A Systematic Review of Evidence on the Best Ways to Disseminate Research Evidence to Teachers

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This paper aims to present a systematic review of the best ways to disseminate research evidence to teachers. The study intentionally adopted a comprehensive search and broad inclusion criteria and identified 68,308 records published between 2000 and 2019 through a primary search consisting of some main databases such as British Education Index (BEI), Applied Social Sciences Index and Abstracts (ASSIA), Educational Resources Information Center (ERIC) and PsychINFO, and complementary search. After the screening, 25 studies were included in the synthesis, most of which were weak in terms of providing robust evidence. However, the study found that simply disseminating research evidence in a passive way like sending evidence-based materials to teachers via email was insufficient to get evidence into use. This review concludes that more research, particularly more large-scale randomised controlled trials (RCTs), on this topic needs to be undertaken to provide robust evidence on dissemination approaches.

Keywords: knowledge transfer; use of research evidence; dissemination of research; systematic review

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Introduction

Evidence-based practice (EBP) as a movement emerged in medicine in the 1990s and has considerably affected other fields, particularly education (Hammersley, 2001). This movement has gained growing interest over the past few decades, and now it is considered an international movement in education (Siddiqui, 2020). However, although evidence is a term frequently used in the literature, there is not yet any consensus about what counts as evidence (Sohn, 2017). Hence, it is necessary here to clarify exactly what is meant by the term evidence in the paper. Although researchers overwhelmingly accept that the term evidence refers to evidence derived from research (Sohn, 2017; Tseng, 2012), practitioners and policymakers are inclined to use a "wide spectrum of evidence" that may be based on opinions such as "public consultations" (Sohn, 2017, p.17). To avoid any possibility of confusion, this paper will therefore use the term research evidence to refer to evidence derived from research which is information collected by employing a variety of methods (Nutley et al., 2013; Sohn, 2017), and provides consistent findings widely accepted (Cooper & Levin, 2010).

Today, using research evidence in education is considered an essential factor, positively contributing to student achievement (Cook & Odom, 2013), which has led to growing emphasis on using research evidence in schools (Scott & McNeish, 2013). Specifically, using evidence in practice mainly contributes to organisational decision-making and teaching strategies adopted by teachers, showing what works in a particular context (Scott & McNeish, 2013). Although research evidence does not always directly improve schools in all circumstances, it can show what does not work, which is crucial to avoid applying ineffective strategies, wasting money and time (Gorard, 2020).

In the UK, the use of research evidence in schools is being encouraged to improve teaching quality, ultimately, students' learning outcomes (See et al., 2016). Teachers are expected to utilise research evidence in developing teaching strategies to be applied in the classroom (See et al., 2016). This has resulted in attempts to generate more robust evidence (Gorard et al., 2020), to facilitate the use of such evidence by users (See et al., 2016), and to make decisions about teaching approaches and strategies based on such evidence (Hollands et al., 2019).

Although what counts as good or robust evidence is controversial, most evidence-based models tend to accept that the best evidence is the one derived from high-quality research (Sohn, 2017), particularly employing well-designed meta-analysis, systematic review and randomised controlled trials (RCTs) (Bagshaw & Bellomo, 2003; Petticrew & Roberts, 2003). Consequently, many initiatives have been made to generate and disseminate research evidence such as the What Works Clearinghouse (WWC), the American Institutes for Research (AIR, www.air.org), the Evidence for Policy and Practice Information and Coordinating Centre (the EPPI-Centre), and the Education Endowment Foundation (EEF). Although many initiatives have been made to promote the use of research evidence by users (See et al., 2016), and even though there has been notable progress in conducting robust evaluations and generating more secure evidence (Gorard et al., 2020), the use of research evidence in schools is still limited (Dagenais et al., 2012; Segedin, 2017; Walker et al., 2019). For this reason, the issue of dissemination of research evidence has received considerable critical attention.

Now, there is a growing interest in effectively disseminating research evidence to facilitate the use of research evidence by teachers. Hence, there have been initiatives to summarise the existing research evidence and disseminate it better to get evidence into use. A notable example of this is the EEF (Education Endowment Foundation) pupil premium toolkit summarising research evidence with estimates of the impact, the strength of the evidence, and cost (See et al., 2016). However, although there has been significant progress in generating research evidence in some areas of the EBP movement, very little attention has been paid to generating good evidence on the effectiveness of dissemination methods (Gorard et al., 2020). Therefore, to contribute to the literature, the researcher's own doctoral research project attempted to review the existing evidence on the most effective ways of disseminating research evidence to teachers, which is the focus in this paper, and to evaluate a promising dissemination route in practice based on this review. In accordance with the purpose of the study, the research question addressed in this paper is:

What is the existing evidence on the most effective ways of disseminating research evidence to teachers?

Methodology

A systematic review was carried out to address the research question. A systematic review identifies the existing evidence regarding a specific topic by applying explicit methods, making

it more rigorous than the traditional review (Torgerson, 2003). In conducting the review, the researcher has benefited from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (PRISMA, n.d), books on systematic review (Gough et al., 2017; Torgerson, 2003), and researchers' views in this field.

Searching

The relevant literature was reviewed to identify the first keywords and understand how to use these words together to create search strings. On deciding on the initial search string, it was then tested in various databases and improved for each of them. Primarily, known studies were used to test the search, and this required adding new terms and using the 'Near' operator to broaden the search, which increased the number of records. Furthermore, using common keywords such as 'research,' 'evidence' and 'use' led to an inclusive search. In order to find as many relevant studies as possible, an inclusive search was intentionally adopted. One of the search strings developed after a series of improvements and tests can be seen in Table 1.

Table 1 - *Search string developed for ERIC*

((“Research knowledge” OR evidence) N/2 (use OR used OR using OR utilis* OR utiliz* OR uptak* OR transf* OR translat* OR modif* OR engag* OR summar* OR access* OR disseminat* OR mobilis* OR mobiliz* OR implement* OR present* OR bring* OR push* OR shar*)) OR (research N/1 (use OR used OR using OR utilis* OR utiliz* OR transf* OR translat* OR disseminat*)) OR (“evidence into practice” OR “research into practice”)
AND
facilitate* OR improv* OR promot* OR increas* OR develop* OR support* OR effective* OR better OR best OR strateg* OR pathway* OR intervention
AND
education OR school* OR college* OR classroom* OR teach* OR learn* OR educator* OR student* OR children OR pupil* OR achieve* OR attainment OR exam* OR attendance
NOT
health* OR dent* OR medic* OR nurses OR nursing OR clinic*

The studies were identified through primary and complementary searches. The primary search consisted of 10 main electronic databases and Google Scholar. The databases searched were as

follows: Applied Social Sciences Index and Abstracts (ASSIA), Australian Education Index (AEI), British Education Index (BEI), Educational Resources Information Center (ERIC), International Bibliography of the Social Sciences (IBSS), PsychINFO, ProQuest Dissertations & Theses Global, Scopus, Social Services Abstracts (SSA), and Social Science Citation Index (SSCI). As for the complementary search, a series of efforts were made to identify a wide range of both published and unpublished studies, such as contacting researchers and experts via email, citation tracking, searching journals and websites, and adding studies already found from previous work in the field. All searches for the 11 databases were undertaken by the author in February 2019, identifying 67,071 records. The number of records found from each database is shown in Table 2.

Table 2 - *Number of records found in each database*

	Databases / Search Engine	Number of hits
1	Applied Social Sciences Index and Abstracts - ASSIA	2,262
2	Australian Education Index - AEI	1,717
3	British Education Index - BEI	457
4	Educational Resources Information Center - ERIC	9,477
5	International Bibliography of the Social Sciences - IBSS	5,607
6	PsychINFO	6,717
7	Scopus	13,888
8	ProQuest dissertations and theses global	15,087
9	Social Services Abstracts - SSA	1,090
10	Social Science Citation Index - SSCI	7,820
11	Google Scholar	2,949
	Total	67,071

Screening

The records from the databases were exported as a Research Information Systems (RIS) file into Mendeley to identify duplicate records, and this found 15,177 duplicate records. However, this type of software can delete records in error. Therefore, before and after exporting the records into Mendeley, the references of all the records were exported into Microsoft Word, and this created two reference lists. These two reference lists were compared, and 531 records were found to have been deleted which should not have been. These records were re-included for the screening process. Furthermore, 1,237 records identified by the complementary search were included in the screening process. Comprehensive selection criteria were used to include or exclude records, but the primary inclusion criteria adopted can be summarised as follows:

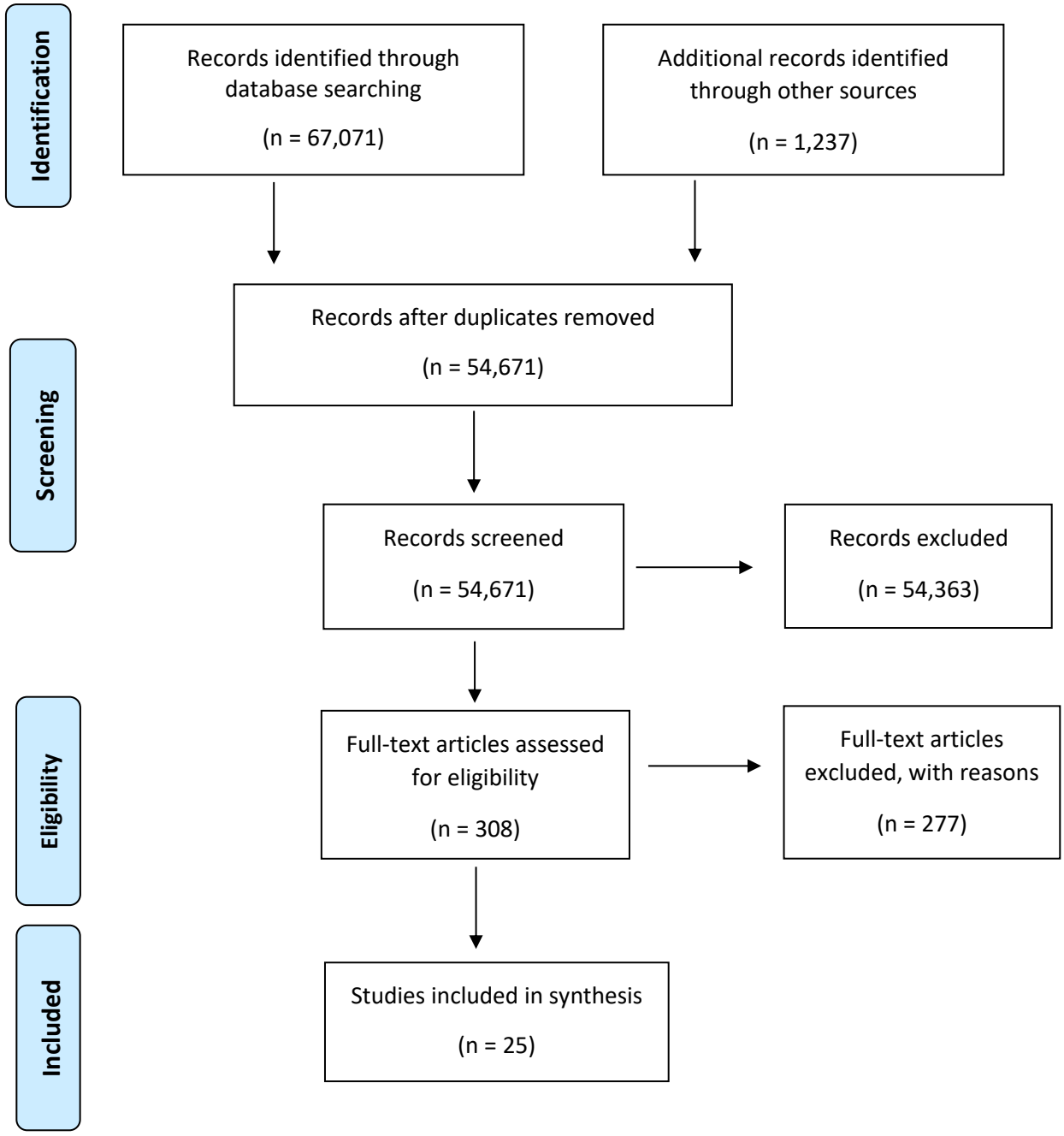
- Any literature (dissertations, articles, books, reports, papers etc.) based on disseminating research evidence to teachers from early childhood education, primary education and secondary education, including preservice teachers
- Experimental studies such as a randomised controlled trials, quasi-experimental, etc., or any evaluation studies conducting pre-post comparisons to test an intervention.
- Studies available in English
- Studies published between January 2000 – May 2019
- No restrictions on the location of the study

Those studies which did not meet the inclusion criteria were excluded. To minimise bias, a pilot screening was conducted with a second independent reviewer. Based on an expert view, randomly selected 2,750 reports' titles and abstracts were screened, respectively. Inter-rater reliability calculated for Cohen's kappa was 0.91, which shows very strong agreement between the reviewers (McHugh, 2012).

After the pilot screening, all records were screened by the author considering their titles and abstracts. Most of the records were excluded because they were irrelevant. The first screening identified 308 records. Of these 308 records, 25 met the inclusion criteria at the full-text screening. Figure 1 shows the movement of records throughout the screening process.

Figure 1

PRISMA flow diagram



Note. The PRISMA flow diagram shows the movement of records through the search and screening process (based on Moher, Liberati, Tetzlaff & Altman, 2009).

A ‘sieve’ approach by Gorard et al. (2017, p. 37), summarised in Table 3, was used to judge the quality of 25 records in terms of providing secure evidence.

Table 3

A 'sieve' to assist in the estimation of trustworthiness of descriptive work

Design	Scale	Dropout	Data quality	Other threats	Rating
Strong design for research question (RQ)	Large number of cases (per comparison group)	Minimal attrition, no evidence of impact on findings	Standardised, pre-specified, independent	No evidence of diffusion, demand or other threat	4
Good design for RQ	Medium number of cases (per comparison group)	Some attrition (or initial imbalance)	pre-specified, not standardised or not independent	Little evidence of diffusion, demand or other threat	3
Weak design for RQ	Small number of cases (per comparison group)	Moderate attrition (or initial imbalance)	Not pre-specified but valid in context	Evidence of diffusion demand or other threat	2
Very weak design for RQ	Very small number of cases (per comparison group)	High attrition (or initial imbalance)	Issues of validity or appropriateness	Strong indication of diffusion, or other threat	1
No consideration of design	A trivial scale of study, or unclear	Attrition huge or not reported	Poor reliability, too many outcomes, weak measures	No consideration of threats to validity	0

As shown in Table 4, most of the studies were ranked as weak in terms of providing secure evidence.

Table 4

Summary of evaluations ranked in terms of providing secure evidence

Research quality	Studies
4	Lord et al. (2017a); Lord et al. (2017b)
3	Rose et al. (2017); Wiggins et al. (2019)
2	Purper (2015); See et al. (2016); Ely et al. (2014); Ely et al. (2018); Clarke et al. (2011); Doabler et al. (2014); Walker et al. (2013)
1	Abbott et al. (2002); Lamarche (2016); Vaughn (2004); Learmond (2017); Kretlow et al. (2012); Schnorr (2013); Griggs et al. (2016); Speight et al. 2016); Maheady et al. (2004); Brown and Food (2018); Sawyer (2015); Ogunleye (2014); Kutash et al. (2009); Mady (2013)

Findings

In this paper, a narrative synthesis was employed to summarise the review findings. The routes to disseminate research evidence were divided in terms of their outstanding features into six approaches: passive approaches with or without active support, active single-component approaches, active multi-component, collaborative, technology-supported routes, and embedding evidence in the curriculum. However, it should be noted that this classification might be done differently by other researchers since there were overlapping interventions. A more comprehensive analysis will be presented in the researcher's own doctoral thesis.

Passive Approaches with or without Active Support

Two large-scale RCTs funded by EEF (Lord et al., 2017a; Lord et al., 2017b) provide high-quality evidence on passive approaches with or without active support. Lord et al. (2017a) investigated the impact of disseminating evidence-based resources and research summaries on pupils' Key Stage 2 English scores. The study involved 12,500 primary schools, randomly allocated to five groups of 2,500 (four intervention groups and one control group). There was no statistically significant difference between the five groups in terms of pupils' scores. In the second trial, involving 823 primary schools, 60 were randomly allocated to each of the nine intervention groups and 283 to the control. Lord et al. (2017b) examined the impact of four passive and five active interventions on pupils' Key Stage 2 English scores and teachers' use of research evidence. After the passive interventions, simply disseminating research evidence

as in the previous study, the active interventions involved additional support such as inviting teachers to one twilight Continuing Professional Development (CPD) session. However, none of the groups showed significant differences in terms of pupils' scores and teachers' use of research. Together, these studies indicate that there is a need for more than passive approaches to disseminate evidence.

On the other hand, lower quality evidence is provided by Lamarche (2016). This study evaluated a model, providing 24 teachers in seven schools with resources and training regarding promoting research evidence use in practice. The study found positive changes in teachers' attitudes towards research.

Active Single-component Approaches

In an RCT by Rose et al. (2017) in 119 schools, 60 were allocated to the treatment group and 59 to the control group, covering 5,462 pupils. Two evidence champions from each school attended workshops delivered by academics and discussed research evidence. The study found some positive changes in teachers' attitudes towards research evidence, but there was no evidence of impact on pupils' Key Stage 2 reading outcomes. In another RCT by Purper (2015), involving 96 teachers (48 randomised to each group), participants were given Professional Development (PD) training and information about five websites disseminating research evidence regarding early childhood education. The evaluation found more positive attitudes towards research among teachers, but there was no improvement in teachers' use of websites.

Learmond (2017) investigated the impact of an instructional coaching model about research-based instructional strategies on teachers' use of research. The intervention, involving 12 teachers, led to improvements in the use of research evidence by teachers.

Vaughn (2004) recruited 12 teachers and used mentoring to promote teachers use of research-based reading strategies. Out of 12 of these teachers, six were given training through PD, and these teachers worked as mentors to help other teachers in their schools. The study found a positive impact on teachers' use of research evidence.

Overall, these studies found mixed results and do not provide strong evidence that active single-component routes effectively disseminate research evidence to teachers.

Active Multi-component Interventions

In this approach, studies mostly involved PD or workshop training with follow-up support. Out of seven studies in this section, five found positive outcomes. Overall, however, the quality of evidence provided in this section may not be sufficient to lead to clear conclusions.

Wiggins et al. (2019) investigated the impact of an intervention based on supporting research leads from schools with CPD sessions, follow-meetings and resources, on student attainment using an RCT involving 40 secondary schools (20 randomised to each group). Headteachers, and English and mathematics subject leads were also supported through workshops. Students made little progress in English and mathematics compared with the control group. Another RCT by Walker et al. (2013) in 16 schools involved PD and follow-up coaching to improve explicit literacy instruction implementation. The study found that teachers improved their instructional behaviours. A similar intervention, PD with follow-up support coaching, was evaluated through a multiple-baseline-across-teachers design involving three teachers by Kretlow et al. (2012). The study found positive outcomes in teachers' instructional behaviours during mathematics instruction. Schnorr (2013) used multiple baselines across participants' designs involving nine teachers. Both workshop and coaching were used to train and support teachers about research evidence on reading. There was positive evidence of the impact on teachers' accurate use of research evidence. In a study by Maheady et al. (2004), preservice teachers were trained and supported through a workshop and with class assistance about a research-based program. Teachers implemented the program accurately, and students improved their weekly test performance.

On the other hand, Griggs et al. (2016) examined the impact of a programme consisting of four key components: 'audits' of school research interests; research symposia; twilight forums; and research brokerage on teachers' use of research evidence using one group pre-test and post-test design. The program was delivered through a research champion from each of the five participating schools. No significant differences were found after the intervention. Another one-group pretest-posttest design was used by Speight et al. (2016) to evaluate CPD training and direct consultant support on research evidence such as feedback. There were no improvements in the teachers' use of research, only some positive changes in attitudes.

Collaborative Approaches

Of the six studies in this section, five studies found positive outcomes. Similarly, however, these studies were weak in terms of providing secure evidence.

See et al. (2016) conducted a quasi-experimental study in nine treatment schools. Teachers were given a research article on feedback and supported with training to develop strategies and create three action research cycles. The study compared the treatment schools with other schools in the local authority and with all maintained schools nationally. The intervention made no difference to pupils' attainment compared with pupils in the comparison schools.

Brown and Food (2018) evaluated theories of action and toolkits in workshops. Teachers were supported in workshops and allowed to develop research-based interventions for their settings. Results indicated that the intervention helped teachers engage with research evidence successfully. A relatively similar study by Sawyer (2015) evaluated coaching to help teachers engage in research evidence to generate self-designed plans, using a multiple baseline design across four novice special education teachers. The study found that teachers successfully implemented their plans in the classroom.

A study by Ogunleye (2014) involved 60 teachers of pre-primary (30) and primary (30) schools and used a one-group pretest-posttest design. The intervention was a collaborative intervention programme based on micro-teaching, seminar and focus group discussion. They found positive changes in teachers' use of and attitudes to research evidence.

In a study by Abbott et al. (2002), researchers allowed teachers to participate actively in the process and generated useful materials for teachers based on research evidence about phonemic awareness. Then, teachers were given training and follow-up support. The study found that teachers received research evidence and implemented it accurately in practice, and students improved their literacy skills. In a similar study by Kutash et al. (2009), evidence-based strategies manuals developed by teachers (Duchnowski et al., 2006) were used. Teachers were given intensive training and an instructional consultant during the implementation. Overall, teachers' implementation and student outcomes were mixed, but students showed notable reading achievement progress.

Technology Supported Routes

Ely et al. (2014) implemented a multimedia-based approach. They used a modelling video and Content Acquisition Podcast (CAP), advanced podcasting to teach evidence-based vocabulary practices to preservice teachers. The study used an experimental study and involved 49 preservice teachers, randomly allocated to one of two treatment groups: CAP plus video (24) and reading (25). CAP plus video helped teachers to implement more evidence-based practices during instruction than simply reading. A more recent experimental study using a pretest, a

postinstruction test, and a post-simulation test, involving 22 preservice teachers, by Ely et al. (2018) adopted a classroom simulation created through a virtual mixed-reality application to enhance preservice teachers' knowledge about research evidence on reading. After the intervention, preservice teachers showed positive changes in their knowledge.

Mady (2013) focused on teachers' conceptual use of research and provided teachers with six research articles, including supporting guides and an online discussion forum to communicate with the researchers. After a pre-post questionnaire evaluation, teachers showed positive changes in their knowledge.

Evidence Embedded in Curriculum Plus Training

A randomised block design (64 classrooms with more than 1,300 students) conducted by Clarke et al. (2011) investigated the impact of the Early Learning in Mathematics (ELM) curriculum in which research evidence is embedded, on student attainment at risk in mathematics. Treatment teachers were given training with the curriculum. The study found that students at risk made notable progress compared with other students, which helped reduce the gap between students. During this trial, Doabler et al. (2014) conducted another evaluation using a total of 379 observations in 129 classrooms (68 intervention and 61 control) covering about 2,700 students from 46 schools. The study investigated the impact of the intervention on teachers' use of explicit mathematics instruction. The intervention group showed more positive results than the control group. Overall, there seems to be some evidence to indicate that embedding research evidence in the curriculum may work in practice. However, further and more large-scale trials need to be carried out to have more robust evidence.

Discussion and Conclusion

The purpose of the study was to review the existing evidence on the most effective ways to disseminate research evidence to teachers. The paper presents a rapid analysis of a systematic review conducted as a part of the researcher's doctoral research project. The review included 25 studies, most of which provided low-quality evidence on the dissemination routes. Furthermore, these 25 evaluations were based on different routes rather than one specific route, which provides only a few studies for each route. Given the limited number of studies per route and their quality of evidence, it can be said that making clear conclusions for each of the routes might be problematic. However, few conclusions on the routes can be drawn from the review.

The most secure evidence provided by two large-scale RCTs (Lord et al., 2017a; Lord et al., 2017b) on passive with or without active support routes showed that just simply disseminating research evidence has not been effective, which can be the most critical finding of this study. As for the promising ones, embedding evidence in the curriculum, technology-supported routes, collaborative or multi-component approaches can be relatively more promising approaches to disseminate research evidence compared with others, respectively. However, the term 'promising' here means promising for better evaluations, especially well-designed large-scale RCTs.

On the other hand, one interesting finding was about EEF-funded studies. All of the four best evaluations were funded by EEF (Lord et al., 2017a; Lord et al., 2017b; Rose et al., 2017; Wiggins et al., 2019). A possible explanation for this might be that large-scale RCTs may require a high-budget and longer time, which can be demanding for many researchers. However, in the main, EEF's interventions were not comprehensive, which can be explained with their sample size.

In conclusion, although there is no equally secure evidence for each of the routes, the study provides significant findings that researchers and practitioners should consider. Taking into account the secure evidence on passive approaches, it can be said that more active and comprehensive approaches should be preferred. Therefore, instead of wasting time and money on passive dissemination approaches, initiatives and evaluations should focus on more promising routes such as embedding evidence in the curriculum, technology-supported routes, collaborative or multi-component approaches, or new routes not tested yet.

The results of this review confirm that as Gorard et al. (2020) claim, little attention has been paid to different routes to disseminate research evidence. Therefore, the study suggests that further and more robust evaluations should be undertaken on dissemination routes. This review could be regarded as a basis for further evaluations and initiatives to get evidence into use.

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