

A Review of Computer-Based Instruction Literature and Practice Recommendations for Staff Training



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Introduction

- Computer-based instruction (CBI) has become more commonly utilized.
 - Accessible
 - No trainer needed
- Johnson and Rubin (2011) reviewed the research on CBI and provided recommendations for using CBI effectively.
 - The purpose of our systematic literature review was to extend their work.

Method

- Keyword search through PsychINFO (1/2011 to 12/2016)
 - Computer *OR* Web *AND* based training *OR* aided training *OR* based instruction *OR* assisted training
 - Total of 798 articles**
- Inclusionary criteria:
 - DV: Observable and measurable skill directly taught in the CBI
 - IV: CBI compared to another method *OR* component comparison within CBI
 - Total of 50 articles (51 experiments)**
- Variables recorded:
 - Skill(s) taught
 - Characteristics of participants trained
 - Effectiveness of training
- Interobserver Agreement
 - Three independent observers
 - 90.1% IOA across 35% of all articles

Results

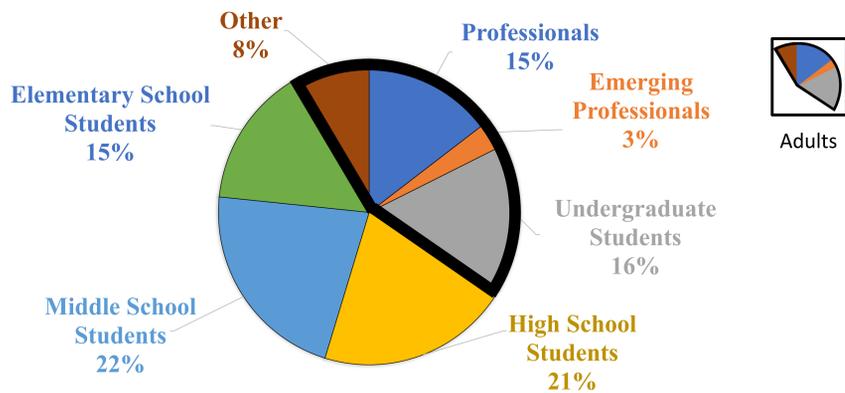


Figure 1. Characteristics of participants (N=10,649) trained

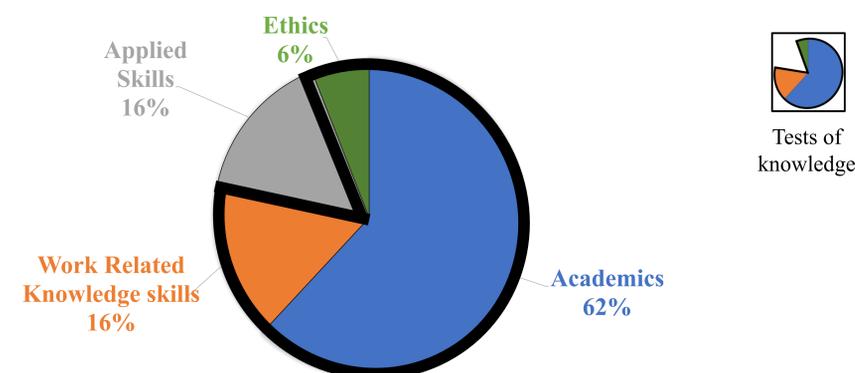


Figure 2. Skills taught in the 51 experiments

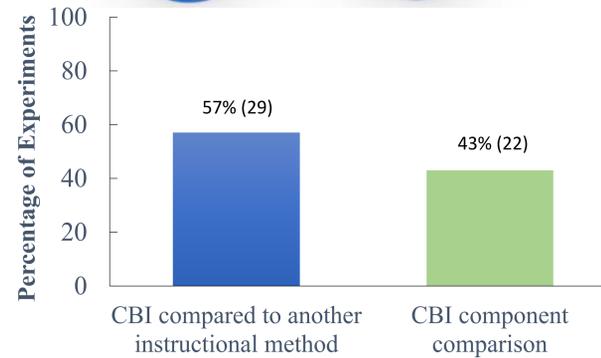


Figure 3. Types of comparisons found in the literature since 1/2011

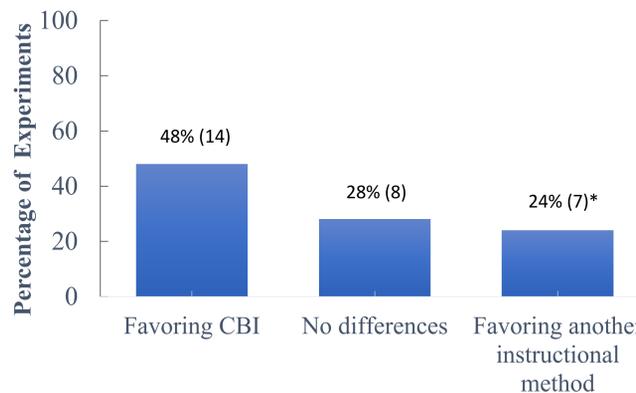


Figure 4. Results of comparisons between CBI and other instructional methods

Instructional Methods:	N (%)
Traditional Teaching	
o Academics	14
o Work related knowledge skills	(48%)* ¹
o Ethics	4 (14%)* ¹
o Applied skills	3 (10%)
	1 (3%)* ¹
Behavioral Skills Training (BST)	
o Applied skills	3 (10%)* ³
Paper-based	
o Applied skills	1 (3%)
Augmented Reality	
o Academic skills	1 (3%)
Video	
o Applied skills	1 (3%)* ¹
iPod/iPad	
o Academic	1 (3%)
Total:	29 (100%)

Table 1. Summary of effective (favoring or equal outcomes) and ineffective* CBI considering the skills taught

Component:	Better than:	N
Multimedia:		
• Interactive pictures	• Static pictures, drawings	2
• Interactive videos	• Static pictures, no videos, non-interactive videos	3
Sequence:		
• Abstract → contextualized	• Contextualized → Abstract	1
• Overarching concept → deeper context	• Deeper context only	1
Types of examples:		
• Combination of examples and non-examples	• Examples only, nonexamples only	1
Textual:		
• Large set of exemplars with rules	• No rules, rules w/ small set of exemplars	1
• Written explanation of visuals	• Voice explanation of visuals	1
Interactive:		
• Matching	• Absence of component	1
• Simple sentences (1 concept)	• Complex sentences (3+ concepts)	1
• Multiple choice questions	• Scenarios, absence of component	2
Feedback:		
• Elaborative feedback:	• Elaborative feedback:	
o FR1 problem	o FR3 problems	1
o FR1 → FR3 problems	o FR3 → FR1 problem	1
• Corrective feedback	• Elaborative feedback	1
Pace:		
• Self-paced	• Computer paced	1

Table 2. Summary of the components favored in empirical analyses (Some articles compared multiple independent variables in one experiment).

Recommendations

Recommendations from Johnson and Rubin (2011):

- Include the following components in CBI:
 - High number of practice items
 - Practice items requiring overt responses:
 - Fill in the blank questions
 - Scripted instructional sequences
 - Auditory narration
 - Visuals and graphics
 - Incentives contingent upon specific performance

Additional emerging findings based on the results of this study:

- Include the following components in CBI:
 - Feedback:
 - FR1
 - Corrective feedback
 - Post-feedback delay
 - Self-paced
 - Combination of examples and nonexamples
 - Overarching concept → deeper context

Discussion

- Across studies, 48% of the comparisons favored CBI and another 28% found it to be equivalent over another instructional method
 - Results are in line with Johnson and Rubin (2011)
 - Effective for teaching knowledge skills
- Implications for teaching staff applied skills in behavior analysis:
 - BST and traditional teaching were more effective than CBI
- Limitations:
 - We did not use “eLearning” as a keyword, which would have caught other related articles
- Future research:
 - Continue to isolate which CBI components are necessary to produce favorable outcomes
 - Examine how to teach applied skills effectively through CBI

Selected References

- Johnson, D. A., & Rubin, S. (2011). Effectiveness of interactive computer-based instruction: A review of studies published between 1995 and 2007. *Journal of Organizational Behavior Management*, 31(1), 55-94.