

## Systematic Review of Vocabulary CALL

Department of Education



A Systematic Review of the Effectiveness of  
New Technologies in English as a Foreign  
Language

Zoe Handley  
zoe.handley@education.ox.ac.uk



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### Overview

- **What is a systematic review?**
- **Map the research**
  1. 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?
- **In-depth review**
  1. What evidence is there that new technologies facilitate the acquisition of vocabulary in EFL?
  2. What (pedagogical) insights can be gleaned regarding the use of new technologies in the teaching of vocabulary in EFL?

### The Review Team

- **Core Reviewers**
  - Prof. Ernesto Macaro (PI), Dr. Zoe Handley, Dr. Catherine Walter
  - Alison Sharpe (Editorial Director, ELT, Oxford University Press)
- **We are grateful to the following for their assistance:**
  - Applied Linguistics Group, Department of Education, University of Oxford
    - Dr. Mairin Henneby, Amanda Holmbrook, Dr. Victoria Murphy, Dr. Vivienne Rogers, and Robert Woore
  - English Language Teaching Division, Oxford University Press
    - Luke Baxter, Julia Bell, Elaine Boyd, Jenny Cammons, Phil Davis, Katherine Goldsmith, Joanna Freer, Catherine Kneafsey, Kate Maciver, Antoinette Meehan, Alex Miller, Sarah Parsons, Gail Pasque, Stephanie Richards, Lynne White, Katherine Wyatt

### What is a Systematic Review?

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

**Systematic reviews** attempt to **reduce the subjective bias** characteristic of many traditional literature reviews through the use of a **transparent and explicit protocol, exhaustive database searches, explicit inclusion/exclusion criteria, and quality assurance measures**, i.e. **hand searches** to validate database searches and **double blind reviews** of individual studies

#### Mapping the research

1. Establish in-depth review questions
2. Establish inclusion/exclusion criteria
3. Apply inclusion/exclusion criteria
4. Conduct exhaustive database searches
5. Assess weight of evidence of identified studies through double blind reviews
6. Synthesise the findings of identified studies

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#### In-Depth Review

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### Mapping the research: 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 **technology** ...
  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. Have been **reported between 1990 and 2009**
  7. Have been **published peer-reviewed journal articles**, and
  8. Have been **published in English**.

# Systematic Review of Vocabulary CALL

## Mapping the research: Method

### • 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

## Mapping the research: Results

### • 97 studies met the inclusion criteria

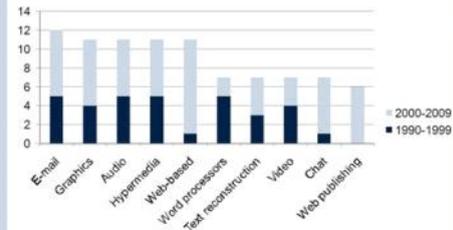
- **Studies by country:** US (32), Taiwan (9), China (7), UK (4)
- **Studies by target language:** English (71), European languages (27)
- **Studies by phase of education:** Primary (39), Secondary (58)

### • 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	24
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

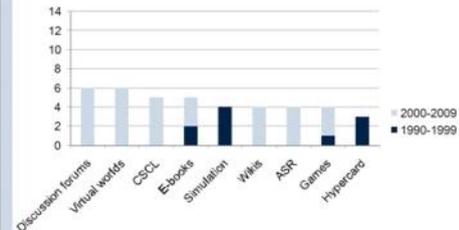
## Mapping the research: Results

### • Studies by year and technology (n=97)



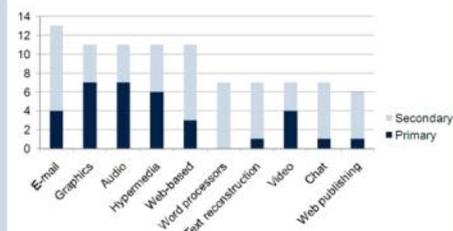
## Mapping the research: Results

### • Studies by year and technology (n=97)



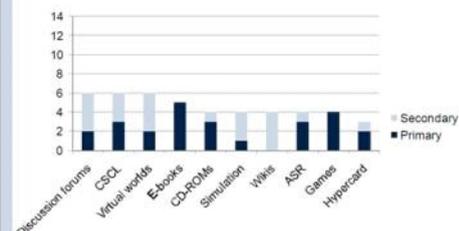
## Mapping the research: Results

### • Studies by phase of education and technology (n = 97)



## Mapping the research: Results

### • Studies by phase of education and technology (n = 97)



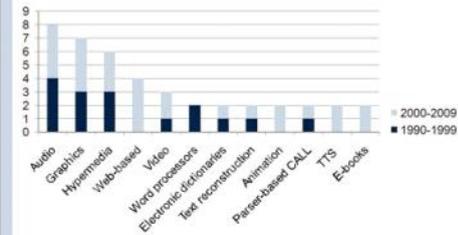
# Systematic Review of Vocabulary CALL

## In-depth review: Method

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

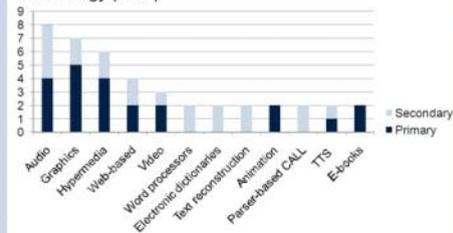
## Mapping the research: Results

### Vocabulary studies by year and technology (n=25)



## Mapping the research: Results

### Vocabulary studies by phase of education and technology (n=25)



## In-Depth Review: Results

- Included studies**
  - 12 studies met the inclusion criteria
  - 8 studies met the weight of evidence criteria (Medium or High for contribution to either review question)
- Excluded studies**
  - 4 studies failed to meet the weight of evidence criteria (Low for contribution to both review questions)
- Reasons**
  - Method not detailed
  - Groups not matched
  - Pre-test scores not accounted for in analysis
  - Small scale / short-term
  - Little data collected / small selection of data presented
  - No inter-rater reliability
  - Researcher intervention

## In-Depth Review: Background

- Vocabulary knowledge**
  - Form: spoken, written, word parts
  - Meaning: form and meaning, concept and referents, associations
  - Use: grammatical functions, collocations, constraints on use (register, freq) (Nation, 2001)
- Ideal psychological conditions for vocabulary learning**
  - Noticing
  - Comprehension
  - Retrieval
  - Generative use (Nation, 2001)
- Balanced language curriculum**
  - Meaning focused input >> Incidental contextualised learning
  - Meaning focused output >> Incidental contextualised learning
  - Language-focused learning >> Intentional decontextualised learning
  - Fluency development >> Familiar vocabulary (Nation, 2009)

## In-Depth Review: Results - Overview

Study	Technology	Phase	In context	Theory	Method
Kim and Gilman (2008)	Web-based, Multimedia, Graphics, Audio	S	No	Cognitive theory of multimedia learning, which combines: Dual coding theory, Cognitive load theory, and Constructivist learning theory	Quant
Lu (2008)	Text messaging	S	No	Cognitive theory, "spacing effect"	Mixed
Nakata (2008)	Adaptive systems	S	No	Cognitive theory, "spacing effect", Retrieval, Reactivation theory	Mixed
O'Hara and Pritchard (2008)	Hypermedia	S	No	Not indicated	Mixed
Proctor et al (2007)	Web-based, Web-publishing, Hypermedia, Multimedia, TTS	P	Yes	Apprenticeship model, Reciprocal teaching, Universal Design for Learning (UDI)	Mixed
Silverman and Hines (2009)	Multimedia, Video	P	No	Cognitive theory, Dual-coding theory, Theory of synergy	Quant
Yun et al. (2008)	Web-based	S	No	Cognitive theory, Recognition/recall, Implicit/explicit feedback	Quant
Zhang et al. (2007)	Discussion forums	S	Yes	Not indicated	Mixed

# Systematic Review of Vocabulary CALL

**In-Depth Review: Results - Effectiveness**  
**Decontextualised vocabulary learning**

**Vocabulary knowledge: Concept and Associations**

- **O'Hara and Pritchard (2008)** (Lower secondary)
  - Compared the effects of (1) a hypermedia (PowerPoint) project (N=20) and (2) a pen-and-paper project (N=20) on acquisition of topic-related vocabulary
  - **Effectiveness:**
    - Students who completed the hypermedia projects improved more on an index card completion task
  - **Insights:**
    - Creating multimedia slides helps students remember meaning
    - Students had 'sophisticated perceptions related to the use of hypermedia'

**India:** Agriculture, Ancient, Artifact, Geography, Caste, Civilization, Culture, Division of Labour, Government, Religion

**Digestion:** Carbohydrate, Enzyme, Esophagus, Intestine, Absorption, Digestion, Nutrition, Peristalsis, Salivation, System

**In-Depth Review: Results - Effectiveness**  
**Decontextualised vocabulary learning**

**Psychological conditions for vocabulary learning**

- **Comprehension**
  - **Definitions using actions, objects, pictures or diagrams**
    - **Dual coding theory (Paivio and Desrochers, 1981)**
  - **Silverman and Hines (2009)** (Early primary)
    - The topic 'habitat' was taught through a series of books
    - Experimental group: Vocabulary illustrated through video clips
    - DVs: (1) target vocabulary, (2) general vocabulary (Peabody Picture Vocabulary Test), (3) content knowledge
    - **Effectiveness:**
      - Both NS and ELLs who worked with video improved more on vocabulary tests (no differences for content knowledge)
      - Video narrowed the gap between NS and ELLs

- **Kim and Gilman (2008)** (Middle secondary)
  - **Effectiveness:**
    - Not all media are the same
    - Graphics support vocabulary acquisition
    - More media are not necessarily better
    - Cognitive load theory (Sweller et al. 1998)
    - Constructivist learning theory (Novak, 1998; Vygotsky, 1978)
  - **Insights:**
    - No difference in attitudes

**In-Depth Review: Results - Effectiveness**  
**Decontextualised vocabulary learning**

**Psychological conditions for vocabulary learning**

- **Retrieval**
  - **Recognition/recall**
    - **Yun et al. (2008)** (Upper secondary)
      - IVs: (1) Multiple choice/Constructed response (2) implicit/explicit feedback
      - DVs: (1) Recall (define) (2) Transfer (generate sentence)
      - **Effectiveness:**
        - Students in the constructed response condition performed better
        - Students in the explicit feedback condition performed better

**In-Depth Review: Results - Effectiveness**  
**Decontextualised vocabulary learning**

**Yun et al. (2008)**

**In-Depth Review: Results - Effectiveness**  
**Decontextualised vocabulary learning**

**Yun et al. (2008)**

# Systematic Review of Vocabulary CALL

## In-Depth Review: Results - Effectiveness

### Decontextualised vocabulary learning

#### Psychological conditions for vocabulary learning

##### Retrieval

###### Spaced learning

- **Lu (2008)** (Upper secondary)
  - Compared (1) bite-sized text message lessons spaced through the day with (2) pen-and-paper instruction, i.e. list presentation
  - Pre-test: English-Chinese; Post-test: English-Chinese
  - **Effectiveness:**
    - Those who received text messages improved more, but this advantage was not retained at post-test
  - **Insights:**
    - Students appreciated the bite-sized lessons
    - The games available on mobile phones may distract students from lessons
    - Students employed positive learning strategies – one constructed here own sentences and sent them back for feedback

>> **autonomous generative use**

## In-Depth Review: Results - Effectiveness

### Decontextualised vocabulary learning

#### Psychological conditions for vocabulary learning

##### Retrieval

###### Spaced learning

- **Nakata (2008)** (Secondary – 6<sup>th</sup> form)
  - Compared (1) computer-controlled sequencing (Low-First Method), (2) flash cards, and (3) list presentation
  - Pre-test: English-Japanese; Post-test: Japanese-English
  - **Effectiveness:**
    - Found an advantage for computer-controlled sequencing and flash cards over lists
    - But, no difference between computer-controlled sequencing and flash card
  - **Insights:**
    - Work on the PC provided students most satisfaction, was most enjoyable and least boring, next came use of flash cards
    - PC group wanted paper

## In-Depth Review: Results - Effectiveness

### Contextualised vocabulary learning

#### Meaning-Focused Input

##### Proctor et al. (2007) (Upper primary)

- Universal Literacy Environment (ULE) with bilingual coach avatar
  - Pre-reading: Power words and personal glossary
  - Within-reading: Expert models, strategy prompts, think-alouds and hints.
  - Post-reading: Re-tell with images as prompts
- IV: English Language Learner (N=16) vs. Native speaker (N=14) N
- DVs: (1) Vocabulary (Gates MacGintie), (2) Reading comprehension (Gates MacGintie), (3) Digital feature use
- **Effectiveness:**
  - Neither ELLs nor NS made statistically significant gains in vocabulary or reading comprehension
- **Insights:**
  - No difference in feature use between ELLs and NS
  - ELLs and less proficient NS made more use of hints
  - Those who used hints more made greater gains in vocabulary

## In-Depth Review: Results - Effectiveness

### Contextualised vocabulary learning

#### Meaning-focused input/output

##### Zhang et al. (2007) (Upper secondary)

- Investigated the effects of participating in online discussion forums, with and without teacher support, on students' linguistic knowledge and skills and critical thinking.
- IV: (1) traditional classroom (N=18), (2) traditional classroom plus online discussion after class (N=18), (3) traditional classroom plus online discussion after class with teacher support (N=18)
- **Effectiveness:**
  - No differences were found between the experimental groups and the control group which did not participate in the online activities on any of the measures
- **Insights:**
  - Students who received teacher support thought the online discussions were more beneficial than those who did not
  - Students who received teacher support were more likely to check messages before posting them
  - Students in the control group spent more time memorizing vocabulary

## In-Depth Review: Conclusion

#### Vocabulary knowledge

- Hypermedia helps learners make associations

#### Psychological conditions

- Comprehension
  - Negotiation:
    - No evidence that participating in discussion forums promotes vocabulary acquisition
  - Definition:
    - Video and graphics promote vocabulary acquisition
    - More media are not necessarily better
- Retrieval
  - Open response items are better than MCQs
  - Explicit feedback is better than implicit feedback
  - Spacing learning and repetitions is beneficial
- Generative use
  - Students will autonomously engage in generative use of vocabulary

## Conclusion

- There is positive evidence which should motivate teachers
- However, results could be expected given established psychological principles
- Are such studies necessary to motivate teachers to use CALL?
- Where is the dividing line between research and R&D in the field of CALL?

**Thank You!  
&  
Questions?**