

Improving Academic Performance of Students in Science 10 through using “e-QUIPPED Learning

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Abstract. This study investigated the effectiveness of the Quipper application as a technology-based intervention in improving the competency mastery of Grade 10 learners in Science through e-QUIPPED Learning at Madrid National High School during the school year 2019–2020. It aimed to determine learners’ mastery level before and after the implementation of the Quipper-based intervention, identify factors affecting their performance, and propose an enhanced instructional strategy. The study employed a pre-experimental research design using a one-group pretest-posttest approach. Ten Grade 10 Gold learners with low mastery of Science competencies were purposively selected as participants. Data were gathered through competency-based assessments and a researcher-made survey questionnaire, while learner progress was monitored through Quipper activities, formative assessments, and performance tracking. Results revealed that all participants were initially classified under the Beginning level of mastery, with scores ranging from 8 to 16. Factors affecting their performance included lack of participation, boredom, and distractions from non-academic use of mobile devices. After the intervention, all learners improved to the Accomplished level, obtaining scores ranging from 33 to 40. The findings indicate that Quipper enhanced learning through accessible resources, interactive activities, continuous assessment, feedback, and remediation opportunities. The study concludes that integrating Quipper as a distributed learning platform can support competency development and address learning gaps among struggling learners. An enhanced Quipper-Based Science Learning Enhancement Program is proposed to sustain learner improvement through structured remediation and monitoring.

Keywords: Distributed learning; E-learning; Quipper application; Science education; Student mastery; Technology integration;

Introduction

Technology has transformed modern education by expanding access to learning resources and improving instructional delivery through digital platforms. The integration of information and communications technology (ICT) in education has allowed teachers to provide more flexible, interactive, and learner-centered approaches while enabling students to access digital learning materials beyond the traditional classroom setting. According to UNESCO (2018), ICT integration can support inclusive and innovative learning environments by improving access to educational resources and strengthening teaching practices. Similarly, the use of digital learning platforms allows educators to provide personalized learning experiences, monitor student progress, and support continuous improvement in academic performance (UNESCO, 2019). Among these innovations, Quipper School has emerged as an e-learning platform that supports the Philippine K–12 curriculum by providing curriculum-aligned learning resources, assessments, homework management, and progress monitoring through ICT. As a learning management system, Quipper enables teachers to deliver lessons, assess student performance, and provide feedback through digital tools that support classroom instruction (Quipper Philippines, 2024).

At Madrid National High School, Quipper was integrated into Science 10 instruction for Grade 10 Gold students using PC tablets in the computer laboratory. Ten learners with low mastery of Science competencies, identified through competency-based assessments aligned with DepEd Order No. 8, s. 2015, participated in the intervention. Their learning progress was monitored through the Quipper platform, allowing teachers to evaluate competency mastery before administering summative assessments. Digital assessment platforms such as Quipper support teachers in identifying learning gaps by providing performance data that can guide remediation and instructional decisions (Black & Wiliam, 2018). Furthermore, learning management systems contribute to improved assessment practices by allowing teachers to track learner progress, manage activities, and provide timely feedback based on students’ needs

(Broadbent & Fuller-Tyszkiewicz, 2018). Quipper's assessment and monitoring features are designed to provide teachers with performance analytics and competency-based learning support aligned with curriculum standards.

Although previous studies have emphasized the benefits of technology integration, e-learning platforms, and digital assessment tools in improving student engagement and learning outcomes, limited studies have focused on the use of Quipper as a targeted remediation intervention for learners with low mastery levels in Science 10 competencies. Most existing studies examine technology integration in general contexts, while fewer studies investigate how a specific learning management system can address identified learning gaps among struggling learners in a public secondary school setting. This study addresses this gap by examining the effectiveness of the Quipper application as a technology-based intervention in improving the Science competency mastery of Grade 10 learners at Madrid National High School.

The implementation of Quipper as a technology-based intervention provides an opportunity to address learning gaps among students experiencing difficulties in Science competencies. By integrating digital learning resources, assessment tools, and progress monitoring, Quipper may support remediation and improve learners' understanding of scientific concepts. The use of educational technology as a support tool has been recognized as an effective approach in improving learning outcomes when integrated with appropriate teaching strategies and instructional goals (Hattie, 2009). Technology-based interventions, particularly those that provide immediate feedback and opportunities for repeated practice, can strengthen students' understanding and mastery of academic competencies (Tamim et al., 2011).

This study aims to determine the effectiveness of the Quipper application in improving the academic performance of Grade 10 students in Science at Madrid National High School during the school year 2019–2020. Specifically, it examines the students' level of mastery of Science competencies before and after the implementation of the Quipper-based intervention and identifies the factors affecting their competency mastery. Through the evaluation of pre-intervention and post-intervention performance, the study seeks to provide evidence on the potential of digital learning platforms in supporting science education and addressing students' learning difficulties.

Research Questions

This study aimed to determine the effectiveness of the Quipper application in improving the competence of Grade 10 Gold learners in Science 10.

Specifically, it sought to answer the following questions;

1. What is the mastery level of Grade 10 section Gold students in Science before using the Quipper app?
2. What are the reasons affecting the mastery level of Grade 10 section Gold students in Science?
3. What is the mastery level of Grade 10 Gold learners in Science after the implementation of the Quipper application?
4. Based on the findings of the study, what enhanced Quipper-based instructional strategy can be proposed to further improve the competence of Grade 10 learners in Science 10?

Scope and Delimitation of the Study

This study was limited to determining the effectiveness of the Quipper application as an intervention strategy in improving the mastery level of Grade 10 Gold students in Science at Madrid National High School during the school year 2019–2020. It focused on ten purposively selected learners who experienced difficulties in mastering Science competencies. The study examined students' performance before and after the implementation of the Quipper-based learning intervention through competency assessments and comparative analysis. It was delimited to the use of the Quipper application, the selected participants, the Science 10 subject area, and the specific learning competencies covered during the intervention; therefore, the findings are applicable only to the identified learners and research setting.

Literature Review

Technology Integration in Education

Technology integration has become an important component of contemporary education as schools adopt digital tools to enhance teaching strategies, improve access to information, and create more engaging learning environments. The effective use of technology allows teachers to provide interactive learning experiences and support students with different learning needs. According to Ertmer and Ottenbreit-Leftwich (2010), successful technology integration depends on teachers' knowledge, beliefs, and ability to use digital tools effectively in instruction. Likewise, Mishra and Koehler (2006) emphasized that meaningful technology integration occurs when technological knowledge is combined with pedagogical and content knowledge to improve learning outcomes. In addition, UNESCO (2023) stressed that the effective integration

of digital technologies into education enhances teaching quality, promotes inclusive learning, and develops learners' digital competencies needed in the 21st century.

Mobile Applications in Learning

Mobile applications have increasingly influenced educational practices by providing learners with portable access to digital resources, communication tools, and instructional materials. These applications support flexible learning opportunities because students can engage with educational content beyond traditional classroom boundaries. Traxler (2007) explained that mobile learning enables personalized and accessible learning experiences through portable technologies. Similarly, Kukulska-Hulme (2012) highlighted that mobile technologies contribute to learner autonomy by allowing students to control the pace, location, and method of their learning. Moreover, Crompton (2013) noted that mobile learning enhances collaboration, engagement, and learner motivation by providing continuous access to educational content regardless of time and place.

Electronic Devices in the Classroom

Electronic devices such as tablets, computers, and mobile phones have become common tools in classrooms for accessing information, completing learning activities, and supporting digital instruction. However, their effectiveness depends on how these devices are managed and integrated into classroom practices. According to Selwyn (2011), digital devices can enhance learning opportunities but may also introduce challenges related to distraction, inequality of access, and inappropriate use. In addition, Junco (2012) found that excessive and non-academic use of mobile technologies may negatively influence students' engagement and academic performance, emphasizing the need for responsible technology use. Likewise, OECD (2015) reported that while digital devices offer valuable educational opportunities, their excessive or inappropriate use in classrooms may negatively affect students' academic achievement and concentration.

Quipper Application as an E-Learning Tool

Quipper, as an e-learning platform, provides digital learning materials, assessment activities, and monitoring features that support teachers in delivering technology-assisted instruction. Learning management systems such as Quipper help facilitate online content delivery, assessment tracking, and feedback mechanisms that allow teachers to address students' learning needs. According to Coates et al. (2005), learning management systems enhance educational delivery by organizing course materials, communication, and assessment processes in a digital environment. Furthermore, Al-Fraihat et al. (2020) explained that the effectiveness of e-learning systems is influenced by their usability, quality of learning content, and ability to support learners' academic experiences. Similarly, Hrastinski (2008) emphasized that online learning platforms encourage active participation and interaction, which contribute to improved learning outcomes and learner satisfaction.

Technology-Based Learning Intervention

Technology-based interventions provide additional opportunities for students to improve academic performance through digital resources, interactive activities, and continuous learning support. These interventions allow educators to provide remediation and reinforcement based on students' identified learning difficulties. Mayer (2009) stated that technology-supported instruction can improve learning when multimedia resources are designed according to principles that promote meaningful understanding. Similarly, Clark and Mayer (2016) explained that well-designed e-learning environments can support knowledge development by combining instructional methods with appropriate digital technologies. Additionally, Means et al. (2013) concluded that students participating in online and blended learning environments generally perform better than those receiving traditional face-to-face instruction alone, particularly when technology is integrated with effective teaching strategies.

Student Engagement and Technology Use

The effectiveness of technology use in education depends on students' engagement, digital responsibility, and the ability of teachers to establish appropriate learning practices. While digital tools can increase participation and provide access to learning materials, improper use may reduce students' attention and involvement in academic activities. Fredricks et al. (2004) emphasized that student engagement involves behavioral, emotional, and cognitive participation, which are important factors in achieving successful learning outcomes. Additionally, Wang et al. (2014) highlighted that technology-supported learning environments can improve engagement when digital activities are interactive, meaningful, and aligned with students' learning goals. Furthermore, Bond et al. (2020) found that educational technology positively influences student engagement by promoting collaboration, active participation, and learner motivation when integrated effectively into classroom instruction.

Methodology

Research Design

This study employed a pre-experimental research design utilizing a one-group pretest-posttest approach to determine the effectiveness of the Quipper application in improving Science competency mastery among Grade 10 learners. Ten learners were purposively selected as participants from January 6–31, 2020, based on their identified low level of mastery in Science competencies. The pretest was administered to determine the learners' initial level of competency mastery before the implementation of the Quipper-based intervention, while the posttest was conducted after the intervention to measure changes in their performance. Data were gathered through a researcher-made survey questionnaire to identify the factors affecting learners' mastery level and through competency-based assessment tools to evaluate their performance before and after the intervention. This research design was appropriate because it allowed the researchers to determine the effectiveness of the Quipper application in addressing learning gaps, providing technology-assisted remediation, and improving learners' mastery of Science competencies.

Sampling Design

The study employed purposive sampling as the primary sampling technique to select the participants who were identified based on their low level of mastery in Science competencies. Purposive sampling allowed the researchers to intentionally choose ten Grade 10 Gold learners from Madrid National High School who needed intervention through the Quipper application. The selected participants underwent a technology-based remediation program designed to improve their competency mastery through digital learning activities. The use of purposive sampling was appropriate because the study focused on a specific group of learners experiencing academic difficulties in Science and aimed to determine the effectiveness of the Quipper intervention in addressing their learning gaps. Data were gathered from the identified respondents through a self-made survey questionnaire, competency-based assessments, and comparative analysis of their performance before and after the intervention.

Research Locale

The study was conducted at Madrid National High School in Madrid, Surigao del Sur during the school year 2019–2020. The school served as the research locale where the Quipper application was implemented as an intervention strategy for improving students' mastery of Science competencies. The participants of the study were Grade 10 Gold students, particularly ten learners identified with low levels of mastery in Science based on their competency assessment results. The study focused on evaluating the effectiveness of the Quipper-based learning intervention through the assessment of students' performance before and after the implementation of the program.

Research Participants

This study included ten (10) selected learners from Grade 10 Gold of Madrid National High School who were identified to have a low level of mastery in Science competencies. The participants were chosen through purposive sampling from the class population and were involved in the implementation of the Quipper application as an intervention strategy. The selected learners served as the primary source of data in determining the effectiveness of the Quipper-based learning approach in improving their Science competency mastery.

Research Instrument

The researcher utilized a researcher-made survey questionnaire and competency-based assessment tools as instruments for data gathering. The questionnaire was designed to identify the factors affecting the learners' level of mastery in Science competencies, while the assessment tools were used to measure students' performance before and after the implementation of the Quipper application. The summative test items were based on the Science 10 competencies covered during the third quarter, and students' mastery levels were categorized using the established rubric: 41–50 as Exemplary, 31–40 as Accomplished, 21–30 as Developing, and 1–20 as Beginning. The data gathered from the respondents' assessments and survey responses were analyzed to determine the effectiveness of the Quipper-based intervention in improving students' Science competency mastery. The administration of the research instruments was conducted with proper approval from school authorities and with consideration of ethical research practices and learners' privacy.

Data Gathering Procedure

The researcher obtained permission from the school authorities before conducting the study and implementing the Quipper-based intervention. Ten Grade 10 Gold learners identified through purposive

sampling participated in the study. Data were collected using a researcher-made survey questionnaire and competency-based assessments administered before and after the intervention. The respondents were exposed to Quipper activities through the school's available PC tablets, and their progress was monitored through formative assessments. After the intervention period, post-assessment results were gathered, analyzed, and compared with the pre-assessment scores to determine the effectiveness of the Quipper application in improving students' mastery of Science competencies while maintaining confidentiality of the collected data.

Results and Discussions

Research Question 1: What is the mastery level of Grade 10 section gold students in science before using the Quipper app?

Table 1. Level of Mastery of Grade 10 Gold in Science before the use of QUIPPER app

Student	Summative Scores	Level of Mastery
1	10	Beginning
2	12	Beginning
3	16	Beginning
4	10	Beginning
5	15	Beginning
6	8	Beginning
7	11	Beginning
8	9	Beginning
9	13	Beginning
10	14	Beginning

Table 1 presents the level of mastery of the ten Grade 10 Gold students in Science before the implementation of the Quipper application. Results revealed that all ten identified learners obtained scores ranging from 8 to 16, which were categorized under the Beginning level of mastery. This indicates that the learners experienced difficulties in understanding and achieving the expected Science competencies prior to the intervention. The findings suggest that the identified students required additional instructional support and remediation strategies to improve their competency mastery and academic performance in Science. According to Guskey (2007), assessing students' learning levels before intervention is essential because it allows teachers to identify gaps in understanding and provide appropriate instructional responses. Similarly, Tomlinson (2014) emphasized that identifying learners' differences in readiness and performance enables educators to design targeted interventions that address specific learning needs. The results further show that the learners' low mastery level may have contributed to their difficulty in applying scientific concepts and achieving the required learning outcomes. These findings served as the basis for implementing the Quipper application as a technology-based intervention designed to provide additional learning opportunities, reinforce Science concepts, and support learners in developing their competency mastery. As noted by Means et al. (2013), technology-supported interventions can provide structured learning experiences and additional practice opportunities that help improve students' academic achievement.

Research Question 2: What are the reasons affecting the mastery level of Grade 10 section gold students in science?

Table 2. Reasons Affecting the Level of mastery in Science of Grade 10 Gold

Reasons	Number of Learners
1. Do not participate and easily bored	3
2. Busy with other stuff like using cell phones during the discussion	7
Total	10

Table 2 presents the identified reasons affecting the level of mastery in science among the ten Grade 10 Gold students who obtained the Beginning level during the summative assessment. The results revealed that the most common factor affecting students' mastery was being engaged in other activities, particularly the use of cell phones during class discussions, as reported by seven learners. Meanwhile, three learners

identified lack of participation and easily becoming bored during discussions as factors that affected their learning progress. The findings indicate that students' attention, engagement, and participation during science lessons may influence their ability to understand and master the required competencies. According to Skinner and Belmont (1993), student engagement is influenced by classroom experiences, motivation, and teacher support, which are important factors in promoting active participation and learning achievement. Furthermore, Amez and Baert (2020) explained that excessive smartphone use among students may negatively affect academic engagement by creating distractions and reducing concentration during learning activities. The presence of distractions, particularly inappropriate smartphone use during class, may reduce students' focus and involvement in learning activities. These results served as the basis for implementing the Quipper application as an intervention strategy to increase learner engagement, provide interactive learning experiences, and improve students' mastery of science competencies. As highlighted by Kahu and Nelson (2018), learning interventions that promote active engagement and meaningful interaction can contribute to improved educational outcomes.

Research Question 3: What is the mastery level of Grade 10 Gold learners in science after the implementation of the Quipper application?

Table 3. Comparative Results in the Level of Mastery after the use of QUIPPER app

	Before the Intervention		After the use of QUIPPER app as Intervention	
	Score	Level of Mastery	Score	Level of Mastery
1	10	Beginning	35	Accomplished
2	12	Beginning	38	Accomplished
3	16	Beginning	40	Accomplished
4	10	Beginning	36	Accomplished
5	15	Beginning	39	Accomplished
6	8	Beginning	33	Accomplished
7	11	Beginning	36	Accomplished
8	9	Beginning	38	Accomplished
9	13	Beginning	37	Accomplished
10	14	Beginning	40	Accomplished

Table 3 presents the comparative results of the learners' level of mastery in Science before and after the implementation of the Quipper application. The findings revealed that all ten Grade 10 Gold students improved from the Beginning level, with scores ranging from 8 to 16 before the intervention, to the Accomplished level, with scores ranging from 33 to 40 after the intervention. This indicates that Quipper positively contributed to improving students' understanding and mastery of Science competencies by providing digital learning activities, accessible instructional materials, opportunities for practice, and continuous assessment. The results support Tamim et al. (2011), who stated that technology integration enhances student achievement when combined with effective instructional approaches, and Sung et al. (2016), who emphasized that mobile learning tools improve performance through increased engagement and interactive learning experiences. Furthermore, the findings align with Cheung and Slavin (2013), who highlighted the effectiveness of educational technology applications in improving learning outcomes when aligned with instructional goals, and Garrison and Kanuka (2004), who explained that technology-supported environments promote active and meaningful learning. Thus, the implementation of Quipper served as an effective intervention strategy in addressing Science learning gaps and enhancing students' competency mastery. The comparative results revealed an improvement in the learners' mastery levels after the implementation of the Quipper application, as all participants moved from the Beginning level to the Accomplished level.

Research Question 4: Based on the findings of the study, what enhanced Quipper-based instructional strategy can be proposed to further improve the competence of Grade 10 learners in Science's 10?

Based on the findings of the study, an enhanced Quipper-Based Science Learning Enhancement Program (QSLEP) is proposed to further improve the competence of Grade 10 learners in science 10. The program integrates Quipper as a supplementary instructional tool by providing competency-based learning modules, formative assessments, immediate feedback, and remediation activities aligned with the Most

Essential Learning Competencies (MELCs). Learners identified with low mastery levels will undergo scheduled remediation sessions using the Quipper application in the computer laboratory or through their personal devices, while teachers will regularly monitor learners' progress through the platform's learning analytics. The intervention also includes periodic assessment, feedback, and enrichment activities to ensure continuous improvement in learners' mastery of science competencies. Through the systematic integration of Quipper into classroom instruction and remediation, the program aims to strengthen learners' conceptual understanding, enhance academic performance, and promote independent and technology-assisted learning.

Ethical Considerations

This study observed ethical standards in educational research to ensure the protection of the rights, privacy, and welfare of the participants. Permission to conduct the study was obtained from the school authorities of Madrid National High School prior to the implementation of the Quipper-based intervention. Informed consent was secured from the selected Grade 10 Gold learners after explaining the purpose, procedures, and their voluntary participation in the study. Confidentiality and anonymity were maintained by protecting the identities of the participants through the use of codes, and no personal information was disclosed in the analysis and reporting of results. The data gathered from the survey questionnaire, assessments, and Quipper activities were used solely for research purposes and were handled responsibly in accordance with the Data Privacy Act of 2012 (Republic Act No. 10173). The study ensured that participants were not exposed to any physical, psychological, or emotional harm, and the researchers upheld the principles of fairness, respect, voluntary participation, and academic integrity throughout the research process.

Conclusion

The study concluded that the use of the Quipper application as a technology-based intervention improved the Science competency mastery of Grade 10 Gold students at Madrid National High School. Before the implementation of the intervention, the identified learners demonstrated a Beginning level of mastery, indicating difficulties in understanding and achieving the required Science competencies. After the utilization of Quipper, all participants showed improvement and reached the Accomplished level of mastery. The findings suggest that integrating e-learning tools into classroom instruction provides learners with additional opportunities for practice, engagement, and access to learning resources. The Quipper application served as an effective strategy in addressing learning gaps and enhancing students' academic performance in Science. The findings of the study should be interpreted within the context of the selected participants and research setting. Since the study involved only ten purposively selected learners, the results may not be generalized to all Grade 10 learners.

Recommendations

Based on the findings of the study, it is recommended that Science teachers consider integrating the Quipper application and other technology-assisted learning platforms as supplementary tools to support instruction and remediation programs. Teachers may provide continuous digital learning activities that encourage student engagement and competency mastery, particularly among learners experiencing difficulties in Science. Schools may also strengthen ICT-based initiatives by maximizing available technological resources and providing support for teachers in implementing e-learning strategies. Future researchers may further investigate the effectiveness of Quipper and similar digital learning applications using larger populations, longer intervention periods, and different subject areas to determine their broader impact on students' academic achievement.

References

- Al-Fraihat, D., Joy, M., Masa'deh, R., & Sinclair, J. (2020). Evaluating e-learning systems success: An empirical study. *Computers in Human Behavior*, 102, 67–86. <https://doi.org/10.1016/j.chb.2019.08.004>
- Amez, S., & Baert, S. (2020). Smartphone use and academic performance: A literature review. *International Journal of Educational Research*, 103, 101618. <https://doi.org/10.1016/j.ijer.2020.101618>
- Baker, W. M., Lusk, E. J., & Neuhauser, K. L. (2012). On the use of cell phones and other electronic devices in the classroom: Evidence from a survey of faculty and students. *Journal of Education for Business*, 87(5), 275–289. <https://doi.org/10.1080/08832323.2011.622814>

- Berry, M. J., & Westfall, A. (2015). Dial D for distraction: The making and breaking of cell phone policies in the college classroom. *College Teaching*, 63(2), 62–71. <https://doi.org/10.1080/87567555.2015.1005040>
- Black, P., & Wiliam, D. (2018). Classroom assessment and pedagogy. *Assessment in Education: Principles, Policy & Practice*, 25(6), 551–575. <https://doi.org/10.1080/0969594X.2018.1441807>
- Bolkan, J. (2012, September 13). Report: Schools not meeting students' technology needs. *The Journal*. <http://thejournal.com>
- Broadbent, J., & Fuller-Tyszkiewicz, M. (2018). Profiles in self-regulated learning and their correlates in the online learning environment. *Computers & Education*, 126, 42–55. <https://doi.org/10.1016/j.compedu.2018.07.015>
- Carrara, A. (2016). Role of mobile applications in technology. *The OneSpy*. University of Pennsylvania.
- Cheung, A. C. K., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K–12 classrooms: A meta-analysis. *Educational Research Review*, 9, 88–113. <https://doi.org/10.1016/j.edurev.2013.01.001>
- Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning* (4th ed.). Wiley.
- Coates, H., James, R., & Baldwin, G. (2005). A critical examination of the effects of learning management systems on university teaching and learning. *Tertiary Education and Management*, 11(1), 19–36. <https://doi.org/10.1080/13583883.2005.9967137>
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255–284. <https://doi.org/10.1080/15391523.2010.10782551>
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109. <https://doi.org/10.3102/00346543074001059>
- Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, 7(2), 95–105. <https://doi.org/10.1016/j.iheduc.2004.02.001>
- Guskey, T. R. (2007). Closing achievement gaps: Revisiting Benjamin S. Bloom's "learning for mastery." *Journal of Advanced Academics*, 19(1), 8–31. <https://doi.org/10.4219/jaa-2007-704>
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.
- Junco, R. (2012). The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. *Computers & Education*, 58(1), 162–171. <https://doi.org/10.1016/j.compedu.2011.08.004>
- Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface: Understanding the mechanisms of student success. *Higher Education Research & Development*, 37(1), 58–71. <https://doi.org/10.1080/07294360.2017.1344197>
- Koehler, M. J., & Mishra, P. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Kukulka-Hulme, A. (2012). How should the higher education workforce adapt to advancements in technology for teaching and learning? *The Internet and Higher Education*, 15(4), 247–254. <https://doi.org/10.1016/j.iheduc.2011.12.002>
- Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.
- Means, B., Toyama, Y., Murphy, R., & Baki, M. (2013). The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College Record*, 115(3), 1–47.
- OECD. (2015). *Students, computers and learning: Making the connection*. OECD Publishing. <https://doi.org/10.1787/9789264239555-en>
- Quipper Philippines. (2024a). Quipper LMS: Digital learning platform for K–12 education. <https://www.quipper.com/ph>
- Quipper Philippines. (2024b). Quipper School: Learning management system for teachers and students. <https://www.quipper.com/ph>
- Selwyn, N. (2011). *Education and technology: Key issues and debates*. Continuum.
- Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology*, 85(4), 571–581. <https://doi.org/10.1037/0022-0663.85.4.571>
- 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>



- Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research*, 81(1), 4–28. <https://doi.org/10.3102/0034654310393361>
- Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners* (2nd ed.). ASCD.
- Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having writ. *International Review of Research in Open and Distance Learning*, 8(2), 1–12.
- UNESCO. (2018). *ICT competency framework for teachers*. United Nations Educational, Scientific and Cultural Organization.
- UNESCO. (2019). *Artificial intelligence in education: Challenges and opportunities for sustainable development*. United Nations Educational, Scientific and Cultural Organization.
- Wang, M. T., Degol, J. L., & Henry, D. A. (2014). An integrative development-in-sociocultural-context model for children's engagement in learning. *American Psychologist*, 69(7), 635–648.
- Wang, Z., Chen, L., & Anderson, T. (2014). A framework for interaction and cognitive engagement in connectivist learning contexts. *International Review of Research in Open and Distributed Learning*, 15(2), 121–141.