Rapid systematic review of interventions that provide targeted ICT support to socially disadvantaged pupils

1. Background

This protocol supports a systematic review of studies which have evaluated interventions that aim to support socially disadvantaged pupils by providing them with targeted ICT provision for educational attainment in the form of free internet access, laptops or other devices to enhance their access to information and communications technology (ICT). This review will be accompanied by a review of the prevalence of IT access in the UK, and a set of case studies compiled from data from individual schools.

Ever since the home market for computers emerged in the 1980s there has been talk of a digital divide between those who can afford to keep abreast with the rapid developments in electronic products and those who can not (ERIC Development Team 1991). For schools this has implications in terms of the expectations they have of the ICT knowledge students bring to school and in terms of homework. If some children do not have access to printers or the internet at home, will this impact on their ability to participate fully at school? While the rapid ICT development makes it hard for many public institutions to keep abreast with it, it has also become cheaper and easier to acquire technology for the home and personal use. This prompts the question of whether the digital divide still exists, and if so what the best way is of addressing it. For schools with sparse resources and multiple demands it is particularly pertinent to ask whether ICT provision has an effect on students’ educational attainment.

This review will therefore focus on interventions that aim to improve the educational attainment of socially disadvantaged pupils by providing them with targeted ICT support.

1. definitions

*Socially disadvantaged*: below the relative poverty line (60% or less of the median income) or free school meals. The review will not include studies on subgroups such as learning difficulties, but will include studies of looked after children (in foster, residential or kinship care).

*Technology access*: access to computers (ownership or elsewhere), access to the internet, ownership of mobile phones. Technology used in group teaching, such as interactive whiteboards, will be excluded, as will entertainment technology such as games consoles and home cinema devices.

*ICTprovision:* provision of free or discounted computers, mobile phone devices (i.e. smartphones), Wi-Fi or internet access to encourage engagement in ICT. The access may be provided to individuals, in the home, school or the community. This review is only interested in such provision when it has been targeted at children and young people.

*Context*: the review is carried out with the specific aim at informing school policies on ICT provision for socially disadvantaged children. The studies will therefore all be focused on ICT as provision for educational purposes.

1. Review question and objectives

The question driving this review is: What is the educational impact of interventions that aim to increase technology access for socially disadvantaged children?

The objectives of the review are:

* To identify studies which have evaluated the effect of ICT support interventions delivered to socially disadvantaged children aged 5-16.
* To critically appraise relevant studies and assess their impact on children’s educational attainment.
* To synthesise the study findings in a report and consider these in relation to a set of case studies from UK schools and a review of ICT access amongst disadvantaged children in the UK.

This review is funded by the CfBT Education Trust and aims to inform their policies in this area.

1. Review focus

This review aims to be *a priori* in its design, but due to the time limit and resources available we will need to be flexible and responsive to the nature and amount of data that emerges. If we find few relevant studies we may extend our search, if we find an abundance of studies we will need to apply stricter inclusion criteria. A main concern with the review is to be transparent in order to facilitate future updates and critical appraisal of the decisions made during the reviewing process. For this reason this protocol contains empty tables for updates as the systematic review progresses.

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| Date | Decision made and rationales | Decision made by |
| 5/3/12 | What do we do with studies that have focused on the different kinds of ICT uses in school and at home? There are some, for example Kerawalla and Crook (2002) and Jing et al (2009), Selwyn and Bullon (2000), that focus on patterns of use rather than links to attainment.  We do not code these as INCLUDEs but have created a BACKGROUND code for studies on HOME/SCHOOL usage patterns. | Antonia and Kristin 8/3/12 |

## Study design

To be included in the review studies will have had to

1. measure attainment in the targeted students before and after the introduction of the ICT intervention, or
2. measured correlation between provision of free computer or internet access and attainment in school pupils.

Studies do not need to have included a comparison group but the study assessment will give more weight to studies that did. Studies which have only focused on the process of such provision, without measuring outcomes, will be excluded from the review. Inclusion criteria for outcome measures are specified in this protocol in section 3.d.

The review aims to include individual studies rather than literature reviews. This depends on the amount of relevant studies found, and the quality of the reviews. A final decision about literature reviews will be made once all the screening has been completed and we have an overview of the amount of data available. The table below will then be updated to make this decision transparent:

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## Intervention components

The review will include any study of a technology intervention aimed at disadvantaged pupils, such as free laptops, increased numbers of computer lessons per week, more accessible computers at school, and improved internet access at school or at home, with the intent to improve their educational attainment. This will include, but not be exclusive to, networked interventions, such as free internet access. The ICT support must have been provided with the specific aim of improving socially disadvantaged students’ educational achievement.

Technology used in group teaching, such as interactive whiteboards, will be excluded, as will entertainment technology such as games consoles and home cinema devices, and electronic devices aimed at pupils with learning difficulties.

The review is not limited in terms of the subject area of the support. This means that we will include any intervention regardless of the subject area in which it intends to boost learning, for example computers may have been provided to improve understanding and learning in science studies or home economics as well as literacy and numeracy.

The focus of this review is on interventions that provide ICT access to support learning across the curriculum, rather than ICT education itself.

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| Date | Decision made and rationales | Decision made by |
| 5/3/12 | What do we do with community-based interventions targeted at socially disadvantaged students? For example home work clubs?  KEEP as INCLUDEs for review | Antonia and Kristin 8/3/12 |
| 14/3/12 | When critically appraising studies Kristin reconsidered the inclusion of Goolsbee and Guryan (2006). Although this is about provision to reduce the digital divide, the provision was across schools in poor areas, which might have included areas of mixed socio-economic pupils. She consulted with Antonia who agreed that this was out due to: “the all-school nature of the intervention. So if they’d provided ICT to poor students within a school, that would be different, but this seems to be all inclusive, so any student attending the school would get it – hence its more about providing resources to schools than to disadvantaged groups (although of course they are actually doing both here).” (Kristin in email to Antonia) | Antonia and Kristin 14/3/12 |

## Population

To be included the study has to be focused on disadvantaged school children aged 5-16, including looked after children.

By ‘socially disadvantaged’ we refer to people below the relative poverty line (60% or less of the national median income) or free school meals. The review will not include studies on children with learning difficulties, but will include studies of looked after children (in foster, residential or kinship care). Also excluded will be children with behaviour problems or those who struggle to engage with education.

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| Date | Decision made and rationales | Decision made by |
| 5/3/12 | During screening, several studies on the gender divide in technology came up.  These will not be included. | Antonia and Kristin 8/3/12 |
| 5/3/12 | Study by Hansson et al on digitally marginalised communities excluded because focus on rural issues and general population. Coded to ‘not ICT provision’. | Kristin 5/3/12 |
| 5/3/12 | Decided to include studies from OECD countries (not just the US and the UK). | Kristin 5/3/12 |

## Outcomes

Outcomes will have to be school-related to be included. This means that health or crime related outcomes will be excluded.

To be included studies will have had to have measured the sample’s literacy or numeracy, grades, subject-specific knowledge or attendance. Types of outcome measures may be: school records of grades, subject-specific tests (such as literacy or numeracy), individual student attainment data collected from students, teachers or school administration offices, and local authority data on educational achievement. Measures of school engagement will also be included. It may be that other outcomes emerge as important from relevant studies. The protocol will be sensitive to this, and any decisions in relation to outcomes criteria will be recorded in the table below.

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| Date | Decision made and rationales | Decision made by |
| 5/3/12 | Study by Barron et al looks at ‘creative computing participation’. They argue that ‘design-oriented’ activities play a special role in learning to adapt computing tools for one’s own purposes. As such, this study considers outcomes that precede ‘attainment’ outcomes such as literacy, numeracy and knowledge-based subjects.  EXCLUDE | Antonia and Kristin 8/3/12 |
| 5/3/12 | What do we do about the outcome ‘information-literacy’? Should these not go out since they are essentially about ICT learning rather than the use of ICT to improve learning? (See Herring 2009 in ER4 on definition)  EXCLUDE | Antonia and Kristin 8/3/12 |
| 5/3/12 | Study by Hohfeld et al currently queried but surely out on outcomes?  EXCLUDE | Antonia and Kristin 8/3/12 |
| 13/3/12 | Is it appropriate to expect attainment outcomes when the intervention was targeted at the lower age groups, e.g. 5-7 year olds? |  |

Studies which have only collected data on users’ satisfaction, the implementation of the intervention, or processes resulting from the intervention, will be excluded in the first instance. If there is a lack of outcome studies in this area, other kinds of study designs will be considered for inclusion. Any decisions on study design will be recorded here:

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1. Methodology

## Searching

Search parameters: years 2000 – 2012, English language studies only.

The search will be transparent, carried out in journals and databases identified as most relevant to the review topic, and by contacting experts.

The databases have been chosen on the basis of their relevance to the review topic and their depth of coverage. These are also databases that are particularly good for identifying English language studies, which are the focus of this review: ERIC, BEI (British Educational Index), ASSIA (Applied Social Sciences Index and Abstracts), LISA (Library and Information Science Abstracts), Sociological Abstracts, Technology Research Database, Child Data, Social Care Online, Bibliomap, SSCI (Social Science Citation Index), Scirus.

A second search will screen the websites of the Ministry for Education and the archives of the Department for Children, Schools and Families. We will also search <http://evidencebasedprograms.org/wordpress/> which is a US site supported by the Coalition for Evidence Based Policy, and <http://ies.ed.gov/ncee/wwc/> which is the website of the US What Works Clearinghouse for educational research.

Relevant journals: Educational Media International, British Journal of Educational Technology, Journal of Educational Technology and Society, Technology Pedagogy and Education, and Contemporary Issues in Technology and Teacher Education. Issues from the last three years will be hand searched.

Academic experts will be contacted.

The search will primarily aim to identify published and peer-reviewed literature, and research reports funded by the UK government (Department for Education). Master dissertations and PhD thesis will be excluded due to the time and costs related to locating such studies.

The search terms will be relevant to:

* Publication year (2000 or after)
* The intervention type (ICT provision for educational attainment)
* The population (primary and secondary school pupils)
* Study design (impact studies)
* Equity filters (socially disadvantaged)

The equity filters will only be added if the search results number > 3000 as research has found that these can miss important studies which did not use such terms in their title or abstract (Oliver *et al.* 2008).

## Screening

A screening tool will be developed in EPPI-Reviewer 4 with the aim of assessing all study abstracts against the inclusion and exclusion criteria. The screening will focus on exclusion criteria, assuming that all studies are originally included. Ten percent of abstracts will be double screened at the start of the screening process and any discrepancies will inform the screening tool, and if need be the protocol will be adjusted accordingly.

The following screening tool has been developed in EPPI Reviewer 4:

* Exclude, not ICT
* Exclude, not children and young people
* Exclude, not ICT for education
* Exclude, ICT for teaching methods
* Include, process/qual study
* Include, survey analysis
* Include outcome evaluation
* Include, abstract unclear, retain
  + Exclude (state reason in comments function)
  + Include on full study
* Included on full study

The screening tool will be tested on a sample of relevant studies identified using text mining. This is to ensure that the tool is tested on studies likely to be relevant to ICT, rather than those which are clearly irrelevant to this review.

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| Date | Decision made and rationales | Decision made by |
| 8/3/12 | After looking through queried abstracts two new screening codes were created:   * EXCLUDE not socially disadvantaged children * BACKGROUND home/school usage | Antonia and Kristin 8/3/12 |

## Critical appraisal and synthesis of findings

Key characteristics of included studies will be extracted using a tool developed at the EPPI-Centre, adapted for this review, collecting data on study design, data collection, data analysis and relevance to the review question. All included studies will be assessed by two reviewers and their assessments compared.

If the data is in a quantitative form suitable for statistical synthesis, they will be considered for inclusion in a meta-analysis. Otherwise, synthesis will take the form of a narrative summary or a qualitative overview.

If the studies found are homogenous and if they provide enough information for effect sizes to be standardised, we will conduct a meta-analysis of treatment effects. It is, however, likely that studies will vary in terms of focus and study design. If so, they will be considered in relation to their interventions population groups and tabulated to assist a narrative review combined with the overall weight of evidence. The weight of the evidence will be considered using a method developed by the EPPI-Centre, considering A-C below:

1. Are the study methods sound? This assessment will be based on the reviewers’ responses to questions about the study’s attempts to establish the reliability and validity of data collection tools and the data analysis, and whether the reviewers differ from the authors over the findings or conclusions of the study.
2. Is this study type appropriate for answering the review question? This assessment will be based on the reviewers’ answers to questions concerning the appropriateness of choice of research design, ethical concerns, involvement of service users, justification for the conduct of the study and assessment of efforts to reduce bias.
3. What is the relevance of the topic focus of the study to the review question? This assessment will be based on the reviewers’ answers to questions about whether the concepts and measures used in the study address the review question and focus, and the generalisability of the study results.

Following the EPPI-Centre model for estimating the weight of the evidence, answers to the questions stated under A-C will be counted and summarised into an overall weight of the evidence, based on individual study results.

* For a study to be considered of high overall weight, A, B and C all need to be high.
* For a study to be considered of high/medium overall weight, two of A, B and C need to be high, and the third must not be less than medium.
* For a study to be considered of medium/high overall weight, at least one of A, B or C must be high, and all must not be less than medium.
* For a study to be considered of medium overall weight, A, B and C all need to be at least medium.
* For a study to be considered of medium/low overall weight, at least two of A, B and C need to be at least medium.
* For a study to be considered of low/medium overall weight, at least one of A, B and C must be low, and none can be greater than medium.
* For a study to be considered of low overall weight, two or more of A, B and C must be low.

1. Final report

The final report will provide an introduction to the topic, information about the review methods, details of all included studies, and a description of the findings from the synthesis of research data. The report will also include a summary of findings presented upfront.

## References

## ERIC Development Team (1991) *Technology and equity.* Syracuse, NY, ERIC.

## Oliver, S., Kavanagh, J., Caird, J., Lorenc, T., Oliver, K., Harden, A., Thomas, J., Greaves, A., and Oakley, A. (2008) *Health promotion, inequalities and young people's health: A systematic review of research.* London, EPPI-Centre.