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Revolutionising educational technology: The imperative for authentic qualitative research

Eva Heinrich

Massey University, New Zealand

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ABSTRACT

The field of educational technology research has been described as dominated by quantitative approaches, superficial and lacking methodological capacity. Calls for more qualitative research and for bringing researchers from diverse backgrounds together have been made to contribute towards solving complex educational challenges. This research employed a critical methodological literature review to examine 1538 research articles published in 2021 editions of 13 top educational technology research journals and identified 168 qualitative and 231 mixed research articles. Applying a research description framework, a detailed study of these two subsets shows that only half of the articles describe their research design and even less address researcher beliefs (31.5% for qualitative, 6.5% for mixed research). Of the mixed research articles, only 20% demonstrate strong qualitative characteristics. The detailed examination of the methodological descriptions undertaken in this research highlights that prior reviews overestimate the qualitative characteristics of especially mixed research studies and that those studies in general do not have the methodological underpinning required for drawing on different perspectives. The article contributes a simplified framework for the description of research approaches which can be used by editors to outline their expectations for research descriptions in a way accessible to prospective authors from a wide variety of backgrounds. The article calls on journal editors to proactively facilitate publication of educational technology research that brings together researchers from different substantive areas and belief systems. Articles that provide authentic qualitative research that is rigorously defended will offer new conceptualizations for addressing the complex challenges educational technologies aim to address.

1. Introduction

Recent global events have brought the close interplay between education and educational technologies to the forefront of public discussions. The effects of the Covid-19 pandemic have intensified conversations about the place of technologies in connecting learners and teachers. Advances in artificial intelligence have multiplied concerns about our ability to assess student knowledge. Without question, technologies play an important role in education and educational technology research is required to address the inherent complexities.

Judging by the standing of research journals in the area, the field of educational technology research is well-established. The three journals ranked top in Google scholar's educational technology category (status September 2022) have a substantial history: *Computers and Education* has been published since 1976, the *British Journal of Educational Technology* since 1970, and *Education and Information Technologies* since 1996. The 2021 Scopus listing of education journals ranks 1647 entries. Educational technology journals feature in second (*Computers and*

Education) and third (*Internet and Higher Education*) place, indicating the high standing of research in educational technology within the wider field of education. Despite this substantial history and the ranking success of educational technology journals, unease about research in the field has been voiced, pointing to the complexities of educational settings and the related need for theory-based and methodological rich investigations. For example, [Bulfin et al. \(2014\)](#) ask educational technology researchers to develop more methodological capacity, inclusive of at least a base level of understanding across methodological approaches. [Selwyn \(2015\)](#) characterizes educational technology research as limited in its focus and superficial, often just looking at technology applications instead of considering the full complexities of educational settings. He asks researchers to consider the 'political, economic, social, cultural, and historical "messiness" of technology and education' (p249).

Missed opportunities and potential gains from employing more qualitative approaches are reported widely. [Levy and Moore \(2018\)](#) ask for more qualitative research in computer assisted language learning to

E-mail address: e.heinrich@massey.ac.nz.

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enable an insider view on processes. Dutta et al. (2020) discuss qualitative work in the field of communication research and point to the opportunities for bridging the divides between quantitative and qualitative traditions in the field. Hussain et al. (2021) seek more qualitative research in health informatics, suggesting that this would lead to systems 'more responsive to practical needs, improving usability, safety, and outcomes' (p402). Educational technology is home to researchers from diverse backgrounds. Working together and bridging differences would allow for strong collaborations and meaningful results.

My observations as reader, author, reviewer, and editor over the last decade mirror the concerns raised in the literature. Little progress has been made in moving beyond the quantitative dominance in educational technology research. This is problematic for a field that is inherently linked to the complexities of education, where technology cannot be separated from social and pedagogical considerations. While this does not diminish the potential for and value of well-constructed quantitative research, the concern lies in the lost opportunities related to the lack of qualitative research and mixed research with a strong qualitative component.

The aim of my research is to contribute to changes in educational technology publishing: by facilitating the publication of qualitative and qualitatively shaped mixed research capable of enriching our understanding of technology in education and developing solutions for the big challenges we face; by providing an evaluation framework for rejecting qualitative and qualitatively shaped mixed research articles that lack methodological rigour, eliminating the smokescreen formed by pseudo qualitative research that covers up the urgent need for change in educational technology publishing.

To achieve this aim, my focus was on seeking guidance from the literature regarding comprehensive descriptions of qualitative and mixed research approaches and finding a framework for the methodological evaluation of articles. I could then use this framework to answer two research questions: to what degree do qualitative and mixed research articles published in educational technology journals provide comprehensive descriptions of their research approaches, and, to what degree do mixed research studies feature strong qualitative orientation.

I was supported by a senior research assistant well-versed in qualitative approaches who undertook the data collection based on my specifications. When discussing the authorship for this article we agreed on sole authorship with acknowledgement of the research assistant. I switch voice in the writing of this article to accurately reflect our shared work and my sole contributions.

2. Previous studies classifying research approaches in educational technology

Pérez-Sanagustín et al. (2017) reviewed 352 articles about ICT in schools published in *Computers and Education* from 2011 to 2015, classifying 16% of these studies as following a qualitative approach. The authors found that 50% of studies collected solely quantitative data, 16% solely qualitative data, and 34% a mixture of quantitative and qualitative data. No detail is provided on data collection methods or how the data were classified. The authors concluded that quantitative research dominates publications in this journal and foreshadowed an editorial on guidance towards high quality qualitative research.

Reeves and Oh (2017) provide a comparison of goals and methods of educational technology research published in *Educational Technology Research and Development* over the years 1989–1994 and 2009–2014 (95 and 102 articles respectively, only research articles were included). The articles were classified according to research goals (theory development/synthesis, exploratory/hypothesis-testing, descriptive/interpretivist, critical/postmodern, design/development, action/evaluation) and methods (quantitative, qualitative, critical theory, literature review, mixed methods). For the 2009 to 2014 timeframe 52% of articles were identified as using quantitative methods, nearly all of which had exploratory/hypothesis testing goals, and 11% used qualitative

methods, all with descriptive/interpretivist goals. While the 29% of articles using mixed methods had a variety of goals, over half fell under the exploratory/hypothesis-testing category, described as using predominantly quantitative methods. Comparing the two timeframes studied, Reeves and Oh (2017) point to the increase in descriptive/interpretivist studies (from 1% to 16%), the low numbers of design-based studies (at 6% and 5%), and the lack of articles with critical/postmodern goals.

Bond and Buntins (2018) examined the 256 articles published in the *Australasian Journal of Educational Technology* from 2013 to 2017. They focused on methodology, dividing articles into descriptive, inferential/quantitative, interpretative/qualitative, content analysis, combined methods (a combination of at least two of the other categories), and theoretical. There is little detail on the parameters and processes used in the coding of articles. The study identifies 31% of articles as inferential/quantitative, 31% as interpretative/qualitative and 24% as of combined methods. These numbers remained steady over the publication years studied.

Kishi et al. (2018) examined trends in qualitative research published in 440 articles in *Japan Society for Educational Technology* from 2006 to 2017. The authors used categories of quantitative, qualitative and mixed-methods designs, based on the following criteria: kind of data collected in a study, the way those data were analysed, and the purpose of the study. This resulted in identifying 70% quantitative, 13% qualitative and 13% mixed studies. The authors found that the number of qualitative and mixed studies remained constant over the period examined.

Valverde-Berrocoso et al. (2020) analysed articles published in *Computers and Education*, the *British Journal of Educational Technology*, and *Internet and Higher Education* from 2009 to 2018. The authors applied automated coding in NVivo to discover the most frequently used terms. Case study arose as the most frequent term, structural equation modelling as the second most frequent term, and design-based research as the third most frequent term. The authors concluded that qualitative methodologies dominate, and that design-based research has a significant presence. The authors do not provide any percentages for quantitative versus qualitative studies, study designs or analysis approaches.

The studies cited cover roughly comparable timeframes yet look at different publications and employ diverse approaches. The data indicate that on methodology or design levels, quantitative tends to be strongly dominant, whereas on methods level this dominance is not as obvious. Regarding 'mixing', the approaches taken by the studies vary. Pérez-Sanagustín et al. (2017) focused on mixing on data level (34%), Reeves and Oh (2017) refer to mixing on methods level (29%), Kishi et al. (2018) on design level (13%) and Bond and Buntins (2018) on methodology level (24%). By relating the mixed methods articles to their exploratory/hypothesis-testing category, Reeves and Oh (2017) provide an indication of the more quantitative orientation of those articles. Kishi et al. (2018) also point to the more quantitative outlook of the mixed studies, commenting that many of the articles in their sample did not explain their research methods adequately, as in studies undertaken from a logical positivist approach with short interviews and descriptive questionnaires in support of predominantly quantitative findings. In the other studies, the balance between quantitative and qualitative elements in mixed studies remains unclear.

The differences across the studies reflect the wide range of views on how research approaches are described and named. While some of the studies (see Kishi et al., 2018; Reeves & Oh, 2017) take care to explain their parameters, in other studies challenges around finding the right descriptors are not explicit. Conclusions like Bond and Buntins' (2018, p179), that 'an even number of quantitative and qualitative studies continue to be published', while technically correct based on the numbers reported, carry the danger of being misleading. Valverde-Berrocoso et al.'s (2020) statement that qualitative methodologies dominate, and that design-based research has a significant presence, is in stark conflict with the findings of all other studies cited and stems

from their keyword-based study approach. Considering that quantitative studies often do not name their study design, terms such as case study or design-based will have surfaced without providing a useful measure of study designs across educational technology studies.

3. The search for a framework for the description of research approaches

Terms such as philosophy, paradigm, conceptual framework, theoretical stance, methodology or method are often used with overlapping or conflicting meanings. As Egbert and Sanden (2020, p. 4) say, ‘we are amazed by the lack of agreement on the definitions’.

I chose Twining et al.’s (2017) framework, extended in 2018 (Twining, 2018; see Table 1), to guide my research. Published in *Computers and Education*, a highly ranked journal in both the educational technology and education disciplines, this framework was provided with the express aim of strengthening qualitative research. The framework separates quantitative and qualitative on the levels of theoretical stance, methodology and research design. This is followed by the levels of methods, instruments and analysis, which according to Twining and colleagues are data focused. On these levels the authors do not distinguish between quantitative and qualitative but suggest thinking of numerical and non-numerical data. To complement the framework and do justice to the design descriptions of mixed research, I also drew on the handbook of mixed methods by Tashakkori and Teddlie (2010) who characterize the ways of combining and sequencing quantitative and qualitative research components.

Twining et al. (2017) ask authors of research articles to address all levels of the framework in describing their research. This request for comprehensive descriptions is reiterated by others. There is common ground on the importance of informing about and justifying one’s research design, despite terminological differences. Dahlberg et al.

(2010) highlight the need to outline the researcher’s lens and conceptual framework, to justify the theoretical framework and methodology used, and how this leads to the methods applied. As McChesney (2021) states, the explicit acknowledgement of paradigms and their implications is important and should frame how ‘the study has been conducted, described, interpreted, and discussed’ (p101). Research aims or questions need to inform and justify the research methods, as stated by Dahlberg et al. (2010), Reeves and Oh (2017), and McChesney (2021). Kishi et al. (2018) emphasize the importance of outlining the epistemological stance that underpins the research and of clear descriptions of analytical methods.

A thorough description of research approaches is also essential for mixed research. Dahlberg et al. (2010) emphasize that a general statement on the benefits of mixed methods, such as referring to the benefits from counterbalancing strengths and weaknesses of quantitative and qualitative approaches, is not sufficient. Plano Clark and Ivankova (2016) ask authors to link their approach to mixed methods literature, and to identify their methods, methodology, and philosophy, as well as explaining why the particular mixed methods approach has been used. McChesney (2021) writes about mixing on methodological level and highlights the opportunities for addressing wicked problems, theory generation and culturally responsive forms of research. This requires researchers to be explicit about their paradigmatic positioning and be consistent and transparent in carrying out and reporting on the research. McChesney (2021, p. 102) emphasizes the need for ‘intentional and meaningful integration of the qualitative and quantitative elements’.

Where mixed research is not carefully considered, the combination of quantitative and qualitative ‘may not be meaningful or defensible’ according to McChesney (2021, p. 102). Hesse et al. (2019) point to the dangers of ‘amateur qualitative research’ (p567) undertaken by positivist/quantitative researchers moving into social science research who fail to contextualise the analysis of non-numerical data, an issue also

Table 1
Summary of Key Research Terms and Contrasting Stances (Replicated from ‘Extending guidance on qualitative research,’ by Twining, P., 2018, The Halfbaked.Education blog. <https://halfbaked.education/extending-guidance-on-qualitative-research/>. Copyright 2018 by Peter Twining, replicated with permission.).

		Level	Contrasting stances	
Theoretical stance	Ontology Beliefs about the nature of being or reality		There is one objective reality	There are multiple realities
	Epistemology Belief about the nature and scope of knowledge (how we come to know the world)		You uncover the reality – there is one true explanation	Meaning is culturally defined
Approach	Methodology Based on paradigmatically different ontological and epistemological assumptions		Quantitative Positivist, Objectivist, Empiricist, Nomothetic	Qualitative Hermeneutic Interpretivist
	Design		Overarching strategy for collecting data, such as:	
	Emphasises		Experimental Quasi-experimental Random Controlled Trials	Case study Action research Ethnography
			deductive reasoning	inductive reasoning
	Data (numerical or non-numerical)	Methods	Techniques for collecting data, such as: Survey/questionnaire; Interview/Focus group; Document analysis; Observation	
		Instruments	Specific data collection tools, such as: a specific questionnaire or interview schedule	
Analysis		How the data are processed in order to make sense of them (to answer your research questions)		
Outcomes		Generalisable Statistics can’t answer the ‘why’ question	Relevant/Resonate Build theory (answer the ‘why’ question)	

identified by Kishi et al. (2018) in the articles they studied. Fischer (2006, p. 437) suggests the term ‘qualiquantive’ for research that transforms non-numerical data from interviews or questionnaires into measurements. While such transformation might be worthwhile, failing to contextualise might lead to a misrepresentation of data provided by research participants. Given (2017) explains that adding open-ended questions to a questionnaire is not enough to add a noteworthy qualitative component to a study.

Based on these voices from the literature, my mission was to examine the completeness of research descriptions, looking for meaningful descriptions for each of the levels identified by Twining et al.’s (2017) framework. As McChesney (2021) states, addressing the higher, more fundamental or theoretical levels, is of particular importance when looking for mixed research studies with the potential to address wicked problems and links back to the research aim of enabling educational technology research that addresses the big challenges of our times.

Plano Clark and Ivankova (2016) identify mixed methods research, mixed research, and multimethod research as the most used terms for describing research combining quantitative and qualitative elements. I employ the term *mixed research* to avoid the focus on methods and suggest a more fundamental perspective, such as offered by McChesney (2021).

4. Methodology

My research assistant and I worked from an interpretivist mindset, acknowledging that educational technology researchers come from a variety of research cultures with varying understandings of research processes and definitions. We conducted the research as a critical methodological literature review, a research approach characterized by examining methodological issues in existing literature with the aim of providing recommendations for improved practice (Aguinis et al., 2023). Such review is a form of conceptual review, described by Kennedy (2007, p. 139) as an approach suitable for ‘gaining new insights

into an issue’. We examined all 1538 research articles published in 2021 editions of the 13 top-ranked educational technology journals (Google Scholar ranking, September 2022; see Appendix A).

As first step we identified all research articles as either quantitative, qualitative, mixed or other (e.g., literature reviews, conceptual studies). This was based on reading the abstracts, followed by the methodology/methods sections, the findings sections, or the whole article, until we were confident in labelling an article correctly. Where explicit wording was used, as in ‘this qualitative study’, we followed the authors’ descriptions. Where this was not the case, we decided on the label, e.g., classifying articles using inferential statistics and no qualitative components as quantitative. We identified 945 (61.4%) of articles as quantitative, 168 (10.9%) as qualitative, 231 (15.0%) as mixed, and 194 (12.6%) as other.

Next, we focused on the qualitative and mixed research articles, applying attribute and magnitude coding as suggested in Onwuegbuzie et al.’s (2016) description of Saldaña’s coding methods in literature reviews. Based on the levels of research description suggested by Twining et al. (2017), we created spreadsheets with columns theoretical stance, methodology, design, methods, instruments, and analysis. For each article, we tabulated how the authors had addressed these aspects of research descriptions. This was based on reading the articles until we had found descriptions for all aspects or were certain that aspects had not been addressed. Where authors used the level descriptors explicitly, as in ‘this research uses a case study design’ or ‘the methodology used is quasi-experimental’, we recorded the details as given by the authors (‘design’ and ‘methodology’ in these examples). Where the authors described their research approaches without using our level descriptors, we used our understanding to associate descriptions with levels. In line with our focus on qualitative research aspects, we did not record details of quantitative analysis for the mixed research articles. To provide consistency, my research assistant and I analysed the articles of one journal separately before discussing our data and refining our approach. My research assistant then performed the data collection, adding

Table 2
Simplified version of the framework for the description of research approaches highlighting the attributes used for coding.

			Simplified framework using four attributes	
Theoretical stance	Ontology Beliefs about the nature of being or reality		Researcher Beliefs What assumptions, thoughts, values, or perspectives do the researchers hold and how do those relate to the research study presented? How are differences between researchers negotiated?	
	Epistemology Belief about the nature and scope of knowledge (how we come to know the world)			
Approach	Methodology Based on paradigmatically different ontological and epistemological assumptions		Research Design What is the overall strategy for the collection of data?	
	Design			
	Data (numerical or non-numerical)	Methods Instruments	Methods and Instruments What techniques are used for the data collection? What are the specifics of the tools?	
Analysis		Qualitative Analysis How are the data analysed?		

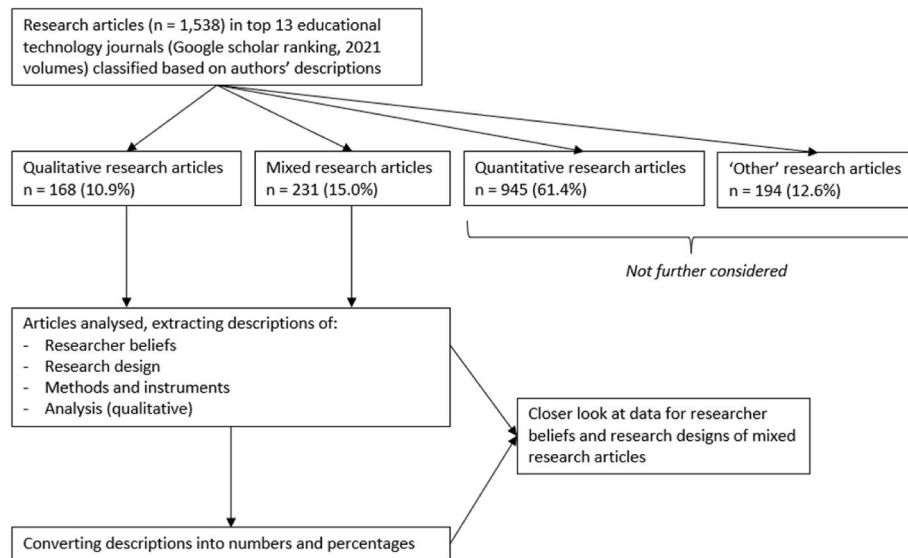


Fig. 1. Research steps.

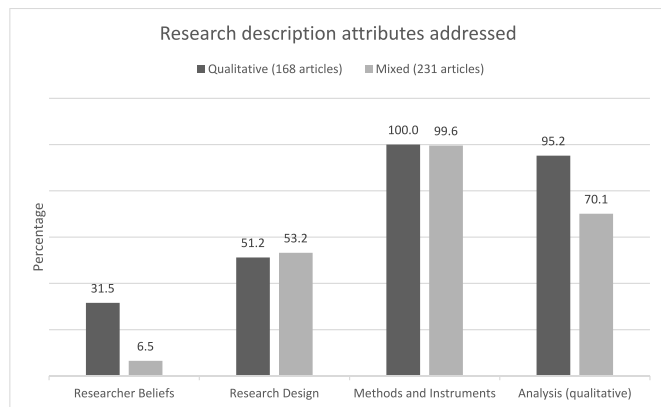


Fig. 2. Research description attributes addressed by qualitative/mixed articles.

additional notes to highlight entries to be reviewed or observations to be discussed.

After studying the data and clarifying details with my research assistant, I reflected on the next steps towards making sense of the data. This led to the following observations and simplifications.

- **Methodology and design levels:** Following the authors' use of terminology, we had recorded under methodology what the Twining et al. (2017) framework refers to as design (e.g., experimental study or design-based study) for many articles. I shifted those descriptions into the design column.
- **Theoretical stance and methodology:** Only few articles addressed either of those levels and hardly any addressed both. I combined the two levels and named the resulting attribute 'researcher beliefs'.

- **Methods and instruments:** All articles addressed at least one of those levels and most addressed both. Based on the close relationship between the two, I decided to combine into one attribute, named 'methods and instruments'.

Table 2 provides an overview of this simplified framework for the description of research approaches.

Based on the data collected for each article in our spreadsheets and rereading sections of most articles, I now undertook magnitude coding, applying judgement calls to decide if the research descriptions in the articles were sufficient to address each attribute. Ideally, I was looking for three components: key words or phrases naming an approach, supporting references, and an explanation of how the approach relates to the research. I was satisfied with short descriptions such as one or two informative sentences. For example, when authors wrote about conducting an 'exploratory mixed methods study' I was expecting an explanation on how the phases of data collection linked to the research objectives. In looking for references to the literature, I wanted more than a generic reference pointing to the advantages of mixed methods based on 'combining two approaches'.

I undertook descriptive coding for the mixed research articles with information on researcher beliefs and research designs. Attaching descriptive nouns such as 'constructivist' for the researcher beliefs or 'action research' for the research design facilitated the presentation of numeric overviews as identified as research technique in Onwuegbuzie et al. (2016).

As described in Aguinis et al. (2023) as characteristic of critical methodological literature reviews, our focus was not on assessing the quality of the articles examined or the strength, suitability or coherence of the research approaches described. Instead, we used our coding to understand the qualitative and mixed research approaches outlined, leading towards an assessment of the prevalence and rigour of qualitative work in the field of educational technology. Fig. 1 provides an overview of the research steps. The data collected are available at [link

Table 3
Combinations of research description attributes addressed.

Researcher Beliefs	Research Design	Methods and Instruments	Analysis (qualitative)	Qualitative n = 168 Number of articles (percentage)	Mixed research n = 231 Number of articles (percentage)
✓	✓	✓	✓	28 (16.7)	6 (2.6)
	✓	✓	✓	56 (33.3)	75 (32.5)
		✓	✓	55 (32.7)	77 (33.3)

Table 4
Researcher beliefs expressed in mixed research studies (n = 15).

Researcher belief	Number of articles
Constructivist	6
Interpretivist, hermeneutic, phenomenological (or combinations)	5
Ecological	3
Pragmatic	1

withheld for anonymous review].

5. Findings and discussion

My first research question asked to examine to what degree qualitative and mixed research articles provide comprehensive descriptions of their research approaches. The data highlight that there are serious gaps in the descriptions of researcher beliefs and research design (see Fig. 2). While about one-third of qualitative articles address researcher beliefs, this proportion is far lower for mixed research studies (6.5%). Nearly half of all studies, qualitative and mixed research, do not outline their research designs. This shows that educational technology research articles overall do not meet the expectations for comprehensive descriptions of research approaches despite calls made by authors such as Dahlberg et al. (2010), Reeves and Oh (2017), Twining et al. (2017), and McChesney (2021).

All articles inform about methods and/or instruments. It is surprising that some qualitative studies (4.8%) do not outline their data analysis approaches. Further, nearly one third of mixed research studies do not describe their qualitative analysis steps. Examples are studies that make a token effort in describing the coding of data, arrive at categories without explanation, or include participant quotes without any information on selection criteria. These studies accentuate the warnings of Fischer (2006), Hesse et al. (2019), and McChesney (2021) who warn of mixed research undertaken from a quantitative perspective without sufficient understanding and considerations of the qualitative components.

While the data presented in Fig. 2 focus on each of the attributes separately, Table 3 looks at the degree to which each article fulfils all or a combination of attributes. For example, the table shows that 16.7% of the qualitative and 2.6% of the mixed research articles provide complete descriptions of their research approaches, addressing all four attributes. Daniel and Harland (2017) found that only 2% of 444 empirical articles published in two leading higher education journals addressed ontological or epistemological underpinnings (in my research included in 'Researcher Beliefs', see Table 2). My figures might have been as low as those of Daniel and Harland had I not added methodology to the grouping. Wald et al. (2023) suggest that the method sections of qualitative research articles in higher education journals are largely descriptive and procedural without providing methodological or philosophical rationale. This is matched by my findings in the educational

Table 5
Research designs described for mixed research studies.

Research design	Number of articles (n = 120; number (percentage))
Mixed methods design	56 (46.7)
Quasi experimental, experimental	30 (30.0)
Case study	17 (14.2)
Design-based research	10 (8.3)
Action research	4 (3.3)
Other	3 (2.5)

A few studies named mixed methods design together with an additional design, e.g., design-based. These studies were recorded under the additional design category.

technology space for many of the qualitative and most of the mixed research articles looked at.

For examples of articles providing full descriptions of their research approaches, I draw on the three articles following an ecological approach (see Hellmich, 2021; Manca & Delfino, 2021; Song & Ma, 2021). It is telling that the average word length of these articles sits at about 9500 words – far higher than the limit of about 6000 words imposed by many journals.

Following my interest in qualitative research components and the quantitative focus of the nearly one third of mixed research articles that do not outline their qualitative analysis approaches, I decided to look more closely at the other two-thirds of the mixed research articles (70.1%, see Fig. 2). I focused on researcher beliefs and research design. I did not look further at methods and instruments, as data collection techniques and tools, such as surveys and interviews, can be used to collect both numerical and non-numerical data and are neither inherently qualitative nor quantitative (see Table 1).

The 15 articles with explicitly described researcher beliefs (see Figs. 2 and 6.5% of the 231 mixed research articles) wrote about constructivist, interpretivist, hermeneutic, phenomenological, ecological, and pragmatic perspectives (Table 4). All these researcher beliefs feature in *The SAGE Encyclopedia of Qualitative Research* (Given, 2008), indicating a research outlook based on or at least compatible with qualitative research. To estimate the overall share of qualitatively focused mixed research in articles without expressed researcher beliefs, I draw on numbers related to the qualitative research articles. There, 31.5% of authors expressed researcher beliefs (see Fig. 2). Assuming that qualitatively focused researchers will express their researcher beliefs equally often, regardless if writing mixed or qualitative research articles, about 20% of the mixed research articles will be of qualitative orientation (setting 6.5% in relation to 31.5%).

Nearly half of all 120 articles with stated research designs (see Figs. 2 and 53.2% of the 231 mixed research articles) use a mixed methods design (Table 5). There are numerous ways of combining and sequencing research phases in such design and without closer inspection it is not possible to talk about the strength of the qualitative components. With close to one third, the next biggest group features quasi experimental or experimental designs. While those studies can work with non-numerical data, their overarching strategies are likely quantitative (see Table 1). While case study and action research designs are open to all forms of data, techniques and tools, they are more associated with a qualitative approach (see Table 1). Design-based research studies feature characteristics of both quantitative and qualitative traditions (Hoadley & Campos, 2022). The distributions of research approaches presented in Table 5 remain largely unchanged when looking only at the articles that explain both design and qualitative analysis (see the first two lines in Table 3), with the exception of quasi/experimental design studies which are at 25% (20 articles, 5% less than in the larger sample). This means that 89 or close to 40% of the mixed research articles are likely of quantitative focus (the 20 articles of quasi/experimental design with qualitative analysis description plus the 69 articles without qualitative analysis description, see Figs. 2 and 29% of 231 articles).

The data cast doubt on the qualitative work done in a substantial proportion of the mixed research articles and are a reminder of the cautions expressed in the literature. Fig. 3 summarizes the interpretation of the data regarding the focus of the 231 mixed research articles analysed. The description (or lack thereof) of the research approaches of those articles suggests that 20% have a qualitative focus and 40% have a quantitative focus. For the remaining 40% no statement can be made based on the data collected.

Several authors highlight the need for a thorough description of the research approaches for mixed research (Dahlberg et al., 2010; McChesney, 2021; Plano Clark & Ivankova, 2016). McChesney (2021) argues that while qualitative and quantitative can be mixed within and across paradigms, it is essential that positions are acknowledged and allowed to impact on the research, followed by comprehensive and

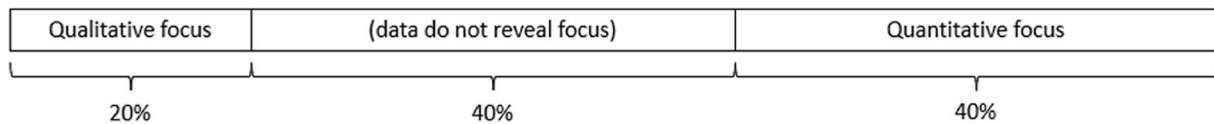


Fig. 3. Focus of mixed research articles.

meaningful reporting. This should translate into addressing all four research description attributes used in this study. Yet, less than 3% (Table 3, first line) of all mixed research articles ($n = 231$) address all four attributes, signifying that a very small group of mixed research studies have the potential to address the complex challenges education faces.

6. Conclusion

The aim of this research is to contribute to changes in educational technology publishing. While change requires a concerted effort of many, this research makes important contributions to facilitate such change. First, by examining the methodological rigour of qualitative and mixed research articles guided by a research-based framework, the research clearly identifies the methodological weakness of a large proportion of educational technology articles. This detailed investigation counters the relatively high numbers of qualitative research reported in previous reviews, often without critical examination of the methodological soundness of those studies, which previously could be used to deflect from the need for change. Second, the findings highlight the high number of mixed research articles that wrongfully claim qualitative study components yet often do no more than collect non-numeric data, analysed and presented from a quantitative mindset. Outing those studies is important to avoid any perception that the field of educational technology might already be rich in valuable mixed research studies of the kind asked for to address complex challenges. Third, the simplified framework for the description of research approaches (see Table 2) provides a new tool. It navigates the terminological complexities inherent in working across belief systems and research domains. The simplified framework can be used by editors to outline their expectations for the requirements in research descriptions, accessible to prospective authors from a wide variety of backgrounds.

The approach of following the steps of a critical methodological literature review, clearly outlining the coding approach, and studying a substantial number of articles from a considerable number of highly ranked journals, provides a strong basis for understanding the methodological rigour in the field of educational technology. While there are other frameworks, building on Twining et al. (2017) was greatly relevant. Published in *Computers and Education*, a highly ranked educational technology journal, using this framework ensures a strong fit with the area under examination. Compressing the framework to only four attributes proved valuable in terms of mapping the wide array of terminology used to describe research while still providing a comprehensive picture of the aspects of research descriptions in the field. Extending the attribute and magnitude coding applied to all qualitative and mixed research articles by descriptive coding for the mixed research articles provided additional insights regarding quantitative versus qualitative focus.

The field of research methodology is complex. Involving more than two researchers would have strengthened the research by bringing in more backgrounds and perspectives, allowing for more rigorous discussions of the many decisions that had to be made in coding the articles. Providing the research data allows other to build on the work. A critical methodological literature review focuses on looking for the presence/absence of description aspects. This means that the research did not assess the quality of descriptions and did not look the coherence across the different sections of an article. This approach was appropriate for highlighting the large number of missing aspects of research

descriptions. Future research should focus on the quality and coherence of the articles with full sets of research descriptions, moving away from a deficit approach to one that would be able to showcase methodologically strong articles. Such work could extend what this research addressed only briefly by looking at the word counts of articles, suggesting that full descriptions require more space than typically allowed.

My call for action is directed at educational technology journal editors who as gatekeepers not only control what is published but also influence how research is conducted. Editors can ensure that qualitative and mixed research articles accepted for publication clearly address researcher beliefs and research designs and their impact on data collection and analysis. Journals need to update their guidelines to authors and my simplified framework could be a suitable tool to communicate requirements. Asking for more in terms of research descriptions will require reconsideration of article length or adoption of new publishing approaches, splitting conceptualization and research implementation across follow-up articles. Editorial teams need to work with their reviewer communities to discuss updated requirements.

A recent special issue on innovative applications and future directions (Knappertsbusch et al., 2023) provides theory and examples of studies for advances in mixing research approaches. The handbook by Gobo et al. (2022) outlines considerations for mixing on epistemology and methodology levels. I would welcome a special issue on mixed research studies in educational technology, focussed on articles bringing researchers from different substantive areas and belief systems together. Regardless of terminological preferences – ‘mixed paradigms’ as suggested by Given (2017), ‘merged methods’ by Gobo (2023) or arguing against paradigms like Kelle and Reith (2023) – articles should lay open backgrounds, implications, and opportunities, conceptualizing new studies capable of addressing the complex challenges educational technology aim to address.

Availability of data and materials

The datasets are available at: Heinrich, Eva; Lewis, Evelyn (2024), “QualMixedResearchArticleMethodsData”, Mendeley Data, V1, doi: <https://doi.org/10.17632/3zm6hmt9mv.1>

CRedit authorship contribution statement

Eva Heinrich: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Top 13 educational technology journals (Google scholar ranking October 2022) and the number of articles published in 2021 vol (please note that this is different from looking at articles published in 2021, e.g., some articles are pre-published online in 2021 but allocated to 2022 vol).

Journal	Number of Articles in 2021 vol
Computers & Education	187
British Journal of Educational Technology	128
Education and Information Technologies	340
Educational Technology Research and Development	125
International Journal of Educational Technology in Higher Education	65
International Review of Research in Open and Distributed Learning	44
International Journal of Instruction	240
Journal of Educational Technology & Society	64
Interactive Learning Environments	87
The Internet and Higher Education	28
Computer Assisted Language Learning	46
Journal of Computer Assisted Learning	117
Australasian Journal of Educational Technology	67
Summary	1538

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