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A critical examination of the relationship among research, theory, and practice: Technology and reading instruction

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ABSTRACT

Recent technological advancements have changed how literacy is perceived, and it is no longer confined to the interaction with print text. The evolving definition of literacy has been reflected in the increasing number of teachers who are incorporating technology into their reading instruction. However, less is known about the extent to which these technology-integrated instructional practices are supported by reading theories. The purpose of this study is to systematically review how technology has been implemented in reading instruction and to explore how transitions of instructional practice from traditional classrooms to digital settings have been grounded in reading theories. The present study reviewed articles published over the past twelve years in flagship practitioner journals to examine the connections and the gaps between theory and practice. Our review uncovered that technology has served in reading instruction primarily in three ways: 1) to increase reading motivation, 2) to present information in multi-modalities, and 3) to promote collaborative learning. Consistent with other domains of reading instruction, social theories were found to be the prominent theoretical bases supporting technology-integrated practices; dual-coding theory has also emerged in recent years as the theoretical basis for technology use in reading instruction. However, most of the theories were rarely referred explicitly. Implications for researchers and practitioners were provided based on the gaps between theory and practice revealed in the current review.

1. Introduction

Young children today are surrounded by digital technologies, such as mobile devices, video games, and the Internet well before they begin formal schooling. The term “digikids” (Marsh, 2005, p. 181) illustrates children’s comfort with new media as a defining characteristic of the current era. Technology, therefore, is no longer a distant but an integral part of children’s life today.

Such technological advancements in the field of literacy have prompted drastic changes in how literacy is conceptualized and taught. As Vacca, Vacca, and Mraz (2013) noted, the dynamic nature of literacy today encompasses more than constructing meaning from printed text; rather, a literate person needs to “read and write and learn with texts that have multimodal elements such as print, graphic design, audio, video, gesture, and nonstop interaction” (p. 33). Plester and Wood (2009) also claimed that literacy in a digital era should be viewed as “the ability to decode information in various orthographic formats, including digital media, to make and take meaning from it, and to encode information into those formats to communicate ideas to others” (p.1109). As such, reading in modern society involves interacting with both print and non-print forms of texts that has substantially expanded the single printed, paper-

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based medium in the past few decades.

Given that students need to develop new literacy skills needed in the digital age, [Biancarosa and Griffiths \(2012\)](#) argued that we must address *how to transform* reading instruction to meet such changing demands. For one thing, researchers, teachers and administrators have been adopting technology as a tool for a wide range of reading skills such as fluency, vocabulary, and reading comprehension, so teachers are expected to incorporate such tools into their reading instruction. While digital texts allow teachers to select and modify the content and layout of a text more flexibly to meet individual needs of students ([Biancarosa & Griffiths, 2012](#)), teachers are also faced with the challenge of helping students “learn how to learn” new technologies ([Vacca et al., 2013](#), p. 14).

As ideas of what it means to be literate and how reading should be instructed in the digital era evolve, it is critical for educators to draw upon theoretical support when making decisions about what technology to use and how to effectively integrate it into the classrooms. Theories are fundamental to classroom practice ([Alvermann, Unrau, & Ruddell, 2013](#)). [Goodson \(2010\)](#) considered theory and practice as “two sides of the same coin” (p. 37): theory would not exist without practice while practice without theory would be meaningless and undefined. The teachers' repertoire of instructional skills could be expanded when they are aware of the diverse range of theories guiding their practice. When teachers are aware of the theoretical underpinnings of instructional practices, they are more able to strategically choose and modify interventions to accommodate the diverse needs of their students, thus optimizing their instructional effectiveness ([Tracey & Morrow, 2006](#)). By the same token, it is particularly critical for literacy researchers and practitioners to monitor how current educational practices are supported and can be further improved through the understanding of theories ([Unrau & Alvermann, 2013](#)).

2. Background

2.1. Major reading theories

Over the past few decades, multiple reading theories have been formulated and examined (for reviews, see, [Alvermann et al., 2013](#); [Samuels & Kamil, 2002](#); [Tracey & Morrow, 2006](#)). In the present review, we will focus on major theories identified by the International Literacy Association (ILA) as the most influential in guiding reading research and practice over the past two decades ([Alvermann et al., 2013](#)). International Literacy Association (ILA), which has approximately 300,000 members from 78 countries worldwide, is the preeminent international professional organization for reading instruction ([ILA, 2017](#)). The theories identified by the International Literacy Association are diverse, comprehensive, and inclusive of both cognitive and socially-oriented theories. The primary theories identified by ILA and included in this study are: information processing theories, four processor theory, psycholinguistics theory, schema theory, social constructionism, transactional theory, simple view of reading, dual-coding theory, socio-cultural perspective, sociocognitive theory, structuralism, reading motivation theory, and critical literacy theory. Brief descriptions of the theories are provided below.

2.1.1. Schema theory

Schema theory accounts for how readers comprehend, learn, and remember ideas in a text. A reader's schema is “organized knowledge of world” ([Anderson, 2013](#), p. 476), and the connections formed in the schema play a key role in the reader's comprehension process. Schema theory postulates that readers are more able to comprehend and remember the new information if their schema is activated, thus establishing connections between the new information and the reader's schema. Since each reader's schema is built upon their individual cultures and experiences, it is important for the teachers to activate student's prior knowledge so that they are able to make meaningful connections with the text.

2.1.2. Psycholinguistic theory

Psycholinguistic theory views reading as a guessing and inferencing process where readers make predictions as they read texts and try to construct meaning. The errors readers make are viewed as keys to understand the problems they encounter in reading. Both schema theory and psycholinguistic theory share the central belief of constructivism and emphasize the active role of readers in the reading process ([Unrau & Alvermann, 2013](#)).

2.1.3. Reading motivation theory

Reading motivation is defined by [Guthrie and Wigfield \(2000\)](#) as “the individual's personal goals, values, and beliefs with regard to the topics, processes, and outcomes of reading” (p. 405). It is a multifaceted construct that includes: 1) goals for reading, or the purpose for engaging in reading; 2) intrinsic reading motivation, including curiosity, involvement, and preference for challenge; 3) extrinsic reading motivation, which is usually associated with the desire of completing a task for external recognition rather than inherent enjoyment; 4) self-efficacy, which refers to a person's judgment of their own reading capabilities; and 5) social motivation for reading, which concerns individual's interpersonal and community activities. [Guthrie and Wigfield's \(2000\)](#) engagement theory believes that engaged reading, which occurs when an individual reads not only because they *can* but also because they are *motivated*, is strongly associated with reading achievement.

2.1.4. Dual-coding theory (DCT)

DCT was originally developed to describe the verbal and non-verbal effects of input on memory, and it has been extended to encompass the reading process ([Sadovski & Paivio, 2007](#)). A basic assumption of DCT is that all mental representations are retained in two systems (codes): the verbal code and the nonverbal code. Based on this assumption, DCT believes that texts that are dually

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