings of the teachers' level of use of technology was statistically significant ($p < .05$) for lesson planning and for lesson presentation. In terms of planning and in light of the urgency for information necessitated by MOEWPI leadership's immediate need to make policy and operational decisions at the critical early stages of its 10-year Master Plan 2017–2026, accepting these findings as indicative of the positive effect of the 1:1 tablet program is reasonable.

Discussion

With the implementation of the MOEWPI's 10-year Master Plan 2017–2026, it became clear that prioritizing funding allocations across a variety of initiatives was a critical issue. The MOEWPI leadership had to decide whether the extraordinary expense of the 1:1 tablet program could be justified for the full 10-year term of the 2017–2026 Master Plan given that sustaining the tablet initiative would mean other equally important strategic goals received limited funding. In all matters of funding and resource allocation, relying upon

research-informed results offers the best method for evaluating alignment between goals and outcomes for any program or initiative.

The findings and conclusions derived from the research results are oriented toward providing practical utility and benefit to the MOEWPI in its critical long-term decision-making. The present study found that, consistent with the purpose for which the 1:1 tablet program of the MOEWPI was implemented, there was a statistically significant, positive effect on teachers' use of technology for lesson planning and lesson presentation during the term of the study. The evidence supports the conclusion that the 1:1 tablet program was beneficial to elementary teachers' instructional practices despite inherent limits to teacher training and the reasonably short pre to postevaluation period. The MOEWPI's implementation of the 1:1 tablet program which relied primarily on experimental learning in the tradition of Kolb (1984) seemed sufficient to produce meaningful change in the teachers' use of technology for lesson planning and lesson presentation. This study represents a meaningful, first step in determining the usefulness of the 1:1 tablet initiative; albeit this study did not seek to determine if the teachers' use of technology had yet developed to the stage of effective implementation or best practice in the field. Specifically, the MOEWPI's stated objective of the 1:1 tablet program—to increase the level of teacher use of technology in lesson planning and presentation—was met.

With this study completed, the MOEWPI leadership was provided the evidence necessary to begin deliberating on the next steps for technology integration efforts going forward. The primary recommendation from the study was for MOEWPI leadership to proceed with the current implementation of the 1:1 tablet program and expand upon the existing investments in accordance with the MOEWPI's 10-year Master Plan 2017–2026. An additional recommendation made to MOEWPI leadership was to plan and carry out follow-up studies to determine the influence and effectiveness of various components relative to the 1:1 tablet program (e.g., teacher and student training, technology literacy, increased observation by CIOT, etc.). Recommendations for future research include further investigation of teachers' use of technology as well as how the teachers' use of technology may influence students' outcomes.

This study was of substantial benefit to the MOEWPI leaders as they considered medium-term technology goals and more targeted operational improvements. Historically, the MOEWPI had sustained minimal efforts toward documenting the influence of high-cost technology initiatives or other instructional improvement programs. The results of this study established that the MOEWPI would benefit from launching organizational divisions tasked with pursuing research on the effectiveness of existing and future programs and projects. Clearly, internal research pertaining to the return on investment of expenditures relative to teachers' instructional and students' educational outcomes is necessary.

Integration Into the Current Literature

To produce students who are technologically literate and prepared for the 21st-century global economy, teachers must build their pedagogical toolboxes by learning about and implementing proven technology-driven strategies and varied approaches to classroom instruction (Darling-Hammond et al., 2017; Hassler et al., 2018; Kim et al., 2019; Koh et al., 2017; Lewis, 2016; Parrish & Sadera, 2018). In practice, a MOEWPI division dedicated to internal research would work closely with teachers and support their individual development efforts in a manner that is consistent with Kolb's (1984) experiential learning theory. In addition, an effort to expose the relationship between teachers' integration of technology in lesson planning and presentation with students' outcomes is a recommendation of great importance to future research activity in the MOEWPI. The present study represents an essential first step toward building a data-driven, research-informed approach to making important decisions within the MOEWPI system.

Limitations and Implications for Future Research and Practice

The limitations of this ex post facto design include that the results cannot be generalized beyond the MOEWPI

(Simon & Goes, 2013); however, the applicability of results from research with this design are well documented as a means for investigating life-event experiences that occur in real-life situations in natural settings (Black, 1999). This study relied upon purposefully selected and delimited data points which were derived from an archival dataset maintained by the MOEWPI. The archival data obtained for this analysis were limited to the variables required to address the research questions that are the focus of the present research. This study addressed only two points in time relative to program implementation (i.e., pre and postimplementation) and only two specific observation items from the CIOT instrument (i.e., lesson preparation and lesson presentation). The research design might be different if there were reliable longitudinal data for these teachers throughout the course of program implementation in the short- and long-terms. Additionally, observation items from the CIOT targeting other teacher behaviors may be valuable data points for future analysis. This study, though delimited to lesson planning and lesson preparation CIOT items, accomplished its goal of providing an empirically sound, first look at these important data. Future research that expands the scope of the investigation to include other CIOT items would increase the scientific rigor and offer additional insight into other important teacher behaviors in the classroom.

Further, the observation tool used for data collection in this study was written for widespread use across all grade levels (K–12) in the MOEWPI. The items used for analysis in this study were not rewritten to focus specifically upon technology resources and to the exclusion of other media or manipulatives that might be in use. Rather, the observers were trained to focus upon and make ratings that considered technology use when observing the elementary teachers. This represents a limitation in the archival data and study design in that the observers may have included use of media or other manipulatives beyond the 1:1 tablet when ratings were completed for the elementary teachers, despite instructions. A future study on this topic should rewrite the observation tool or add items to focus solely upon technology use in the classroom.

According to the director of curriculum and instruction, the MOEWPI leadership understood these limitations and saw the results of the current study as viable for use within the local context, especially in informing the immediate deliberations about the continuation of the technology program. As an additional step forward in light of these limitations, recommendations for future research on this topic include qualitative research methods that give teachers a voice to share their experiences, recommendations, and requests.

Conclusion

This study advances the decision-making process by infusing it with practical data and meaningful empirical outcomes; and, consequently, an opportunity exists to improve upon the return on investment of technology relative to the MOEWPI's scarce resources. Considering the potential advantages of and the concerns about the 1:1 tablet program, the MOEWPI leadership was placed in a better position to plan steps for advancing technology applications that help schools and teachers with adequate infrastructure, integrated curricula, ongoing professional development, funding, and appropriate applied research. Beyond the MOEWPI, this study demonstrates the critical importance of implementing even small research studies with strong contextual or local applicability as a means for enhancing decision-making processes for technology integration across the educational system. More than anything, local contexts with unique attributes, severely limited educational resources and supports, and/or a minimally established commitment to an empirically based, data-driven decision-making paradigm can use this study as a model for taking important steps forward in their approach to technology integration, knowing that even modest efforts to infuse technology into education are shown to be beneficial.

References

Abbott, R. (2016). Embracing digital technologies in classroom practice: The impact of teacher identity. *Australian Educational Computing, 31*(2), 1–26. https://journal.acce.edu.au/index.php/AEC/article/view/93

Alghamdi, A., & Prestridge, S. (2015). Alignment between principal and teacher beliefs about technology use. *Australian Educational Computing, 30*(1). http://journal.acce.edu.au/index.php/AEC/article/view/52

Aufenanger, S. (2015). Tablets an Schulen—ein empirischer Einblick aus der Perspektive von Schülerinnen und Schüler. [Tablets in schools—An empirical insight from the perspective of students]. In K. Friederich, F. Siller, & A. Treber (Eds.), *Smart und mobil—Digitale Kommunikation als Herausforderung für Bildung, Pädagogik und Politik* (pp. 63–77). GMK.

Barbera, E., Gros, B., & Krischner, P. A. (2015). Paradox of time in research on educational technology. *Time & Society, 24*(1), 96–108. https://doi.org/10.1177/0961463X14522178

Bishop, D., Justice, C., & Fernandez, E. (2015, June). *The perceived impact of information technology experiential learning on career success: A pilot study.* Presented at American Society for Engineering Education Annual Conference and Exposition, Seattle, Washington. https://doi.org/10.18260/p.24900

Black, T. R. (1999). *Doing quantitative research in the social sciences: An integrated approach to research design, measurement and statistics*. SAGE Publications, Ltd.

Blundell, C., Lee, K., & Nykvist, S. (2020). Moving beyond enhancing pedagogies with digital technologies: Frames of reference, habits of mind and transformative learning, *Journal of Research on Technology in Education, 52*(2), 178–196. https://doi.org/10.1080/15391523.2020.1726235

Breyer, M. (2020). *Bildung im digitalen Zeitalter* [*Education in the digital age*]. Diplom.

Byers, T., Hartnell-Young, E. & Imms, W. (2018). Empirical evaluation of different classroom spaces on students' perceptions of the use and effectiveness of 1-to-1 technology. *British Journal of Educational Technology, 49*(1), 153–164. https://doi.org/10.1111/bjet.12518

Camburn, E. M., & Han, S. W. (2015). Infrastructure for teacher reflection and instructional change: An exploratory study. *Journal of Educational Change, 16*, 511–533. https://doi.org/10.1007/s10833-015-9252-6

Chang, B. (2019). Reflection in learning. *Online Learning, 23*(1), 95–110. https://doi.org/10.24059/olj.v23i1.1447

Chikasa, S., Ntuli, M., & Sundarjee, R. (2014). ICT integration in teaching: An uncomfortable zone for teachers: A case of schools in Johannesburg. *Education as Change, 18*(1), 137–150. https://doi.org/10.1080/16823206.2013.847013

Chorazy, M. L., & Klinedinst, K. S. (2019). Learn by doing: A model for incorporating high-impact experiential learning into an undergraduate public health curriculum. *Curriculum, Instruction, and Pedagogy, 7*(31), 1–6. https://doi.org/10.3389/fpubh.2019.00031

Cole, B. V., & Sauers, N. J. (2018). Superintendents' perceptions of 1:1 initiative implementation and sustainability. *Journal of Research on Technology in Education, 50*(3), 200–213. https://doi.org/10.1080/15391523.2018.1442754

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017, June 5). Effective teacher professional development. *Learning Policy Institute.* https://learningpolicyinstitute.org/product/effective-teacher-professional-development-report

De Bruyckere, P., Kirschner, P. A., & Hulshof, C. D. (2016). Technology in education: What teachers should know. *American Educator, 40*(1), 12–18. https://www.aft.org/ae/spring2016/debruyckere-kirschner-and-hulshof

Dinc, E. (2019). Prospective teachers' perceptions of barriers to technology integration in education. *Contemporary Education Technology, 10*(4), 381–398. https://doi.org/10.30935/cet.634187

Ditzler, C., Hong, E., & Strudler, N. (2016). How tablets are utilized in the classroom. *Journal of Research on Technology in Education, 48*(3), 181–193. https://doi.org/10.1080/15391523.2016.1172444

Fleischer, H. (2012). What is our current understanding of one-to-one computer projects: A systematic narrative research review. *Educational Research Review, 7*, 107–122. https://doi.org/10.1016/j.edurev.2011.11.004

Francom, G. M. (2016). Barriers to technology use in large and small school districts. *Journal of Information Technology Education: Research, 15*, 577–591. http://www.informingscience.org/Publications/3596

Fransson, G., Lindberg, O. J., & Olofsson, A. D. (2018). From a student perspective, what constitutes a good (or less good) use of ICT in teaching? *Education and Information Technology, 23*, 2155–2177. https://doi.org/10.1007/s10639-018-9708-4

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism, 10*(2), 486–489. https://doi.org/10.5812/ijem.3505

Gherardi, S. (2017). Digitized and decoupled? Teacher sensemaking around educational technology in a model 1:1 program. *Mid-Western Educational Researcher*, *29*(2), 166–194. https://www.mwera.org/MWER/volumes/v29/issue2/V29n2-Gherardi-GRADUATE-INQUIRY.pdf

Gonzales, M. M. (2020). School technology leadership vision and challenges: Perspectives from American school administrators. *International Journal of Educational Management, 34*(4), 697–708. https://doi.org/10.1108/IJEM-02-2019-0075

Hall, A. B., & Trespalacios, J. (2019) Personalized professional learning and teacher self-efficacy for integrating technology in K–12 classrooms. *Journal of Digital Learning in Teacher Education, 35*(4), 221–235. https://doi.org/10.1080/21532974.2019.1647579

Harper, B. (2018). Technology and teacher–student interactions: A review of empirical research. *Journal of Research on Technology in Education, 50*(3), 214–225. https://doi.org/10.1080/15391523.2018.1450690

Harris, J. L., Al-Bataineh, M. T., & Al-Bataineh, A. (2016). One to one technology and its effect on student academic achievement and motivation. *Contemporary Educational Technology, 7*(4), 368–381. https://eric.ed.gov/?id=EJ1117604

Hassler, B., Hennessy, S., & Hofmann, R. (2018). Sustaining and scaling up pedagogic innovation in Sub-Saharan Africa: Grounded insights for teacher professional development. *Journal of Learning for Development, 5*(1), 58–78. https://jl4d.org/index.php/ejl4d/article/view/264

Hill, G. M., & Valdez-Garcia, A. (2020). Perceptions of physical education teachers regarding the use of technology in their classrooms. *The Physical Educator, 77*(1), 29–41. https://doi.org/10.18666/TPE-2020-V77-I1-9148

Holen, J. B., Hung, W., & Gourneau, B. (2017). Does one-to-one technology really work: An evaluation through the lens of activity theory. *Computers in the Schools, 34*(1–2), 24–44. https://doi.org/10.1080/07380569.2017.1281698

Jack, C., & Higgins, S. (2019). Embedding educational technologies in early years education. *Research in Learning Technology, 27*, 1–17. https://doi.org/10.25304/rlt.v27.2033

Kallio, J. M., & Halverson, R. (2020) Distributed leadership for personalized learning. *Journal of Research on Technology in Education, 52*(3), 371–390. https://doi.org/10.1080/15391523.2020.1734508

Kalonde, G. (2017). Rural school math and science teachers' technology integration familiarization. *International Journal of Educational Technology, 4*(1), 17–25. https://files.eric.ed.gov/fulltext/EJ1167312.pdf

Karolcik, S., Cipkova, E., & Kinchin, I. (2016). Teacher attitudes to professional development of proficiency in the classroom application of digital technology. *International Education Studies, 9*(4), 9–19. https://doi.org/10.5539/ies.v9n4p9

Kay, R. H. & Ruttenberg-Rozen, R. (2019, July 1–3). *An analysis of how elementary school pre-service teachers learn to use technology* [Paper]. EduLearn 19. International Conference on Education and New Learning Technologies, Palma, Spain. https://doi.org/10.21125/edulearn.2019.0440

Keane, T., & Keane, W. (2017). Achievements and challenges: Implementing a 1:1 program in a secondary school. *Education Information Technology, 22*, 1025–1041. https://doi.org/10.1007/s10639-016-9470-4

Kim, J. H., Choi, J., & Lee, S. (2019). Teacher experience of integrating tablets in one-to-one environments: Implications for orchestrating learning. *Education Sciences, 9*, 1–13. https://doi.org/10.3390/educsci9020087

Kimmons, R., & Hall, C. (2016). Toward a broader understanding of teacher technology: Integration beliefs and values. *Journal of Technology and Teacher Education, 24*(3), 309–335. https://www.learntechlib.org/primary/p/172627/

Koh, L. H. J., Chai, S. C., & Lim, Y. W. (2017). Teacher professional development for TPACK-21CL: Effects on teacher ICT integration and student outcomes. *Journal of Educational Computing Research, 55*(2). 172–196. https://doi.org/10.1177/0735633116656848

Kolb, A., & Kolb, D. (2018). Eight important things to know about the experiential learning cycle [online]. *Australian Educational Leader, 40*(3), 8–14. https://learningfromexperience.com/downloads/research-library/eight-important-things-to-know-about-the-experiential-learning-cycle.pdf

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* (Vol. 1). Prentice-Hall.

Kopevev, Z., Mubarakov, A., Kultan, J., Aimicheva, G., & Tuyakov, Y. (2020). Using a personalized learning style and Google classroom technology to bridge the knowledge gap on computer science, *International Journal of Emerging Technologies in Learning, 15*(2), 218–229. https://doi.org/10.3991/ijet.v15i02.11602

Lamb, A. (2018). *Preparing a school district for a 1:1 technology initiative: Issue brief*. Neag School of Education. https://education.uconn.edu/2018/06/06/preparing-a-school-district-for-a-11-technology-initiative-issue-brief/#

Lawless, K. A. (2016). Educational technology: False profit or sacrificial lamb? A review of policy, research, and practice. *Policy Insights from the Behavioral and Brain Sciences, 3*(2) 169–176. https://doi.org/10.1177/2372732216630328

Lewis, M. (2016). Professional learning facilitators in 1:1 program implementation: Technology coaches or school librarians? *School Libraries Worldwide, 22*(2), 13–23. https://www.semanticscholar.org/paper/Professional-Learning-Facilitators-in-1%3A1-Program-Lewis/7cc2d57e40a2b95a3b08379e28a33fd31e789077

McClure, J., & Pilgrim, J. (2020). Implementing a 1:1 technology program in a rural, public school: A study of perceptions of technology integration. *Journal of Research on Technology in Education*, 1–15. https://doi.org/10.1080/15391523.2020.1852455

Ministry of Education on a Western Pacific Island. (2017a). All quarter report. [Powerpoint slides]. Report to the 23rd Education Convention, Ministry of Education.

Ministry of Education on a Western Pacific Island. (2017b). Education Master Plan 2017–2026. Ministry of Education.

Ministry of Education on a Western Pacific Island. (2018). MOE Personnel statistics. Report to the 24th Education Convention, Ministry of Education.

Mitchell, G. W., Wohleb, E. C., & Skinner, L. B. (2016). Perceptions of public educators regarding accessibility to technology and the importance of integrating technology across the curriculum. *The Journal of Research in Business Education*, *57*(2), 14–25. https://www.questia.com/library/p438572/the-journal-of-research-in-business-education

Mohale, A. B., Litshani, N. F., Mashau, T. S., Sebopetsa, N. S., & Moyo, H. (2020). Perceptions of school leadership in pursuit of developing effective teaching and learning culture in schools. *Gender & Behaviour, 18*(1), 15217–15232. https://search.proquest.com/openview/7c1aba4e2aff093468294d125ea38a39/1?pq-origsite=gscholar&cbl=39577

Morris, T. H. (2020). Experiential learning—a systematic review and revision of Kolb's model. *Interactive Learning Environments*, *28*(8), 1064–1077. https://doi.org/10.1080/10494820.2019.1570279

Mwapwele, S. D., Marais, M., Dlamini, S., & Biljon, V. J. (2019). Teachers' ICT adoption in South African rural schools: A study of technology readiness and implications for the South Africa Connect broadband policy. *The African Journal of Information and Communication, 24*, 1–24. https://doi.org/10.23962/10539/28658

Natia, J. A., & Al-hassan, S. (2015). Promoting teaching and learning in Ghanaian basic schools through ICT. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT), 11*(2), 113–125. https://files.eric.ed.gov/fulltext/EJ1074173.pdf

Nicholas, K., & Fletcher, J. (2017). What is happening in the use of ICT mathematics to support young adolescent learners? A New Zealand experience, *Educational Review, 69*(4), 474–489. https://doi.org/10.1080/00131911.2016.1237476

Niederhauser, D. S., Howard, S. K., Voogt, J., Agyei, D., Laferriere, T., Tondeur, J., & Cox, M. J. (2018). Sustainability and scalability in educational technology initiatives: Research-informed practice. *Tech Know Learn*, *23*, 507–523. https://doi.org/10.1007/s10758-018-9382-z

Niederhauser, D. S., & Lindstrom, D. L. (2018). Instructional technology integration models and frameworks: Diffusion, competencies, attitudes, and dispositions. In J. Voogt, G. Knezek, R. Christensen, & K. W. Lai (Eds.), Handbook of information technology in primary and secondary education. Cham: Springer.

Office of Educational Technology (2017). *Reimagining the role of technology in education: 2017 national education technology plan update*. U.S. Department of Education. https://tech.ed.gov/files/2017/01/NETP17.pdf

Onalan, O., & Kurt, G. (2020). Exploring Turkish EFL teachers' perceptions of the factors affecting technology integration: A case study. *Journal of Language and Linguistic Studies, 16*(2), 626–646. https://doi.org/10.17263/jlls.759264

Parrish, A. H., & Sadera, W. A. (2018). Teaching competencies for student-centered, one-to-one learning environments: A Delphi study. *Journal of Educational Computing Research, 0*(0) 1–25. https://doi.org/10.1177/0735633118816651

Paulus, M. T., Villegas, S. G., & Howze-Owens, J. (2020). Professional learning communities: Bridging the technology integration gap through effective professional development. *Peabody Journal of Education*, *95*(2), 193–202. https://doi.org/10.1080/0161956X.2020.1745610

Poncet, A., Courvoisier, D. S., Combescure, C., & Perneger, T. V. (2016). Normality and sample size do not matter for the selection of an appropriate statistical test for two-group comparisons. *Methodology*, *12*(2), 61–71. https://doi.org/10.1027/1614-2241/a000110

Powers, J. R., Musgrove, A. T., & Nichols, B. H. (2020). Teachers bridging the digital divide in rural schools with 1:1 computing. *Rural Educator, 41*(1), 61–76. https://doi.org/10.35608/ruraled.v41i1.576

Ra, S., Chin, B., & Lim, C. P. (2016). A holistic approach towards information and communication technology (ICT) for addressing education challenges in Asia and the Pacific. Educational Media International, 53(2), 69–84. https://doi.org/10.1080/09523987.2016.1211334

Raja, F. U., & Najmonnisa. (2018). Comparing traditional teaching method and experiential teaching method using experimental research. *Journal of Education and Educational Development, 5*(2), 276–288. https://files.eric.ed.gov/fulltext/EJ1200262.pdf

Romero, G., & Vasilopoulos, G. (2020). From rural China to Canada: Communities of practice to support a teacher professional development study program abroad. *The Electronic Journal for English as a Second Language, 23*(4), 1–13. http://tesl-ej.org/pdf/ej92/a3.pdf

Sert, N., & Boynuegri, E. (2017). Digital technology use by the students and English teachers and self-directed language learning. *World Journal on Educational Technology: Current Issues. 9*(1), 24–34. https://doi.org/10.18844/wjet.v9i1.993

Shamir-Inbal, T., & Blau, I. (2016). Developing digital wisdom by students and teachers: The impact of integrating tablet computers on learning and pedagogy in elementary school. *Journal of Educational Computing Research*, *54*(7), 967–996. https://doi.org/10.1177/0735633116649375

Sheppard, B., & Brown, J. (2014). Leadership for a new vision of public school classrooms: Technology-smart and learner-centered. *Journal of Educational Administration, 52*(1), 84–96. https://doi.org/10.1108/JEA-03-2012-0027

Siefert, B., Kelly, K., Yearta, L., & Oliveira, T. (2019). Teacher perceptions and use of technology across content areas with linguistically diverse middle school students. *Journal of Digital Learning in Teacher Education, 35*(2), 107–121. https://doi.org/10.1080/21532974.2019.1568327

Simmons, B., & Martin, F. (2016). Perceived implementation barriers of a one-to-one computing initiative in a large urban school district: A qualitative approach. *Journal on School Educational Technology, 11*(4), 26–38. https://www.learntechlib.org/p/191479/

Simon, M. K., & Goes, J. (2013). *Dissertation and scholarly research: Recipes for success*. Dissertation Success LLC. https://www.dissertationrecipes.com/wp-content/uploads/2011/04/Ex-Post-Facto-research.pdf

Snijders, T. A. B. (2011). Statistical methods: Robustness [PowerPoint slides]. http://www.stats.ox.ac.uk/~snijders/SM_robustness.pdf

Soebari, T. S., & Aldridge, J. M. (2015). Using student perceptions of the learning environment to evaluate the effectiveness of a teacher professional development programme. *Learning Environment Research, 18*, 163–178. https://doi.org/10.1007/s10984-015-9175-4

Solano, L., Cabrera, P., Ulehlova, E., & Espinoza, V. (2017). Exploring the use of educational technology in EFL teaching: A case study of primary education in the south region of Ecuador. *Teaching English With Technology, 17*(2), 77–86. https://bit.ly/3M4rxvq

Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education*, *50*(1), 37–56. https://doi.org/10.1080/0305764X.2019.1625867

Statti, A., & Torres, K. (2020). The forgotten minority: Exploring deficiencies in access to education and technology in rural America. *Peabody Journal of Education, 95*(2), 173–182. https://doi.org/10.1080/0161956X.2020.1745608

Sung, Y.-T., Chang, K.-E., & Liu, T.-C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education, 94,* 252–275. https://doi.org/10.1016/j.compedu.2015.11.008

Swallow, M. (2015) The year-two decline: Exploring the incremental experiences of a 1:1 technology initiative, *Journal of Research on Technology in Education, 47*(2), 122–137. https://doi.org/10.1080/15391523.2015.999641

Tinmaz, H., & Ozturk, Y. E. (2019). ICT integration into education: A comparison of South Korea and Turkey. *Perspectives on Global Development & Technology, 18*(4), 422–456. https://doi.org/10.1163/15691497-12341527

Tosuntas, S. B., Cubukcu, Z., & Inci, T. (2019). A holistic view to barriers to technology integration in education. *Turkish Online Journal of Qualitative Inquiry, 10*(4), 439–461. https://doi.org/10.17569/tojqi.613969

Varier, D., Dumke, E. K., Abrams, L. M., Conklin, S. B., Barnes, J. S., & Hoover, N. R. (2017). Potential of one-to-one technologies in the classroom: Teachers and students weigh in. *Educational Technology Research and Development, 65*, 967–992. https://doi.org/10.1007/s11423-017-9509-2

Vega, V., & Robb, M. B. (2019). *The Common Sense census: Inside the 21st-century classroom.* Common Sense Media. https://www.commonsensemedia.org/research/the-common-sense-census-inside-the-21st-century-classroom-2019

Wade, W. Y., Rasmussen, K. L., & Fox-Turnbull, W. (2013). Can technology be a transformative force in education? *Preventing School Failure: Alternative Education for Children and Youth, (57)*3, 162–170. https://doi.org/10.1080/1045988X.2013.795790

Williams-Britton, S. M. (2021). Teachers' voices in one-to-one technology integration professional development programs. I. Sahin & W. Admiraal (Eds.). *International Society for Technology, Education and Science*. https://files.eric.ed.gov/fulltext/ED608553.pdf

Woods, C. (2020). Trusting in your craft, technology, and student input: Logic and compassion in the relevant 21st century ELA classroom. *The Virginia English Journal, 69*(2), 29–41. https://rb.gy/uejjqh

Wright, D. B. (2018). A framework for research on education with technology. *Frontiers in Education, 3*(21), 1-12. https://doi.org/10.3389/feduc.2018.00021

Zagami, J., Bocconi, S., Starkey, L., Wilson, J. D., Gibson, D., Downie, J., Malin-Smith, J., &. Elliott, S. (2018). Creating future ready information technology policy for national education systems. *Technology, Knowledge and Learning, 23*, 495–506. https://doi.org/10.1007/s10758-018-9387-7

The *Journal of Educational Research and Practice* is a peer-reviewed journal that provides a forum for studies and dialogue about developments and change in the field of education and learning. The journal includes research and related content that examine current relevant educational issues and processes. The aim is to provide readers with knowledge and with strategies to use that knowledge in educational or learning environments. *JERAP* focuses on education at all levels and in any setting, and includes peer-reviewed research reports, commentaries, book reviews, interviews of prominent individuals, and reports about educational practice. The journal is sponsored by The Richard W. Riley College of Education and Leadership at Walden University, and publication in *JERAP* is always free to authors and readers.