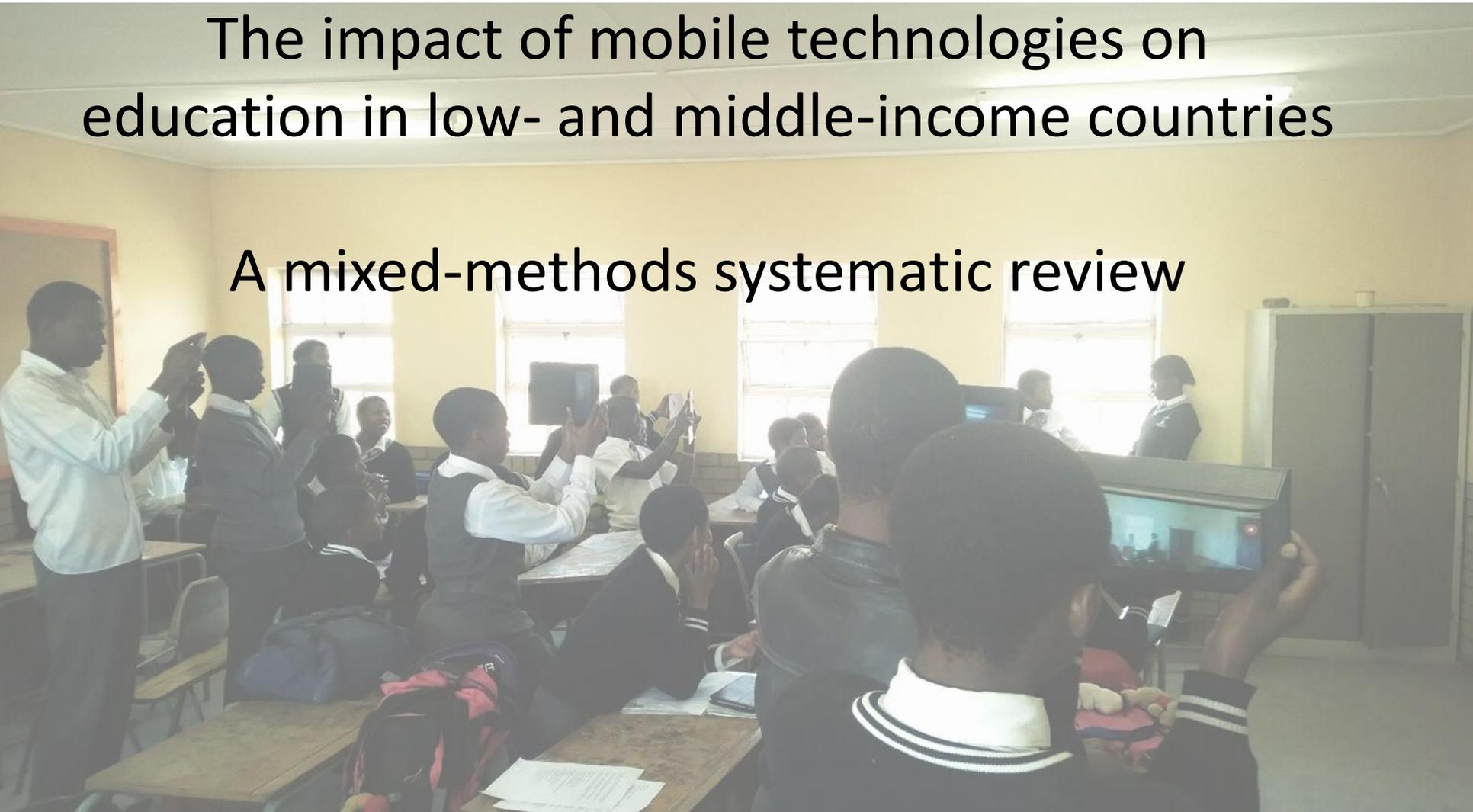


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The impact of mobile technologies on education in low- and middle-income countries

A mixed-methods systematic review

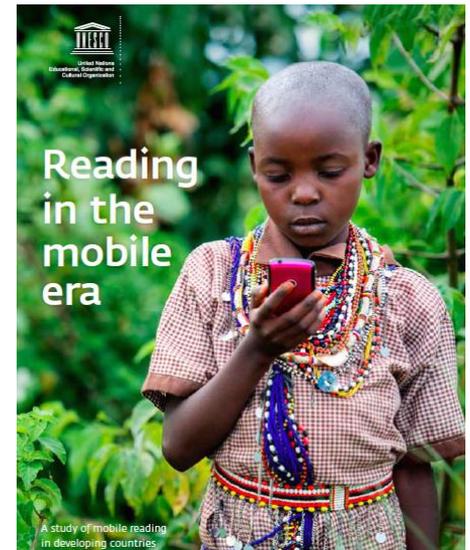


Laurenz Langer, Ruth Stewart, Niall Winters

The promise of mobile learning

‘A revolution in reading is upon us thanks to the massive proliferation of mobile technology (...)’ (UNESCO 2014: 83)

→ Systematic review to assess this claim



Objectives

1) Investigate whether mobile technologies are effective as an intervention to improve education in LMICs

2) Explore the applicability of mixed-methods systematic reviews as an approach to research synthesis in international development



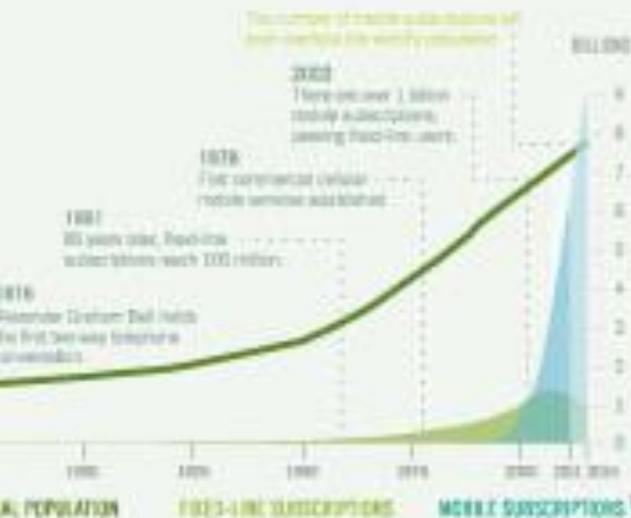
Why is mobile learning important?



- Access to education
- Quality of education
 - Empowerment
 - EMIS

The context

THE PAGE AT WHICH MOBILE PHONES SPREAD GLOBALLY IS UNMATCHED IN THE HISTORY OF TECHNOLOGY



OVER
6 BILLION
MOBILE SUBSCRIPTIONS
WORLDWIDE

75% of the
WORLD
NOW HAS ACCESS
to a MOBILE PHONE



PERCENT OF THE WORLD'S POPULATION
WITH MOBILE CELL SIGNAL*

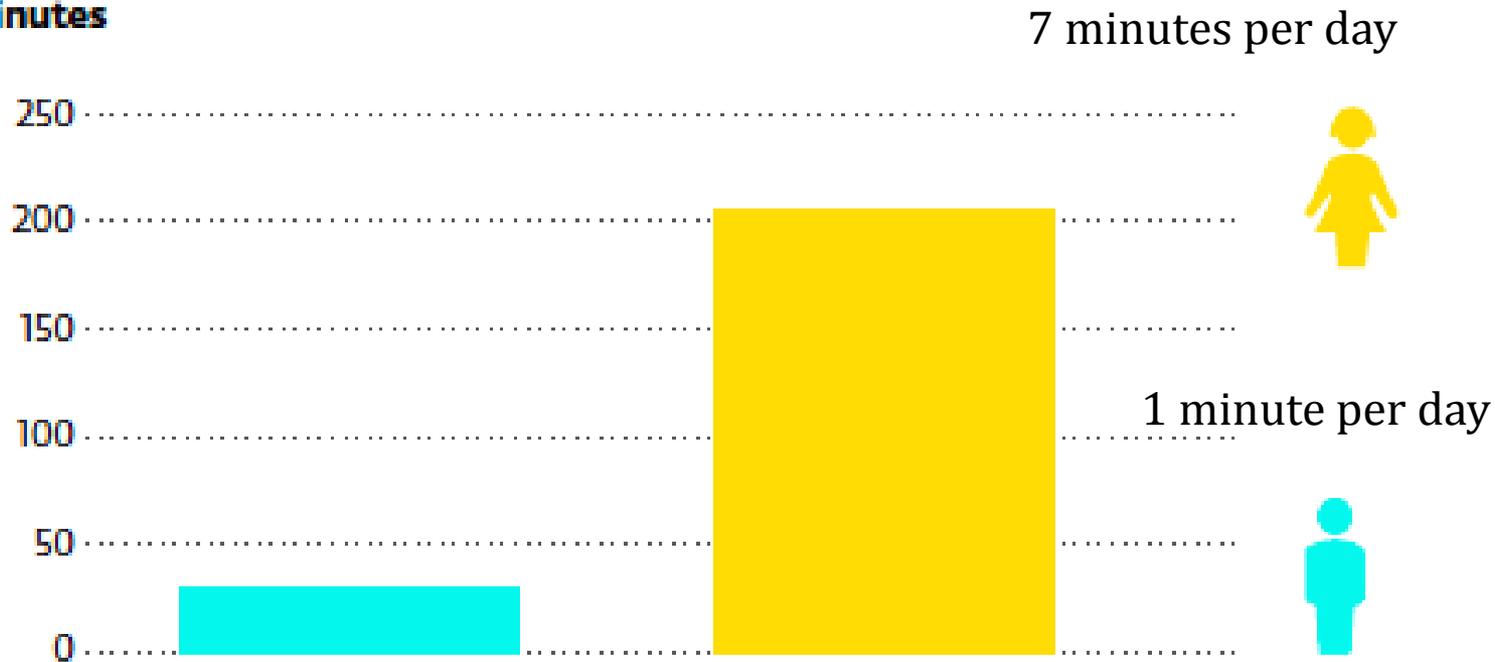
ACCESS TO A RANGE OF MOBILE APPLICATIONS HAS INCREASED DRAMATICALLY THROUGHOUT THE LAST DECADE

The evidence? (1)

FIGURE 6

Time spent reading per month by minute

Minutes



(UNESCO 2014: 30)

The evidence? (2)

- Endogenous up-take of mobiles
- Rigorous experimentation

Aker RCT in Niger

(ES*: 0.18)

[0.125-0.236]

Kaleebu in Papua New-Guinea

(ES*: 0.154)

[0.066-0.242]



Rationale for research synthesis

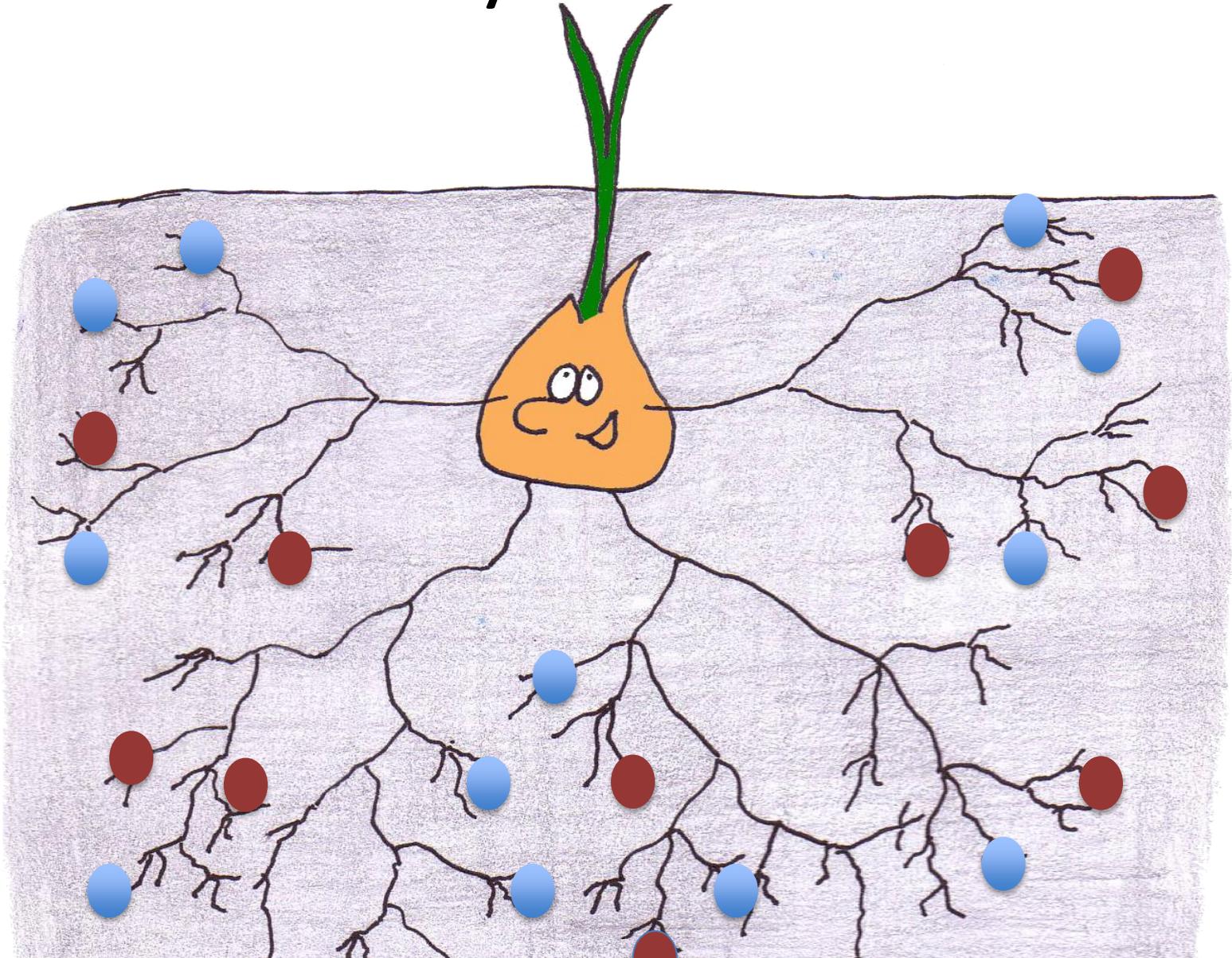
- Conflicting messages from primary research evidence
- No clear overall picture emerges

→ Systematic review of research evidence

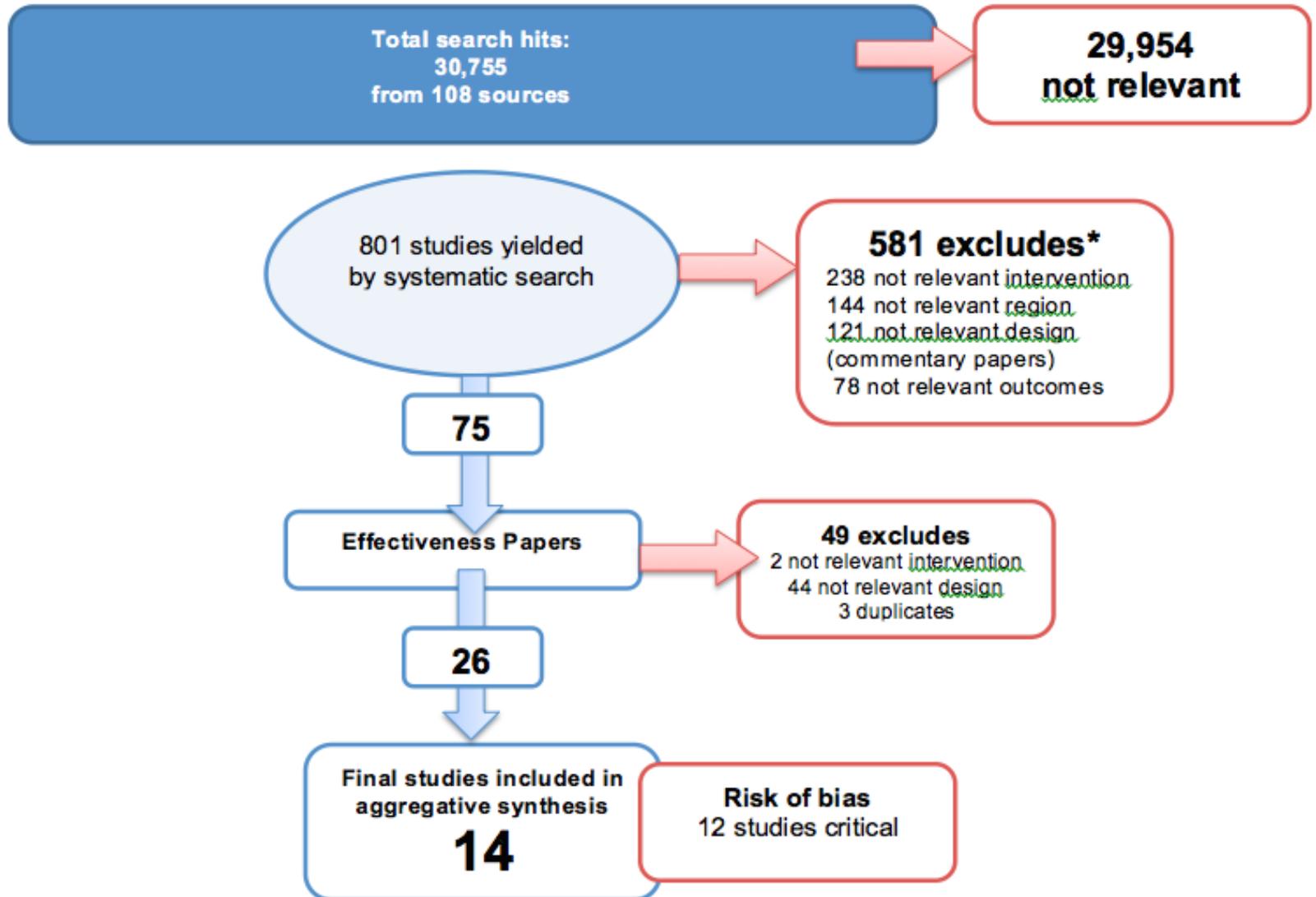
→ Answer question of 'what works'



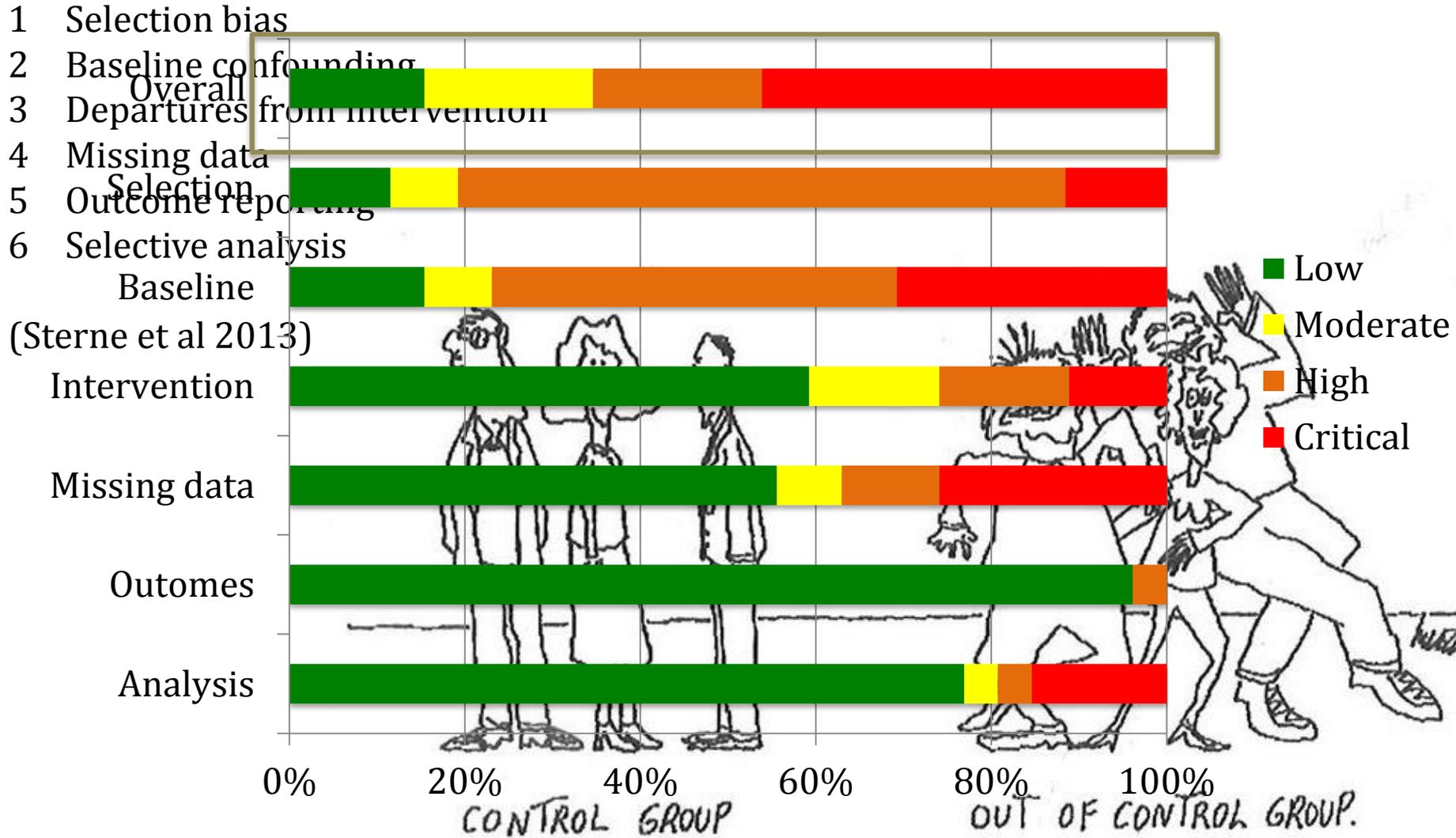
What is a systematic review?



Searching for studies



Risk of bias



Synthesis Analysis

Aker (2010)

Chen (2010)

Cole (2012)

Kaleebu (2010)

Kumar (2013)

Lai (2007)

Liu (2008)

Liu (2009)

Lu (2008)

Sung (2013)

Yang (2013)

Zurita (2004)

TOTAL:

0.154 (0.000, 0.242)
0.539 (0.124, 0.954)
1.074 (0.616, 1.532)
0.85 (-0.124, 1.424)
0.616 (0.000, 1.232)

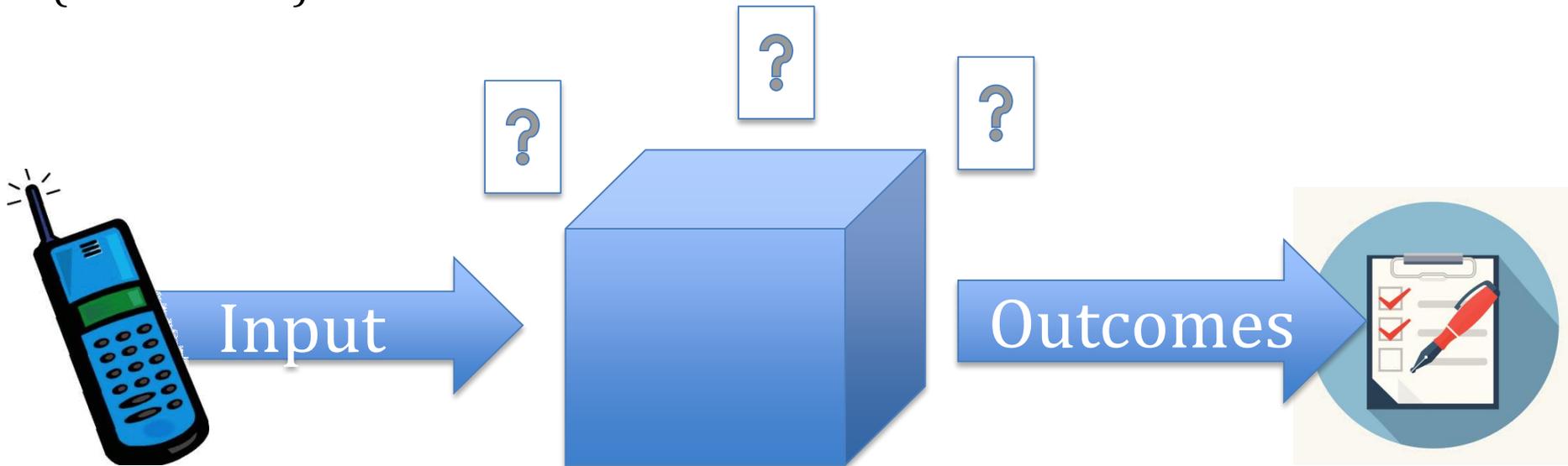
0.8 2 2.2

Mobile learning in LMICs

Does this help policy-making?

- Need to unpack the 'black box'

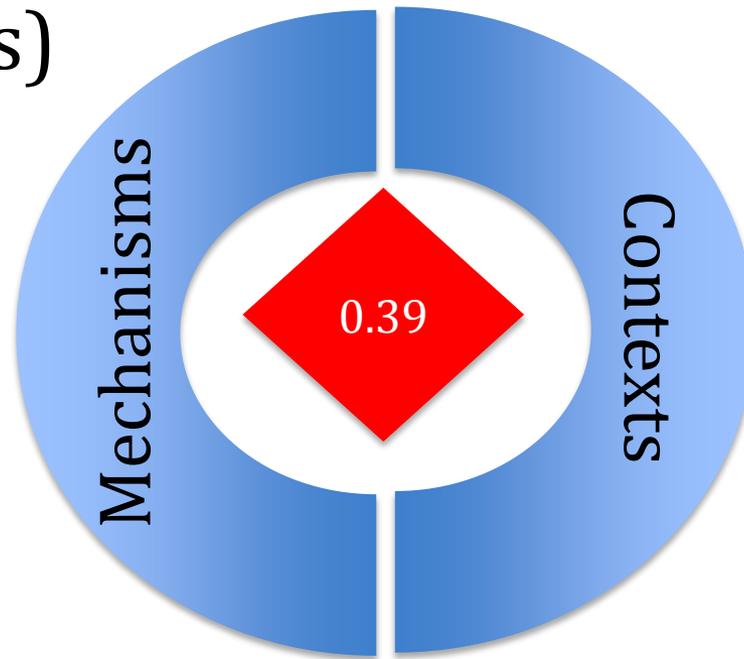
(White 2009)



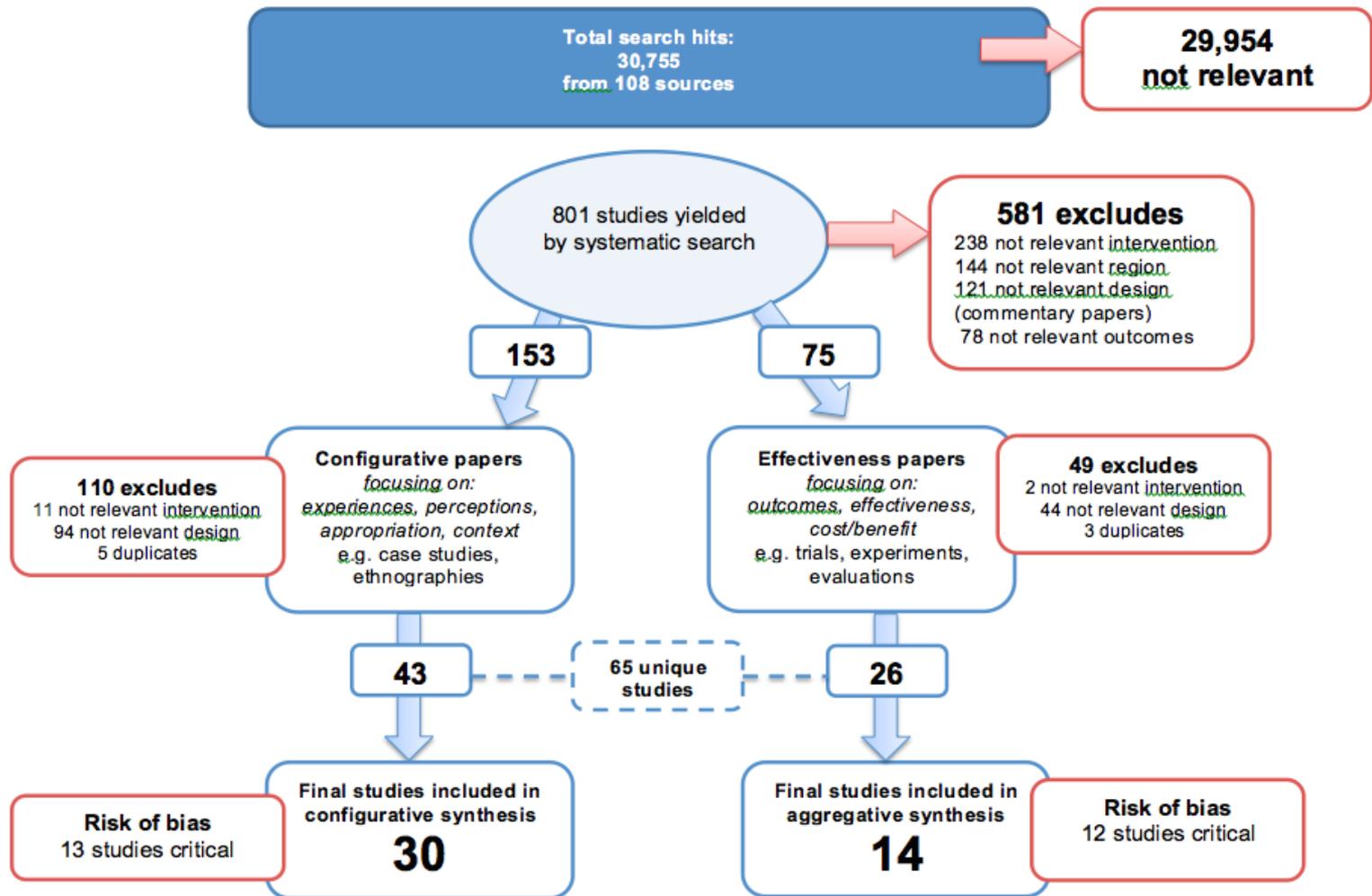
Need for different type of evidence

- Mixed-methods: Add qualitative evidence on mechanisms and contexts (includes perceptions)

(Pawson 2006)



Full search diagram



Critical appraisal

- Controversial in qualitative research

- 1 Research is defensible in design
- 2 Research features an appropriate sample
- 3 Research is rigorous in conduct
- 4 Research claim is credible
- 5 Research attends to contexts
- 6 Research is reflexive



Thematic Synthesis (1)

Document details

Auto advance Hotkeys

Citation details Text document Reference Search Coding record Linked records PDF

Current Code: **Has the learning experience/practice been altered?** 100% Find

- Administration
- Intervention
- Outcomes
- Contextual information
- Critical Appraisal
- Findings
 - Effectiveness Info
 - Configurative Info
 - Findings (face value) Info
 - Was the tech feasible? (hardware/software)
 - How has tech been received as an educational tool? (describe and tick)
 - Is there evidence of teachers/learners appropriating the tech to their context?
 - Describe new educational situation? Consider the following: Info
 - Has the teacher/pupil ratio been affected? (describe) Info
 - Has the material/pupil ratio been affected? Info
 - Has the educational approach been affected? (describe) Info
 - Has the teacher/learner interaction been affected? (describe) Info
 - Has the learning experience/practice been altered? and how? (specify)
 - Ownership/Independence of learning process Info
 - Access to more information Info
 - Ad-hoc/rapid/instant access Info
 - More motivation/fun/passion etc? Info
 - More efficient? (quicker, better organised, etc) Info
 - Deeper learning? (retention/understanding of concepts/etc) Info
 - More collaborative? Info

- Reading aloud method to test the reading ability and fluency of students
- Discussion method to promote active participation
- Child centered method in which a student leads the class rather than the teacher
- Group method in which students work together and help each other
- Competition method. For example students competed to find the meanings of words in a particular e-book
- Indicating locations on the chalkboard so that students' can follow along more easily

Encouraging Student Participation. Teachers also praised the e-reader for helping students to contribute to class discussions. Since students had direct access to information, students took turns acting as the "teacher" by standing in front of the class and sharing what they learned from reading assignments. Such participatory lessons engaged students, increased retention of concepts, and built their self-confidence. Several students in focus group discussions expressed that e-readers made their classes more interesting and educational, particularly English classes. Teachers also observed that the e-reader helped students understand the importance of supporting their ideas with specific facts and evidence. Before they had access to the e-reader, students were able to conduct research and cite the source of their information.

Facilitating Learning at Home. Teachers also added that with the advent of the e-reader, they could cover the syllabus faster and more in-depth than previous years. Since students were familiar with topics, making it easier and faster for teachers to prepare for classes, they were familiar with topics, making it easier and faster for teachers to explain concepts. Furthermore, teachers encouraged students to refer to their e-reader textbooks when they were at home reviewing their class notes, so that if students came to concepts they did not remember well, they could read the textbook's explanation.

Teachers also noted the following challenges associated with incorporating e-books into the classroom:

Distraction. In primary classrooms in particular, teachers noted that making sure all of the young students were on the right page in an e-book could be time consuming. At all grade levels, a very common complaint was that students spent too much time using the e-reader for entertainment purposes such as listening to music. One teacher mentioned that during class

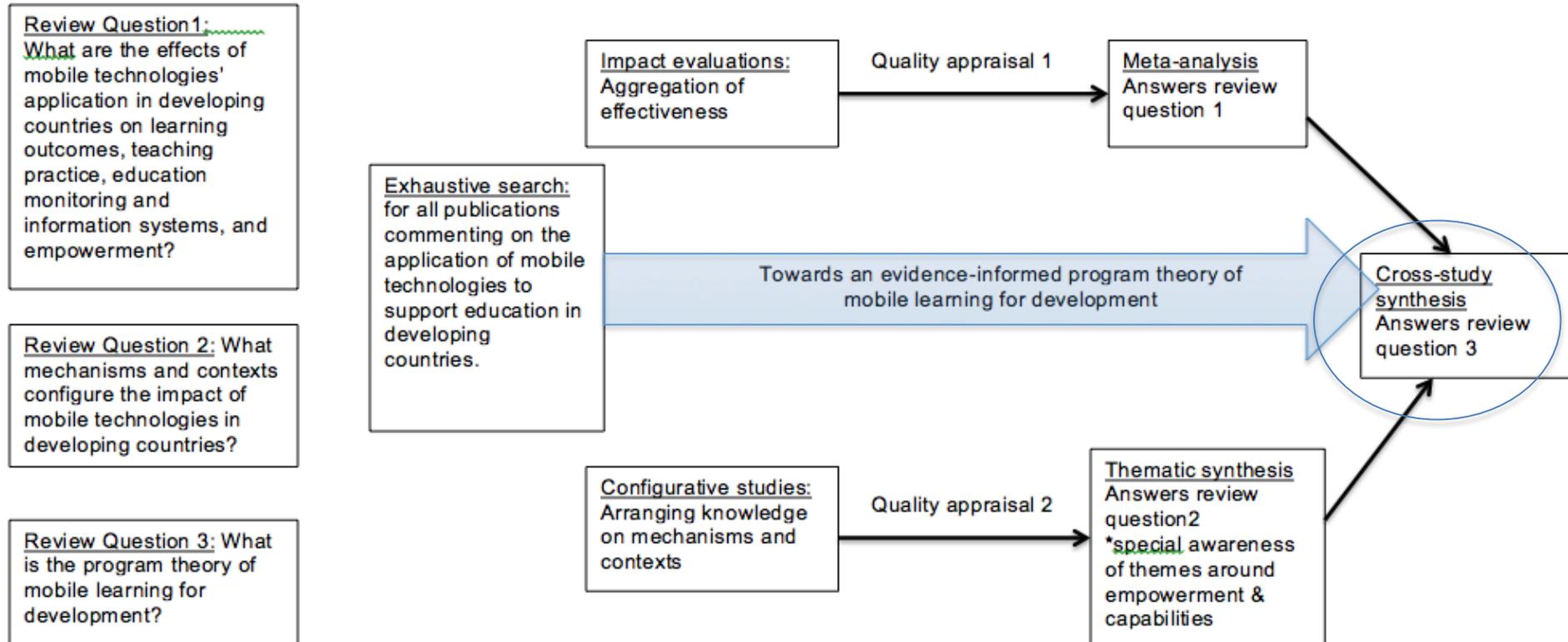
Thematic synthesis (2)

Key findings:

Contexts	Mechanisms
Mobile technology as an educational tool is acceptable to teachers, learners and parents	Teachers to receive technology first, and to control implementation (ideally in teacher training)
Mobiles intrinsically associated with professionalism, and higher perceptions of schools/teachers using devices	Mastery of technology large motivation for learning with technology as source of pride, confidence, self-efficiency
Rapid acquisition of device literacies	Intrinsic economic motivation to use mobile phones
Need for integration in national curriculum	Extension of learning to informal contexts leads to more but not different learning
Beneficiaries rarely spend as much time with devices as assumed by programme design	Change towards more student-centered learning grounded in practical benefits rather than embedded in pedagogy

A framework for mixed-methods reviews in international development

AGGREGATIVE REVIEW APPROACH



CONFIGURATIVE REVIEW APPROACH

Implications for practice

Key review findings:

- ☑ Mobile technologies are an effective tool to support education in LMICs
- ☑ Mobile technologies are accepted by learners, teachers, and parents to support educational
- ☑ Interventions introducing mobile technologies in the educational process should target at and be controlled by teachers

Implications for research

- ☑ Mixed-methods approach adds value in research synthesis and mitigates risks of empty reviews
- ☑ Mixed-methods reviews are of particular relevance in international development as lots of qualitative evidence and limited (reliable) quantitative evidence

Some thoughts on SR & GlobalDev

- Needs exceed resources
- No systematic knowledge of what works
(often what works is resource-intensive)
- Highly context-dependent interventions
- Policy-based evidence

→ Mixed-methods reviews proposed as an effective approach to inform policy-makers with reliable research evidence of 'what works and why'

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Thank you very much!

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