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ICT Inaccessibility and Reported Learning Outcomes among Secondary Learners at Kinabuksan Integrated School

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Abstract

Unequal access to information and communication technology (ICT) can constrain learning in remote communities, underscoring the need to examine barriers within specific school contexts. This study investigated ICT inaccessibility, student-reported learning outcomes, and their association at Kinabuksan Integrated School in Zambales, the Philippines. A descriptive-correlational design involved 100 learners in Grades 7–12 during the 2025–2026 school year. Data were collected using a researcher-developed questionnaire with a five-point agreement scale and analyzed through descriptive statistics, group comparisons, and Pearson correlation. Internet connectivity received the highest mean barrier rating (4.50), followed by device access (4.29) and ICT capabilities (3.80). Mean agreement ratings for items concerning academic performance, completion of requirements, and participation were 3.98, 3.98, and 3.88, respectively. Group comparisons indicated differences by family income in ICT inaccessibility ($p = .021$) and reported learning outcomes ($p = .015$). A negative correlation was reported between ICT inaccessibility and learning outcome scores ($r = -.682$, $p < .001$). However, its directional interpretation requires verification of score coding because the outcome items combine statements about learner functioning with perceptions of ICT influence. The descriptive findings identify connectivity and device availability as priorities for school support, with offline learning resources, shared device access, and guided digital skills development warranting consideration. The study contributes a school-level account of ICT access barriers and reported learning experiences that can

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inform locally appropriate educational support. Its findings neither establish causation nor demonstrate changes in objectively measured academic achievement.

Keywords: ICT Inaccessibility; Internet Connectivity; Student-Reported Learning Outcomes; Secondary Education; Philippines

INTRODUCTION

Educational use of information and communication technology (ICT) depends on whether learners can obtain suitable devices, maintain usable connectivity, and apply digital skills to academic tasks. These conditions can differ substantially even when students are enrolled in the same school. UNESCO (2023) places access, governance, and teacher preparation among the conditions shaping the educational value of technology. Consequently, introducing digital materials does not by itself establish that learners can use them consistently or benefit equally from them.

The digital divide provides a framework for examining these inequalities. van Dijk (2006) distinguishes motivational, physical, skills, and usage access, showing why a simple division between connected and unconnected users is insufficient. Later research identifies inequalities in the quality and range of available equipment and in the costs associated with maintaining access (van Deursen & van Dijk, 2019). Scheerder et al. (2017) further distinguish digital skills and uses from the tangible outcomes of internet use. These distinctions are relevant when educational access is measured alongside students' reports about their learning.

Socioeconomic circumstances can shape both access and the ability to use technology effectively. Scherer and Siddiq (2019) document an association between socioeconomic status and ICT literacy, while Gonzales et al. (2020) show that unreliable or poorly functioning technology can persist despite device ownership. Research on home learning in England also identifies inequalities in learning resources and experiences across household circumstances (Andrew et al., 2020). These studies support examining family income without assuming that income alone explains differences in educational participation.

In the Philippines, pandemic-era studies describe learning barriers that extend beyond technical competence. Barrot et al. (2021) identify the home learning environment as a major challenge among college students, and Rotas and Cahapay (2020) describe

difficulties involving connectivity, learning resources, and other conditions of remote study. Agaton and Cueto (2021) examine parents' experiences in supporting distance learning, including the practical demands of learning at home. Toquero (2020) discusses institutional responses to emergency remote education. These contributions establish relevant contextual concerns, but their populations and emergency conditions cannot be treated as equivalent to secondary schooling in the 2025–2026 academic year.

Comparable research outside the Philippines reinforces the need to examine access in context. Azubuike et al. (2021) investigate unequal opportunities for remote learning in Nigeria, and Lai and Widmar (2021) emphasize limitations in internet availability, speed, and capabilities, particularly in rural areas. Beaunoyer et al. (2020) explain how increased dependence on digital services can interact with existing inequalities. These findings inform the present inquiry without establishing the prevalence or magnitude of barriers at the study school.

Kinabuksan Integrated School is located in Sitio Kinabuksan, Barangay Cawag, Subic, Zambales, a remote coastal community described in the study as relying largely on fishing. The study context identifies an absence of permanent electricity and fixed internet lines, with residents depending primarily on mobile data and cellular signals. Such conditions make reliable access to learning resources a concrete school-level concern. The local contribution of this study is to examine device access, connectivity, and ICT capabilities together with learning-related reports across Grades 7–12 in this setting.

A further issue concerns what counts as a learning outcome. Students' perceptions of the role of technology, their reports of completing tasks, and independently recorded achievement are related but distinct forms of evidence. For example, Pagani et al. (2016) examine digital skills using performance tests linked to educational assessment, while Hatlevik et al. (2018) distinguish ICT self-efficacy from computer and information literacy. The present survey concerns student reports; its interpretation therefore requires attention to the content and coding of the questionnaire rather than treating agreement scores as verified grades.

The study aimed to describe the respondents' demographic and household characteristics, assess ICT inaccessibility across three domains, and describe reported learning outcomes concerning academic performance, completion of requirements, and class participation. It also examined reported differences by age, sex, grade level, and family

income, and the association between ICT inaccessibility and the outcome score. Its contribution is a contextual descriptive and correlational account, rather than a causal estimate of the effects of technology access. Figure 1 summarizes the variables examined.

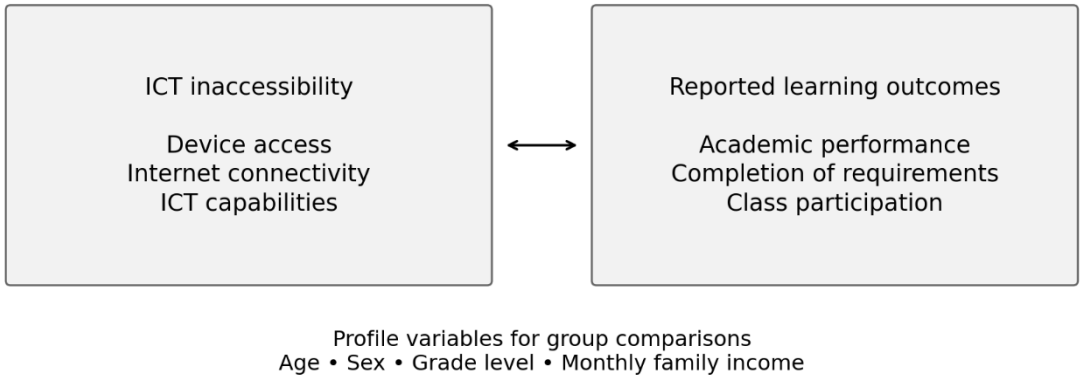


Figure 1. ***Conceptual relationships among ICT inaccessibility, reported learning outcomes, and profile variables***

Note. The double-headed link represents an association to be examined. Profile variables define group comparisons; the framework does not establish a causal pathway.

METHODS

Research design and setting

The study used a descriptive-correlational survey design to examine ICT inaccessibility and reported learning outcomes during the 2025–2026 school year. The design describes patterns and associations without assigning learners to an intervention. The research site was Kinabuksan Integrated School in Sitio Kinabuksan, Barangay Cawag, Subic, Zambales, the Philippines. Figure 2 shows the location of the school within the coastal community.



Figure 2. Location of Kinabuksan Integrated School in the coastal community of Kinabuksan

Note. The image identifies Kinabuksan Integrated School within the coastal settlement of Kinabuksan.

Participants and sampling

The reported dataset comprised 100 secondary learners in Grades 7–12. The sampling approach was described as total enumeration of the defined target population. The participant distribution is presented in Table 1. Coverage of several grade levels supports comparison within this school but does not establish representativeness of other schools or coastal communities.

Questionnaire and measurement

A researcher-developed questionnaire contained a respondent profile section and 30 substantive items. Fifteen items addressed ICT inaccessibility, organized into device access, internet connectivity, and ICT capabilities, with five items per domain. Fifteen further items concerned academic performance, completion of school requirements, and participation in class activities, also with five items per domain. The profile section recorded age, sex, grade level, and monthly family income. Responses used a five-point scale from 1 (strongly disagree) to 5 (strongly agree).

The descriptive agreement bands were 1.00–1.80 (strongly disagree), 1.81–2.60 (disagree), 2.61–3.40 (neutral), 3.41–4.20 (agree), and 4.21–5.00 (strongly agree). These labels describe endorsement of statements. They do not indicate how frequently an event occurred or establish an objective level of achievement. Higher endorsement of the ICT items generally indicates greater barriers or stronger perceived consequences of those barriers.

The outcome items require particular caution. Some statements concern learner functioning, such as submitting assignments on time, whereas others concern beliefs about ICT influence, such as ICT affecting grades or participation. Agreement with these latter statements does not necessarily indicate better or worse learning. The domain labels are retained to reflect the intended constructs, but the scores are described as reported learning outcomes rather than verified grades.

The available instrument documentation did not provide sufficient detail on completed validation procedures or domain-specific reliability coefficients to establish measurement quality. The questionnaire combines items on access barriers, learner functioning, and perceptions of ICT influence, which limits the interpretation of composite scores. Transparent documentation of measurement decisions is essential for evaluating study inferences (Flake & Fried, 2020).

Data collection and research ethics

The data collection protocol provided for school-level permission, an explanation of the research purpose, voluntary participation, confidentiality, and personal distribution and collection of questionnaires. Data were obtained through the researcher-developed questionnaire and summarized in the participant profiles, item ratings, and statistical results.

The participant profile included both learners younger than 18 years and adult learners. Formal ethics-review information and specific procedures for parental permission, learner assent, and adult consent were not documented in the available study materials.

Statistical analysis

Frequencies and percentages described the participant profile. Item means and domain means summarized agreement ratings. The reported domain means correspond, after rounding, to the arithmetic average of their five displayed item means; variability and respondent-level distributions were not available for assessment. The analysis plan specified independent-samples t tests for two-group comparisons, one-way analysis of variance for comparisons involving more than two groups, and Pearson product–moment correlation for the association between the study scores. The stated significance threshold was .05.

Group comparisons are presented as reported, unadjusted p values because group means, test statistics, and detailed statistical output were not available. The direction and magnitude of income-group differences therefore cannot be established. Pearson correlation summarizes the association between questionnaire-based scores, with interpretation limited by the mixed content of the outcome items. A displayed p value of .000 is expressed as $p < .001$.

RESULTS

Participant characteristics

The largest age category was 14–15 years (42%), followed by 16–17 years (30%). Female respondents accounted for 53% of the dataset. Grade 10 had the largest share of respondents (20%), although each grade from 7 to 12 was represented. Fifty-five percent reported monthly family income below PHP 10,000, while 5% reported income of at least PHP 30,000 (Table 1). The largest age and grade categories did not constitute majorities.

Table 1. Demographic and household characteristics of respondents

Characteristic	Category	n	%
Age in years	12–13	18	18%
Age in years	14–15	42	42%
Age in years	16–17	30	30%
Age in years	18 and above	10	10%
Sex	Male	47	47%
Sex	Female	53	53%
Grade level	Grade 7	15	15%
Grade level	Grade 8	16	16%
Grade level	Grade 9	18	18%
Grade level	Grade 10	20	20%
Grade level	Grade 11	16	16%
Grade level	Grade 12	15	15%
Monthly family income	Below PHP 10,000	55	55%
Monthly family income	PHP 10,000–PHP 19,999	28	28%
Monthly family income	PHP 20,000–PHP 29,999	12	12%
Monthly family income	PHP 30,000 and above	5	5%

Note. N = 100. Each characteristic totals 100 respondents and 100%. PHP = Philippine pesos; family income refers to a monthly amount.

ICT inaccessibility ratings

Internet connectivity had the highest descriptive domain mean (4.50), followed by device access (4.29) and ICT capabilities (3.80). The highest individual rating concerned unstable internet connection (4.58). Within the device domain, perceived effects of limited access on learning received the highest mean (4.41). Within the ICT capabilities domain, the highest rating concerned the perceived effect of ICT skills on learning (3.88). These comparisons reflect agreement ratings, without statistical tests of differences between domains (Table 2).

Table 2. Item and domain means for ICT inaccessibility

Domain	Indicator	Mean	Agreement
Device access	Limited access to gadgets	4.35	Strongly Agree
Device access	Shared use of gadgets	4.27	Strongly Agree
Device access	Gadget unavailable when needed	4.18	Agree
Device access	Gadget limitations affect schoolwork	4.22	Strongly Agree
Device access	Limited access affects learning	4.41	Strongly Agree
Device access	Domain mean	4.29	Strongly Agree
Internet connectivity	Unstable internet connection	4.58	Strongly Agree
Internet connectivity	Difficulty accessing online materials	4.49	Strongly Agree
Internet connectivity	Connectivity affects school tasks	4.45	Strongly Agree
Internet connectivity	Frequent network problems	4.52	Strongly Agree
Internet connectivity	Internet limitations affect performance	4.47	Strongly Agree
Internet connectivity	Domain mean	4.50	Strongly Agree
ICT capabilities	Difficulty using ICT applications	3.76	Agree
ICT capabilities	Need assistance in ICT use	3.84	Agree
ICT capabilities	Lack of confidence in technology use	3.69	Agree
ICT capabilities	Insufficient ICT skills	3.81	Agree
ICT capabilities	ICT skills affect learning	3.88	Agree
ICT capabilities	Domain mean	3.80	Agree

Note. Five-point agreement scale. Indicator labels are shortened descriptions of the original questionnaire items. The ICT capabilities items assess reported difficulties, not demonstrated digital proficiency. Standard deviations were not reported.

Reported learning outcomes

The means for the domains labelled academic performance and completion of requirements were both 3.98; participation in class activities had a mean of 3.88. Among performance-related items, the highest mean concerned the influence of ICT on performance (4.15). For completion, the highest mean concerned ICT affecting requirements (4.13). For participation, the highest mean concerned ICT affecting participation (4.08). These statements concern perceived technological influence and should not be interpreted as objective indicators of academic success (Table 3).

Table 3. Item and domain means for reported learning outcomes

Domain	Indicator	Mean	Agreement
Academic performance	Maintain satisfactory grades	3.88	Agree
Academic performance	ICT contributes to performance	4.02	Agree
Academic performance	Limited ICT affects grades	4.10	Agree
Academic performance	Accomplish learning tasks effectively	3.76	Agree
Academic performance	Performance influenced by ICT	4.15	Agree
Academic performance	Domain mean	3.98	Agree
Completion of requirements	Submit assignments on time	3.84	Agree
Completion of requirements	Limited ICT makes completion difficult	4.11	Agree
Completion of requirements	Complete projects as required	3.77	Agree
Completion of requirements	ICT helps finish tasks	4.06	Agree
Completion of requirements	ICT affects completion of requirements	4.13	Agree
Completion of requirements	Domain mean	3.98	Agree
Class participation	Active participation in class activities	3.70	Agree
Class participation	Participation in discussions	3.74	Agree
Class participation	ICT affects participation	4.08	Agree
Class participation	ICT helps engagement in learning	4.02	Agree
Class participation	Communicate effectively with teachers and classmates	3.88	Agree
Class participation	Domain mean	3.88	Agree

Note. These are questionnaire agreement ratings rather than school-record grades, submission logs, or observed participation. The mixture of learner-functioning and ICT-influence items limits the interpretation of a combined outcome score.

Reported comparisons by participant characteristics

The reported p values for age, sex, and grade level exceeded .05 for both ICT inaccessibility and the outcome score. These results indicate that the reported analyses did not detect differences at the stated threshold; they do not establish that groups are equivalent. Family-income comparisons yielded $p = .021$ for ICT inaccessibility and $p = .015$ for the outcome score (Table 4). Group means, variability, post hoc comparisons, and effect sizes were not reported, so neither the direction nor the practical magnitude of those differences can be established.

Table 4. Reported unadjusted p values for group comparisons

Grouping variable	ICT inaccessibility p	Outcome score p	Decision at .05
Age	.214	.284	Do not reject H_0
Sex	.318	.417	Do not reject H_0
Grade level	.107	.093	Do not reject H_0
Family income	.021	.015	Reject H_0

Note. Decisions apply separately to the two reported p values in each row. Test statistics, degrees of freedom, and multiplicity adjustments were not supplied. The income comparisons are exploratory; significance does not identify which income categories differ.

Reported association between study scores

The reported association between ICT inaccessibility and the outcome score was negative, $r = -.682$, $p < .001$ (Table 5). This coefficient describes an association between questionnaire-based scores. Because the outcome items combine learner-functioning reports and perceptions of ICT influence, the coefficient does not provide a direct estimate of the association between access barriers and objectively measured academic achievement.

Table 5. Reported correlation between ICT inaccessibility and the outcome score

Variables	Pearson r	Reported p
ICT inaccessibility and outcome score	−.682	< .001

Note. The correlation concerns questionnaire-based scores. It does not establish a causal effect or a change in independently measured academic achievement.

DISCUSSION

Interpreting the pattern of access barriers

The clearest descriptive finding is the high endorsement of connectivity-related difficulties. Internet instability received the highest item mean, while connectivity also had the highest domain mean. This pattern is consistent with the infrastructural conditions described for the coastal setting. It supports prioritizing the reliability of educational access in local planning, although the survey does not quantify network uptime, connection speed, expenditure, or the number of tasks missed because of connection failure.

The pattern is compatible with Philippine studies documenting connectivity and resource difficulties during remote learning (Rotas & Cahapay, 2020) and with the emphasis on rural internet reliability in Lai and Widmar (2021). It should not be read as a replication of pandemic conditions. The present setting and school year differ, and no common instrument or direct cross-study comparison establishes that barriers were more or less severe. The contribution lies in the school-specific combination of connectivity, device, and skills-related concerns.

Device barriers also received strong endorsement. Shared equipment and lack of availability when needed can constrain opportunities even if a household has a device. This interpretation follows the distinction between physical ownership and material access in van Deursen and van Dijk (2019). Gonzales et al. (2020) similarly highlight the importance of maintaining functional technology. For the study school, these perspectives suggest that an access assessment should record availability at the time of schoolwork, device condition, charging arrangements, and affordability, rather than counting ownership alone.

The lower mean for ICT capabilities does not establish adequate competence. Agreement with difficulty-oriented statements indicates continuing perceived support needs, while no practical skills assessment was reported. Hatlevik et al. (2018) distinguish confidence in using ICT from measured computer and information literacy. Accordingly, skills support should be based on learners' actual tasks and demonstrated needs. The present questionnaire can identify topics for follow-up, but cannot classify learners as digitally proficient.

Family income and unequal learning opportunities

The income comparisons warrant further investigation because they were the only reported profile comparisons below the stated significance threshold. The participant profile

also shows that more than half of respondents belonged to the lowest income category used in the survey. Together, these findings make household resources a relevant consideration in school planning. Nevertheless, absent group means and post hoc results, the analyses do not identify which income categories experienced greater barriers or stronger outcomes.

The broader literature provides a plausible explanation for examining economic circumstances. Scherer and Siddiq (2019) link socioeconomic status with ICT literacy, and Andrew et al. (2020) document socioeconomic differences in home-learning experiences. Azubuike et al. (2021) show how unequal resources relate to access to remote learning in another national context. These studies support the relevance of household resources; they do not supply missing local group statistics or establish income as the cause of the reported score differences.

The absence of statistically detected differences by age, sex, and grade level also requires restraint. The income categories contain unequal numbers of learners, including only five respondents in the highest category, and the precision of the comparisons cannot be evaluated without dispersion and effect-size information. Eight profile comparisons were reported across two outcomes without a stated adjustment for multiple testing. The income results are therefore exploratory and do not provide precise estimates of between-group differences.

Meaning and limits of the reported correlation

The mixed content of the outcome composite limits interpretation of the negative correlation. Agreement that ICT influences academic performance has no fixed positive or negative meaning, whereas agreement about submitting work on time more clearly concerns learner functioning. Consequently, the sign of the association cannot be translated directly into a claim that greater ICT inaccessibility produces lower achievement. This limitation concerns the definition and construction of the measures, rather than the numerical direction of the reported coefficient.

This is a measurement issue with direct consequences for the conclusion. Flake and Fried (2020) explain why transparent operational definitions and scoring decisions are necessary for evaluating study inferences. Scheerder et al. (2017) also distinguish outcomes of internet use from access, skills, and uses. Several questionnaire items already refer to the learning consequences of limited ICT access, creating conceptual overlap between the

intended predictor and outcome. Such overlap, together with collecting both scores from the same respondents, may contribute to an association that is partly a feature of measurement.

The distinction from objective achievement is substantive. Pagani et al. (2016) connect performance-based digital skills with educational assessment, and Engzell et al. (2021) examine learning loss using achievement records in a different national context. Those designs illustrate forms of evidence that can address attainment more directly. The present survey provides no verified grades, baseline scores, or follow-up assessment. Its correlation therefore cannot show that ICT inaccessibility reduced grades, caused learning loss, or independently explained differences in participation.

Practical implications for the school

The descriptive findings support reviewing how school tasks depend on connectivity and device availability. Teachers can prepare downloadable or printed materials, provide feasible offline submission routes, and avoid requiring uninterrupted access for activities that can be completed asynchronously. These are proposed responses to reported barriers, rather than interventions whose effectiveness was tested in this study. Ferri et al. (2020) distinguish technological, pedagogical, and social challenges, while Rasheed et al. (2020) identify both technology-use and self-regulation challenges in blended learning. Their findings support combining access arrangements with instructional support.

School administrators can assess the feasibility of scheduled shared-device access, reliable charging facilities, and assistance for common academic applications. A local assessment should establish recurrent costs and access conditions before equipment is acquired. Teachers and families can also agree on communication methods that remain usable with weak signals. Agaton and Cueto (2021) highlight the demands placed on families in distance learning, while Barrot et al. (2021) show the importance of managing learning resources and environments. Family support should therefore be considered alongside the resources available to households.

At the institutional level, planning should account for electricity, connectivity, maintenance, and teaching practices together. Toquero (2020) discusses the need for institutional responses to emergency remote education, and UNESCO (2023) emphasizes that educational technology must be judged in relation to learners' needs and implementation conditions. Beaunoyer et al. (2020) likewise caution that digital dependence can interact with

existing inequalities. These perspectives inform possible school responses without implying that a particular technology purchase will improve achievement.

Study limitations and future research

The study concerns one school and a group of 100 learners. Coverage of the defined school population does not establish generalizability to other locations. All substantive measures were questionnaire responses, and the temporal sequence between access barriers and learning-related reports was not established. Household resources, prior attainment, instructional practices, and other unmeasured conditions may be associated with both scores. Causal and mediational claims are therefore outside the design.

Further limitations concern the incomplete documentation of instrument validation, reliability, score construction, participant-consent procedures, and statistical assumptions. Standard deviations, confidence intervals, group means, and complete inferential output were not reported. These omissions limit assessment of precision and measurement quality. Future research could use clearly differentiated and validated measures of access barriers and learner functioning, supplemented by documented access conditions, practical digital-skills assessments, school-record outcomes, and longitudinal observations. Proposed support programs should be evaluated using an appropriate comparison strategy and prespecified outcomes.

CONCLUSION

Secondary learners at Kinabuksan Integrated School reported substantial ICT-related constraints, with the highest agreement concerning internet connectivity, followed by device access and ICT capabilities. The findings provide a local basis for reviewing connectivity-dependent school tasks and considering offline resources, shared-device arrangements, and guided skills support. The reported income differences suggest a need for closer examination of household circumstances, but the available statistics do not establish the direction or size of those differences.

The reported negative association applies to questionnaire-based scores. Because the outcome items mix learner functioning with perceptions of technological influence, the findings cannot establish an effect on objectively measured achievement. The study contributes a contextual account of reported barriers and learning-related perceptions.

Future research using validated measures and independently documented educational outcomes would provide a stronger basis for evaluating the educational consequences of ICT inaccessibility.

REFERENCES

Agaton, C. B., & Cueto, L. J. (2021). Learning at home: Parents' lived experiences on distance learning during COVID-19 pandemic in the Philippines. *International Journal of Evaluation and Research in Education, 10*(3), 901–911. https://doi.org/10.11591/ijere.v10i3.21136

Andrew, A., Cattan, S., Costa Dias, M., Farquharson, C., Kraftman, L., Krutikova, S., Phimister, A., & Sevilla, A. (2020). Inequalities in children's experiences of home learning during the COVID-19 lockdown in England. *Fiscal Studies, 41*(3), 653–683. https://doi.org/10.1111/1475-5890.12240

Azubuike, O. B., Adegboye, O., & Quadri, H. (2021). Who gets to learn in a pandemic? Exploring the digital divide in remote learning during the COVID-19 pandemic in Nigeria. *International Journal of Educational Research Open, 2*, Article 100022. https://doi.org/10.1016/j.ijedro.2020.100022

Barrot, J. S., Llenares, I. I., & del Rosario, L. S. (2021). Students' online learning challenges during the pandemic and how they cope with them: The case of the Philippines. *Education and Information Technologies, 26*(6), 7321–7338. https://doi.org/10.1007/s10639-021-10589-x

Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Computers in Human Behavior, 111*, Article 106424. https://doi.org/10.1016/j.chb.2020.106424

Engzell, P., Frey, A., & Verhagen, M. D. (2021). Learning loss due to school closures during the COVID-19 pandemic. *Proceedings of the National Academy of Sciences, 118*(17), Article e2022376118. https://doi.org/10.1073/pnas.2022376118

Ferri, F., Grifoni, P., & Guzzo, T. (2020). Online learning and emergency remote teaching: Opportunities and challenges in emergency situations. *Societies, 10*(4), Article 86. https://doi.org/10.3390/soc10040086

Flake, J. K., & Fried, E. I. (2020). Measurement schmeasurement: Questionable measurement practices and how to avoid them. *Advances in Methods and Practices in Psychological Science, 3*(4), 456–465. https://doi.org/10.1177/2515245920952393

Gonzales, A. L., Calarco, J. M., & Lynch, T. (2020). Technology problems and student achievement gaps: A validation and extension of the technology maintenance construct. *Communication Research, 47*(5), 750–770. https://doi.org/10.1177/0093650218796366

Hatlevik, O. E., Throndsen, I., Loi, M., & Gudmundsdottir, G. B. (2018). Students' ICT self-efficacy and computer and information literacy: Determinants and relationships. *Computers & Education, 118*, 107–119. https://doi.org/10.1016/j.compedu.2017.11.011

Lai, J., & Widmar, N. O. (2021). Revisiting the digital divide in the COVID-19 era. *Applied Economic Perspectives and Policy, 43*(1), 458–464. https://doi.org/10.1002/aepp.13104

Pagani, L., Argentin, G., Gui, M., & Stanca, L. (2016). The impact of digital skills on educational outcomes: Evidence from performance tests. *Educational Studies, 42*(2), 137–162. https://doi.org/10.1080/03055698.2016.1148588

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education, 144*, Article 103701. https://doi.org/10.1016/j.compedu.2019.103701

Rotas, E. E., & Cahapay, M. B. (2020). Difficulties in remote learning: Voices of Philippine university students in the wake of COVID-19 crisis. *Asian Journal of Distance Education, 15*(2), 147–158. https://doi.org/10.5281/zenodo.4299835

Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes. A systematic review of the second- and third-level digital divide. *Telematics and Informatics, 34*(8), 1607–1624. https://doi.org/10.1016/j.tele.2017.07.007

Scherer, R., & Siddiq, F. (2019). The relation between students' socioeconomic status and ICT literacy: Findings from a meta-analysis. *Computers & Education, 138*, 13–32. https://doi.org/10.1016/j.compedu.2019.04.011

Toquero, C. M. (2020). Emergency remote education experiment amid COVID-19 pandemic. *IJERI: International Journal of Educational Research and Innovation*, (15), 162–176. https://doi.org/10.46661/ijeri.5113

UNESCO. (2023). *Global education monitoring report 2023: Technology in education—A tool on whose terms?* https://doi.org/10.54676/UZQV8501

van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2019). The first-level digital divide shifts from inequalities in physical access to inequalities in material access. *New Media & Society, 21*(2), 354–375. https://doi.org/10.1177/1461444818797082

van Dijk, J. A. G. M. (2006). Digital divide research, achievements and shortcomings. *Poetics, 34*(4–5), 221–235. https://doi.org/10.1016/j.poetic.2006.05.004