



A structural equation modeling investigation of relationships among school-aged ELs' individual difference characteristics and academic and second language outcomes



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ABSTRACT

This statistical modeling study explored the relationships between language learning strategies and reading and mathematics achievement of English learners (ELs) in the presence of mediating and intervening factors. The sample comprised 805 Grade 3–8 students in one urban school district in the United States. Final SEM models had an exceptionally good fit to the data suggesting that the hypothesized models captured well the relationships among the constructs of interest and accounted for about 54% of the variance in academic achievement, 28% to 32% in English proficiency, and 28% to 53% in strategy use. The results identified three positive, instructionally manipulable contributors to EL outcomes (metacognitive strategies, motivation, native language literacy) and two intervening effects (age, length of residence [LOR]). Whereas metacognitive strategy use appeared to be stable, cognitive strategy use declined as a function of age; memory, social, affective, and compensation strategy use declined as a function of LOR.

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1. Introduction

Due to the globalization of education, ever increasing numbers of students with low English literacy skills “represent both a quantitative and qualitative shift in the kinds of students faced by teachers” (Miller, 2009, p. 571). According to National Center for Education Statistics (NCES, 2014), for example, currently, one in nine students enrolled in the United States schools is an English learner¹ (EL). This important student population is often targeted for educational interventions and is affected by both general education policies and policies specific to language minority groups (Solórzano, 2008). Studying variables that may affect ELs' academic achievement, then, is crucial for informing practice, policy, and theory regarding instruction for ELs.

EL academic achievement research, however, rarely goes beyond data sets available through school districts, thus limiting academic achievement predictor variables to demographic and language achievement data. Such sets of predictors exclude language-related individual difference variables (e.g., language learning strategies, motivation) strongly linked to second language (L2) achievement (e.g., Masgoret &

Gardner, 2003; Plonsky, 2011; see also Dörnyei, 2005), one of the strongest predictors of EL academic outcomes (Ardasheva, Tretter, & Kinny, 2012; Solórzano, 2008). Research on language-related individual differences, on the other hand, rarely explores the relationship among such differences and EL academic achievement beyond language classrooms (for some notable exceptions see, for example, Martínez-Álvarez, Bannan, & Peters-Burton, 2012) and is most often conducted in postsecondary settings (Oxford, 1999, 2011). Further, research in this area is mostly correlational, whereas better understanding of structural relationships among language-related individual difference variables and L2 outcomes in the presence of other potentially moderating variables may better lend itself to more advanced statistical modeling techniques (Pae, 2008).

The purpose of the study reported in this paper, then, was to incorporate into statistical modeling analyses academic outcome predictors separately explored by EL academic achievement, L2 development, and language-related individual differences literature as they relate to secondary-school-aged ELs. *Language learning strategies* (LLS), defined as “specific actions consciously employed by the learner for the purpose of learning language” (Griffiths, 2007, p. 91), served as the main language-related individual difference variable of interest to this study. Thus, in pursuit of its purposes, this study developed and tested against data a statistical model in which LLS were hypothesized to enhance elementary and middle school EL students' academic achievement directly and indirectly, by means of language proficiency, in the

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¹ It is worthwhile noting that while current ELs, by definition, have low English literacy skills, former ELs—those ELs that have reached an English proficiency benchmark—perform on par or above native English speakers not only in literacy but also in mathematics and science (e.g., Ardasheva, Tretter, et al., 2012; Kim & Herman, 2009).

presence of mediating and intervening factors suggested by the literature.

2. Study background

In the paragraphs below, the main variables of interest to the present study are introduced first, beginning with LLS. Then, a hypothesized model linking the reviewed predictor (or intervening) variables (i.e., length of residence, age, language motivation, L1 literacy), mediating variables (i.e., LLS, L2 proficiency), and outcome variables (i.e., LLS, L2 proficiency, academic achievement) is described (see Fig. 1).

2.1. Language learning strategies

Although varied LLS taxonomies have been proposed in the literature (see a review by Barjesteh, Mukundan, & Vaseghi, 2014) and it could be argued that many LLS may also be described as general learning strategies, the present study adopts one of the most frequently used categorization schemas currently used in LLS research worldwide (e.g., Ardasheva & Tretter, 2012, 2013a; Fahim & Noormohammadi, 2014; Nahavandi & Mukundan, 2014), namely, that of Oxford (1990). Oxford distinguished six LLS categories: (a) *metacognitive strategies*, strategies used to plan, organize, and monitor learning; (b) *cognitive strategies*, comprehension and production strategies; (c) *memory strategies*, information storage and retrieval strategies; (d) *affective strategies*, strategies used to control motivation and emotions; (e) *social strategies*, strategies used for facilitating interaction with others; and (f) *compensation strategies*, strategies used to compensate for limitations in linguistic knowledge or production.

The results of four extensive reviews of LLS research conducted since the 1970s both in second and foreign language contexts suggested that (a) explicit strategy instruction can improve student L2 outcomes (Hassan et al., 2005; Plonsky, 2011) and (b) higher LLS use is linked to successes across varied aspects of L2 learning (e.g., vocabulary, listening, reading; Cohen & Macaro, 2007; McDonough, 1999; see also Lan & Oxford, 2003; Nahavandi & Mukundan, 2014; Peacock & Ho, 2003). Oxford (1999), for example, in synthesizing findings from just 12 studies, reported that the amount of variance in L2 proficiency accounted for by LLS ranged from 21% to 58%. Further, LLS have been associated with better academic performance in content areas such as language arts, mathematics, and science (Ardasheva & Tretter, 2013b; Martínez-Álvarez et al., 2012; Montes, 2002; see also Chamot, 2007) and with higher performance on cognitive/behavioral measures (e.g., motivation: MacIntyre & Noels, 1996; self-efficacy: Magogwe & Oliver, 2007).

Some differences in the relationship between LLS and L2 outcomes by strategy category have been reported (e.g., Oxford, 1999; Takeuchi, 1993). Dreyer and Oxford (1996), for example, found that while the overall LLS use accounted for about 45% of the variance in L2 proficiency,

the strongest correlations were between metacognitive strategies and a host of L2 outcomes (e.g., reading, structures; correlation range: .54–.64). Peacock and Ho (2003) found that among 50 strategies examined, only 27 had a significant positive association with L2 proficiency; 59% of these strategies were cognitive and metacognitive. Similar results were reported in Hu, Gu, Zhang, and Bai (2009). Overall, evidence suggests that, in comparison to other strategy categories, metacognitive strategies may be linked with a broader range of L2 outcomes including overall proficiency (Nisbet, Tindall, & Arroyo, 2005; Takeuchi, 1993), listening and grammar (Peacock & Ho, 2003; Takeuchi, 1993), reading (Ardasheva & Tretter, 2013b; Peacock & Ho, 2003; Schoonen, Hulstijn, & Bossers, 1998), speaking and writing (Peacock & Ho, 2003), and vocabulary knowledge (Takeuchi, 1993). In addition, empirical evidence (e.g., Gardner, Tremblay, & Masgoret, 1997; Nisbet et al., 2005) suggests that the relationship between LLS and L2 learning may be moderated by a host of individual difference variables necessitating further inquiry into the topic, in particular, using sophisticated statistical modeling techniques (such as structural equation modeling used in the present study) that allow for taking such intervening effects into consideration.

2.2. LLS and intervening effects

Investigators working under the umbrella of LLS research have discovered that several variables—potentially intervening factors—directly related to “the choice, use, or evaluation” of LLS (Oxford & Leaver, 1996, p. 227). Among these variables, researchers identified length of L2 study, age, and motivation.

2.2.1. Length of L2 study

A number of studies have documented different patterns of strategy use as a function of length of L2 study. Oxford and Nyikos (1989), for example, found that students with four years of L2 study used significantly more social strategies. Students who studied L2 for a minimum of five years used significantly more cognitive strategies. Longitudinal research (Chesterfield & Chesterfield, 1985) has suggested that learners may increase their LLS repertoires over time, progressing from more receptive (memory), to more interactive (social, affective), to more self-regularity (cognitive, metacognitive) strategies. However, results from two studies have suggested that learners with over seven years of L2 study may reach a LLS use plateau. In a study of Chinese university students with a minimum of seven years of L2 study, Nisbet et al. (2005) found that metacognitive strategies—reported by the students as being the most frequently used—significantly correlated with L2 scores ($r = .17$); correlations with other strategy categories, however, were not significant. Further, LLS accounted for only a small percent (4%) of the variance in English proficiency. Among possible explanations for the low correlations found the authors noted the influence of intervening factors.

In contrast, using statistical modeling techniques, Gardner et al. (1997) found that LLS were a negative predictor of L2 outcomes in a sample of Canadian university students with at least nine years of L2 study. One plausible explanation proposed by the authors is that longer L2 study may have contributed to transformation of strategies into unconscious processes through practice and automatization (see Cohen, 1998), thus leading to the inability of accurately assessing LLS use via self-report measures and undermining the estimation of the true LLS–L2 relationship. Alternatively, the negative relationship between LLS and L2 performance may have been due to high levels of L2 proficiency (also associated with extended length of L2 study). For instance, Gardner et al. hypothesized, whereas beginning students may still need to use a substantial number of LLS to advance their learning, more advanced students may no longer feel a need to use LLS.

2.2.2. Age

A number of studies have documented different patterns of strategy use as a function of age (e.g., Ardasheva & Tretter, 2012; Chen, 2009; Hu et al., 2009). Peacock and Ho (2003), for example, found that older

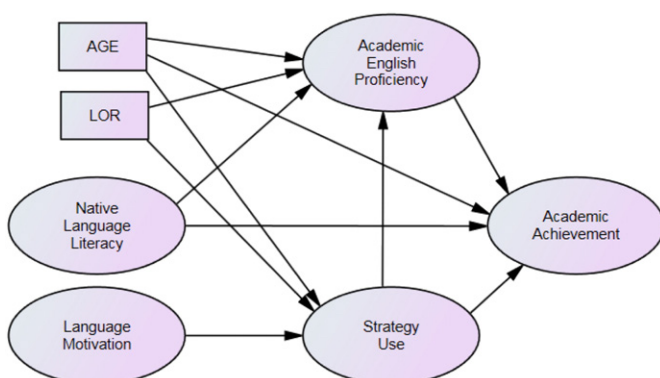


Fig. 1. A hypothesized model of LLS contributions to ELs' L2 outcomes.

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