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Do New Technologies Facilitate the Acquisition of Reading Skills? A Systematic Review of the Research Evidence for Primary and Secondary Learners

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Overview

- What is a systematic review?
 - Keyword map
 - In-depth review
- This systematic review
 - Keyword map methodology and results
 - In-depth review methodology
 - In-depth review results for ...
 - Effectiveness in promoting language acquisition
 - Non-linguistic pedagogical benefits

What is a systematic review?

EPPI-Centre: <http://eppi.ioe.ac.uk/cms>

Keyword map	In-depth review
1. Establish broad review question	1. Establish in-depth review questions
2. Establish inclusion/exclusion criteria	2. Establish inclusion/exclusion criteria
3. Establish search strategy	3. Apply inclusion/exclusion criteria
4. Conduct exhaustive database searches	4. Assess weight of evidence of identified studies through double blind reviews
5. Apply inclusion/exclusion criteria	5. Synthesise the findings of identified studies
6. Key word and map the identified studies	

This systematic review: Keyword map: Method

- **Review question**
 - What empirical research could be found on the use of new technologies in language learning and teaching with learners in primary and secondary schools since 1990?
- **Inclusion criteria**
 1. Report on the use of **new technologies** ...
 2. ... in **foreign** or **second language learning** ...
 3. ... with **school age** (primary and secondary) learners.
 4. Focus on **learners**.
 5. Describe or include an **empirical study** carried out by the author(s)
 6. ...which focused on the **effects of an intervention on the acquisition of linguistic knowledge and skills**.
 7. Have been **reported between 1990 and 2009**
 8. Have been **published peer-reviewed journal articles**, and
 9. Have been **published in English**.

This systematic review: Keyword map: Method (cont.)

- **Search strategy**
 - Language AND Learning AND (Computer OR technology OR individual technologies) AND (Primary OR Secondary) NOT (Pre-school OR Postsecondary OR Special education OR Teacher training OR Online processing)
- **Databases searched**
 - Education Resources Information Center (ERIC)
 - Language and Linguistics Behavior Abstracts
 - PsycINFO
 - INSPEC

>> 90/461 studies met criteria
- **Hand searches of journals and literature reviews**
 - CALL Journal
 - CALICO Journal
 - ReCALL Journal
 - Language Learning & Technology

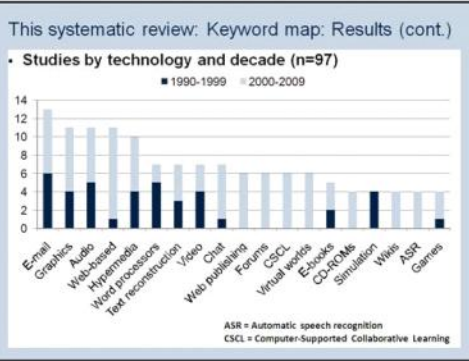
>> 7 studies met criteria

This systematic review: Keyword map: Results

- **97 studies met the inclusion criteria**
- **Studies by country:** US (32), Taiwan (9), China (7), UK (4)
- **Studies by target language:** English (71), European languages (27)
- **Studies by phase of education:** Primary (39), Secondary (58)
- **Studies by year and linguistic knowledge and skill**

	1990-1994 (n=18)	1995-1999 (n=16)	2000-2004 (n=16)	2005-2009 (n=47)	Total (n=97)
Vocabulary	4	6	4	11	25
Grammar	1	2	1	4	8
Pronunciation	0	0	1	2	3
Reading	5	3	5	11	23
Writing	5	3	4	12	24
Speaking	1	2	3	1	7
Listening	1	3	2	1	7
Other/Not indicated	6	6	9	20	41

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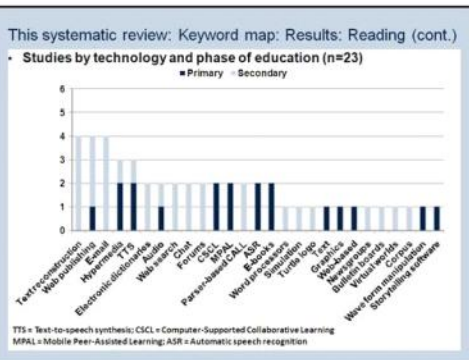
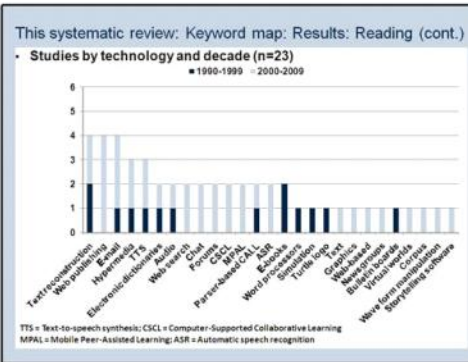
This systematic review: Keyword map: Results (cont.)

- **Other technologies used in the studies**

Hypercard (3), Text (3), Animation (3), Web search (3), Parser-based CALL (3), Text-to-speech synthesis (3), Electronic dictionaries (2), Videodisc (2), Video conferencing (2), Mobile peer-assisted learning (2), Adaptive systems (2), Dialogue systems (2), Electronic encyclopaedias (1), Turtle logo (1), Network-based (1), Text-based conferencing (1), Newsgroups (1), Bulletin boards (1), Blogs (1), Text messaging (1), Virtual learning environments (1), Corpus (1), Wave form manipulation (1), Storytelling software (1), Authoring software (1)

This systematic review: Keyword map: Results: Reading

- **23 studies focused on reading**
- **Studies by country:** US (10), Taiwan (6)
- **Studies by target language:** English (19), European languages (4)
- **Studies by phase of education:** Primary (12), Secondary (11)



This systematic review: In-depth review: Method

- **Review questions**
 1. What evidence is there that new technologies facilitate the acquisition of **reading** in EFL? (**Product**)
 2. What (pedagogical) insights can be gleaned regarding the use of new technologies in the teaching of **reading** in EFL? (**Process**)
- **Additional inclusion criteria**
 1. ... to teach **reading**
 2. ... of **English as a Foreign Language (EFL) or English as a Second Language (ESL)** ...
 3. They were **reported between 2000 and 2009**

>> 13 studies met these criteria
- **Weight of evidence**
 1. **Relevance** of the focus of the study
 2. **Appropriateness** of the study's research design for addressing the review questions
 3. **Trustworthiness** of the study's overall methodology
 4. **Contribution** of the study (as a result of 1-3) to the review questions.

This systematic review: In-depth review: Linguistic benefits

Study	Experimental conditions	Results
Troia (2004)	Participants: 1 st to 6 th grade students in the US whose L1 was Spanish Conditions: (1) FastForward software (N=99) (2) Classroom instruction (N=92)	Phonological awareness (Linwood Auditory Conceptualisation test or Woodcock-Johnson) •Control group scored significantly higher on the rhyming task, otherwise no differences Basic reading skills (Woodcock-Johnson) •No main effect of treatment.
Lan et al. (2009)	Participants: 3 rd grade learners of English in Taiwan Conditions: (1) Group work (N=26) (2) Computer-Assisted Reciprocal Early Reading (CAREER) system (N=26)	Linguistic outcomes •Oral reading fluency: No significant difference •Retail fluency: CAREER group improved more
Inctor et al. (2007)	Conditions: Universal Literacy Environment with bilingual avatar coach (1) Native speakers of English (N=14) who were struggling readers (2) Spanish learners of English (N=16)	Vocabulary •Neither group made significant gains from pre-test to post-test Reading comprehension •Neither group made significant gains from pre-test to post-test.

This systematic review: In-depth review: Linguistic benefits: Conclusion

- **What evidence is there that new technologies facilitate the acquisition of reading in EFL?**
 - There is little evidence regarding the effects of new technologies on reading
 - Few studies investigated the effects of technology on reading outcomes
 - Few studies met our quality criteria
- **Limitations**
 - Unfocused, broad comparisons and pre-experiments
 - Like many CALL studies before them (Hubbard, 2008), the studies do not contribute to theory building in the field of reading – despite the fact that CALL permits the operationalization of SLA theories (Doughty, 1987)
- **Implications**
 - Studies should focus on the differential effects of the different attributes or coding elements of technologies (Salomon, 1979; Pederson, 1988)
 - Studies should have a pre-test post-test format and a delayed post-test (Chapelle, 2001)
 - Building up to large-scale studies
 - Qualitative data should be collected to confirm that the technology is being used as intended (Chapelle, 2001) and for further hypothesis formation (Levy and Stockwell, 2006)

This systematic review: In-depth review: Non-linguistic benefits

Study	Experimental conditions	Results
Troia (2004)	Participants: 1 st to 6 th grade students in the US whose L1 was Spanish Conditions: (1) FastForward software (N=99) (2) Classroom instruction (N=92)	Classroom behaviour (Social Skills Rating System) •No main effect of treatment or time. Compliance •66% completed the min. 4 wks. Training •78% achieved a compliance rating of 8 or higher •Amount of training was not significantly correlated with any of the learning outcomes •The compliance rating was negatively correlated with some of the learning outcomes
Lan et al. (2007)	Participants: 3 rd grade learners of English in Taiwan Conditions: (1) Whole class instruction (N=26) (2) Group work (N=26) Conditions: (1) Group work (N=26) (2) Mobile Peer-Assisted Learning (MPAL) (N=26)	Behaviours •Some group leaders helped lower-ability students, others ignored them and read individually, and others even teased them •Intermediate students often asked to read alone Behaviours •MPAL group engaged in significantly more learning-related behaviours •Control group engaged in significantly more learning-unrelated behaviours •Postponed support, delayed feedback and conflict-oriented collaboration were significantly lower for the MPAL group.

This systematic review: In-depth review: Non-linguistic benefits

Study	Experimental conditions	Results
Lan et al. (2009)	Participants: 3 rd grade learners of English in Taiwan Conditions: (1) Group work (N=26) (2) Computer-Assisted Reciprocal Early Reading (CAREER) system (N=26)	Behaviours •The number of learning-related and learning-unrelated behaviours differed significantly •Students in the control group failed to cooperate, were dependent on the teacher, were not good at peer assessment, and spent more time in learning-unrelated behaviours
Greenfield (2003)	Participants: 15-16 yr old Hong Kong learners of English 16-17 yr old US students of World Literature. Conditions: Production of a writing anthology through a collaborative e-mail exchange	Skills •Overall their confidence increased •Confidence in reading and writing decreased Attitudes •Reactions were mainly positive •84% preferred to work with computers •Students appreciated: novelty, freedom, collaboration, communication opportunities •Evidence that novelty wears off •Authenticity and authorship
Kramsch et al. (2006)	Participants: A struggling Chinese learner of English at a senior high school in the US Conditions: On-line activities	•Empowered, authenticity of feelings, valued member of a community •Identity and agency are more appropriate than 'authenticity' and 'authorship' •On-line activities allow learners to not only negotiate meaning, but also negotiate conceptions of the self and other

This systematic review: In-depth review: Non-linguistic benefits: Conclusion

- **What (pedagogical) insights can be gleaned regarding the use of new technologies in the teaching of reading in EFL?**
 - Some evidence to suggest that technology can be used to support collaborative learning by scaffolding that activity
 - Some evidence to suggest that students like technology-supported collaborative activities
 - Some evidence that technology can transform students' language learning experiences – empower them
- But, there is also evidence to suggest that the novelty of working with computers may wear off
- **Implications**
 - Much research in CALL has focused on motivation and attitudes towards the use of computers
 - These are often short studies and students have never used the technologies before
 - Studies of motivation need to be longitudinal
 - And we need to go beyond motivation

The review team

- **Core reviewers**
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**Thank You!
&
Questions?**

Lan et al (2009) CAREER system

The screenshot shows a table with columns for 'Student number', 'I's reading task', and 'The suggested further practicing words'. The table contains several rows of text, with some words highlighted in red. A callout box points to the 'I's reading task' column, and another points to the 'The suggested further practicing words' column.

Lan et al (2009) CAREER system

The screenshot shows a reading task titled 'What Color is it?' with a text passage and a table of suggested words. The text passage is in Chinese and English. The table has columns for 'I's reading task' and 'The suggested further practicing words'. The table contains several rows of text, with some words highlighted in red.

Proctor et al. (2007)

The screenshot shows a reading task titled 'CAST Fals f/Al' with a text passage and a table of suggested words. The text passage is in Chinese and English. The table has columns for 'I's reading task' and 'The suggested further practicing words'. The table contains several rows of text, with some words highlighted in red.

Troia (2004) FastForWord

The screenshot shows a reading task titled 'FastForWord' with a text passage and a table of suggested words. The text passage is in Chinese and English. The table has columns for 'I's reading task' and 'The suggested further practicing words'. The table contains several rows of text, with some words highlighted in red.

Waveform Manipulation

The screenshot shows a table of suggested words with columns for 'I's reading task' and 'The suggested further practicing words'. The table contains several rows of text, with some words highlighted in red. Below the table is a waveform manipulation interface with a row of buttons labeled 1 through 10.

(Hattori and Iverson, 2007)