ERD 2017
Education, Reflection, Development, Fifth Edition

DEVELOPING PEDAGOGICAL CONTENT KNOWLEDGE AND STRENGTHENING PHONOLOGICAL REPRESENTATIONS AMONG EFL TEACHER TRAINEES

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Abstract

This article is concerned with the linguistic aspects of consolidated pedagogical teacher content knowledge that may set the stage for foreign language teacher trainees from L1 consonantal-based orthographies to more effectively teach reading in a vowel-based L2 deep orthography such as English. In accordance with the Linguistic Affiliation Hypothesis, and the Linguistic Phonological and Orthographic Proximity Hypothesis, English foreign language teacher trainees from L1 consonantal-based orthographies may have incomplete or low quality novel L2 phoneme phonological representations as described in the Phonological Distinctness Hypothesis and the Lexical Restructuring Model. These phonological representations are often good enough for accurate reading and speaking, yet, the teacher trainees may need explicit metalinguistic instruction on developing higher quality phonological representations of novel L2 vowel phonemes to more effectively teach reading and spelling in English. Foreign language teacher education programs need to include teacher reading-related content knowledge and language-specific content knowledge in relation to the specific L1 orthographies of the teacher trainee population and of their learners. Meta-linguistic awareness may need to be developed, fine-tuned and stabilized for distinct L2 novel vowel phonological representations not found in the L1 linguistic mental lexicon of teacher trainees. These developing metalinguistic awareness skills and the resulting consolidated teacher trainee pedagogical reading-related teacher content knowledge for teaching reading and spelling effectively in English may improve learner reading outcomes.

1. Introduction

Teacher education programs bear an enormous responsibility in the initial preparation of a teacher trainee's developing pedagogical reading-related content knowledge. L1 reading research over the past few decades has grown vastly (Adams, 1990; Chall, 1996; Snow, Griffin, & Burns, 2007; National Reading Panel, 2000; Stanovich, 2000), with research showing teacher content knowledge as an essential element of successful reading acquisition (Moats, 1994; 2009). Yet, teacher preparedness has not necessarily evolved along with the recent scientific-based evidence necessary to prepare reading teachers (Al Otaiba, Lake, Scarborough, Allor, & Carreker, 2016). This research-practice divide (Spear-Swerling, 2007), a 'failure to cultivate a scientific ethos' as Seidenberg (2017) writes, results in lost opportunities for recent research to facilitate and to further understanding and practice in teaching beginning reading. Teacher educators in certain research settings exhibit sometimes-deficient knowledge about linguistic constructs, which is referred to as the 'Peter Effect' in the literature (Malatesha Joshi, Binks, Hougen, Dahlgren, Ocker-Dean, & Smith, 2009; Binks-Cantrell, Washburn, Joshi, & Hougen, 2012). Many teachers in the field and in training are also inadequately prepared and perform below minimum standards (Spear-Swerling, Brucker & Alfano, 2005) revealing a lack of understanding concerning the basic language constructs needed to teach reading (Bos, Mather, Dickson, Podhajski & Chard, 2001; Moats, 1994; 2009). While empirical research to date suggests a general association between teacher knowledge, teacher practice and student reading growth (Moats & Foorman, 2003), only a small number of studies have linked thus far the specific relationship between these constructs (McCutchen, Abbott, Green, Beretva, Cox, Potter, & Gray, 2002; McCutchen, Green, Abbott & Sanders, 2009; Piasta, Connor, Fishman, & Morrison, 2009; Podhajski, Mather, Nathan, & Sammons, 2009) so to characterize, inform and advance teacher education preparedness.

Despite the lack of a conclusive body of research, teacher educators need to move forward their teacher trainee programs which focus on pedagogical reading-related teacher content knowledge and application of this knowledge in practice. Moats asserts that teachers need to understand the depth of the English orthography and the linguistic properties of the written system to teach word recognition to their pupils (2014). A body of teacher research-based content knowledge and practice standards (Moats, Carreker, Davis, Meisel, Spear-Swerling, & Wilson, 2010) along with knowledge of English language structures (Snow, et al 1998) and knowledge about relevant beginning reading theories to guide instruction and intervention, which includes dynamic collaborative problem solving skills and guided practical experience are essential elements of a teacher education program as a bridge over the research-practice divide in L1 settings (Al Otaiba, et al 2016).

EFL teacher education programs across Israel have only recently begun to independently address evidence-based research and the adaptation of their curriculums for teaching beginning English (Goldfus, 2012). The Israeli English National Curriculum (Ministry of Education, 2013) defines the educational benchmarks for pupils beginning reading acquisition. While the pre-foundation level recognizes the importance of phonological awareness, the textbooks do not reflect research-based evidence and lack activities to strengthen phonological awareness tasks (Russak, 2013). Furthermore, the pre-foundation benchmarks lack the L1 language-specific knowledge for Israeli EFL teachers and learners, and lacks linkage to a set of teacher reading-related content knowledge for effective pupil reading outcomes. Israeli EFL teachers showed weak teacher content knowledge of English orthography, (Goldfus, 2012; Roffman,

2012; Kahn-Horwitz, 2015, 2016) mirroring L1 research results. If teachers cannot explain the linguistic aspects of word recognition and spelling, they themselves may have difficulty with these skills, and as a result effective teaching of beginning reading and spelling will be less than adequate (Moats, 2014; Kahn-Horwitz, 2016). L2 research highlights also language-specific difficulties which were noted for Hebrew and Arabic L1 speakers in recent studies (Russak & Kahn-Horwitz; 2015; Russak, 2013; Russak & Saiegh-Haddad, 2011; Russak & Saiegh-Haddad, 2017).

English, an opaque complex orthography (Shankweiler & Fowler, 2004) is known for having more complex phoneme-grapheme and grapheme-phoneme relationships in comparison to other orthographies and is known to be more difficult to acquire in comparison to orthographies with less intricate sound-letter relationships (Frost, 2005). English has about 15 vowel combinations, along with complex syllabic and morphological knowledge needed for efficient word recognition (Frost, 2005; Shankweiler & Fowler, 2004). The production of vowels is very inconsistent across the English vocabulary (Goswami, 2000a). Hebrew and Arabic are consonantal orthographies read from right to left. Both orthographies have several different novel consonant phonemes in comparison to English. In addition, both orthographies have two written forms, pointed versions with vowels being represented by diacritical marks which are used initially to teach L1 reading and unpointed versions that eventually drop the diacritical marks in Hebrew and which are mostly dropped in Arabic after a few years of L1 reading instruction. Hebrew has relatively simple syllable structures; its 5 vowel sounds (Most, Amir, &Tobin, 2000) do not have a long-short division (Frost, 2005; Geva, Wade-Wooly, & Shany, 1997). Arabic as a diglossic language owns three short vowels and 3 long vowels as compared to the English writing system and has linguistic differences between spoken Arabic and Standard Arabic (Fender, 2008).

Koda (2007) refers to L2 reading as cross-linguistic in nature since it includes at least two languages that can facilitate or interfere in the L2 reading process. This article will discuss the issues affecting the developing reading-related pedagogical content knowledge and the developing phonological representations needed for successful teaching of L2 beginning reading with teacher trainees from L1 consonantal alphabets. There are several important concepts for teacher educators and teacher trainees to understand concerning the linguistic differences across languages. Understanding the interaction between universal features and the language-specific features of phonological awareness in relation to the mother and target languages and understanding how this information will transfer will 'create unique issues for learning and instruction' (Grabe, 2009:109).

2. The Role of Phonology in Reading Acquisition

Besides carrying semantic meaning, spoken words are comprised of phonological units that can be broken down and segmented into smaller units of speech that are named syllables and phonemes, and morphemes, which are smaller units of meanings that gain semantic meaning as a joint unit (Shankweiler & Fowler, 2004). Phonemes are 'abstract sounds, or mental images of sounds that are part of an unconscious linguistic system' and are found in our mental lexicon (Birch, 2015:64). There is increasing agreement today of the importance of early awareness of the connections of phonological processes for orthographic learning and orthographic representations as a critical element in beginning reading and spelling (National Reading Panel, 2000; Snow, Burns, & Griffin, 1998). Phonological awareness is seen as enabling learners

to be better at learning to read. Another interpretation of this causal relationship between phonological awareness and successful reading is that, it is the process of learning to read, through the orthographic writing system instruction that fine-tunes phonemic awareness (Ehri, 1989; Morais, 1991). Other researchers contend that it might be that reading development improves a child's ability to perform phonological awareness tasks by exposure to orthographic information (Castle & Coltheart, 2004). There are researchers that suggest that phonemic awareness exists only in relation to its connection to its grapheme representation (Hatcher et al. 1994; Byrne & Fielding-Barnsley, 1991; Ehri & Soffer, 1999, as cited in Castles & Coltheart, 2004). Whether utilizing a dual-route model of reading (Colheart, Rastle, Perry, Landon & Ziegler, 2001) or a connectionist model of reading (Seidenberg & McClelland, 1989) as a lens to reading acquisition, both models acknowledge the strength of the phonological representations for word recognition.

The quality of these lexical representations will depend on the quality of the phonological representations and the efficiency of reading and spelling (Elbro, 1996; Goswami, 2000). Research has shown that successful acquisition of phonological awareness skills is dependent on distinct phonological representations of each of the sounds that make up a spoken word. It has been found that the quality of phonological representations is responsible for differences in phonological awareness skills (Elbro, 1996; Goswami, 2000).   Phonological processing research has been divided into three main directions. The first, phonological awareness, focuses on spoken language processing, the second, on phonological recoding of graphemes to phonemes for word recognition and third, a process of phonetic recoding of words in the mental lexicon (Castles & Coltheart, 2004). The mental lexicon stores and organizes words according to their phonological features, as these features become more distinctive (Anthony, Williams, Aghara, Dunkelberger, Novak, & Mukherjee, 2010) The higher quality lexical information stored, the easier its retrieval access from working memory (Perfetti, 2007). Oral language and written language are dependent on phonological processing skills. Skills that include 'articulation, speech perception, phonological awareness and phonological memory span, etc'. The above-mentioned skills share the need for quality phonological representations of words (Anthony et al. 2010:970). This author contends that the importance of phonological representations of phonemes is an essential element of any theory of reading acquisition and hypothesis of phonemic awareness on the reading process. This is the emphasis of the argument presented.

3.   Universal Aspects of Phonological Awareness for Reading Acquisition

Awareness of the phonemes of the target language, awareness of print and the relationship between the phonemes and graphemes, vocabulary input and output, the decoding and encoding of words are all basic literacy skills for reading comprehension (National Reading Panel, 2000). Reading L1 research over the past few decades emphasizes phonological processing skills as one of the fundamental components for successful reading acquisition of children and adults (Adams, 1990; National Reading Panel, 2000) specifically linking the importance of phonemic awareness in beginning reading, as well as highlighting the mutual relationship between reading and spelling (Moats, 2005; 2009; Moats & Foorman, 2003) irrespective of the depth of the orthography being studied (Ziegler & Goswami, 2006).

Phonological awareness is a blanket term for the understanding that units of oral language can be stored, accessed, and manipulated. The possible actions that can be taken on a spoken word include the rhyming of words, segmenting a word into syllables or onset and rime, segmenting into its individual phonemic units, blending a word from individual phonemes or deleting phonemes, substituting phonemes or adding phonemes to or from a word (Adams, 1990). These skills are developmental in nature and develop from more basic actions which are more intuitive to more complex actions that require metalinguistic awareness and explicit instruction for successful completion. Phonemic awareness demands the highest phonological sensitivity and is a task that rarely arises naturally, and as such, explicit instruction should be made available by focusing on the sub-lexical structure of spoken words (Fowler, 1991; Shankweiler & Fowler, 2004). Phonological awareness skills and reading have been shown in research to have a mutual relationship, and phonemic awareness has been shown to be fine-tuned by the orthographic representations of these spoken words in the process of teaching beginning reading. The difficulty in isolating phonemes stems from the fact that spoken language is co-articulated. As we pronounce a word, the articulators are already planning the next sound, and the delineation of where one phoneme begins and one ends is not clear. This co-articulation as a result, does not allow for a speaker to be able to hear and distinguish individual phonemes within a spoken word. The importance of this concept for teacher trainees will be developed later in this article.

General exposure to an orthographic writing system might not necessarily encourage phonemic awareness; thus, explicit instruction concerning the structure of spoken words has been shown to be an essential element of a reading program (Adams, 1990; National Reading Panel, 2000). Once basic phonemic awareness has developed, then exposure to the written orthography of English may very well further develop and refine the skill (Shankweiler & Fowler, 2004). Phonological awareness has been shown to be a crucial factor in reading development in additional languages so far studied (Genesee, Geva, Dressler & Kamil, 2006). Phonological awareness also transfers between languages and can predict successful reading acquisition in bi-lingual children, thus supporting its important role in reading (Koda, 2008; Saiegh-Haddad & Geva 2008). As such, phonological awareness can be a reliable predictor of additional language reading difficulties (Geva & Yaghoub-Zadeh, 2006).

4. Language-Specific Aspects of Phonological Awareness for Reading Acquisition

There are several important factors influencing phonological awareness that may affect developing phonological awareness and reading acquisition of learners from alphabetic orthographies which are language-specific to a writing system whether learning to read in the L1 or the L2. Firstly, the orthographic depth of a specific writing system and the complexity and access of linguistic language structures might affect the rate of phonological awareness development (Ziegler & Goswami, 2006). For example, English has complex syllable structures, and has one-to-many phoneme-grapheme correspondences, and as a result, its depth is considered opaque. Secondly, phonological awareness as it relates to reading acquisition may be influenced by the linguistic gap between L1 and L2 phonemes, (Wade-Woolley & Geva, 2000; Wang & Geva, 2003; Russak & Saiegh-Haddad, 2011). The Linguistic Affiliation Hypothesis, focuses on a learner's 'degree of familiarity with the phonological structure of the target language' and its accessibility by the learner (Russak & Saiegh-Haddad, 2011:429). In the L2, this hypothesis relates to the familiarity of a

specific phoneme, especially if the L2 phoneme is novel. Sub-syllable structure of syllables in different languages and the prominence of the target phoneme within a syllable can influence phonological awareness. Recent psycholinguistic studies, reveal the once thought universal feature across languages of a syllable known as a consonant-vowel/consonant division, (frequently referred to as onset and rime), is language-specific and not universal. For example, in Hebrew, (Russak & Saiegh-Haddad, 2011; Saiegh-Haddad et al 2010; Share & Blum, 2005) and in Arabic research (Saiegh-Haddad, 2003, 2004, 2007), a cohesiveness was observed in isolation tasks of the initial consonant followed by a vowel within a syllable, suggesting language-specific constraints of a consonantal alphabet language. As a result, suggesting 'an alternative internal hierarchical structure to the syllable' which is dependent on the syllable structure and orthography of the specific language (Russak-Saiegh-Haddad, 2017:4).

L2 English readers must deal with interference from their L1, their incomplete linguistic knowledge of English and their tendency to fall back to low-level phonological and orthographic processing strategies that are better suited for their L1 and not their L2 (Birch, 2015). In addition, for L2 acquisition, cross-linguistic studies of 'typographically diverse' first languages reveal the unique impact of prior literacy experiences on second language reading development of adult readers (Koda, 2008:71; Birch, 2015). It appears that EFL learners are as challenged as L1 learners of English at best (Birch, 2015), and according to research in Israel, researchers suggest that the challenges for EFL learners to master the English orthography are even greater (Russak & Kahn-Horwitz, 2015). Thus, taking a cross-linguistic perspective, according to the Linguistic Phonological and Orthographic Proximity Hypothesis an additional language might not only facilitate certain aspects of reading acquisition but might also delay and interfere in developing accurate and stable phonological representations of the novel phonemes needed for beginning reading and spelling of English as an additional language (Kahn-Horwitz, Schwartz, & Share, 2011).

5.   Developing Phonological Representations

Phonological representations are the heart and soul of words. A phonological representation of a sound or a word 'holds the speech sound information of spoken words' (Anthony, et al 2010: 970). Phonological representations are constructed from distinct linguistic features which uniquely differentiate one sound from another (RAMA, 2013). When children acquire their L1, they gradually learn more and more spoken words which are added to their mental lexicon. At first these words are stored in their gestalt form, but as a child's spoken vocabulary grows so does his or her phonological sensitivity (Anthony et al. 2010) to the distinct linguistic features of similar words. A phoneme, the smallest unit of spoken language, can be distinguished from other phonemes best by the comparison and identification between phonemes either by place of articulation or by its manner of articulation, and even maybe by its voicing.

For example, the sound /p/ is articulated by putting your lips together, and using one burst of sound that is unvoiced as compared to the sound /b/ that is articulated by putting your lips together, and using one burst of sound that is voiced. By comparing the sounds /p/ and /m/, another feature is characterized and contrasted. The vocalization of the /m/ sound is made by sending air through the nose and can be held until the breath runs out. The sound made by /f/ creates friction when air is forced when the teeth are touching the lip and the sound has a 'hissy' quality. A consonant diagraph /ch/ is a voiceless hissy burst of sound where the tongue is pulled back on the roof of the mouth as compared to /sh/ which is unvoiced also where

the tongue is pulled back on the roof of the mouth but can be held until the breath runs out (Moats & Tolman, 2009). Vowels phonemes are described in relation to the position of the tongue and the height of the tongue, and as they compare to each other (Birch, 2015). Repeated experiences with articulation output and speech input are essential for the development of accurate and clear phonological representations which are to be stored and organized in long-term memory according to their phonological features (Boada & Pennigton, 2006).

Words, that differ in only one phoneme, known as minimal pairs, help the brain develop awareness of the specific features of individual phonemes as discussed above because of their close but distinct features. As a child adds similar but different words to his or her mental lexicon, the brain's mental lexicon is forced to categorize and classify its phonological representations for words according to these distinct linguistic features (Elbro, 1996). These new linguistic categories are adapted in the mental lexicon for new phonological information as vocabulary knowledge grows, exhibiting an individual's ability to examine the spoken sounds more precisely in words, moving from a syllabic organization to phonemically organized information (Nittrouer, Studdert-Kennedy & McGowen, 1989). These linguistic refinements evolve over time from gestalt forms to specifically fine-tuned phonological representations. This process is called lexical restructuring and is based on the quality of phonological representations known as the Lexical Restructuring Model (Metsala & Walley,1998). Deficiencies in this process of manipulating the phonological representations of spoken language as hypothesized in the Phonological Distinctness Hypothesis (Elbro, 1996; Fowler, 1991; Perfetti, 2007) are a result of low-quality phonological representations. Where accurate lexical information will be easily accessed and retrieved, lower quality lexical information will be more difficult to access and retrieve (Perfetti & Hart, 2001).

As mentioned before, quality phonological representations in the L1 are important for beginning reading. These same L1 phonological representations of phonemic sounds that can be found also in the L2 are useful for learning an additional language. Research has shown that phonemic awareness can transfer from one language to another. A learner's phonological representations within his or her linguistic development is dependent on accurate and repeated speech input and articulary output (Boada & Pennington, 2006). A learner's L1 phonological inventory should be stable by the beginning of reading instruction, an English language learner on the other hand has a more difficult path to stable L2 phonological representations of novel L2 phonemes not found in the L1 learner's phonological inventory. L2 phonological representations are dependent on the amount of quality exposure and the accuracy of the representations. A L2 learner who is exposed to high quality representations will have a better chance at developing his or her own L2 phonological inventory (Saiegh-Haddad, 2003, 2007; Saiegh-Haddad, Levin, Hende & Ziv, 2011). It has been shown that high quality representation development depends on accurate representations which are modeled. Teacher trainees whose L1 is not English may have language-specific lower quality representations for these same L2 novel phonemes. As teachers of EFL, they are expected to distinguish, access, retrieve and manipulate as a part of their explicit teaching of reading and spelling so to develop their learners L2 phonological inventory.

Teacher trainees who's L1 is Hebrew or Arabic may have trouble with the novel L2 phonemes that are not part of their own L2 phonological inventory, even though they speak and read well in English for the following reasons. Arabic speakers need to develop high quality phonological representations for the

following L2 novel phonemes /p/, /g/, /v/ and Hebrew speakers need to focus on /th/ and /w/. Both native speakers of Hebrew and English will need to strength their novel L2 vowel phonemes. In addition, the effect of co-articulation prevents the identification of individual phonemes within a spoken word. The phonological awareness tasks for blending and segmentation, noted as important for reading better and the recoding and encoding of words demands stable phonological representations. Research has shown that phonemic awareness skills in literate adults declines in adulthood and adults lose their capability to segment a word into its individual sounds (Scarborough, Ehri, Olson & Fowler, 1998). Phoneme counting becomes more difficult because of the emphasis on the orthographic representations in the mental lexicon as beginning reading and spelling is taught. Shankweiler & Fowler (2004) and Moats (1994) stress the need to refresh the metalinguistic awareness of teacher trainees. For these reasons noted above, EFL teacher trainees will need research driven courses that are language-specific to their needs for teach reading and spelling effectively in an EFL classroom.

The importance of phonological processes, in the eyes of this author and researcher, does not diminish the importance of orthographic processes. The flow of information between orthographic and phonological processes has empirical support with dual-route (Colheart et al, 2001) connectionist (Seidenberg & McCelland, 1989) and dynamic (Van Orden & Golddinger, 1994) models of word recognition. EFL teacher trainees pedagogical reading-related content knowledge is dependent on the stability of the complete lexical representations of words for effective beginning reading in the EFL classroom. To have complete lexical representations, stable phonological representations are needed. It is the experience of this author and teacher educator that many of the teacher trainees as L1 speakers of Arabic or Hebrew will need to be taught to recognize vowels, isolate vowel phonemes, model pronunciation of these novel phonemes and learn how to explicitly teach about them efficiently.

6.   Meta-linguistic Awareness for Teacher Trainees of Beginning Reading

This paper has dealt with the developing pedagogical reading-related content knowledge of EFL foreign language teacher trainees and the strengthening of their L2 phonological representations. L1 and L2 research has shown that teacher trainees and teachers in the field have 'low personal metalinguistic knowledge' (Purvis, McNeill & Everatt, 2016). Low metalinguistic knowledge of EFL teacher trainees might restrict evidence-based explicit teaching of reading and spelling instruction in the classroom (Shankweiler & Fowler, 2004; Washburn, Joshi, Binks-Cantrell, 2011; Spear-Swerling & Brucker, 2003; Moats & Foorman, 2003). Linguistic content knowledge facilitates a teacher's ability to instruct a learner's 'accurate and fluent reading and spelling' (Kahn-Horwitz, 2016). Yet, research thus far shows that while improvement is shown, 'it is concerning that the teaching intervention administered still did not result in high levels of pre-service knowledge at the phoneme level, the most important level utilized in reading instruction (Purvis, McNeill, & Everatt, 2016: 58; Moats, 2000). Thus, the universal and most importantly the language-specific phonological aspects of these processes are an essential component for EFL trainee teachers pedagogical reading-related content knowledge and practice in the classroom. As such, teaching reading in an additional language demands from an English foreign language teacher trainee from L1 consonantal-based orthographies fine-tuned metalinguistic awareness and expert language content knowledge so to be able to model pronunciation and explicitly instruct learners about the novel L2

phonological representations and their orthographic representations. Since it has been shown that phonological knowledge and orthographic knowledge tends to blend over time, adults tend to rely on the written spelling of a word and are less able to discriminate phonological structures of a word. Supporting the idea that these skills have become implicit skills. An EFL teacher trainee must be able to access stable novel L2 representations stored in their mental lexicon. While these same EFL teacher trainees have the fundamental capability to read quite well, they need to make sure that they can access their explicit meta-linguistic knowledge of language structure constructs to teach about beginning reading and spelling effectively (Purvis, McNeill & Everatt, 2016).

Another aspect not discussed previously is the reading-learning history of these teacher trainees as L2 learner-readers of English. It is likely that many, if not most, teacher trainees were taught using a whole language approach in both L1 and L2 reading. Birch (2015) notes that L2 readers sometimes face possible reading problems because the reading strategies they have learned to use in their L1 might not be efficient for L2 reading.

7. Conclusion

This article highlights only one aspect of pedagogical reading-related content knowledge concerning phonological development, and addresses the language-specific content-knowledge of EFL teacher trainees who are native speakers of consonantal alphabetic Hebrew and Arabic who will be teaching beginning reading and spelling to learners in an additional language. Therefore, in consideration of the above, these same stable phonological representations of novel L2 novel phonemes important to develop in L2 learners are essential for teacher trainees' effective pedagogical reading-related content knowledge and application in the EFL classroom.

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