Education Quarterly Reviews

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The Impact of Individual Differences in Cognition on L2 Learners' Reading Outcomes

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Abstract

There are a large number of factors contributing to the reading outcome diversity. Individual differences in cognition are possibly regarded as one of the most significant causes and have a predominated impact on the reading development. Individual differences, like meta-cognition and working memory, are found to have a positive correlation with L2 learners' reading outcome variety and have a profound influence on their ultimate achievement in reading to some extent.

Key Words: Individual Differences, Cognition, Meta-Cognition, Working Memory, Reading Outcomes

I. Introduction

People are likely to perform various degrees of efficiency and different levels of achievement in reading areas, not only in the first language learning but also in foreign language learning. Especially in foreign language learning, learners' reading performance and attainment vary tremendously from person to person. There are a large number of factors contributing to the reading outcome diversity, such as the quality and quantity of natural exposure, the selection of textbooks and materials, the choice of teaching approaches, effects of instruction, teachers' proficiency and dedication, social environment, family background, the application of technology, and individual differences etc. However, when it comes to accounting for the diversity of reading outcomes, individual differences in cognitive variables - despite the fact that they are not fully independent- are possibly regarded as one of the most significant contributing factors and have a predominated impact on L2 learners' reading development (Dörnyei, 2005; Ellis, 2008; Pawlak, 2012; Lightbown and Spada, 2013).

Among these factors, the influence of individual differences on reading outcomes has drawn considerable attention in literature involved in aspects of meta-cognition (Dabarera et al., 2014; Carretti, 2014; Schiff et al., 2015; Veenman, 2016; Chevalier et al., 2017; Bergey et al., 2017) and working memory capacity (Swanson et al., 2006; Baddeley, 2007; Conway et al., 2010; Dahlin, 2011; Misyak and Christiansen, 2012; Brandenburg et al., 2015; Prat et al., 2016; Friedman et al., 2017 etc.). Most of these variables in IDs are found to have a positive correlation with L2 learners' reading outcome variety and have a profound influence on their ultimate achievement in reading to some extent.

II. IDs in L2 learning

2.1 Definitions and Classifications of IDs

It is widely known that children all over the world, no matter where they are born, no matter what language they speak, no matter what their social and cultural background, can acquire the first language by a very early age and perform a high degree of similarity in the process of first language acquisition (Johnson, 2008). As Chomsky (1959) pointed out, all human beings were biologically designed to acquire language and had the potential to develop their language proficiency based on some innate universal principles (cited in Lightbown and Spada, 2013). Nevertheless, the innate competence people commonly share in reading acquisition is not always compatible with the various levels of reading outcomes, even in their native language, let alone in the second language. One possible explanation for variance in L2 learners' reading outcomes is the influence of individual differences.

Individual differences (henceforth IDs) refer to any personal characteristics or traits that mark a person differ from each other in a stable and systematic way (Dörnyei, 2005). Admittedly, such a definition seems to be rather unquestionable and reflects well the general laws of human individuality. However, experts hold different or even controversial views towards the categories of IDs. For instance, as Oxford (1992) suggested that learners' IDs could be classified into eleven elements: age, sex, motivation, anxiety, risk-taking, cooperation, competition, learning style, learning strategies, self-esteem, and tolerance of ambiguity, which were the most predominated causes in second language learning.

Another example, such as Oxford and Ehrman (1992) indicated that there were nine categories in IDs including age, gender, aptitude, motivation, anxiety, self-esteem, risk-taking, language learning styles, and tolerance of ambiguity, which were regarded as the utmost elements in IDs on L2 learning. In addition, Ehrman et al. (2003) categorized IDs as three areas: learning styles, learning strategies, and affective variables that incorporated four subcategories: anxiety, ambiguity tolerance, motivation, and self-efficacy, and also they stated that second language learners' IDs played a crucial role in predicting the ultimate attainment in language learning. Similarly, Ellis (2004) classified IDs into seven categories: motivation, learner beliefs, language aptitude, anxiety, learning style, learning strategies, and personality that was sub-categorized as tolerance of ambiguity, anxiety, risk-taking, empathy, inhibition, and self-esteem, and claimed that there was a positive correlation between IDs and language learning.

Yet Dörnyei (2005) presented another eleven elements of IDs which involved personality, aptitude, motivation, learning styles, language learning strategies, anxiety, self-esteem, creativity, willingness to communicate, and learner beliefs. More recently, Foroozesh-nia (2015) offered an ID taxonomy including cognitive styles, learning styles, learning strategies and effective factors that might comprise motivation, attitude, self-regulation, and self-efficacy. Comparing with these different categorizations of IDs, this literature revealed that the conceptualization of IDs consisted of some key variables and certain alternative factors. Take motivation as an example, and it was defined as one of the subcategories of affective factors by Ehrman et al. (2003) and Foroozesh-nia (2015), whereas it was identified as one of the core variables in IDs by Ellis (2004) and Dörnyei (2005).

2.2 The need for studying IDs in reading

Although there were some different classifications of IDs in above-mentioned literature, they all agreed with the influence of IDs on language learning to some extent. They also shared some general purposes in their studies, such as investigating the relationship between differences in human characteristics and language learning process, shedding light on the diversity of reading outcomes, predicting language learning success, and optimizing the individual potential in L2 reading, etc. However, the correlation of IDs and reading outcomes is rather complicated, and variables in IDs are more likely interconnected rather than fully independent. The interconnected variables in IDs on reading outcomes are usually classified under three broad realms: cognition, affect and conation (Afflerbach, 2016).

To some extent, these three factors in IDs may account for readers' various performance in the process of reading: from the earliest acquisition stages on up to having abilities to read to achieve self-selected and valuable

goals as adults and predict their various paths of development. These three factors in IDs may also help educators to get a better understanding of different individuals' learning outcomes in achieving particular reading-related tasks and different individuals' responses in particular reading contexts. Furthermore, these three factors in IDs may shed light on different individuals' choices of engaging in different reading behaviors, for which they may reflect themselves differently as readers and rethink the reading process in various ways. Finally, these three factors in IDs play a crucial role in helping educators to get a better grasp on how reading itself becomes a source of variability and individuation in the identity and characteristics of the individual reader (Fox and Maggioni, 2016).

Therefore, it would be quite important to investigate the aims and assumptions of IDs which may have a profound influence on learner' reading process and outcomes. The investigations of IDs probably provide instructors with the opportunities and challenges to appropriately intervene in the ways of fulfilling potential, achieving success, or equalizing rights in reading. Moreover, the investigations of IDs in reading usually help instructors to gain understandings of developmental differences of the skills and abilities needed for implementing reading processes. Through these interventions and understandings, it is more likely to achieve the utmost goals of enhancing readers' proficiency and helping struggling readers. However, it seems to be difficult to draw a conclusion on long-awaited elixir or one-size-fits-all instructions.

III. Meta-cognition and working memory on reading

3.1 Meta-cognition on reading
It appears to be somewhat complex not only in the aspects of the classifications of IDs but also in the aspects of their impact on reading processes and reading outcomes. As Artley (1981) argued that reading outcomes were possibly influenced by a combination of differences deriving from both inherited and acquired characteristics, or from both nature and nurture. This view was also shared by Strang (1961) who introduced that difference in reading emanated from internal and external factors, and from learners' interactions with their reading environments. Admittedly, the dynamics of these internal and external factors greatly impact the reading outcomes. An isolated study of these variables may not provide a better explanation to this broad outcome diversity.

Indeed, the complicated relationships between the IDs in cognitive factors and reading areas (e.g., phonemic awareness, word identification, fluency, and comprehension, etc.) have been widely discussed in the literature. Among these variables, cognitive factors in IDs in reading areas have received quite considerable attention. For instance, Veenman (2016) pointed out that meta-cognitive strategies and skills played a rather predominated role in the reading process: at the onset of a reading task, high-level meta-cognition should help readers to orientate and plan the reading assignment; during the reading, it might encourage them to monitor and select methods for processing context; at the end of the reading, meta-cognitive proficient readers could evaluate their comprehension of the reading task and recapitulate the thesis statements, arguments and conclusions.

As Dabarera et al. (2014) pointed out, there was a positive correlation between increasing awareness of meta-cognition and the improvement of reading comprehension. In their research, they investigated the influence of instruction in meta-cognitive strategies on reading comprehension in 67 year-1 secondary L2 learners from Singapore. Their findings corroborated previous studies that instruction of meta-cognitive strategy was effective in rising-awareness of meta-cognition and was significantly related to reading comprehension achievements. Carretti (2014) also suggested that training programs emphasizing on meta-cognition could enhance learners reading comprehension. In addition, Chevalier et al. (2017) examined the relationship between meta-cognition and academic success, and their findings indicated that the application of reading strategies in meta-cognition could predict academic attainment for learners with a history of reading difficulties.

However, some experts presented another picture of the relationship between IDs in meta-cognition and academic success. For example, Bergey et al. (2017) investigated the effects of meta-cognitive strategies on reading comprehension and academic achievement for universities learners with and without a history of reading difficulties. Their study results showed there was a negative correlation between meta-cognition and academic achievement, and meta-cognition failed to predict academic success for learners with a history of reading

difficulties. When it comes to the relationship between meta-cognition and reading development, Schiff et al. (2015) claimed that the application of meta-cognitive strategies could help L2 young learners acquire early reading skills and achieve higher scores in reading tests. Thus, it might be concluded that IDs in meta-cognition have a positive influence on L2 learners reading development and outcomes.

3.2 Working memory on reading

Turning to the IDs in working memory on reading, it could be argued that working memory is highly related to L2 learners' reading development and has a positive impact on reading outcomes. Working memory in IDs can be identified as a central executive with three subcategories: a phonological loop storing information of sound, a visuospatial sketchpad storing information of vision and space, and an episodic buffer integrating information of sound, vision, and space (Baddeley, 2007). Like Swanson et al. emphasized in 2006, L2 learners' working memory abilities were somehow associated with abilities of executive processing for comprehension: learners with working memory deficits likely performed reading disabilities in word recognition and comprehension.

In addition, a study of investigating the connection between working memory and reading outcomes conducted by Dahlin (2011) revealed that individual working memory was significantly correlated to young learners' reading achievements and the training effects of working memory were found to benefit L2 learners' development of reading comprehension. More recently, Friedman et al. (2017) examined the contributing factors to reading comprehension disabilities in learners with Attention-Deficit Disorder. They demonstrated that IDs in working memory and orthographic conversion were the key elements relating to the difference of reading comprehension to ADD learners. Their findings also showed that instructions or interventions with the combination of working memory and orthographic conversion might be beneficial to the improvement of reading outcomes in ADD learners.

When it comes to the working memory in phonemic awareness, Quinn et al. reported in 2016 that phonemic awareness was related to the early reading skills development and had an obvious impact on the normal beginning reading skills acquisition. They argued that there was a casual relationship between phonemic awareness and reading development, in other words, individuals with phonemic awareness deficits were a hallmark of reading disabilities. Furthermore, the relationships between phonological awareness and reading development were possibly mediated by working memory abilities of individuals (Prat et al., 2016). Different working memory capacities could also elucidate various reading outcomes, namely a deficit in working memory was often associated with reading problems (Brandenburg et al., 2015). Thus, there was a positive correlation between IDs in working memory capacities and reading outcomes.

However, some experts, such as Conway et al. (2010) who conducted an implicit learning experiment in which sixty-four undergraduate students at Indiana University participated, argued that IDs in short-term memory or working memory had no significant influence on the relationship between word predictability and implicit learning. Analogously, like an experiment study carried out by Misyak and Christiansen in 2012, examining the association between IDs in statistical learning and comprehension, in which thirty Cornell undergraduates who were monolingual and native English speakers took part, its results revealed that there was a negative correlation between IDs in short-term memory and implicit learning, whereas a positive correlation between IDs in short-term memory and explicit learning.

Taken together, although there are quite a few controversial discussions involving the effects of meta-cognition and the individual working memory, the crucial role of IDs in reading outcomes may not be denied to some extent. More importantly, the significant influence of individual cognitive variables on the ultimate degree of attainment in reading outcomes has also been demonstrated in the aforementioned literature. Thus, it can be concluded that IDs in meta-cognition and working memory are positively related to L2 learners' reading development and outcomes, and proper interventions and instructions of meta-cognitive strategies and working memory appear to be beneficial and helpful to L2 learners' ultimate reading achievements.

IV. Conclusion

In sum, as discussed on the above-mentioned literature, the majority of variables in IDs like meta-cognition and working memory are found to have a positive correlation with L2 learners' reading outcome variety and have a profound influence on their ultimate achievement in reading to some extent. For the variable of meta-cognition in IDs, it appears to be able to predict L2 learners' eventual academic attainment and help them to acquire early reading skills and gain higher scores in reading tests. In addition, individual working memory capacities are somehow related to learners' abilities of executive processing for comprehension, that is, learners with working memory deficits likely perform reading disabilities in word recognition and comprehension whereas those with high working memory competence tend to obtain better scores in reading.

Although there is no elixir to account for all these complicated and interactive variables in IDs, there is no doubt that the investigations of relationships between IDs and reading outcomes would probably provide instructors with better understandings of L2 learners' developmental differences of the skills and abilities and final attainment. Gaining these understandings may help instructors appropriately intervene in the ways of fulfilling L2 learners' potential and achieving reading success. Thus, it is more likely to reach the utmost goals of enhancing readers' proficiency and helping struggling readers.

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