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Efficiency, Effectiveness and Fairness Narratives of Education Technology: A Synthesis of Claims and Evidence from the Asia-Pacific Region

Sarah Lambert, Faris Nur Khulafa, Kim Chi Vu, Joe Gauld, Adhitya Amarulloh, Almizar Dharmazi, Elizabeth Duyao, Paravuth Hem, Ei Thinzar Kyaw, Yixin Tan

Abstract: For decades, the field of educational technology (ed-tech) has been characterised by over-optimism and lofty promises that often fail to materialise. This research investigates the narrative claims or hype of ed-tech across diverse education contexts in seven Asian-Pacific countries. It uses a qualitative meta-analysis of research reports developed by Master of Education Students at Monash University in 2023. These reports examined narratives and evidence of particular ed-techs in their contexts. We found five common narrative claims made for new educational technologies (Effectiveness, Efficiency, Fairness, Transformation, and Limitations) and ten narrative sub-themes that were quite similar across different nations, contexts and technologies. However, there were differences in the specific expressions of the narratives, especially within the efficiency narratives, due to different implementations, strategic approaches, and cultural contexts. Overall, the evidence fell a long way short of the narrative claims made for the various technologies. While some narratives produced a reasonable number of studies supporting them in limited contexts, many narrative sub-themes were unmatched by evidence. To support more informed dialogues, we offer a Critical Thinking framework of Education Technology, which summarises the most common hype narratives and evidence gaps from our study. We hope this might support more informed planning and investment conversations, enhance educators' tools to teach critical appraisal of education technology in university programs, and inspire further research into areas where evidence for improvements is limited.

Keywords: educational technology, narrative claims, effectiveness, efficiency, fairness, transformation, limitation, systematic review, critical thinking framework, Asia-Pacific.

Highlights

What is already known about this topic:

- Narratives about the potential of ed-tech are created by and for affluent global north contexts.
- The impact of ed-tech on educational outcomes does not always match up to the narrative hype.

What this paper contributes:

- Overarching narrative themes are similar in various contexts but with localised differences in priority and framing.
- A summary of the most common narratives and evidence gaps in Asia Pacific.

Implications for theory, practice and/or policy:

- Research often overlooks narratives on ed-tech limitations, which warrant further exploration.
- Localised evidence in Asia Pacific is required to prevent wasteful experimentation.

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Introduction

For decades, educational technology (ed-tech) has been characterised by over-optimism and lofty promises that often fail to materialise. The gap between expectations and outcomes has raised concerns regarding the effectiveness and impact of ed-tech initiatives. Addressing this problem requires a strategic approach that cultivates critical thinking among future ed-tech professionals. Training the next generation of ed-tech professionals to be critical thinkers and collaborative, culturally sensitive practitioners is one strategy to address ed-tech's tendency "to discuss how educational technologies could and should be used… (while being) less competent and confident in discussing how and why educational technologies are actually being used" (Selwyn, 2016, p. 66).

To address the challenges associated with ed-tech, many Masters of Education programs around the world provide students with the opportunity to critically appraise the impact of education technology. The Monash Master of Education program in Australia offers a specialised introductory level course titled "Education and Technology: Issues and Debates". This course was designed with guidance by well-known scholar Neil Selwyn (at that time a Monash Faculty member) to develop in students a critical approach to ed-tech, drawing inspiration from Selwyn's influential book of the same title (Selwyn, 2011c).

The first author has been teaching the introductory course and, in 2023, refined the assessment to emphasise identifying hype narratives surrounding ed-tech and producing a report which evaluates the gap between hype and evidence while simultaneously identifying realistic opportunities and areas for further development. This investigation into narratives serves as a useful teaching tool to equip students with the skills to identify and scrutinise narratives within the ed-tech domain, empowering them to critically evaluate evidence and challenge prevailing assumptions. In the context of this assignment, students were presented with effectiveness, efficiency, and fairness as examples of common narratives permeating the ed-tech landscape as observed by the first author in practice and the literature-for example, see Laurillard (2008) and Selwyn (2011a).

Notably, the assessment design prominently features students' specific contexts as valuable sources of insight, particularly those of international students. This is because the international students enrolled in the program bring with them diverse contexts and experiences of different ed-tech implementations that offer new perspectives and possibilities. Inspired by Selwyn's notion of "state of the actual" as a critique of positioning ed-tech as "state-of-the-art" (Selwyn, 2008, p.83) this assessment encourages students to engage deeply with their unique contexts and challenge dominant narratives.

During the marking of the first run of the revised assignment, the first author noticed how the assignment's focus on narratives-in-context succeeded in illuminating ed-tech tools, programs and narratives which were fresh and notably different from what is published in most journals, especially those with Australian, UK or USA dominant authors. Taken together, the assignment collection had the potential to counteract the problem of ed-tech's whiteness and colonialism, by providing evidence to challenge the notion that Silicon Valley's experiences and innovations can transform education in a unifying and mono-cultural manner (Adam, 2019; Warschauer & Ames, 2010; Watters, 2015a, 2018). In contrast to the problematic assumptions made by Western ed-tech innovators that Western technology can be transplanted globally to "fix" education (Watters, 2015b), the assignment collection illuminated different local purposes and implementations of ed-tech for addressing local educational problems, including online skills development for unemployed adults and additional digital support for learning English as a second language.

As a result of this experience, this paper is co-authored between the teacher and a group of students from the Monash Master of Education program whose contexts are under-represented in the international ed-tech literature. The process of inviting students to serve as authors was conducted ethically. They were approached after the marking was complete at the end of the semester with an

invitation to collaborate on a piece of writing for publication utilising their reports. It was made clear that the project was separate from their formal studies and entirely optional. In addition to this, the experience also benefits them by providing research experience and mentoring in a method that was new to them as well as academic co-authorship writing experience. By involving students as co-authors, their perspectives and experiences are integrated into the research, providing a more comprehensive understanding of the complexities and nuances surrounding ed-tech.

Throughout the paper, primary, secondary, and higher education contexts from Indonesia, Myanmar, Vietnam, the Philippines, Cambodia, New Zealand, and Taiwan will be explored. By including these distinct contexts, the study aims to explore the similarities and differences in ed-tech focus, aims, and implementations across varied educational landscapes. In particular, it examines the local variations in the efficiency, effectiveness, fairness, limitations, and transformations of narrative claims made for ed-tech in different settings.

By embracing context and engaging students as co-authors, the study also seeks to dismantle some of the problematic colonial assumptions underlying ed-tech and foster a more inclusive and culturally sensitive ed-tech ecosystem.

We begin with a literature review, and then the Method section outlines two research questions to guide this study and a five-step meta-analysis method. Next, we present findings for both research questions. We conclude with a Discussion and Suggestions section that incorporates a Critical Thinking framework of Education Technology. This framework also summarises the most common hype narratives and evidence gaps from our study.

Literature Review

Critical Ed-Tech: Moving from Potential to Practice

A critical approach to ed-tech suggests a perspective that goes beyond the surface-level potential of technology. Influenced by critical social studies, more generally (Denzin, 2017) and recent work into critical ed-tech literacies (Bali, 2019, 2023), a critical approach involves analysing the realities and complexities of its implementation, considering the human and social dynamics of power and agency in education that shape outcomes and possibilities of technologies.
Critical scholars have long discussed the propensity of ed-tech to overstate the potential of new technologies to transform education practice (Oliver, 2011; Selwyn, 2011b). Indeed, ed-tech literature often uses the Gartner Hype cycle (developed by research firm Gartner in 1995) as a framework that describes and explains the typical life cycle that emerging technologies go through, from initial hype and inflated expectations to eventual disillusionment and realistic adoption. The Hype Cycle has been used by researchers to analyse the maturity, adoption, and potential impact of technology over time (Laaser, 2023; Prinsloo & Van Deventer, 2017).

Drawing inspiration from the Gartner Hype Cycle, the students' assignments and, indeed, this study seek to investigate the common narratives observed in ed-tech during the hype phase, beginning with claims for effectiveness, efficiency, and fairness, which are often observed in the media and literature. It then seeks to appraise to what extent the evidence eventuates some years later to justify or question these common narratives. By exploring which narratives are likely to hold true over time and which remain commonly in question, we aim to provide new insights that will help future educators and researchers cut through the hype and make better-informed predictions about future technologies.

Asia-Pacific Representation in Ed-Tech Literature

South-East Asia and the Pacific context serve as the backdrop for this research, which also aims to understand if these narratives hold true across diverse educational settings. Asian countries are generally underrepresented in educational technology scholarship. For instance, taking the Asian Journal of Distance Education (AJDE) and the International Review of Research in Open and Distributed Learning (IRRODL) as 2 indicative examples, there is a limited number of studies focusing on Southeast Asia and New Zealand. Please refer to Table 1 for the specific count of studies.

Table 1. Number of Asia Pacific papers in AJDE and IRRODL (per July 2023).

Country	AJDE	IRRODL
Myanmar	1	3
New Zealand	3	9
Indonesia	4	7
Philippines	19	12
Vietnam	1	5
China	22	250
Cambodia	1	10

China has the greatest number of papers, dating back to 2002, with a paper exploring the emergence of web-based learning in China. There has been representation on a range of topics over the two decades since, such as a 2023 paper about undergraduate perceptions and intended behaviours with MOOCs. In between, a micro-blogging account of public responses to MOOCs in China would be the closest to our topic. Other case studies looked at ed-tech in school settings, and for specialist cohorts such as Disabled students. Some addressed quality assurance and institutional concerns with ODL. AJDE papers focused on distance learning, COVID responses, open university cases and perspectives.

In all other countries, representation was limited in both journals. There are only two case studies from Cambodia, from 2007 (eLearning debut for Higher Ed) and 2013 (multimedia ODL for agricultural training). Six papers focus primarily on higher and distance education in Vietnam, the most relevant to this study being on developing institutional open educational resources. In all countries, papers tended to be from the last decade. The earliest representation from New Zealand is a 2004 paper about online discussion forums for distance learners. All papers in AJDE from Indonesia focus on open and distance learning. In IRRODL, Indonesian articles also focus on education technology and teacher development. The only paper studying Myanmar focuses on OER frameworks to maintain acceptable academic standards for a particular teaching need.

In terms of education system focus, most papers are about higher or adult education, and very few are about K-12 education. For example, in the Philippines, only 2 out of 19 papers in ADJE focus on K-12, and in New Zealand there are no case studies on K-12 in either journal..

There are a number of empirical studies in both journals that compare countries in the region, such as two studies examining webpage loading times across 12 Asian countries, including Vietnam, noting slower-than-recommended speeds and frequent failures. Similarly, some papers use international students from a specific country as a case study, such as one study into Active Learning in a Virtual Learning Environment (VLE) with Vietnamese students at a large Australian University.

Therefore, this research seeks to understand if the narratives of effectiveness, efficiency, and fairness are common across the diverse education contexts in the Asia-Pacific region where the students were working and relating to the various popular technologies in particular settings they chose as focus areas. The aim is to shed light on whether these narratives hold true or if there are variations and unique nuances within specific national and policy contexts. We also seek to identify any additional common narrative claims made during the hype of ed-tech's introduction.

We have also specifically chosen to include reports on Asian ed-tech initiatives that we do not see published, for example, just in Indonesia: nationwide investment in online adult basic, technology and employability skills; professional learning using an in-house LMS for Department of Finance employees, and use of Edmodo LMS in Indonesian schools. While MOOCs have all but died in most Western contexts and are no longer a focus of scholarship, MOOCs have continued to be a hot topic in other contexts, and our study includes reports of where they are being enthusiastically integrated into mainstream University learning in China and the process of MOOC integration is also just starting in Vietnam. We also have reports from contexts where central government policy and investment are key drivers, such as digital transformation in Philippine schools (and in Indonesia, as noted above), and other contexts, such as NZ schools and Cambodian private English colleges, where the private sector plays a more active role.

Methodology

This research paper aims to explore two primary research questions:

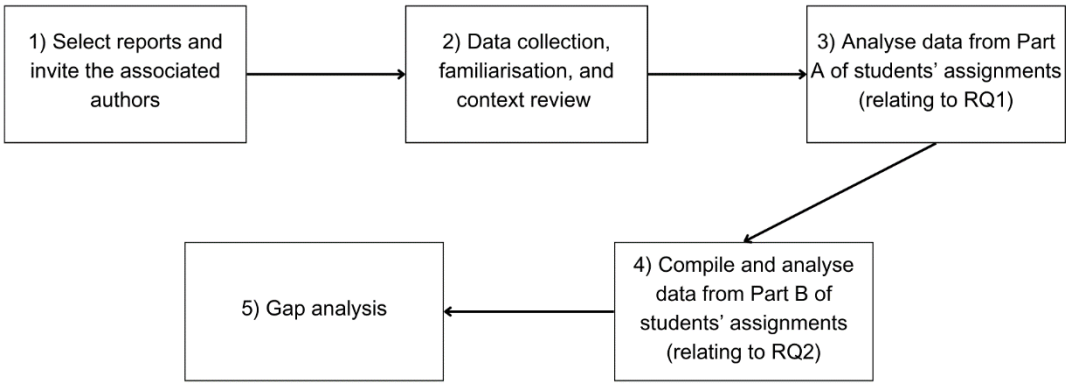
RQ1: *To what extent do the narratives of efficiency, effectiveness, and fairness function as common thematic categories of claims made for technology across Asia-Pacific education systems?*
RQ2: *What are the major gaps between the narratives and evidence for these claims?*

To address these research questions, a qualitative meta-analysis method was employed, using the students' major assignment research report texts as inputs.

The meta-analysis method allows for the compilation and synthesis of knowledge from multiple studies or reports, providing a comprehensive understanding of issues and trends across diverse contexts (Farrow et al., 2020; Finfgeld-Connett, 2014; Finfgeld, 2003). As part of the assignment process, the students were provided with tools and guidance to systematically review their research reports. The research benefits from their systematic search to create strong inputs for the meta-analysis phase.

Thematic analysis was used to analyse report data by converting long-form text to themes, allowing us to draw together and make sense of the findings from the multiple reports (Farrow et al., 2020). Figure 1 is provided as an overall summary of the method steps detailed in the following sections.

Figure 1. Diagram of method steps.



Step 1: Select reports and invite the associated authors

From the pool of 23 student assignments, nine were chosen as preferred inputs for the meta-analysis. The authors of these reports were invited to participate in the research project, and all agreed. The reports included in the research were purposefully selected to cover a diverse range of countries across Southeast Asia and the Pacific, as well as educational contexts from compulsory schooling through to university and professional/workforce settings. Assignment standard was not a major consideration in the selection as the class standard was generally quite high, although poor assignments which offered no knew knowledge or insight were excluded from consideration. Some of the included reports had some weaknesses in some places, such as gaps in the identified literature due to narrow search term use. This was corrected by undertaking some additional searching using more scholarly terms and synonyms during Steps three and four.

Step 2: Data collection, familiarisation, and context review

To address RQ1, a synthesis of the educational technology narratives of each country was developed using the section of the "state of the actual" reports, which focused on media, social media, commercial websites, and government claims from the time when the various technologies emerged and rose in popularity. For RQ2, the source data was the section of the reports that systematically reviewed and summarised the evidence from the scholarly literature and government reports from the perspective of some years after the technology implementations. Using shared Google documents, all authors cut and paste the required RQ1 data into one document and the required RQ2 data into another.

All authors reviewed the data from each participant, utilising the commenting feature to pose questions and provide commentary on shared and divergent themes or issues across various contexts. We undertook a brief review of national contexts to help us understand where the national policy context might be influencing implementations and outcomes – see Table 2 below. Apart from New Zealand, all countries are relatively new to online education, with COVID-19 producing big changes in educational technology experiences and expectations. While city/regional digital divides in technology access and infrastructure were common to all report contexts, there were also considerable variations in both social and technology policy contexts, as noted in the "Context Differentiators" column below. These contextual differences were kept in mind and helped the authors make more informed judgements and insights regarding relevance and meaning at all later stages of the process.

Step 3: Analyse data from Part A of students' assignments (relating to RQ1)

First author undertook thematic analysis manually in the shared Google documents using standardised data tables. Data about narratives was summarised down to a phrase at the level of multiple sentences

or a paragraph and matched to the themes of efficiency, effectiveness, fairness, or categorised as "other." A country code was used (see Table 2) to label each narrative summary and identify which report the data came from. This allowed for cross-checking to ensure that all data was included from all report sources. The "other" category was further examined to identify any recurring themes that might constitute an additional narrative. A consensus position on the matching of issues to narratives and the definition of the "other" narrative was developed through discussions among the group of authors.

Next, each of the narrative summaries for each theme were reviewed and arranged into groups with common ideas or sub-themes. The sub-themes were not pre-determined but developed from the text itself. A final tally produced totals for each main narrative category and sub-themes. See Appendix 1 for the data tables, which act as a full bibliography. When this was complete the data was tallied to count the number of instances of each narrative and determine numerically the most/least common themes. Findings and discussion points were written. Word cloud diagrams were developed to communicate the results succinctly.

Step 4: Compile and analyse data from Part B of students' assignments (relating to RQ2)

We undertook a qualitative analysis of the report summaries relating to where the evidence was stronger vs weaker for the claims made in the various national contexts. This enabled the development of novel findings on major trends and related contextual drivers without getting distracted by the lesser thematic issues. For completion, however, we went back and compiled the systematic review table results from each report (see Appendix 2) and undertook quantitative analysis to determine numerically how many references, i.e., evidence, were found for each of the different themes and sub-themes identified in Step 3. Each piece of literature was re-read, and a summary of the main findings was made, coded and matched to each of the narrative themes and sub-themes previously developed. At this point, it was clear that the findings/outcomes were made in some very specific contexts of disciplinary and student age/class, and these contexts were noted and included in the summary. Findings and discussion points were written.

Step 5: Gap analysis

The last step was to undertake a quantitative gap analysis between the findings of RQ1 (narratives) and RQ2 (evidence). The gaps were so substantial that the results acted as a guide for future research and are reported in the Discussion and Suggestions section.

Table 2. Variation of national and educational settings in the data set for this study.

Country, data code	Technology, education context	Contributing author	Context differentiators
Indonesia (01,02,03)	LMS (Edmodo) in Indonesian Secondary School	Amarullah, A	The largest population is 278.6 M of Southeast Asia (Statistic Indonesia, 2023). The strongest economy of the region. Centralised technology decision-making. Significant rural/urban divide in access to education services due to numerous remote small island or mountain provinces.
	Professional/workplace learning	Khulafa, F.N.	Training fee assistance and incentive program for adults. National training program. Compliance culture. Significant collaboration between private companies and government.
	Professional/workplace learning	Dharmazi, A.	Training programs within Indonesia's finance ministerial body. Transition from traditional learning to digital learning in organisational development.

Myanmar (04)	Teacher education	Kyaw, E.	Population 53.89 M (Statista, 2023). Limited public access to the internet. Limited international support for higher education development since 2005, e.g., World Bank and Asian Development Bank, due to the political unrest. Reliance on mobile phones for internet access.
New Zealand (07)	Upper primary schooling	Gauld, J.	Population 5.2M (Stats NZ, 2023). "Hands-off" approach from government, ed-tech vendors very influential, active partnering with schools on projects.
Philippines (08)	Primary schools	Duyao, E.	Population 111.57M (Statista, 2022) Utilising open educational resources (OER). Government centrally run initiatives.
China (06)	MOOCs in Higher Education	Tan, Y.	Population 1,411.75 M (Textor, 2022). Centralised technology decision-making, traditional education practices, hierarchical structure, significant preference for and investment in local solutions, proliferation of local ed-tech start-ups.
Vietnam (05)	MOOCs in Higher Education	Vu, C.	Population 99.5 M (Statista, 2022). Centralised technology decision-making, traditional education practices, hierarchical structure, and the proliferation of ed-tech start-ups while also collaborating with other nations.
Cambodia (09)	Private English schools	Hem, P.	Small population of 16.7 M (World Bank, 2022). English teaching is a major concern and focus for the education sector.

Findings

RQ 1: Ed-tech Narratives

The first major finding is that the originally proposed narratives of efficiency, effectiveness, and fairness were confirmed and found to be big generic themes common to claims for ed-tech implementations across all countries and educational settings in our study. These three narratives are expressed as positive outcomes. However, we found that the negatively framed "limitations" narrative was the biggest "other" narrative theme found in the study. In addition, the narrative of "transformation" was found to be common across the study as a "meso" level narrative focused on whole organisations. We labelled this theme "organisational and economic transformation". Upon further investigation, the sub-themes of efficiency, effectiveness, and fairness were found to be split between "micro" level narratives (benefits to individuals' learners and teachers) and "macro" level narratives (benefits to organisations).

Across the data set (see Tables 3-7), effectiveness was clearly the most common narrative (N=30), nearly twice as common as narratives for efficiency (N=16) and nearly three times as common as narratives for fairness (N=12). Narratives about limitations (N=27) were very common, almost as common as those for effectiveness.

Table 3. Effectiveness narrative themes.

Narrative	**Narrative and narrative sub-themes**	**Variation in narratives (source data country code)**
Effectiveness (N=30)	*Micro: Student engagement and student-centred learning (N=16)*	Easy to use (02); User interface, fun, engagement (02); Engagement and motivation: (03); Parental engagement (09) Personalised learning (03) Personalised learning, creative outputs (07)

		Student freedom and choice (06); Deep Learning, real-world problem solving (07) Gamification as engagement and motivation (09) Student-centred and autonomous learning (09) Digital native/Alpha generation (03); Enhanced class communication (03) Collaborative learning (07) Collaborative learning improves student outcomes (03) Game changer for learning (01); Fill competencies gap (02);
	Macro: Teaching and organisational effectiveness (N=14)	*Teaching and pedagogy reform* ICT uplift towards a quality education (04); Better quality education, advanced online pedagogy (05); Blended learning to enhance classroom activities (05); Teaching reforms. Better quality education, advanced online pedagogy (06); Free up teachers, active learning (efficiency and effectiveness 06) *Monitoring and adapting* Monitoring progress (09) Ability to modify, engagement, special needs (08) Big data, individualised teaching (06); Quality reviewed (08) Curriculum aligned (08) Quality assurance (08) *More is better* More is better, tech inevitability (07) 1:1 device to "transform" learning (07) A large number of resources, choice (08)

Within the effectiveness narratives (Table 3), just over half (N=16) were about Student engagement and student-centred learning (SESCL), which were present in almost every study context, an unexpected result considering the traditional nature of the teaching contexts which often discuss teacher-led didactic learning. Narratives about teachers or teaching/organisational effectiveness (N=14) were split into sub-themes, which had some regional differences. Teaching and pedagogical reform narratives were clustered in contexts 4, 5, and 6 (Myanmar teacher education, Higher Ed MOOCs in Vietnam and China). Themes relating to centralised monitoring, adapting and quality control were clustered in contexts 8 and 9 (Philippine schools, Cambodian ESL private college). Narratives dubbed "more is better" are mostly related to the 1:1 laptop program in New Zealand schools, where larger numbers of laptops were thought to relate to better outcomes. Similarly, in the "more is better" category, a larger number and choice of digital resources was hoped to lead to better outcomes specific to the Philippines school context.

Table 4. Efficiency narrative themes.

Narrative	**Narrative sub-themes**	**Variation in narratives**
Efficiency (16)	*Micro: Speeding up processes of teaching and learning (N=11)*	General efficiency benefits to staff (07) Freedom from mundane repetitive teaching tasks (06) Communication between teachers and students (03) Mobile-friendly assessment portal (04) Easy to use, range of resources (08) Personalised learning (effective and efficient 06) Agentic students, teachers as coach, not captain (07) Own pace learning (08) Supplementary learning (08) Speed to certification (06) Administrators improving curriculum (09)

	Macro: Cost-effective (N=5)	Costly, cost-effective program (01); Doing more with less (02); Cost-effective, easy to use (03) Cost-effective, doing more with less (05) Low cost (08)

Efficiency narrative sub-themes (Table 4) were mostly about speeding up the teaching, assessment and certification processes, but there was a wide variety of ways this was expressed. Narrative claims were often quite unique to the context and specific, from improving communication between teachers and students to producing personalised or own-pace learning or the production of a mobile-friendly assessment portal. The macro narratives about cost-effectiveness were less common and were associated with the larger Nationwide programs in Indonesia, the Philippines and Vietnam, where governments were involved in the investments.

Table 5. Fairness narrative themes.

Narrative	**Narrative sub-themes**	**Variation in narratives**
Fairness (12)	*Macro: Inclusion at the community level (N=8)*	Inclusive of underprivileged communities (01); Reducing digital divide (03) Works in low-resource context (08) Inclusive education, gender and regional equity (04) Improve access to HE in the region (05) Distance learning for Widening participation (05); Distance learning for widening participation (06) Open Education system (05);
	Micro: Inclusion at the individual level (N=4)	Heart-warming individual success stories (01); Equal opportunities for trainees/employees from different backgrounds (02); Portable no-data version (08) Improved accessibility for students, UDL (07)

Fairness narratives (Table 5) were split between inclusion at the macro or community level (N=8) and narratives of individual benefit (N=4), but the focus varied depending on context. While many of the technology implementations in the study were about blended learning, in this set of data, distance learning was specifically called out for its ability to address digital and regional divides, while UDL and accessibility only came up once.

Table 6. Limitation narrative themes.

Narrative	**Narrative sub-themes**	**Variation in narratives**
Limitations (27)	*Macro: Worsen digital divide, barriers to access (N=9)*	Digital divide, especially a city/regional divide (03) Inadequate ICT infrastructure (04) Digital infrastructure (08) Cost of gadgets and internet connection (08) Digital infrastructure (04) Lack of teacher training (03) 1:1 device, SES achievement gap (07) Inequitable device distribution (09) Lacking printable versions (08)
	Micro: Digital literacy, overuse and teacher skills (N=8)	Digital literacy, staff PD (04) Teacher skills esp. regional teachers (03); Differences in teacher's MOOC skills and learning curve (06) Limited digital literacy, variable self-directed learning skills (05); Freedom brings complexity to basic use (07)

		Teachers lack confidence as tech increases (07) Distractions, mobile use (06) Distraction and discomfort (07)
	Macro: Ethical, human, social (N=10)	Benefits private companies more than citizens (01); "Calo" to compensate for digital illiteracy, cheating (01); Assessment concerns, family input (08) Resistance to new ways (02); Threat to traditional classrooms (06) Mismatch between MOOC topic and study interests (06) Open avoidance, reputation concerns (05); High dropout rates, quality concerns (05) Lack of parental engagement (03); Impedes traditional Chinese language diversity (06)

The Limitations sub-narratives (Table 6) revealed common publicly expressed concerns across most contexts that technology would worsen the digital/access divide and that teachers' lack of skills and digital literacy would hinder implementation success. Within the Micro: Digital literacy, device overuse and teacher skills (N=8) theme, there were some concerns about students' skills and device overuse. Most of the narratives were limited to macro topics: The worsening digital divide, barriers to access (N=9), and ethical, human, and social (N=10). The latter topic featured various themes, including unique concerns specific to contexts, e.g., "calo" (cheating/bribery) relating to financial incentives for registering for online employability programs in Indonesia and the standardisation of MOOCs impeding traditional Chinese language diversity.

Table 7. Transformation narrative themes.

Narrative	**Narrative sub-themes**	**Variation in narratives**
Other: Transformation	*Macro: Organisational transformation, innovation and competitiveness (N=11)*	*Organisational and economic transformation* Decrease unemployment, Increase employability skills (01); Skills and Economic Transformation (07) Lifelong learning (05) Business transformation (02) Higer Ed Transformation (05) Higher Ed transformation (06) Organisational cooperation, innovative education system (06) School freedom (07) *Competitiveness* Hi-profile partner pilots (04) Keeping up internationally (07) Keeping up locally (07)

Within the Transformation narratives (Table 7) there was just one Macro sub-theme of Transformation, Innovation and Competitiveness with most narratives relating to Organisational and economic transformation specific to Higher Education and Employment project contexts. Narratives relating to Competitiveness, i.e. keeping up with technology locally and abroad, were related to schooling or teacher education contexts.

To produce an at-a-glance summary of our findings - word cloud style diagrams were produced for each of the narratives where common text/sub-theme issues are represented with larger text for themes (Table 8). The narrative themes and sub-themes are also mapped to produce a matrix of narratives at the macro and micro levels.

Table 8. Summary of Narrative Findings
Larger text indicates more popular narratives.

Narrative Summary		
	Micro Level	**Macro Level**
Effectiveness	***Student engagement and student centred learning***	***Teaching and organisational effectiveness***
	student_freedom creative_outputs real-world_problem engagement student-centred deep_learning gamification personalised_learning collaborative_learning parental_engagement solving autonomous_learning	transform_learning teaching_pedagogy_reform monitoring_and_adapting
Efficiency	***Speeding up processes of teaching and learning***	***Cost-effective***
	benefits_to_staff personalised_learning supplementary_learning own_pace_learning range_of_resources free_from_repetitive_teaching_tasks easy_to_use speed_to_certification	low-cost user-friendly cost-effective
Fairness	***Inclusion at the individual level***	***Inclusion at the community level***
	udl accessibility-improvement portable_no_data_version trainees_equal_opportunities	access-improvement open-education widening-participation regional-equity higher-education distance-learning digital-inclusion inclusive-education
Limitation	***Digital literacy, overuse, and teacher skills***	***Worsen digital divide, barriers to access, ethical, human, and social issues***
	teacher_skills mobile-use discomfort variable_self-directed_learning_skills distractions limited_digital_literacy teachers_lack_confidence digital-literacy differences_in_teacher's_skill_learning_curve freedom_brings_complexity	reputation-concerns gadgets_internet_cost threat_to_traditional_classrooms ses_achievement_gap open-avoidance concerns high_dropout_rates family-input digital-infrastructure quality assessment-concerns devices mismatch_between_mooc_topic_and_study_interests

RQ2: Gaps between Narratives and Evidence

To investigate the gaps between the narrative claims and the actual evidence, we first undertook a qualitative analysis. We reviewed and compared the authors' concluding summaries of the nine original research reports investigating specific technology implementations. In each, the evidence for effectiveness, efficiency or fairness improvements was patchy - partial success or some small learning

or pedagogical gains, but many limitations persisted, commonly lack of investment in teacher professional development, low digital literacy levels, and uneven access to electricity, devices and internet connectivity. Where the ed-techs did prove to be useful, it was often in some quite specific areas and not in others.

The following excerpts are illustrative and typical. Firstly, from Cambodia and relating to gamification in ESL classes: “While there are few studies from Cambodia into gamification platforms for teaching English, there is evidence from similar Asian contexts for the narrative claims of effectiveness: both motivation/engagement as well as actual improvement in language skills particularly reading, writing, grammar. The strongest improvement in skills tends to relate to “mastery of grammar”. Mobile devices do seem to be crucial for many implementations, however, and some evidence points to pedagogies as success factors alongside the platforms and apps, i.e., flipped classrooms. Few, if any, apps support fluent speaking; the speaking that can be tested by apps like Duolingo focuses on pronunciation. There was less evidence for teaching innovations and the shift to student-centred learning. There are also some studies backing up claims for parental engagement in students’ progress, and some very specific forms of efficiency - in students’ being able to quickly follow up on their quiz results and target areas for more study on their own.”

Similarly, from Vietnam, a classic example of patchy outcomes from author Vu: “Notwithstanding the commendable endeavours of Vietnamese HE institutions and instructors to integrate progressive pedagogical approaches, the implementation of MOOCs is impeded by various obstacles.…The lack of comprehensive strategies, clear policies at the institutional or national level, traditional curriculum and pedagogy, underdeveloped ICT infrastructure, outdated education content, low digital literacy capacity among key stakeholders, and language barriers are among the most significant barriers to MOOC adoption in HE in Vietnam” (Belawati et al., 2019; Ho & Nguyen, 2021; Huong, 2021; World Bank, 2020). As a result, while Vietnam has experimented with various improvements in HE to increase access, it has not achieved significant progress in terms of quality, relevance, and equity (World Bank, 2020).”

The situation relating to ICT in Myanmar schools from author Kyaw similarly notes that: “Although there is still some way to go before ICT is well and evenly distributed through schools, the various reports suggest that some progress and successes are evident in particular areas on the pathway to more effective use of ICT”. Positive initiatives related to the establishment of e-learning centres and assessment-related ICT infrastructure for storing and analysing assessments and publishing assessment results. Online textbooks and videos were also used to supplement print materials.

While this review painted a useful high-level view of common shortcomings and some specific areas of success, we were looking for more detail to systematically quantify the level of evidence gaps for each of the narrative themes. Therefore, we undertook further thematic analysis of the evidence by going back and reviewing all of the original studies cited in the source research reports, matching reported evidence to our narrative themes across all nine different National contexts. By tallying up each instance of evidence against the narrative themes, we were able to determine which narratives were more or less supported by evidence. See Tables 9 and 10 for the results.

The evidence for claims of Effectiveness was overwhelming with 44 studies. Only seven studies provided evidence for Fairness narratives and only six provided evidence for Efficiency claims. Most benefits reported within the Effectiveness category were split between the major sub-themes of Student Engagement or Student-Centred Learning (SESCL) or Teaching and/or Organisational Effectiveness (TeachOrgEffect). The research concerned with Organisational and Economic Transformation was almost non-existent and was usually presented as an assumed additional benefit to digital literacy improvements, reported under the Fairness category.

Table 9. Evidence for Effectiveness Narratives.

Evidence for Effectiveness Narratives (N=44)			
Micro: Student Engagement and Student-Centred learning		**Macro: Teaching and Organisational effectiveness**	
Gamification, ESL classes	5	Teaching effectiveness, Pedagogical reform	9
Gamification: one paper on Science teaching, one on the flipped classroom	2	Teaching effectiveness, Online delivery	5
LMS: 2 papers on blended learning, one on flipped classroom	3	Teaching effectiveness, Maths classes	3
Improving workplace skills	2	1 to 1 laptop programs: 2 teacher PD related; One paper on student effort and achievement one paper on teachers convinced of effectiveness more than students	4
1 to 1 laptop program	1	LMS/MOOCs noting both Effectiveness and Efficiency outcomes	6
Real-world problems	1	Sub-total	27
Collaborations	1		
MOOCs at university	1	***Effectiveness not proven or questioned***	
Parental engagement	1	*Including five specific to 1:1 laptop programs "more is better" narrative*	16
Total:	17		

Table 10. Evidence for Efficiency narratives and Fairness narratives

Evidence for Efficiency Narratives (N=6)		**Evidence for Fairness Narratives (N=7)**	
Cost-effective	**3**	Inclusion for groups of learners	**6**
Speed up teaching and learning change	1	Inclusion using 1:1 laptops	1
ICT integration, blended learning	1	Total	7
Gamification, speed up learning	1	***Fairness not proven or questioned***	*7*
Total	6		
Efficiency not proven*, ERT COVID context*	1		

No papers solely investigated Limitations - instead, limitations were noted in the studies as barriers to the 3 main narrative claims: Effectiveness, Fairness, and Efficiency. However, there were numerous studies that had negative findings where the Narrative claims were not proven or questioned, e.g. 16 studies questioning or refuting Effectiveness claims, 7 questioning Fairness claims and one questioning Efficiency claims. Overall, the evidence fell a long way short of the narrative claims made for the various technologies. While some narratives produced a reasonable number of studies supporting them in limited contexts, many narrative sub-themes were unmatched by evidence.

Discussion

In our study, we found that narratives can be considered common organising themes for claims made for education technology while also recognising variations in issues within the narratives depending on education contexts. Our findings highlight the difference between narratives and finer-grained "issues" discussed in scholarly literature. While issues are more specific and detailed, narratives represent broader themes or common stories that stakeholders tell to explain why they think new technology is worth investing time and money in.

One implication is that narratives and their sub-themes can be used as a kind of critical thinking framework to identify and label hype claims at the time they are being made, as a way of encouraging some more considered debates. The narrative framework could also be useful as a teaching tool, to help student-educators develop the kind of critical thinking skills required of education programs.

The finding of popular narratives relating to student engagement and student-centred learning seems to fly in the face of common assumptions about "traditional" teacher-centred learning and "textbook culture" in Asian contexts (Sarangapani & Pappu, 2021). It is unclear whether the aspirations for technology are intertwined with desires for significant changes to teaching practices towards more student-centred learning or if the narratives indicate a broader shift towards constructivism in Asian education settings. Constructivism is a learning philosophy wherein learners are not merely passive recipients of information but active participants responsible for constructing their own understanding in unique ways (Gogus, 2012). It has gained traction in Western educational discourse, including within the realm of educational technology (Selwyn, 2008) and is associated with student-centred learning activities and assessments in contrast to didactic, traditional or teacher-led philosophies of learning.
We also noted that claims for Efficiency were made more in the contexts of math education and effectiveness claims were made more in the context of English teaching. It is unclear but we wonder if these differences are due to underlying beliefs and value systems of math educators (a quantitative focus) and English teachers (qualitative focus). However, we could not find any similar research to shine a light on these issues.

We found it interesting to see an almost equal number of effectiveness (positive) and limitations (negative) narratives in our study. This appears to be a change from earlier educational technology research seeking to quell education technologies over-optimism (Selwyn, 2011b, 2013). Our results suggest that the calls for more critical appraisals of technology over the last few decades might be producing some more realistic narratives to balance out the hype. This is important because narratives can be considered as discourse in the Foucauldian sense (1998), in that discourse is used by those in power to influence others. As such, they shape and inform our practices and what is seen to be possible in education technology. For a recent example, we can look at the hype and what is considered possible with Artificial Intelligence in education (Nemorin et al., 2023). Yet narratives and discourse can be challenged and dismantled as Foucault reminds us – "Discourse transmits and produces power; it reinforces it, but also undermines and exposes it, renders it fragile and makes it possible to thwart" (Foucault, 1998, p. 100). Therefore, educators should feel empowered to name and challenge the weaknesses and hype of ed-tech in their own contexts so they can redirect educators' efforts towards more likely areas of success.

This is particularly the case because despite the areas of benefit and opportunity, our study still found major differences between narrative claims and evidence. Firstly, most narrative claims for the benefits of new digital technologies related to improving learning effectiveness for students, with half as many claims made for teacher or organisational effectiveness. However, the amount of evidence found was in reverse - predominantly oriented towards teaching and organisational benefits or improvements and less evidence for improvements in student outcomes. Whether this will persist or is a matter of research pragmatics and maturity is unclear. Perhaps in time, further studies will emerge that are more student-

focused. An alternative implication of our results is that perhaps educators should not focus all their innovation efforts on technology. A recent systematic review of educational innovation in Southeast Asia suggests that about half the successful innovation programs involved technology, and the other half did not (Wong, 2019). So perhaps a broadened understanding of innovation, reform, and learning transformation needs to be considered where we also invest in people and systems change rather than just investing and "rolling out" new technologies.

Equally interesting are the results about the gaps between narrative claims and evidence. Current critical literature suggests the realities fall quite short of the narrative hype, and in some ways, our study also found this. For example, when comparing the narratives to the evidence, some claims had no or very low amounts of evidence (many efficiency claims, claims relating to laptop rollouts), which suggests such narratives should be open to question. However, we also found that in a few areas, evidence was beginning to line up with some of the claims, and some narratives were proven partially true (mobile/gamification, MOOCs, and LMS within adult learning contexts). The gap between these narrative claims and evidence was a lack of specifics, i.e., the narrative claims were made too broadly - promising benefits for everybody, but the evidence was for benefits to more specific and limited cohorts and/or settings. In our research, which focused on Southeast Asian countries, stronger evidence exists for the benefits of ed-tech in the context of blended learning, mobile learning, English language learning, and Maths classes.

Perhaps this should not be so surprising, as within our Southeast Asian study context, not only is mobile internet connectivity dominant, but it is often the sole method of connecting to the internet. Desktop usage in Southeast Asia is generally low: Indonesia (37.01%), Vietnam (13.33%), Myanmar (25.2%), and Thailand (38.14%) (Statcounter, 2024). New Zealand had a higher level of laptop internet usage in our study contexts as of January 2021 - 49 per cent of internet traffic in New Zealand was accessed with laptops and desktop computers compared to 46% for mobile devices (Hughes, 2023). This means that in many Asian study contexts, ed-tech narratives are strongly influenced by the opportunities available through mobile phones, apps, and games. Our study also featured multiple English language learning settings – a popular and specific usage of ed-tech and mobile devices in the Asia Pacific, which is positively impacting student achievement. This supports similar research that identified the ability to use English as an additional language to access learning materials through mobile devices as an important factor for improved learning in low-resourced schooling contexts in Asia and Africa (Kukulska-Hulme et al., 2023).

Limitations and Areas for Future Research

While our study integrated reports from seven different Asia-Pacific countries and was able to broadly sample ed-tech use from primary school through to university, this means that we were not able to focus deeply on any one area. Multiple studies in a specific setting might produce results that differ. Other studies in other contexts might also come up with more or less evidence for the narratives than the gaps we found. This suggests that not only is further research necessary in Asia-Pacific regions but also that we should be further moderating our education technology hype narratives beyond broad claims about effectiveness benefits and/or limitations for everyone. Instead, we should encourage more modest claims linking our proposed technology use to the needs of our particular students, learning and curriculum in our specific educational settings and cultural contexts.

Conclusion and Suggestions

Asia-Pacific educational technology is highly under-represented in scholarly publishing. However, the reports produced by the Master of Education Students show that education technology is used in a wide range of fascinating contexts, which deserves a wider readership. The use and focus on particular technologies, including some not much currently used in other Western contexts, suggest that ed-tech

is not some homogeneous, colonising force equally transplanted from west to east, north to south, as some commentators fear. The technology does not “afford” or “provide” the same outcomes. Instead, it gets taken up in contextually different ways. The particular narrative claims that herald their arrival show that different technologies get used for a different set of priorities, with sometimes similar and sometimes different promises of success.

While the specifics may differ, nevertheless, the five overarching narrative claims made for new educational technologies and the ten narrative sub-themes are quite repetitive across different nations, contexts and technologies - making them easier to spot and put into question. Considering that the actual evidence is typically much more narrowly scoped than the narrative claims ever are and specific to a more limited number of settings, then it is clear that many of these narratives deserve to be questioned.

To support more informed dialogue, we offer the following Critical Thinking Framework of Education Technology: a summary of the most common hype narratives and evidence gaps. Please refer to Table 11 for a detailed review of the summary. We hope this might support more informed planning and investment conversations between stakeholders of educational technology while also helping to manage more realistic expectations of outcomes of planned implementations. We hope this might also add tools for educators to teach critical appraisal of education technology in university programs. Lastly, we suggest this might also inspire further research into those areas where evidence for improvements is very thin on the ground.

Table 11. Critical Thinking Framework for Education Technology: A summary of the most common hype narratives and evidence gaps.

Most common narratives in order (high to low)	**Narrative theme and *sub-themes* - areas where benefits are claimed to be made through educational technology**	**Evidence for particular narratives**
1	Effectiveness narrative *Sub-theme: Student engagement and student-centred learning (N=16)*	**Some**: Gamification as engagement and motivation using mobile device apps within teacher-led English language or maths classrooms; LMS in flipped/blended learning contexts; Higher Ed MOOC integration. **Nil to minimal:** Personalised, student-centred or autonomous learning; student collaboration; deep learning or solving real world problems; ease of use; parental engagement.
2	Effectiveness narrative *Sub-theme: Teaching and organisational effectiveness (N=14)*	**Most evidence:** Teaching/Pedagogical reform; improved online delivery; **Some evidence:** improvements in maths teaching; multiple studies questioning or disproving the effectiveness of 1:1 laptop programs **Nil:** Big data, individualised teaching and/or the ability to monitor, modify, address special needs
3	*Transformation narrative* *Sub-theme: Organisational transformation, innovation and competitiveness (N=11)*	**Nil**: not a topic of educational scholarly research. Even government reports focussed on student/teacher outcomes.
4	Efficiency narrative *Sub-theme: Speeding up processes of teaching and learning (N=11)*	**Nil**: General efficiency benefits to staff; speeding up or freedom from mundane repetitive teaching tasks; supplementary, out of class, own-pace or self-directed learning; resource portals
5	Limitations narrative *Sub-theme: Ethical, human, social (N=10)*	Studies sometimes discuss or affirm ethical, human or social limitations or negative outcomes

6	Limitations narrative *Sub-theme: Worsen digital divide, barriers to access (N=9)*	Studies very commonly affirm the digital divide narrative as a legitimate concern
7	Fairness narrative *Sub-theme: Inclusion at the community level (N=8)*	**Some:** The evidence is split between positive reports of inclusion for groups of learners and studies where the fairness/inclusion of learners was disproved or questioned.
8	Limitations narrative *Sub-theme: Digital literacy, overuse and teacher skills (N=8)*	Studies very commonly affirm these narratives as legitimate concerns
9	Efficiency narrative *Sub-theme: Cost-effective (N=5)*	**Some:** cost effectiveness
10	Fairness narrative *Sub-theme: Inclusion at the individual level (N=4)*	**Minimal**: individual success related to laptop accessibility

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About the Author(s)

- Sarah Lambert; sarah.lambert@monash.edu; Monash University, Australia, https://orcid.org/0000-0003-2722-9684
- Faris Nur Khulafa; khulafafaris@gmail.com; Monash University, Australia, https://orcid.org/0009-0007-5740-6713
- Kim Chi Vu; kvuu0006@student.monash.edu; Monash University, Australia, https://orcid.org/0009-0008-8723-127X
- Joe Gauld; joegauld@gmail.com; Monash University, Australia, https://orcid.org/0009-0003-7701-0848
- Adhitya Amarulloh; adhitya.amarulloh@outlook.com; Monash University, Australia, https://orcid.org/0000-0002-1694-3500
- Almizar Dharmazi; almizardh@gmail.com; Monash University, Australia, https://orcid.org/0009-0006-2984-7506
- Elizabeth Duyao; teacherliza.ph@gmail.com; Monash University, Australia, https://orcid.org/0009-0001-4057-7387
- Paravuth Hem; phem0002@student.monash.edu; Monash University, Australia, https://orcid.org/0009-0000-3276-5575
- Ei Thinzar Kyaw; ekya0002@student.monash.edu; Monash University, Australia, https://orcid.org/0009-0008-8084-3177

- Yixin Tan; ytan0287@student.monash.edu; Monash University, Australia, https://orcid.org/0009-0009-1081-3746

Author's Contributions (CRediT)

Sarah Lambert: Conceptualization, methodology, data curation, formal analysis, writing – original draft, writing – review & editing; Faris Nur Khulafa: Project administration, writing – review & editing, investigation; Kim Chi Vu: Visualisation, investigation; Joe Gauld: writing – review & editing, investigation; Adhitya Amarulloh: Investigation; Almizar Dharmazi: Investigation; Elizabeth Duyao: Investigation; Paravuth Hem: Investigation; Ei Thinzar Kyaw: Investigation; Yixin Tan: Investigation.

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Conflict of Interest

The authors do not declare any conflict of interest.

Data Availability Statement

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Appendix 1: Data tables for RQ1

Thematic analysis of Ed-Tech Narratives of the Asia-Pacific region

01 - Prakerja as national adult training in Indonesia

Background/ Context	The Indonesian government spent IDR 59 trillion throughout 2020-2022 to implement a national-scale adult learning program called Prakerja using mainly LMS, with some use of video conferencing tools or webinars (Prakerja, 2021; Susanto, 2023)
Effectiveness	**Game changer** (Hidayah, 2023; Prakerja, 2021).
Efficiency	**Costly, cost-effective program** (Said, 2021).
Fairness	**- Inclusive of underprivileged communities** (APEC, 2021; Kominfo, 2021) **- Heart-warming individual success stories** (Mahrofi, 2022; Situmorang, 2021).
Limitations	**- Benefits private companies more than citizens** (Kumparan Bisnis, 2020; Kumparan News, 2020; Warih, 2020). **- "Calo" as digital illiteracy, cheating** (Kompas, 2021; Liputan 6, 2020)
Other	**- Decrease unemployment** (Antara News, 2021; Masitoh, 2021). **- Increase employability skills** (Detik, 2020).

02 - Kemenkeu Learning Center (KLC) in the Indonesian Finance Education and Training Agency

Background/ Context	Financial Education and Training Agency (FETA), one of the institutions under the Ministry of Finance of Indonesia developed an online learning platform called Kemenkeu Learning Center (KLC) to scale-up employee training, overcoming the limitations of traditional learning which cannot be conducted for a great number of learners. With the presence of KLC as learning management system platform, many trainees, not only from Ministry of Finance but also other ministries and public, could access the knowledge from that platform to fulfil their competence and skill needs to support their job.
Effectiveness	**Fills the competencies gap; easy to use; user interface, fun, and engagement** (FETA, 2020)
Efficiency	**Doing more with less** (FETA, 2020)
Fairness	**Equal opportunities for trainees/employees from different backgrounds** (FETA, 2017)
Limitations	**Resistance to new ways** (FETA, 2019)
Other (Innovation & Transformation)	**Business transformation** (similar to "game changer") (FETA, 2020)

03 - Edmodo LMS in Indonesian Secondary Schools

Context/ background	Edmodo was launched in 2009 by school teachers from the USA to address the need for a better, safer way for teachers to connect and communicate with their students (Empson, 2013). The platform was developed in many languages and became popular in many schools around the world, and developed a "freemium" model to try and cover their costs. Even before the pandemic of Covid-19, Edmodo was used at various levels and schools in Indonesia. By this time, Edmodo in Indonesia was considered as more than a communication tool, but a complete LMS with resources, communications and assessment (Purnawarman et al., 2016; Putra et al., 2018; Wahyuni et al., 2019; Wardono et al., 2016). Edmodo was one of the regularly used ed-tech tools to support emergency remote schooling during COVID along with Canvas LMS, and other free tools like Kahoot and Mentimeter (Latasha, 2021). Edmodo was acquired by NetDragon in 2018 and the company decided to shut it down on only 6 weeks notice in September 2022 as they could not properly support it (Ng, 2022).
Effectiveness	**- Engagement and motivation; enhanced class communication; collaborative learning improves student outcomes** (Wahyuni et al., 2019; Widyaningrum et al., 2020) **- Personalised learning** (Putra et al. 2018; Sumardi & Muamaroh, 2020; Wardono et al., 2016) **- Digital native/Alpha generation** (Kongchan, 2012; Putra et al., 2018)
Efficiency	**- Cost-effective, easy to use** (Al-Said, 2015; Balasubramanian et al., 2014; Warawudhi, 2017) **- Communication between teachers and students** (Edmodo, n.d.)
Fairness	**- Reducing digital divide** (Latasha, 2021) **- Fairness through COVID by maintaining the ability to respond to all children equally** (Putra et al., 2018; Sumardi & Wardono et al., 2020)
Limitations	**- Worsen digital divide, especially a city/regional divide due to lack of access to computers, and the internet** (Nursamsu et al., 2021; UNICEF, 2021; WorldBank, 2013) **- Lack of teacher training** (Putra et al., 2018; Sumardi & Muamaroh, 2020; Wahyuni et al., 2019) **- Teacher skills esp regional teachers** (Anwar, 2021; Purnawarman et al., 2016) **- Lack of parental engagement** (Wardono et al., 2016)

04 - Myanmar Teacher Education

Context/ background	Although Myanmar has been using ICT since 1981, it is recognized internationally as the last ICT greenfield nation (Htun, 2019). Through the e-Governance ICT master plan in 2015 and the National Education Strategic Plan of 2021 - ICT in education has become a priority (Ministry of Education, 2020). The integration of ICT in teacher education is seen as a way to deliver quality education and effective education services to these diverse populations living in remote areas.
Effectiveness	**ICT uplift towards quality education** (Ministry of Education, 2020, UNESCO, 2002; UNESCO Myanmar, 2020a)
Efficiency	**Mobile-friendly assessment portal** (Ministry of Education, 2020)
Fairness	**Inclusive education, gender and regional equity** (Asia Development Bank, 2015; Mar, 2004; King and South, 2017)
Limitations	**- Inadequate ICT infrastructure** (The & Usagawa, 2018; UNESCO Myanmar, 2020a) **- Digital infrastructure, digital literacy, staff PD** (personal experience of author) **- Silent on problems** (personal experience of author)
Other	**Hi-profile partner pilots** (Dede, 2020; Nam et al., 2015).

05 - MOOCs in Vietnamese HE

Context/ background	In the context of Vietnam's "National Digital Transformation Program" addressing changes in the nature of jobs and skills (Prime Minister, 2022), MOOCs have dominated education technology in Higher Education (HE) in the country (Patru & Balaji; Truong et al., 2021). Since Vietnam's first MOOC platform was launched in 2013, over 150 MOOC startups have grown along with MOOC popularity due to a growing need for accessible, adaptable, and cost-effective education, coupled with constrained GDP (Dang et al., 2017; Sang & Tai, 2017). The Vietnamese Government prioritizes open and online learning development across its guiding documents to address the learning needs of its citizens and accomplish an education-for-all strategy.
Effectiveness	**- HE Transformation** (Cu & Amin, 2018; Anh et al., 2019) **- Better quality education, advanced online pedagogy** (Dang et al., 2017; Cu & Amin, 2018) **- Blended learning to enhance classroom activities** (Tang & Tien, 2020; Pham & Ho, 2022) **- Cost-effective, doing more with less** (Sharrock, 2015; Dang et al., 2017)
Efficiency	-
Fairness	**- Widening participation** (Patru & Balaji, 2016) **- Open Education system, improve regional HE access** (Huong, 2021) **- Improve regional HE access** (Huong, 2021; Nguyen, 2017) **- Other: Lifelong learning** (Belawati et al., 2019)
Limitations	**- Limited digital literacy and variable self-directed learning skills** (Selwyn, 2009; Ho & Nguyen, 2021; Nguyen-Anh et al., 2022; Patru & Balaji) **- Open avoidance** (Ho & Nguyen, 2021; Nguyen, 2020; Dang et al., 2017) **- High dropout rates and quality concerns** (Dang et al., 2017; Huong, 2021)

06 - Chinese MOOCs in Higher Education

Context/ background	The MOOC 'tsunami' hit China in 2013 as it did the rest of the world, with media and Higher Education commentators engaged in a debate about the potential of MOOCs to transform learning and teaching and indeed Higher Education (Zhang and Wang, 2013). China 's leading universities such as Tsinghua University, Peking University and the University of Hong Kong were quick to join the edX MOOC partnership to expand their reach. MOOCs are now embedded in the required curriculum of many Chinese campus-based Universities, providing a blended learning experience and more timetable flexibility that is popular with the young students who typically live and study on campus funded by their parents.
Effectiveness	**- Student freedom and choice** (personal experience of author) **- Teaching reforms, better quality education, advance online pedagogy** (Chen 2013, Sina Education, 2013) **- Big data, individualised teaching** (Sun et al., 2022) **- Free up teachers, active learning** (efficiency and effectiveness) (Zhang and Wang, 2013) **- Organisational cooperation, innovative education system** (Zheng et al. 2017)
Efficiency	**- Speed to certification** (personal experience of author) **- Freedom from mundane repetitive tasks** (Guangming Daily, 2013, Zhang & Wang, 2013) **- Personalised learning (effective and efficient)** (Abdullah & Sakr, 2021).
Fairness	**- Distance learning for widening participation** (Liu, 2014)
Limitations	**- Distractions, mobile use** (personal experience of author) **- Mismatch between MOOC topic and study interests** (personal experience of author) **- Differences in teacher's MOOC skill and learning curve** (personal experience of author) **- Impedes traditional Chinese language diversity** (Jia and Ma, 2014)
Other	**- Threat to traditional classrooms** (Vardi, 2012) **- Higher education transformation** (Li, 2013)

07 - Ed-tech in New Zealand schools

Context/ background	New Zealand schools operate with a high level of autonomy about the curriculum and technology. Individual schools have significant agency over spending choices and pedagogical matters (Thrupp, 2020). The Ministry of Education influences schools by offering optional support and resources, and many private sector organisations do the same. The Ministry's lack of a definite position on most ed-tech matters, such as how digital tools should be used in the classroom, leaves an ambiguous space filled by ed-tech vendors keen to provide tools, professional development, and conferences to schools. (Wright & Peters, 2017). For all parties (teachers, schools, government) narratives are strongly influenced by a key external stakeholder: commercial ed-tech. Currently, "BYOD" laptop programs are pursued by many schools, provided by commercial ed-tech and supported by the Ministry (Wylie & Mcdonald, 2019).
Effectiveness	**- Personalised learning, creative outputs** (Kallio & Halverson, 2020, p. 372) **- Deep Learning, real-world problem-solving** NB. New Pedagogies for Deep Learning framework (Fullan & Langworthy, 2014) **- More is better, tech inevitability** (author experience of various school communications) **- Collaborative learning** (Fullan & Langworthy, 2014, ch. 2), (Alirezabeigi et al., 2020, p. 1523) **- 1:1 devices to 'transform' learning** (author experience of various school communications)
Efficiency	**- Teachers as coaches, not captains** (Lourie, 2020, p. 123). (Kallio & Halverson, 2020, p. 372). (Ideland, 2021, p. 39) **- Benefits to staff** (personal experience of author considering marketing materials), (Darragh, 2021, p. 166)
Fairness	**Improved accessibility for students, UDL** (Lee & Shin, 2021, p. 4 37).
Limitations	**- 1:1 devices, SES achievement gap** (Sutcliffe, 2021) **- Freedom brings complexity brings basic use; and teachers lack confidence as tech increases** (Varier et al., 2017, p. 979-980) **- Distraction and discomfort** (Scherer & Hatlevik, 2017, p. 197)
Other	**- School Freedom** (personal experience) **Skills and Economic Transformation** (Ministry of Education, 2018, p. 8). **- Keeping up internationally** (Wiggins, 2023) **- Keeping Up locally** (Wright & Peters, 2017, p. 170)

08 - LMS and OER in Philippine schools

Context/ background	The Department of Education (DepEd) in the Philippines is leveraging "DepEd commons" open educational resources (OER) platform, and the Moodle learning management systems (LMS) to enhance the education experience and to support teachers and students in distance learning with an overarching goal of accelerating the digital transformation of the education system in the country. These became particularly important during the COVID-19 pandemic.
Effectiveness	**- Ability to modify and increase engagement particularly for special needs** (OUA, 2020a) **- Large number of resources** (RTI International, 2022) **- Quality reviewed** (RTI International, 2022) **- Curriculum aligned** (DepEd, 2021a; OUA, 2021b)
Efficiency	**- Own pace learning** (OUA, 2021b) **- Supplementary learning** (OUA, 2020a; RTI International, 2022) **- Low cost** (OUA, 2020b) **- Easy to use, range of resources** (RTI International, 2022).

09 - ESL Teaching in Cambodian Private Colleges

Context background	Due to limitations in resourcing, including a shortage of laptops and electronic devices in public schools and workplaces, Cambodia has been slow to integrate ICT in education and it remains a challenge to lift ICT skills within the education system. However, this case study focuses on the private English college sector which is generally better resourced and more advanced with ICT integration into teaching and learning including the emergence of gamification and the rise of popular online platforms being used in language teaching. These include Quizizz, Baambozle, Bookwidget, Booklet and Zoom. Duolingo is also important as it can test speaking pronunciation skills. These online tools are generally positively received by the relevant stakeholders such as students, teachers, schools, administrators and students' parents.
Effectiveness	**- Gamification as engagement and motivation** (Arce & Valdivia, 2020) **- Student-centred and autonomous learning** (author's personal experience within college community; Rahayu & Purnawarman, 2019; Zainuddin, et al., 2020) **- Monitoring progress** (Zainuddin, et al., 2020)
Efficiency	**Administrators improving curriculum** (author's personal experience)
Limitations	**Inequitable device distribution** (broadly discussed in the news and community, author's experience)
Other	**Parental engagement** (Osorio-Saez, 2021)

Appendix 2: Data Tables for RQ2

Review of literature summary table and evaluation of evidence

Evidence for Effectiveness						
Paper title	**Authors**	**Year**	**Participants**	**Subject area**	**Evidence**	**Note**
Adapting competitiveness and gamification to a digital platform for foreign language learning	Arce & Valdivia	2020	114 students in Peru	English Classes	- The implementation of gamification in a digital support tool was to enhance language learning among students. - The approach involved offering feedback to students, which helped keep them motivated and engaged throughout the course while allowing them to compete with their classmates. - incorporating digital resources as supplementary materials in class was an effective method for language learning.	Student Engagement and Student-centred learning (SESCL) gamification, specific to ESL classes, feedback, motivation/competition, supplementary resources in class
The use of Quizizz in improving students' grammar understanding through self-assessment	Rahayu & Purnawarman	2019	14 students (11th grade in Indonesia)	English Class	- Self-assessment was conducted in the hierarchical process, including receiving feedback reviewing, replaying the quiz and taking the new quiz. This showed a significant improvement on the students' result. - Quizizz for self-assessment showed a dramatic improvement on students' grammar understanding.	SESCL in-class gamification, specific to ESL in 11th grade classes, improved grades, big improvement in grammar, self-assessment, feedback and review/replay quiz
Quizizz effect on students' grammar mastery in higher EFL classroom based mobile assisted language learning (MALL)	Dewi et al.	2020	246 students (4th semester in Indonesia)	English Complex Grammar class.	- The implementation of the Quizizz application gave a large significant effect towards the students' grammar mastery.	SESCL in-class gamification, specific to ESL, uni context, big improvement in grammar

Gamification-based assessment: The washback effect of Quizizz on students' learning in higher education	Pitoyo et al.	2020	18 students (3rd semester in Indonesia)	English TOEFL structure class.	- Incorporating Quizizz showed that students were motivated to learn more on the subject. - Students were very active in answering the teacher's questions. - Students were more confident in asking the teacher when they were not clear of any points they made mistakes. - Using Quizizz improved students' attention to the teacher as they had to listen to the instructions or explanations carefully prior to the activity. - Students were able to identify their weaknesses and mistakes after doing the test. Therefore, students were motivated to find their own solutions before seeking help from the teacher. - The meme feature in the Quizizz helped students to release tension and stress while doing the quiz.	SESCL in-class gamification, specific to Quizziz use in ESL uni classes. Increased learning motivation, increased class engagement and confidence answering questions and asking for help when making mistakes. Ss could identify their own weaknesses, find their own solutions before asking the teacher. Meme feature released tentions and stress.
The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system	Zainuddin et al.	2020	94 students (Indonesia secondary school)	Science classes	- Quizizz was an effective tool to evaluate students' learning performance. - The integration of game-based learning like Quizizz helped increase student engagement.	SESCL + SpeedT&LP, gamification, specific to Quizziz in secondary science classes. Increased engagement, effective to evaluate ss learning performance.
Active and emerging methodologies for ubiquitous education: Potentials of flipped learning and gamification	Parra-González et al.	2020	60 students (secondary school)	Secondary School Subjects	- The application of flipped learning showed a significant improvement on the processes and results of the students. Therefore, it encouraged everyone to actively participate. - It was a potential and effective tool to observe the students' learning progress. - There was an increase in autonomy learning, which could be implied that students were motivated to learn in the class.	SESCL in-class gamification, specific to the flipped learning model in secondary school subjects, improved processes and results due to the flipped learning model, engagement, increased learner autonomy, motivation implied

Exploring students' views in the use of Quizizz as an assessment tool in English as a foreign language (EFL) class	Zuhriyah & Pratolo	2020	6 students	English Class	- Students perceived Quizizz as an effective and interesting application tool for completing their assignments. - Self-confidence was noticeable when Quizizz was incorporated into the lesson. - There was an increase in students' motivation. - Through Quizizz, students could improve their skimming skills in reading as they had to read the questions as quickly as they could.	SESCL in-class gamification, specific to Quizziz in English classes. Increased self-confidence and motivation, helped Ss complete the assignments. Improved skimming skills in reading English (had to read fast).
Learning in one-to-one laptop environments: A meta-analysis and research synthesis	Zheng, B. et al.	2016	K-12 contexts globally. 73/96 studies from the USA. 10/96 from Australia. Meta Analysis (10 studies): affect value for laptop use in various school subjects. Research synthesis (96 studies): key themes from literature.	All subject areas	1:1 devices have an effect of 0.16 on student achievement across all subjects. 1:1 improves student enthusiasm, supports better home-school engagement, improves teacher-student relationships and allows for more individualised instruction.	SESCL + More is better specific to 1:1 laptop programs, increased student achievement across all subjects, due to student enthusiasm, supports better home-school engagement, improves teacher-student relationships. Large international data set but majority US and Australia.
Improving achievement using digital pedagogy: Impact of a research practice partnership in New Zealand	Jesson et al.	2018	9 low-SES Schools in Auckland, NZ (8 Primary 1 Secondary). Quantitative achievement data from 2096 primary students. Qualitative classroom observations.	Primary school	Research-practice partnership improves teacher attitudes towards the use of 1:1 devices, by supporting desired pedagogical shifts and technological confidence. Focus needs to be on 1:1 use in specific subject areas where achievement gains are desired.	TeachingEffect + Fairness specific to 1:1 laptops in LSES Primary schools, Improved achievement through improved teacher pedagogy and improved confidence. Limits/recommends focus to specific subject areas where achievement gains are desired.

In-service mathematics teachers' integration of ICT as innovative practice	Daher et al.	2018	five lower-secondary teachers, Israel	Mathematics	Teachers' ICT professional development programs can contribute to the social learning community to use ICT in the mathematics classroom.	TeachingEffect is specific to developing a social learning community in maths classrooms secondary schools
Role of ICT for better mathematics teaching	Das	2019	Secondary documents, India	Mathematics	ICT integration in Mathematics education has a positive impact on both the teaching and learning processes.	TeachingEffect specific to maths classrooms, T& Learning reform, improved T&L processes
Understanding factors affecting primary school teachers' use of ICT for student-centred education in Mongolia	Li et al.	2018	838 primary school teachers, Mongolia		Professional competency, teacher cooperation and belief can affect teachers' perception of using ICT tools in promoting student-centred education.	TeachingEffect, reform towards student-centred education, specific to teacher competency, cooperation and attitudes to ICT
Developing technology together: A whole-school metacognitive approach to ICT teacher professional development	Phelps & Graham	2008	16 primary and secondary schools, Australia		The metacognitive approach can have a positive impact on school culture and ICT use by teachers.	TeachingEffect, reform, improved ICT culture through whole school metacognitive approach to improving ICT use by teachers.
Educational innovation through ICT-mediated learning strategies in the initial teacher education of English language teachers	Rincón-Ussa et al.	2020	43 student teachers, Colombia	English, trainee teachers	ICT-mediated learning strategies can promote constructivist learning and enhance self-directed learning	TeachingEffect, the "ed innovation" of the title refers specifically to trainee English teachers using ICT to promote constructivist learning, self-directed learning. Active not passive students.

Strengthening pre-service Teacher Education in Myanmar (STEM) Phase II Final Narrative Report	UNESCO Myanmar	2020	over 65 documents & 20 stakeholders' interview, Myanmar	Pre-service teachers	Utilising ICT in management and teaching practices can enhance the quality of teacher education in Myanmar. The accessibility of the Internet outside school hours and providing sufficient Internet bandwidth are key priorities for the next phase (2021-2030) to improve ICT adoption in teacher education.	TeachingEffect, Uplift to quality of teacher ed, due to use of ICT in mngt and teaching practice.
Online professional development for in-service teachers in Information and Communication	Zhou et al.	2007	34 secondary school teachers, Canada	ICT	Distance ICT professional development can be a successful alternative to conventional face-to-face professional development.	TeachingEffect + Efficiency, online PD successful for ICT teachers
Blended learning with Edmodo: The effectiveness of statistical learning during the COVID-19 pandemic	Sefriani, et. al.	2021	Experiment on 40 university students, Indonesia	Mathematic	Edmodo's blended learning is effective to be used in virtual learning	TeacherOrgEffect, Edmodo LMS can be used for virtual/distance learning, specific to learning Statistics at uni during COVID
Edmodo-based blended learning model as an alternative of science learning to motivate and improve junior high school students' scientific critical thinking skills	Wahyuni, et. al.	2019	Experiment on 35 secondary students, Indonesia	Science	Edmodo-based blended learning can improve critical thinking and motivation	SESCL, Edmodo LMS specific to blended learning in Junior High School Science classes, Improve students' motivation and Scientific Critical Thinking Skills
The use of Edmodo Apps in flipped classroom learning. How is the students' creative thinking ability?	Widyaningrum, et. al.	2020	Experiment on all 4th semester undergraduate students, Indonesia	Indonesian Languange	Edmodo gives a better influence to students' critical thinking	SESCL, Edmodo LMS specific to flipped classroom learning in undergraduate Indonesian language classes, Improve students' creative and critical thinking

Edmodo-based makerspace as e-learning technology to improve the management project of vocational students in the disruptive technology era	Putra, et. al.	2018	R&D and testing on 29 secondary students, Indonesia	Vocational	Edmodo-based makerspace is effective to improve management project skill of VE students	SESCL, real world problems, creative outputs Edmodo-based makerspace is effective to improve management project skill of VE students
Edmodo impacts: Mediating digital class and assessment in English language teaching	Sumardi & Muamaroh	2020	Survey on 286 secondary students, Indonesia	English	Edmodo is an effective to mediate digital class	TeachOrgEffect, advance online pedagogy, specific to Edmodo LMS for virtual classes and assessment of secondary school students
Discussion on "online hybrid" teaching of engineering drawing course under the background of epidemic situation	Mu, H., Xue, L., Xue, Y. and Wang, J	2021	Summarised the effectiveness of online teaching and learning and teacher and student evaluations in China	University subject	There is no significant difference in learning outcomes between online and live classroom teaching of the same course .	TeachOrgEffectiveness, acceptance of virtual class during covid, no difference in outcomes between online and onsite classes for Engg drawing in China
Perception of learning versus performance as outcome measures of educational research	Persky, A. M., Lee, E., & Schlesselman, L. S	2020	Correlation research with 277 students, USA	Pharmacy course, in US college	Insignificant correlation between learning perceptions and actual gains in skills and knowledge	TeachOrgEffectiveness, research effectiveness in Pharmacy courses, perceptions of learning do not correlate to actual learning gains in skills and knowledge.
Kartu Prakerja program management report 2021	Prakerja	2021	Indonesian adults around 18-64 years old, The research method is not revealed	Adult training course	The average score of the pre-test and post-test of Prakerja participants increased from 53 to 68, and 75% of participants received certificate training with an average post-test score above 60	TeachOrgEffectiveness, advance online pedagogy, improve student learning outcomes based on pre and post testing, skills gained, specific to Prakerja adult training

Report on the Prakerja program in August 2022 in Sakernas BPS	Statistic Indonesia.	2022	Indonesian adults around 18-64 years old, The research method is not revealed	Adult training course	84,83% of Prakerja's participants believe that the training improves their work-based skills	SESCL improve skills, perception of improved adult workplace skills
Enhancing e-learning effectiveness using an intelligent agent-supported personalised virtual learning environment: An empirical investigation	Xu, D., Huang, W. W., Wang, H., & Heales, J.	2014	Empirical field experiment involving 228 participants in University of Hongkong	Information system	Students' perceived learning significantly affects their actual performance	SESCL improve skills, perceived learning affects actual outcomes HongKong uni students studying Infosys
Revealing the regulation of learning strategies of MOOC retakers: A learning analytic study	Fan et al	2022	Statistical Analysis of Teachers' Text Presentation Behaviour in MOOC Videos in China	University Basic Courses	MOOC instructional videos make full use of information technology means, with the help of diversified graphics, charts, subtitles, interactive software and other elements, which can enhance learners' concentration and interest in learning.	TeachEffect specific to improving quality of MOOC video lectures in uni basic courses
Disruptive education: Implications for higher education in Vietnam	Cu, T., & Amin, M. R.	2018	A comparative case study of a data-driven confirmation model at a national scale.	Higher Education in Vietnam	Vietnam's HE has been disrupted by MOOCs in three stages. Online, blended learning, and MOOCs can generate a variety of learner experiences, and technology-enhanced initiatives can improve student accountability and education quality.	TeachOrgEffectiveness + Org transformation, uplift to quality ed, tech can improve student accountability
Digital transformation in higher education from online learning perspective: A comparative study of Singapore and Vietnam	Nguyen-Anh, T., et al.	2022	A cross-country sample with Technology Acceptance Model (TAM) has been used	Higher Education in Vietnam	A minority of learners with elevated levels of learning motivation and digital literacy employ online learning resources effectively.	Limitations of online learning, Singapore and Vietnam, only a minority of learners with high motivation and digital literacy are effective online
The adoption of blended learning using Coursera MOOCs: A case study in a Vietnamese higher education institution	Thao Ho., et al.	2022	An online survey with 637 students across four campuses of a Vietnamese higher education institution	Higher Education in Vietnam	Vietnamese HE institutions have attempted to adopt a blended learning model, integrating Coursera MOOCs	

Shanghai Jiao Tong University: Blended learning design and practice	Yu	2019	Case Study on MOOC Teaching Practice in Shanghai Jiao Tong University	HE in China	Shanghai Jiao Tong University has found after several rounds of teaching practice that a blended teaching approach that combines MOOC with face-to-face teaching can improve student engagement, student performance compared to traditional classrooms, and the efficiency of content delivery and assessment has been improved to some extent.	TeachingOrgEffectiveness + Efficiency, blended learning, MOOC + F2F improves uni student motivation and performance in China, some improved efficiency of delivery and assessment
Quality beats frequency? Investigating students' effort in learning when introducing technology in classrooms	Futterer, T. et al.	2022	Achievement data and student survey on effort from 1363 7-8 grade students at 28 schools in Germany	Schools in Germany	The introduction of 1:1 devices causes an initial boost in student effort, which alleviates over time. Quality use of 1:1 rather than frequent usage is linked to better student effort.	MoreisBetter not proven: Quality rather than frequent use of 1:1 devices (Year 7-8 Germany) improves student effort in the long run, after the newness effect dies down
A mixed methods investigation of third grade academic achievement data: Pre- and post-Google Chromebook usage in a midwest elementary school	Powell, B.	2022	Quantitative 3rd grade student achievement data, interviews with teachers and administrators at one school.	Elementary Schools in USA	After two years of use, teacher and administrator attitudes toward Chromebooks are positive, and student achievement has improved. Technical challenges are the main problem.	MoreisBetter: 1:1 laptops improve student achievement (Year 3, regional US school) after 2 years of use. Tech challenges the main problem.
'It's just another nightmare to manage:' Australian parents' perspectives on BYOD and 'ed-tech' at school and at home	Jeffery, C.	2020	Thematic analysis of focus groups with 40 parents.	Schools in Australia	Parents feel that BYOD undermines their agency on their children's learning and is a source of distraction.	MoreisBetter not proven: Australian parents views BYOD as distraction, undermines their agency on their children's learning.
"Sore eyes and distracted" or "excited and confident"? – The role of perceived negative consequences of using ICT for perceived usefulness and self-efficacy	Scherer, R. Hatlevik, O.	2017	Analysis of survey completed by 1640 7th grade students.	Schools in Norway	Some students report physical discomfort from using ICT, but this does not correlate with the amount of use. Amount of use correlates with ability to use.	MoreisBetter not proven: physical discomfort from ICT use related to how used not amount of use (Norway 7th grade)

Potential of one-to-one technologies in the classroom: teachers and students weigh in	Varier, D. et al.	2017	Analysis of 18 teacher interviews, and 7 student focus groups.	Schools in USA	Teachers were far more positive about increases in student engagement than students were. Technical issues are a key challenge.	MoreisBetter + SESCL, USA teachers were far more positive about student engagement using 1:1 than students were.
The role of pedagogy in one-to-one computing lessons: a quantitative observational study of teacher-student interactions	Hershkovitz, A. et al.	2018	Analysis of teacher-student interaction data gathered from 11 observations upon 3 teachers.	Schools in Israel	Presence of 1:1 reduces individual pedagogical differences between teachers. Time spent on discussion, individual work, group work becomes more similar with 1:1.	TeachOrgEffectiveness, L effect leads to T effect, specific to 1:1 devices in Israeli schools due to reducing pedagogical variance between teachers.
Online Learning Management System (OLMS) in Indonesian Higher Education: Investigating benefits and obstacles	Yunus, H.	2021	27 Journal Articles	higher education in Indonesia	Benefit: easy and communicative access, enhance collaborative learning & Expressing opinion	Efficiency + Effectiveness LMS in Indonesia, specific benefits include ease of use, improved communications and collaborations and expressing opinions
Benefits of using the Learning Management System based on flipped learning methodology	Pozo-Sánchez, S., et.al.	2022	a post-test quasi-experimental on 231 Spanish secondary school students	Spanish secondary school	Optimize of the overall teaching-learning process and academic performance	Efficiency + Effectiveness LMS in Spanish high schools, Optimize of the overall teaching-learning process and academic performance
Learning management system implementation: A case study in the Kyrgyz Republic	Nurakun Kyzy, Z., et.al.	2018	Survey on 541 students and interview 6 instructors	higher education (10 faculties) in the Kyrgyz Republic	Technical characteristics, ease of use, feedback, and advantage of use are significantly affect students' learning success	Efficiency + Effectiveness LMS in Kyrgyz uni, ease of use and feedback affect students' learning

The use of a mobile Learning Management System at an online university and its effect on learning satisfaction and achievement	Shin, W. S., & Kang, M.	2015	Survey on 1,117 undegraduate tudents	higher education in South Korea	The acceptance of mobile LMSs directly impacts student learning satisfaction and achievement.	Effectiveness, LMS (Korean undergrads) improved student satisfaction and achievement through mobile-friendly LMS
Formative evaluation of the DepEd Commons - Final report	RTI International	2022	**SWOT analysis of DepEd Commons + Survey**: 714 education professionals (teachers, master teachers, head teachers, principals in basic education)	Use of DepEd Commons in basic education	Teachers unaware how OER in DepEd Commons can be reused and modified to fit their instructional needs, more training and guidance needed to maximize its use	TeacherOrgEffectiveness not proved, OER not curriculum relevant/specific enough, limited interactive OER, more training/guidance needed.
					Teachers claim that interactive resources and video content are limited on the OER platform to accommodate other learning styles.	
Distance learning is challenging DepEd to rethink its ways of assessment	Estrada, R.	2020	n/a	Limitations and challenges of distance learning	Video lessons from DepEd TV can only supplement the lessons in the learning modules but it is not interactive enough to answer any queries or clarifications that may arise from students (Estrada, 2020).	TeacherOrgEffect is not proven, specific to video lessons, not effective as distance learning, downgraded to supplementary resources, as student queries cannot be handled.
[Analysis]] Rethink schooling now	Yeban, F.	2021	n/a	Limitations and challenges of emergency remote learning	However, the survey conducted by the Movement for Safe, Equitable, Quality, and Relevant Education from November to December 2020 reveals that 70.9% of 1,395 teacher respondents are uncertain if these competencies are developed in the students (Bernardo, 2021a) and perceive that certain competencies have no connection to practical applications (Yeban, 2021).	Effectiveness not proved: specific to teacher and student views of ERT

Majority of students say they learned less under remote learning: Survey	Bernardo, J.	2021	1,278 teachers, 1,299 Grades 4 to 12 students, and 3,172 parents		In the same survey, 53% of 620 student respondents from Grades 4 to 12 are hesitant if they can learn the competencies through distance learning, while 42.7% of 1,207 parent respondents have a perceived confidence that their children understand their lessons (Bernardo, 2021a).	Effectiveness not proved: specific to parent and student views of ERT, parents more confident than students
Mathematics literacy on problem-based learning with Indonesian realistic mathematics education approach assisted e-learning Edmodo	Wardono, et. al.	2016	Mixed-method study on 2 class of secondary school, Indonesia	Mathematic	Mathematics literacy is improved	TeachingOrg Effectiveness, LMS helps improve maths skills in Indonesian secondary schools
The use of Edmodo in teaching writing in a blended learning setting	Purnawarman , et. al.	2016	Case study on 17 secondary students, Indonesia	English	It is possible to use Edmodo in the writing class	TeachingOrgEffectiveness, LMS effective
Collaborative writing assisted with Edmodo Learning Management System in Indonesian EFL classes: Learners' attitudes and learning engagement	Miftah & Cahyono	2022	Survey on 85 university students and interview on 17 university students, Indonesia	English	Positive attitudes towards Edmodo implementation in the classroom	SESCL, collaboration, LMS combined with collaborative writing pedagogy improves student attitudes and engagement with blended learning Indonesian EFL uni students
Learning with digital technology - NZCER national survey primary.	Wylie, C. MacDonald , J.	2019	Random sample of 620 english-medium primary school teachers and 145 principals	NZ Primary schools	Usage of technology in schools continues to increase. Teachers are uncertain about their confidence with digital technologies curriculum and value support on this.	TeachingOrg Effectiveness not proven, NZ primary schools, ICT use increases but teachers lack confidence with curriculum use

Mid-term review of the National Education Strategic Plan (NESP) 2016-2021	Ministry of Education	2020	390 documents, 159 stakeholders' interviews, three-day workshop, Myanmar	Myanmar national ed plan	Technology-assisted instructional methods can create a comprehensive plan for modern, blended and distance learning.	TeachingOrg Effectiveness, advance online pedaogy, specific to creation of modern, blended and distance learning in Myanmar
Collaborative Edmodo in writing: A conceivable course of fusion	Anwar	2021	Experiment on 56 secondary students, Indonesia	Indonesian Language	Edmodo is dependable when merged with a collaborative writing strategy	TeachingOrg Effectiveness, LMS is efficient when combined with collaborative writing strategy, Indonesian language in high schools
BYOD and its impact on teacher pedagogy: a New Zealand case study	Rae, G.	2017	Analysis of interviews and classroom observations at three primary schools	Schools in New Zealand	Teachers lack technical training to teach with BYOD devices in a way that modifies or redefines learning that could occur without BYOD.	MoreisBetter not proved, BYOD lack teacher PD so pedagogy is not changed
Negotiating digital divides: Perspectives from the New Zealand schooling system	Starkey, L. et al.	2017	Survey completed by 222 school board chairs and interviews with 4 principals in New Zealand.	Schools in New Zealand	Priority on teacher professional development rather than the impact of 1:1 on student experience or achievement.	MoreisBetter not proved, BYOD for teacher PD not student learning transformation
A study of factors influencing learner adoption of MOOCs: a user survey based on Tsinghua University's Xuedang Online	Lu	2016	Questionnaire survey of more than 20,000 current university students participating in a MOOC	China Higher Education	Researchers at Tsinghua University conducted a study on satisfaction with MOOCs and found that over 90% of respondents were satisfied with their learning experience on MOOCs. In addition, MOOCs are particularly useful for improving learners' knowledge and skills.	SESCL 90% of 20K students satisfied with MOOCs at Chinese university, help to improve knowledge and skills.

Parents' acceptance of educational technology: Lessons from around the world	Osorio-Saez et al.	2021	4,600 parents from 19 countries	N/A	- Students' parents valued collaborative learning through online platforms. - Parents showed satisfaction when being able to check their children's learning progress, attendance, and participation feedback from the teachers in real time. - Parents were happy that there were a number of resources available on the platform that they could download.	SESCL, parental engg: parents important stakeholders, valuing online collaborative learning, downloadable resources, being able to monitor progress, teacher feedback
Learning to teach in a digital age: ICT integration and EFL student teachers' teaching	Prasojo et al.	2018	60 student teachers, 10 classes for observation, Indonesia	English	Being competent in ICT literacy does not mean using ICT in the teaching practice.	Effectiveness questioned: general digital literacy does not translate over to using ICT in teaching practice
"Seductive promises" and the use of online mathematics instructional programmes in New Zealand primary schools	Darragh	2021	Survey and interviews with teachers and school leaders	New Zealand Schools	When asked to justify the use of schools' CAI Maths programmes, many teachers in New Zealand largely repeat promotional claims presented by commercial vendors	Effectiveness questioned: NZ teachers heavily influenced by promotional claims of commercial vendors, maths programmes
Schooling futures in tension: On competing discourses at a technology education summit	Saul & Burkholder	2019	Researchers attended a government initiated ed-tech summit	Canada	Commercial ed-tech promotes positive narratives through concerted efforts. They fund exciting and inspiring professional development opportunities for teachers where new products and uses are promoted	Effectiveness questioned: Commercial ed-tech promotes positive narratives through concerted efforts, PD programs, Canada
Beyond workforce preparation: contested visions of 'twenty-first century' education reform	Chang	2019	Participant observation and ethnographic interviews	California	Teachers openly admit the limited value of some vendor led professional development, but their involvement is likely to warm them to commercial ed-tech perspectives	Effectiveness questioned: Teachers admit to being swayed to view commercial ed-tech more positively, despite seeing limited value in commercial PD programs, California

Evidence for Efficiency						
Paper title	**Authors**	**Year**	**Participants**	**Subject area**	**Evidence**	**Note**
Gamification-based assessment: The washback effect of Quizizz on students' learning in higher education	Pitoyo et al.	2020	18 students (3rd semester in Indonesia)	English TOEFL structure class.	- Students were able to identify their weaknesses and mistakes after doing the test. Therefore, students were motivated to find their own solutions before seeking help from the teacher. (This was just one finding in the study which could be considered as having some kind of efficiency benefit, there were many other findings related to effectiveness.)	
Examining perceptions of systematic integration of instructional technology in a teacher education program	Allsopp et al.	2009	13 pre-service teachers, USA	teacher education program	Collaborative efforts of faculty in implementing a structured ICT integration plan can enhance the utilisation of instructional technology in university classrooms.	Efficiency, collaborative approach to ICT integration can enhance ICT use in uni classrooms
Tiga tahun kartu Prakerja: Gebrakan program inovasi start-up e-government hingga diminati untuk ditiru negara lain (Three years of Prakerja: A breakthrough in the e-government start-up innovation program that has been enthusiastically imitated by other countries)	Limanseto, H	2023	Indonesian Coordinating Minister for Economic arguments on online news	Adult training course	Low operating cost: Despite negative public sentiments, Prakerja is still running for about three years now as the Government argues that Prakerja is an efficient program due to its low operational cost. Indonesian Coordinating Minister for economic affairs highlights that Prakerja has been implemented at a remarkably low cost, with operating expenses accounting for only 0.59% of the total budget (Limanseto, 2023).	CostEffective, national adult online training program Indonesia
Manajemen pelaksana tegaskan efisiensi program kartu Prakerja di era digital (Project implementation management affirms the efficiency of the Prakerja in the digital age)	Prakerja	2022a	Prakerja chariman arguments on newsletter	Adult training course	Reduced cheating: Prakerja's chairman also emphasised that the online system diminished corruption practices as there were no illegal fees that might be encountered during offline training	CostEffective to users through reduced corruption processes regarding illegal fees for completing offline training

Massive open online course: International experiences and implications in Vietnam	Dang, L., Watts, S., & Nguyen, T.	2017	Qualitative, case study & participant observation study with literature analysis	Higher Education in Vietnam	Universities use MOOCs to innovative online pedagogies. The shift from direct to virtual environment requires adaptation. MOOCs' free nature appeals to Vietnam's low GDP & growing need for quality, affordable & flexible learning.	CostEffective, Vietnamese MOOCs and low cost, affordable learning
The new form of teaching in future education: Flexible teaching and active learning	Huang, R., Wang, Y., Wang, H., Lu, X., & Gao, B.	2020	Analysing useful experiences of online teaching during the closure of Chinese university campuses	HE in China	Teachers' online teaching support services, in addition to providing teachers with support on how to use synchronous e-learning software, how to make use of the learning management system, and how to design learning activities, should also provide teachers with online teaching strategies, information technology applications, and cases of local teacher training, so as to promote the rapid enhancement of teachers' online teaching ability.	Efficiency, speed up T&L change, teacher online support for LMS use during ERT an efficient measure for some T&L processes while others could be improved
Experiences of teachers, parents and students in learning delivery modalities: A qualitative inquiry	Anoda, M.	2022	qualitative-phenomenological study: 5 parents and 5 students (virtual in-depth interview), 5 public elementary teachers (focus group discussion)	lived experiences of participants on the learning delivery modalities	Students, parents, or guardians in distance learning setup may have to divide their attention between daily tasks and academic responsibilities, which is further challenging for low socio-economic families balancing work and school (Anoda, 2022).	Efficiency of LMS for distance learning not proved, students and parents/carers have too many competing home tasks esp LSES families who work.
Evidence for Fairness						
Paper title	**Authors**	**Year**	**Participants**	**Subject area**	**Evidence**	**Note**
Utilizing information and communication technologies to achieve lifelong education for all: A case study of Myanmar	Mar	2004	Primary data from individual interviews, secondary data from MOE, UNESCO-UNEVOC, IDCJ, JICA. Myanmar		ICTs can be used to reach underprivileged groups, in developing countries.	Fairness, inclusion for groups, ICT to reach underprivileged groups in developing countries

Kartu prakerja program management report 2021	Prakerja	2021	Indonesian adults around 18-64 years old, The research method is not revealed	Adult training course	Prakerja's beneficiaries consist of 90% of unemployed, 3% former migrant workers, 62% people living in rural areas, 4% people living in underdeveloped regions, 19% elementary school graduates, 2% people with disabilities, 2% 60 years old participants;	Fairness, inclusion for groups, Online adult training program reached underprivileged groups including rural and unemployed in Indonesia
Kartu Prakerja program management report 2021	Prakerja	2022b	Indonesian adults around 18-64 years old, The research method is not revealed	Adult training course	Prakerja beneficiaries comprise various groups: 47% are from 212 extreme poverty cities/regencies, 51% are women, 2% come from left-behind cities/regencies, 3% have disabilities, 44% belong to the most impoverished households, and 3% are former migrant workers.	Fairness, inclusion for groups, around half of participants in Online adult training program were extremely underprivileged groups including those from extreme poverty cities and the most impoverished households
Kartu Prakerja program management report 2021	Prakerja	2022b	Indonesian adults around 18-64 years old, The research method is not revealed	Adult training course	Prakerja beneficiaries hail from 34 provinces and 514 cities and regencies, with a total participation of up to 5,931,574	Fairness, inclusion for groups, Online adult training program reached both cities and rural provinces in Indonesia
The inclusive internet index	Economic Impacts	2022	National-level internet inclusion in 100 countries, including Indonesia	-	Indonesia is at 74th out of 100 countries in internet affordability based on price and its competitiveness with the global market	Fairness questioned, inclusion for groups, Online adult training program relies on internet, but Indonesia very low internet affordability.

PMO Prakerja: “Joki” daftar kartu Prakerja bukan kriminal (PMO Prakerja: “Joki” for Prakerja registration is non-criminal)	Putri, C. A (CNBC Indonesia)	2020	Prakerja director arguments on online news	Adult training course	The Prakerja director has acknowledged calo issue and perceives it as a non-criminal action, as calo only assists prospective participants in registering and not in completing the training (Putri, 2020). However, this service still raises concerns because many calo manipulates Prakerja participants by falsely guaranteeing their successful registration, despite the fact that there is a selection process for participants (Putri, 2020)	Fairness questioned, inclusion/exclusion challenge for individuals can be overcome by "calo" paying fees for third party to assure online selection/registration test.
Making sense of MOOCs: A guide for policy-makers in developing countries	Patru, M., & Balaji, V.	2016	Synthesizes and analyzes existing literature on MOOCs, drawing on studies and reports from a variety of sources	Open Education in Developing Countries	In Vietnam, MOOCs are perceived as potential instruments to encourage open access to higher education and lifelong learning. It is believed that MOOCs provide higher education access to disadvantaged populations, particularly those who cannot afford formal education	Fairness, inclusion for groups, MOOCs in Vietnam to reach underprivileged groups
The state of open Education practice in Vietnam	Huong, N. M.	2021	Mixed-methods study, combining both qualitative and quantitative data collection and analysis methods. 336 educators, administrators, students from institutions in Vietnam, including universities, colleges, and vocational schools joined this study.	Higher Education and Vocational Training in Vietnam	Vietnam has strategized to innovate basic education, build an open education system, and robustly implement open and online learning programs for its citizen. The Vietnamese Government prioritizes open and online learning development across its guiding documents to address the learning needs of its citizens and accomplish an education-for-all strategy. Along with the global expansion of MOOCs, Vietnam has made considerable strides in integrating MOOCs within its higher education framework. the Hanoi Open University and Ho Chi Minh Open University are part of the ASEAN online open educational institutions network, aiming to enhance regional HE access	Fairness, inclusion for groups, MOOCs in Vietnam to reach underprivileged groups to enhance regional HE access

Capitalizing open education: The state of practice in ASEAN region	Belawati, T., Javier Alfonso, G., & Saludadez, J.	2019	A two-year study conducted by the OU5 Research Network. Survey participants are policymakers/government officers, heads of organization/institutions, instructors, and students	Education in ASEAN	In the era of information and knowledge-based economy, MOOCs are regarded by many countries globally and within the ASEAN region as an effective tool for lifelong learning and development. The efforts to adapt the MOOC approach to higher education are still in their early stages in many developing countries, especially in Vietnam	Fairness questioned, inclusion for groups, MOOCs in Vietnam at early stages of HE integration, therefore early stages or reaching underprivileged groups to enhance HE access
Open education (Hệ thống Giáo dục mở)	Nguyen, S.	2020	Government News	Education in Vietnam	The Vietnamese Ministry of Education and Training launched a virtual university initiative in 2012, serving more as a public regulation experiment than a pioneering model for potential investors	Fairness questioned, inclusion for groups, early virtual university pilot (suggests aim of widening regional access to HE) in Vietnam more as "a public regulation experiment" than something that would attract investors.
A laptop for every child? The impact of technology on human capital formation.	Hall, C. et al.	2021	Publicly available achievement data combined with a survey completed by schools about their use of 1:1 devices at 221 middle schools	Middle Schools in Sweden	1-5 semesters after 1:1 device programmes were introduced, schools experienced no improvement in achievement and worse performance among low-SES students.	Fairness questioned, 1:1 devices in middle schools, 1-5 semesters after introduced, no improvement in achievement, worse performance for low-SES students.
Understanding children's use and experience with digital technologies	Lips et al.	2017	Semi-structured interviews with 70 children from 12 schools	Children in New Zealand	Having a strong home-school relationship, where ideas and norms about device use at school are reinforced at home, supports students' use of devices at school	Fairness, 1:1 laptop use in schools relies on strong home-school relationships and messages about device use norms being reinforced at home

Learning at home: Parents' lived experiences on distance learning during COVID-19 pandemic in the Philippines	Agaton, C. and Cueto, L.	2021	30 parents and guardians of learners	Lived experiences of the parents who act as learning supervisor, tutor, and home-schooling teacher for modular learning during the health crisis.	However, Agaton & Cueto (2021) argues that online distance learning is expensive due to the increase in electricity bill consumptions to run the internet. In addition, unreliable internet connection limits the students' ability to communicate with their teacher to get educational support and participate in online learning activities (Bernardo, 2021b; Yeban, 2021).	Fairness questioned, online ERT costly due to electricity costs and internet subscriptions, limits fair and equal participation regarding support and communication with teachers
As school year ends, learning under distance education questioned	Bernardo, J.	2021	news article (interview with parents and other education stakeholders)	challenges and limitations of distance learning		Fairness questioned, specific to ERT
Formative evaluation of the DepEd Commons - Final report	RTI International	2022	SWOT analysis of DepEd Commons + Survey: 714 education professionals (teachers, master teachers, head teachers, principals in basic education)	Use of DepEd Commons in basic education	However, the same survey reports that a large number of resources, including video resources to help parents facilitate distance learning, are on external websites like Facebook and YouTube which will incur data charges (RTI International, 2022). This may limit the access of those who cannot afford mobile data subscriptions or do not have a stable internet connection. In addition, the need to login to the DepEd Commons site to access content is a perceived barrier for teachers as this limits them to link the resources to other platforms (RTI International, 2022).	Fairness questioned, specific to data charges for external linked resources such as videos on OER commons

Distance learning is challenging DepEd to rethink its ways of assessment	Estrada, R.	2020	n/a	Limitations and challenges of distance learning	Although the use of digital technologies provides flexible options to assess learning (DepEd, 2020), Estrada (2020) argues that in distance learning, individual student learning and performance may depend on their access to resources such as a compatible gadget, reliable internet connection, and support from educated household members.	Fairness questioned, online learning costly due to electricity costs, device costs and internet subscriptions, limits fair and equal participation
Digital 2022: Indonesia	Data Reportal	January 2023	Secondary research from third parties resources	-	23% of Indonesians do not have access to the internet	Fairness questioned inclusion for groups, Online learning relies on the internet, but Indonesia has very low internet affordability.
Indonesia's digital literacy index rises	Kominfo	2021	Survey towards 10,000 respondents (Indonesian)	-	Indonesia's digital literacy has slightly grown by 0.05 points, from 3.49 to 3.54	Fairness Inc Community Level + OrgEcoTransformation, digital literacy in Indonesia increased slightly
Evidence for Limitations						
Paper title	**Authors**	**Year**	**Participants**	**Subject area**	**Evidence**	**Note**
Activity report on the fact finding on digital transformation at 11 partner TVET institutes	Ho and Nguyen	2021	The methodology includes document review, group discussion, campus visit and interviews on 11 TVET institutes in Vietnam. The participants include representatives of rector boards, heads of departments, faculties, key teachers.	Vietnam	Vietnamese learner's self-directed learning in digital environment is spontaneous and fluctuates. Teachers lack confidence and scepticism in blended learning and online methods. Traditional teaching methods dominant in Vietnamese educational institutions may discourage educators from adopting MOOCs. Lack of holistic strategies, clear policies for online learning at the institutional or national level; traditional curriculum and pedagogy, outdated education content.	

Digital transformation in higher education from online learning perspective: A comparative study of Singapore and Vietnam	Nguyen-Anh, T., et al.	2022	A cross-country sample with Technology Acceptance Model (TAM) has been used	Higher Education in Vietnam	A minority of learners with elevated levels of learning motivation and digital literacy employ online learning resources effectively	
Massive open online course: International experiences and implications in Vietnam	Dang, L., Watts, S., & Nguyen, T.	2017	Qualitative, case study & participant observation study with literature analysis	Higher Education in Vietnam	High dropout rates among Vietnamese students enrolled in MOOCs is a significant barrier	
The state of open education practice in Vietnam	Huong, N. M.	2021	Mixed-methods study, combining both qualitative and quantitative data collection and analysis methods. 336 educators, administrators, students from institutions in Vietnam, including universities, colleges, and vocational schools joined this study.	Higher Education and Vocational Training in Vietnam	The observed decline in enrolments for open and online learning from Vietnamese institutions over a number of years is indicative of ongoing concerns regarding the quality of MOOCs	

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