Understanding quality characteristics of EdTech interventions and implementation for disadvantaged pupils

Supplementary coding and data extraction tool for a systematic review with meta-analysis:

This tool is designed to be used alongside the EEF's existing data extraction tools.

May 2024

Contents

Instructions

For a full overview of this project and the methodology, please refer to the published protocol (↑Haßler et al., 2024).

This tool is designed to be used in combination with the EEF's existing MDE and ESDE tools. This supplementary tool should be completed after the MDE tool.

Please carefully follow the suggested actions for each question.

Step 1. Disadvantage

No.	Question	Checkboxes	Definitions	Actions
1a	Which groups of disadvantage does the research identify?	● Low economic status	Students experiencing financial hardship and limited access to resources and opportunities. This could also be referred to as free-school meals (FSM) or pupil premium (PP) in the UK.	**TICK** all relevant coding checkboxes. If 'other' is selected, please write it into the textbox. **HIGHLIGHT** relevant information in the text
		● Under the care of a local authority/care leaver	Students who are under the care of a local authority, or previously under the care of a local authority. This may include foster children, children who have been adopted, or children who live in a residential care home.	
		● Special Educational Needs and Disabilities	Students who require additional support or accommodations due to physical, cognitive, emotional, or behavioural needs that may impact their learning.	

		● Roma	Students who identify as Roma.	
		● Traveller of Irish Heritage	Students who identify as travellers.	
		● Black Caribbean	Students who identify as Black Caribbean.	
		● Low-performing local authority	Students who attend school in a low-performing local authority (as explicitly stated in the research).	
		● Other	Please specify in textbox	
		● No information		
1b	What is the proportion of children under the care of a local authority in the sample?	● Percentage of children under the care of a local authority	Please add the percentage of pupils in the sample who are under the care of a local authority. *This information must only contain the percentage for the overall sample (only numerical digits, no symbols e.g. %).*	
		● Further information about children under care in the study sample	Please highlight any details provided in the study about the children under the care of a local authority that are involved in the research.	

		● No children under the care of a local authority in the sample	Select this option if there is no information about children under the care of a local authority in the sample.	

Step 2. Educational technology and pedagogy

No.	Question	Checkboxes	Actions	Example
2a	What technological hardware does the intervention use?	● Assistive devices for SEND ● CD/DVD ● Computer ● E-book hardware e.g. Kindle ● Handheld device ● Interactive whiteboards ● Internet ● Laptops ● Mobile/smartphone ● Multimedia (one or more) ● Radio	**TICK** the relevant coding check box(es). If 'other', you should type text information into the relevant box.	

		- Tablet - Touch-screen - TV - Other (text) - No mention		
2b	What type of technological software does the intervention use?	- Audio books - Augmented reality - Building blocks - Clicker-integrated instruction - Computer algebra systems - Computer-assisted instruction (CAI) - Computer-based teaching (CBT) - Digital media (audiovisual) - Dynamic geometry software - E-book software - Game learning - General apps - Graphic organisers/ visualisations	**TICK** the relevant coding check box(es). If 'other', you should type text information into the relevant box.	

		- Intelligent tutoring - Learning management systems (LMS) - Robotics - Serious games - Simulations - Tutorials - Virtual manipulatives - Virtual reality - Word processor - Other (text) - None - No mention		
2c	What learning approach did the intervention utilise/focus on?	- Blended learning - Classroom learning - Remote learning - Homework - Other (text) - None - Not clear/not mentioned	**TICK** the relevant coding check box(es). If 'other', you should type text information into the relevant box.	
2d	What teacher pedagogy is used in the intervention?	- Collaboration - Feedback	**TICK** the relevant coding check box(es). If 'other', you should type text information into the relevant box.	

	● Flipped classroom ● Game-based learning ● Group learning ● Individualised ● Peer learning ● Project-based learning ● Scaffolding ● Self-paced (no teacher) ● Other (text) ● None ● Not clear/not mentioned	

Step 3. Mechanisms and barriers

No.	Question	Definitions	Actions	Example(s)
3a	What mechanisms can be identified in the intervention?	Mechanisms are the *"entities and activities organised in such a way that they are responsible for the phenomenon".* The "phenomenon" that our study is concerned with is improved student attainment. The	**HIGHLIGHT** the relevant text and write a phrase in the textbox to reflect each mechanism that you have highlighted. Try to include any explanation about the mechanism in your	Text: "Overall, these findings indicate that tablet technology can provide a form of individualised effective support for early maths development, when software is age appropriate and grounded in a well-designed curriculum. Apps that incorporate repetitive and interactive features might help to reduce cognitive task demands, which could be particularly beneficial to low-achievers and could

		"entities and activities" of mechanisms refer to the inputs that characterise the use and implementation of EdTech. The entities could include the software or hardware utilised as part of an EdTech intervention, as they are tangible tools that contribute to the implementation. Activities would include any practices, behaviours, or other activities that are employed that contribute to improved student attainment	highlighting.	help to close the gap in early maths attainment from the start of primary school." (↑Outhwaite et al., 2017) Phrase: Repetitive and interactive app features reduce cognitive load so that low-achievers' math attainment improves Text: For this specific population (low-proficiency ELs), ==educational technology affords personalized instruction that gives students more opportunities for speaking practice and allows students to proceed at their own pace==. (↑Harper et al., 2021) Phrase: Personalised instruction for low-proficiency ELs encourages speaking practice and individualised pacing. Additionally, ==frequent automated feedback on speaking accuracy allows students to practice speaking without fear of social embarrassment and gauge their own progress. Thus, in this context, technology may provide a low-anxiety learning environment== and lead to a subsequent willingness to participate more in English in the classroom. (↑Harper et al., 2021) Phrase: Automated accuracy feedback reduces

				anxiety and promotes self-assessment, enhancing participation and proficiency.
3b	Were any barriers to the implementation or continued implementation of the intervention identified in the study?	• Yes - please follow instructions • No Barriers broadly refer to any factors mentioned by the authors of the study that hinder the implementation of EdTech interventions. It does not refer to limitations of the study itself.	**If yes, HIGHLIGHT** the relevant text and write a word/phrase in the textbox to reflect each barrier that you have highlighted.	"For instance, in a large sample study, previous research has presented some misconceptions and negative perceptions related to the AI-nature of AI-EdTech (Cukurova et al., 2020). Moreover, ==research in other domains confirms that human forecasters quickly lose trust in automated recommendation systems after seeing that they make a mistake==, while they are more tolerant of the same mistake made by a human (Dietvorst et al., 2015). This phenomenon is called Algorithm Aversion (Dietvorst et al., 2015) and manifests itself also in educational settings. ==More specific to teachers, it was shown that they may expect automated recommendations to be fully compliant with their own opinion and perceive the recommendation worthless in the case of any disagreement.==" (↑Nazaretsky et al., 2022). Keyword/phrases: Mistrust in automation; perception of tech as unhelpful "Though they are positive as they discuss access, interview respondents also suggest some reasons why a lack of access to technology tools and

			resources could continue to be a barrier. <mark>Respondents from both small and large school districts and communities suggested that a lack of finances could affect access.</mark> One interview respondent from a large district and community shared her frustration, "No [technology access is not available] and the reason is because of funding to our district. I do not feel as though it is a school decision, I feel like that comes from the district." (↥M Francom, 2016). Keyword/phrases: Lack of finances

Step 4: Intermediate outcomes

No.	Question	Checkboxes	Actions	Examples
4a	Have any relevant intermediate outcomes been evaluated alongside attainment outcomes?	● Yes 　　● Pupil attitudes 　　● Engagement 　　● Motivation 　　● Participation 　　● Attendance 　　● Other (text) ● No	**TICK** the relevant coding check box(es). If 'other', you should type text information into the relevant box.	

If the answer to question 4a is 'Yes', the intermediate outcomes will be data extracted from the paper using the same questions used for extracting primary outcome data/effect sizes in the Effect Size Data Extraction tool. We will replicate the relevant sections of the tool in EPPI. We will only extract for intermediate effect sizes once we have determined that a paper will be included in the meta-analysis, to avoid wasting time and resources.			

Step 5: Study transparency

No.	Question	Checkboxes	Actions	Examples
5a	Were any methodological limitations reported in the study?	● Yes ● No	**HIGHLIGHT** the relevant text.	"Whilst this study provides proof of concept for the efficacy of the maths tablet intervention, there are two key limitations. First, the experimental maths assessments were delivered using the same tablet technology format as the maths intervention and the content of the curriculum knowledge assessment included the same characters and layout as the intervention materials. Therefore, the observed learning gains could be attributed, in part, to pupils' familiarity with the intervention materials." (⬆Outhwaite et al., 2017) Keyword/phrases: Potential familiarity bias

Step 6: Additional information

No.	Question	Checkboxes	Actions	Example
6a	Any other relevant information or comments about the study?	● Open text box	**WRITE** in the text box any additional comments that you think would be useful to the study that have not already been covered by the coding tools.	
6b	Is there a need to contact the authors? (i.e. missing data or additional statistics needed?)	● Yes - textbox ● No	**TICK** the answer and **WRITE** in the textbox what information you would suggest that we request from the study authors.	"The authors mentioned that there was qualitative data collected around the mechanisms but not analysed so it would be helpful to request this."

Bibliography

This bibliography is available digitally in our evidence library at
https://docs.opendeved.net/lib/G5P9ZNRI

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