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Self-Regulated Learning of Vocabulary in English as a Foreign Language

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Abstract
Within the framework of self-regulated learning, this study examined how motivational factors (extrinsic and intrinsic motivations) and use of learning strategies work in tandem in influencing L2 vocabulary knowledge among 230 Korean high-school students in Korea learning English as a Foreign Language (EFL). Structural Equation Modeling (SEM) analysis revealed that motivation had a significantly positive indirect effect on EFL vocabulary knowledge through the mediation of vocabulary learning strategies. Intrinsic and extrinsic motivations were positively correlated, and both were positively associated with vocabulary learning strategies as well as vocabulary knowledge. Separate SEM analyses further showed a similar pattern of an indirect effect of these two types of motivation on vocabulary knowledge via the influence of the use of learning strategies. Results are discussed in light of the importance of both intrinsic and extrinsic motivations in high-school students' English learning in the foreign language context in Korea.

Keywords: self-regulation, learning strategies, extrinsic motivation, intrinsic motivation, vocabulary, English as a Foreign Language

Introduction

Second- or foreign-language (L2) learning involves a complex conscious process of interacting with linguistic, cognitive, psychological, and sociocultural factors. To be a successful L2 learner and go through this complex process, one needs to establish goals, find appropriate ways of learning, and control one's learning processes, that is, self-regulated learning (SRL). SRL refers to the self-directive process and self-beliefs by which learners transform their mental abilities into academic skills (Zimmerman, 2008). Good self-regulated learners, compared to poor self-regulated learners, are in more proactive processes of learning in terms of setting learning goals, implementing effective strategies, monitoring progress, seeking help, and exerting effort towards and persisting in achieving their goals (Zimmerman, 2008; Zimmerman & Schunk, 2008). Good self-regulated learners are likely to be successful in their learning processes and their subsequent performance.

Although research on self-regulation in L2 learning is in its beginning stage, concepts related to self-regulation in the field of educational psychology have long influenced research of L2 learning (Dörnyei, 2005; Nakata, 2010; Tseng, Dörnyei, & Schmitt, 2006). In general, the literature consistently has shown that motivational beliefs and self-regulated use of learning strategies are critical factors closely tied to successful L2 learning (Nakata, 2010; Schmidt, Boraie, & Kassabgy, 1996). For example, Schmidt et al. (1996) found that more self-determined learners were more active language learners with respect to their use of learning strategies than were less self-determined learners. Nakata (2010) argued that intrinsic motivation helps learners become

autonomous both affectively and cognitively, which subsequently leads to successful L2 learning.

The literature has identified the impact of both motivational factors and the use of language learning strategies on L2 learning, but little attention has been given to how these factors play together within a SRL framework in explaining L2 learning, how differentially they may influence different aspects of L2 learning (e.g., reading and vocabulary), and how self-regulated language learning may be specific to a particular learning context. The last issue seems to deserve special attention. For learning in a foreign language (FL) context to be successful, learners are expected to be more self-regulated than learners in a second language context where adequate language input and opportunities for productive use of the target language are present. In other words, given typically limited exposure to and opportunities for using the target language beyond the classroom setting (Dörnyei, 1990; Tsuda & Nakata, 2013), a more conscious language-learning effort seems necessary for FL learners.

To address such a gap in the literature, we examined, within a SRL framework, how motivation and the use of learning strategies work in tandem in influencing FL vocabulary learning, focusing on adolescent learners of English as a Foreign Language (EFL) in Korea. For two major reasons we focused our attention on vocabulary knowledge. First, although plenty of studies in the L2 literature have addressed vocabulary learning (e.g., Gu & Johnson, 1996; Nassaji, 2006), few have studied it within the SRL framework. Second, vocabulary learning is ubiquitous and occurs throughout the learning of a language, which particularly seems to require strong conscious efforts and strategic learning for knowledge increment and refinement.

In the next section, we review the literature on self-regulated learning in relation to L2 learning. In particular, we present how motivation and learning strategies are intricately related to L2 learning within the framework of self-regulated learning. In the Method section, we introduce the instruments used in the study, describe the process of data collection in Korea, and explain how the data were analyzed. Structural Equation Modeling (SEM) (Kline, 2011) was the primary statistical method used to test if there was a direct and/or an indirect effect of motivation on EFL vocabulary knowledge and how intrinsic and extrinsic motivation might be differentially related to vocabulary learning strategies as well as vocabulary knowledge. Finally, results are discussed in light of the importance of both intrinsic and extrinsic motivation in high-school students' English learning in the foreign language context in Korea.

Literature Review

Self-regulated Learning

The concept of self-regulated learning has been defined and proposed in different ways based on different theoretical frameworks (e.g., social-cognitive theory, information-processing theory) (Dinsmore, Alexander, & Loughlin, 2008; Pintrich, 2000). Drawing on different constructs and mechanisms addressed in the previous literature, Pintrich (2000) proposed a general definition of self-regulated learning as "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment" (p. 453). Schraw, Crippen, and Hartley (2006) postulated that self-regulated learning comprises three major components: cognition, metacognition, and motivation. The cognition component refers to skills and strategies to learn information. The metacognition component involves skills for learners to monitor their learning processes. The motivation component includes learners' beliefs and attitude in their learning and learning capacity.

Despite those different constructs and conceptualizations that researchers have proposed in defining SRL, they seem to share two common features: systematic use of self-regulated learning strategies (cognitive and metacognitive) and motivational beliefs (Pintrich, 1999; Zimmerman, 1990; Zimmerman & Schunk, 2008). Self-regulated learning strategies refer to "actions and processes directed at acquisition of information or skills that involve agency, purpose, and instrumentality perceptions by learners" (Zimmerman, 1990, p. 5). Specifically, self-regulated learners are metacognitively and cognitively active and strategic in learning to achieve their academic goals (Pintrich & De Groot, 1990). At a metacognitive level, self-regulated learners are aware of their own learning process, and know what they need for learning and what they should do proactively for their academic achievement. They establish their learning goals, plan specifically to achieve those goals, and monitor their own learning for optimum outcomes. At a cognitive level, self-regulated learners use various learning strategies to help them understand information they have while learning and improving their knowledge.

In addition to self-regulatory strategies, SRL also ties closely to how and why learners choose a particular learning strategy, which is an indication of their motivation to learn (Zimmerman, 1990; Zimmerman & Schunk, 2008). Because learners' self-regulatory process in learning involves their conscious efforts, intellect, and time commitment, unless the resultant outcomes of their efforts

are attractive enough, they might not be sufficiently determined to regulate themselves to learn actively (Zimmerman, 1990). The literature indicates a general consensus that self-regulated learners are more motivated in their use of learning strategies by which their learning goal is more likely to be achieved (Lau & Chan, 2003; Pintrich & De Groot, 1990). In particular, Zimmerman (2008) highlighted the role of motivational constructs as precursors, mediators, concomitant outcomes of SRL, and the primary outcomes of self-regulatory learning processes. For example, he explained that highly motivated learners are more attentive, show better progress and task mastery, are persistent to learn on their own, and have greater satisfaction when they are given the opportunity to learn.

Motivational Beliefs and L2 Learning

Motivation has long been recognized as one of the most critical factors impacting L2 learning. Previous research findings generally have endorsed a close relationship between motivation and L2 proficiency and performance of various kinds (e.g., Tsuda & Nakata, 2013; Vandergrift, 2005). Different theoretical approaches have been used to address motivational influence on L2 learning. Among the seminal works, Gardner (1985), in his Socio-educational Model, defined language learning motivation as a combination of effort and desire to achieve the goal of language learning. The Socio-educational Model differentiates between two types of language-learning motivational orientations: integrative and instrumental. Integratively-oriented learners want to learn the target language so as to integrate or assimilate with the language's people and culture, whereas instrumentally-oriented learners want to study the language because of the practical benefits that language proficiency can provide, such as meeting requirements for graduation or seeking higher-paid employment. While both integrative and instrumental orientations are essential elements of successful language learning, in early research based on the Socio-educational Model, it was argued that integrative orientation was more associated with better performance in L2 (Gardner & Lambert, 1972). However, later studies showed that the relationship between orientation and L2 achievement might depend on different linguistic and cultural contexts or different definitions of orientation (Clément & Kruidenier, 1983; Dörnyei, 1990).

Although the Socio-educational Model has helped L2 researchers understand how and why one learns a L2, it also has been contested in the L2 research community. For example, some questioned that the two orientations - integrative *vs*. instrumental - are unclear and, more important,

that they seem unable to explain all possible aspects of motivations for language learning (Dörnyei, 1990; Noels, Pelletier, Clément, & Vallerand, 2000). Consequently, some L2 researchers, such as Noels and her colleagues (2000), resorted to an alternative motivation framework: Self-Determination Theory (SDT; see Deci & Ryan, 1985). According to the SDT, the key factor in one's motivation is autonomy, which indicates 'a sense of choice in initiating and regulating one's own actions' (Deci & Ryan, 1985, p. 580). Based on how autonomy plays, the SDT defines two types of motivation - extrinsic and intrinsic, which are not so much categorically different but rather on a continuum of self-determination. That is, intrinsic motivation (IM) is the most self-determined form of motivation, whereas extrinsic motivation (EM) is positioned at the other end of the continuum of self-determination, although this does not necessarily indicate a lack of self-determination in behavior (Noels et al., 2000).

IM refers to a learner's internal desire to perform a particular task because the task itself gives pleasure and satisfaction. Vallerand (1997) identified a three-part taxonomy of IM, which basically indicates pleasurable feelings or sensations people have while doing self-initiated and challenging activities. Intrinsic motivation to know is the motivation for the desire to attain new ideas and develop knowledge. Intrinsic motivation toward accomplishments refers to the feelings of mastering a task or achieving a goal. Lastly, intrinsic motivation to experience stimulation relates to motivation based simply on the sensations brought forth by the task.

People with EM do the task with an expectation that completing it will bring external rewards, such as grades, promotion, and positive feedback. EM has four different types based on the degree of autonomy**:** external regulation, introjection regulation, identified regulation, and integrated regulation (Ryan & Deci, 2000). *External* regulation is the least autonomous form of EM. One has certain behaviors to meet an external demand or to achieve externally imposed rewards. *Introjected* regulation considers behaviors internally motivated by the feeling of pressure to avoid guilt or to achieve self-esteem, which remains controlling in terms of continuum of autonomy. *Identified* regulation is a more self-regulated form of EM, which represents regulation accepted by identifying one's own importance or value of a behavior. *Integrated* regulation is the most self-determined form of EM, when one fully internalizes and assimilates identified motivation to oneself by making it congruent with one's own values.

Over the last three decades, researchers have examined extensively how learners' performance can differ when they are extrinsically *versus* intrinsically motivated. Many studies have

highlighted the importance of IM in learning (Pintrich & De Groot, 1990; Reeve, Ryan, Deci, & Jang, 2008). Similar findings have been reported in L2 learning as well (Noels, Clément, & Pelletier, 1999; Pae, 2008). Noels et al. (1999), for example, in their study of French immersion students in Canada, found that those motivated through more self-determined forms (e.g., identified regulation or intrinsic motivation) were likely to experience less anxiety and greater motivational intensity and self-evaluation in competence.

While a positive relationship has been documented widely between IM and learning achievement, no general consensus is apparent on the role of EM in learning achievement and the relationship between IM and EM. Some studies showed EM to negatively correlate with or undermine IM, thus negatively influence learning (Deci, Koestner, & Ryan, 2001; Ryan & Deci, 2000). Others found IM and EM to positively correlate (J. H.-Y. Wang & Guthrie, 2004) or to show no significant correlation (Law, 2009), or that EM interacted with the level of IM in explaining performance (Lin, McKeachie, & Kim, 2001). In the L2 literature as well, mixed findings have been identified. For example, Vandergrift (2005) revealed that EM and its subscales were all positively and significantly correlated with IM and its subscales in adolescents' L2 (French) listening. Interestingly, neither EM nor IM had any significant correlation with L2 listening proficiency. In Wang's study (2008) with Chinese college EFL learners, autonomous EM correlated positively with IM and English performance, whereas controlled EM negatively correlated with IM and English performance. Noels et al. (2000) also found in their study with French-English bilingual university students that external regulation (i.e., the least autonomous form of EM) correlated significantly only with IM-Accomplishment, but not with IM-Knowledge nor IM-Stimulation. However, both introjected regulation and identified regulation (i.e., the more autonomous forms of EM) correlated with each of the IM subscales.

Overall, debates remain about the relationship between EM and IM on the one hand, and that of EM and IM with L2 learning on the other hand. A reason might be that previous studies were conducted in different learning contexts with different learner groups and different L2 performance variables (e.g., Canadian adolescents' L2 French listening in Vandergrift, 2005 *versus* adult EFL learners' overall English achievement in Wang, 2008). Apparently, more research is warranted to address further the relationship between IM, EM, and L2 learning.

Self-regulatory Strategy and L2 Learning

SRL involves learners' conscious control over their thoughts and behaviors (Pintrich & De Groot, 1990; Zimmerman, 1990). This entails using self-regulatory strategies to control the process of learning to achieve goals. Pintrich and his associates (Pintrich, 1999; Pintrich, Smith, Garcia, & McKeachie, 1991) identified several types of metacognitive strategies (i.e., planning activities, monitoring one's thinking and academic behavior, and regulation strategies) and various cognitive learning strategies (i.e., rehearsal, elaboration, and organizational strategies) that tend to have an impact on academic achievement.

L2 researchers also have paid a significant amount of attention to strategy factors in various aspects of L2 learning, and there tends to be a consensus that use of strategies enhances performance in L2 learning and use, in both general and specific tasks (Park, 1997; J. Wang, Spencer, & Xing, 2009). For example, Park (1997), found that all six categories of strategies (i.e., memory-, cognitive-, compensation-, metacognitive-, affective-, and social-strategy) significantly correlated with adult Korean EFL students' English proficiency measured by a TOEFL test. J. Wang et al.'s (2009) study on college learners of Chinese in the United Kingdom also showed that those who monitored their progress, persevered at tasks, and set realistic goals, were more successful in a Chinese achievement test including listening, speaking, and writing.

Regarding studies focusing on L2 vocabulary learning in particular, Gu and Johnson (1996) divided vocabulary learning behaviors into two major parts**:** metacognitive regulation and cognitive strategies. Metacognitive regulation comprised two sub-dimensions: selective attention and self-initiation. Cognitive strategies were more specified into guessing, dictionary use, note-taking, rehearsal, encoding, and activation. The researchers found that two metacognitive strategies (i.e., selective attention and self-initiation) of vocabulary learning were positive predictors of Chinese college EFL learners' general English proficiency; and cognitive strategies in general were correlated positively with both general English proficiency and vocabulary size. Nassaji's (2006) study on adult intermediate ESL learners also revealed a close relationship between learners' lexical inferencing strategy use and depth of vocabulary knowledge.

Linking Motivation and Strategy Use with L2 Vocabulary Learning

The above two sections reviewed some foundational research that confirmed the relationship of motivation with L2 learning on the one hand, and that of learning strategy use with L2 learning on

the other hand. However, within a SRL framework, motivational beliefs and self-regulatory strategies are not isolated factors but rather closely intertwine in influencing learning and academic achievement (Zimmerman, 1990, 2008). Pintrich and De Groot (1990) examined the relationship between motivation, self-regulated learning, and classroom academic achievements of seventh graders in science classes. Regression analysis revealed that intrinsic motivation did not directly influence academic performance, but highly associated with the use of self-regulatory strategies, a strong predictor of academic achievement. Credé and Phillips (2011) meta-analyzed the studies using the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1991), which is "a single measure designed to assess task-specific cognitions and motivations as well as the learning strategies used by students" (p. 2). Results revealed that students achieved higher academic performance when they engaged in self-monitoring and regulation, had intrinsic interest and value in tasks with high self-efficacy, and used appropriate learning strategies. More importantly, the meta-analysis showed that students' motivational beliefs seemed to influence academic performance only through the mediation of their use of learning strategies.

Despite L2 researchers' strong interests in motivation as well as strategy use in L2 learning, only few studies have considered both factors in their examination of L2 learning. MacIntyre and Noels (1996), for example, found that highly-motivated adult learners of Spanish or Italian as a foreign language reported knowing more strategies, used them more easily and frequently, and viewed them as more effective, than did those who were less-motivated. Schmidt et al. (1996) reported that adult Egyptian EFL learners, who were highly determined, instrumentally motivated, and addressed personal needs for affiliation, tended to be active users of cognitive strategies for learning English. However, the learners' integrative orientation failed to correlate significantly with their reported use of any learning strategies, although all dimensions of motivation associated positively with their English proficiency.

Noteworthy is that almost all aforementioned studies with concurrent considerations of both motivation and strategy use in L2 learning were focused on general English proficiency or learning achievement. In addition, methodologically, relationships often were tested with bivariate correlations or multiple regression analyses in which exactly how the two factors work in tandem in influencing L2 learning failed to be addressed, such as a possible indirect effect of motivation on L2 competence through the mediation of strategy use as revealed in Credé and Phillips's (2011). To date, few studies specifically have addressed L2 vocabulary learning within a SRL framework

with both factors of motivation and learning strategies considered. Tseng and Schmitt's (2008) SEM study of Chinese-speaking EFL learners' vocabulary knowledge shed some light on our understanding of such an issue. They tested a SEM model representing relationships among motivation, self-regulating capacity, vocabulary learning strategies, and vocabulary knowledge. The final structural model suggested a mechanism of vocabulary learning as "a cyclic process" (p. 383), with initial motivation permeating the entire process through different stages of vocabulary learning. Overall, findings provided interesting insights into motivated vocabulary learning. The instrument for self-regulating capacity of vocabulary learning in this study was developed from the previous study conducted by Tseng et al. (2006). To address a problem that traditionally-popular instruments for strategic learning are not psychometrically robust, they designed a new instrument based on a theoretical construct of self-regulation and directly targeting the learner trait of self-regulatory capacity. Their pilot studies showed that the instrument was psychometrically satisfactory, and that the hypothesized model had a good fit with the empirical data collected. Later, Mizumoto and Takeuchi (2012) conducted a validation study of Tseng et al.'s (2006) results in the Japanese EFL context, and found the instrument to provide a reliable and valid measurement, but with a factor structure different from the original study.

Although Tseng and his colleagues significantly contributed to understanding self-regulated vocabulary learning, some issues remain. For example, in the final SEM model, motivational beliefs only significantly predicted vocabulary knowledge through the mediation of self-regulatory capacity; and they also had no direct influence on learning strategies. On the one hand, such findings did not agree with those of previous studies documenting motivational influences on strategy use. On the other hand, the study did not directly statistically test any possible indirect effect of motivation on achievement through the mediation of strategy factors (Pintrich, 1999; Wang & Guthrie, 2004). The question thus remains whether motivation contributes to L2 vocabulary knowledge uniquely over and above strategy use, or its contribution is primarily indirect through the mediation of strategy use. In addition, the study sub-categorized motivation into three constructs (i.e., anxiety, self-efficacy, and attitude), but did not compare different types of motivation in conjunction with strategy use and examine their influence on vocabulary knowledge, which might give different insights in understanding self-regulated vocabulary learning. This certainly warrants more research on self-regulated L2 vocabulary learning, particularly by further examining how different types of motivation and strategy use are related,

how motivation and strategy use work together in influencing L2 vocabulary learning, and how different types of motivation may be related differentially to L2 vocabulary learning.

The Present Study

To address the above research that pertains to self-regulated learning of L2 vocabulary, we conducted a SEM study on how motivation and learning strategies work together in influencing L2 vocabulary knowledge, focusing on Korean-speaking adolescent EFL learners. Specifically, we proposed the following questions to guide the study:

1. How do motivation and use of learning strategies work together in explaining English vocabulary knowledge of adolescent EFL learners?
2. Do extrinsic motivation and intrinsic motivation have differential relationships with vocabulary learning strategies and, consequently, with EFL vocabulary knowledge?

Method

Participants

Participants included 230 11th graders (164 males, 66 females; aged 16-17) from two high schools in Korea. Four classes from each school participated in this study, and the average class size was about 38. Those students had studied English for about 9 years since 3rd grade under the Korean national curriculum, where English language learning is highlighted as a critical global communication skill (Jeon, 2009). The students had five 50-minute English classes each week.

Instruments

Motivation in English vocabulary learning

The motivation questionnaire, a modified version of the Language Learning Orientations Scale (Noels et al., 2000), included 17 items covering both EM and IM. On a 7-point Likert scale, from 1 (not at all true of me) to 7 (very true of me), and students were asked to rate the extent to which they agreed with statements. The EM part (8 items; Cronbach's α = .85) included external regulation (3 items, e.g., *I learn vocabulary in order to get high scores in exams*), introjected regulation (3 items, e.g., *I learn vocabulary because I would feel bad if I have little knowledge of it*), and identified regulation (2 items, e.g., *I learn vocabulary because I want to be the kind of*

person who knows many words). The IM part (9 items; Cronbach's α = .93) included knowledge (3 items, e.g., *I learn vocabulary for the pleasure I experience in learning words*), accomplishment (3 items, e.g., *I learn vocabulary for the satisfied feeling when I master difficult words*), and stimulation (3 items, e.g., *I learn vocabulary for the pleasure I get from knowing the English words around me*).

English Vocabulary Learning Strategies

The questionnaire on vocabulary learning strategy use was developed on the basis of the Vocabulary Learning Questionnaire (Gu & Johnson, 1996), Strategic Vocabulary Learning Involvement (Tseng & Schmitt, 2008) and Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991). It included 49 items with 14 for metacognitive strategies (Cronbach's α = .93) (e.g., *I check the progress I make when using a new vocabulary learning method*), and 35 for cognitive strategies (Cronbach's α = .95) (e.g., *I make use of context when guessing the meaning of a word*). Questionnaires for motivation and learning strategies were presented in both English and Korean.

Vocabulary Knowledge

To have better representation of the construct of vocabulary knowledge for modeling how it is predicted by motivation and strategy use, we measured learners' vocabulary size as well as depth. Participants' vocabulary size was measured with Schmitt, Schmitt, and Clapham's (2001) revised version of the Vocabulary Levels Test (Nation, 1990). In the present study, given the learners' level, we used only the first three frequency levels (i.e., 2000, 3000, and 5000 words). Each frequency level had 6 sets of 6 choice words that were accompanied by 3 target meanings. Participants were asked to choose an appropriate word from a set of 6 choice words (e.g., *business, clock, horse, pencil, shoe, wall*) to match each of the three meanings (e.g., *part of a house, animal with four legs, something used for writing*). Students gained one point for each correct match of a meaning and a word, and received zero points for each incorrect answer. Maximum possible score was 54. Cronbach's α = .89.

Read's (1993) Word Associates Test (WAT) was used to measure participants' depth of vocabulary knowledge. In the WAT, a target word (e.g., *sudden)* was presented with eight words in two different boxes, among which four were its associates. The four in the left box were all

adjectives (e.g., *beautiful, quick, surprising, thirsty*) and students selected the associates that were either synonyms of the target word or indicated one of the various meanings the target word might have (e.g., *quick* and *surprising*). The other four in the right box were all nouns (e.g., *change, doctor, noise, school*), and students indicated the associates that could collocate with the target item (e.g., *change* and *noise*). There were 30 items in the WAT used in the present study. To make this test less susceptible to guessing, participants were advised to choose as many appropriate answers as possible, without being informed of the number of correct answers for each question (i.e., 4). Participants received one point for both choosing an associate and not choosing a non-associate. Maximum score for an item was 8 (4 for choosing 4 associates and 4 for not choosing non-associates). Total possible test score was 240, and the test had a high internal reliability coefficient (Cronbach's α = .88).

Data collection procedure and method of analysis

Data were collected in the aforementioned two high schools in Korea during students' regular English classes. Motivation and strategy questionnaires were administered first in a regular class session, followed by the vocabulary size and depth tests. SEM was the primary method used to answer the research questions. SEM is a statistical technique that enables one to test a hypothesized model representing structural relationships among a set of observed (measured) and/or unobserved (latent) variables (Kline, 2011). All SEM analyses were conducted using Amos 20 (Arbuckle, 2011) with a maximum likelihood estimation method. To evaluate on the goodness of model fit, multiple indices were adopted in addition to significance testing through chi-square values, including Comparative Fit Index (CFI), Tucker-Lewis Index (TLI)**,** Jöreskog–Sörbom Goodness of Fit Index (GFI)**,** Standardized Root Mean Square Residuals (SRMR)**,** and Root Mean Square Error of Approximation (RMSEA). Typically, models are considered to have a good fit when the GFI, CFI, and TLI are greater than .95, the SRMR is less than .08, and the RMSEA is less than .06 (Hu & Bentler, 1999; Kline, 2011).

Results

Descriptive Statistics and Correlations

Table 1 shows the means, standard deviations, and bivariate correlations of all observed variables. Based on Deci and Ryan (1985), the scores of IM and EM were gained from averaging out their

three indicators. Correlations were all positive and significant. To highlight, all aspects of IM positively and significantly correlated, as did the three aspects of EM. Notably, the correlation between IM and EM was also positive and significant (r = .603, p < .001). Both types of motivation also positively and significantly correlated with the two aspects of vocabulary learning strategies (i.e., cognitive and metacognitive) as well as the two types of vocabulary knowledge (i.e., size and depth). Cognitive and metacognitive strategy use, which significantly correlated with each other (r = .851, p < .001), both had positive and significant correlations with vocabulary size as well as depth. Finally, the two indicators of vocabulary knowledge also significantly correlated with each other (r = .507, p < .001).

Direct and Indirect Effects of Motivation on Vocabulary Knowledge

To answer the first research question, we tested a conceptual model in which the structural model comprised three latent variables, including motivation, strategy use, and vocabulary knowledge. The latent variable of vocabulary knowledge was represented by the two dimensions of size and depth. The latent variable of strategy use had two indicators: cognitive and metacognitive strategies. Because IM and EM were positively correlated with each other as well as with both aspects of strategy use and vocabulary knowledge, they were used as the two indicators of the latent variable of motivation. Based on the SRL framework and previous research findings about the influence of motivation and strategy use on L2 learning, we hypothesized that vocabulary knowledge was positively predicted by both motivation and strategy use, and strategy use was also positively predicted by motivation.

The model showed a good model fit with $\chi^2(6)$ =13.340 (p < .05), GFI=.981, CFI=.990, TLI=.975, SRMR=.023, and RMSEA=.073. In the measurement model, both EM and IM significantly loaded on the latent variable of motivation, β=.72 and β=.84 (both ps < .001), respectively. Observed variables also loaded significantly on the latent variable of strategy use, β=.91 and β=.93 (both ps < .001), respectively, for metacognitive and cognitive strategies. Both dimensions significantly loaded on the latent variable of vocabulary knowledge, β=.85 and β=.60 (both ps < .001) for vocabulary size and depth, respectively.

Table 1

Me*ans, standard deviations, and bivariate correlations of all observed variables*

	1	2	3	4	5	6	7	8	9	10	11	12
1.VOCASIZ												
2.VOCADEP	.507***											
3.METASTR	.526***	.379***										
4.COGSTR	.594***	.409***	.851***									
5.EM	.372***	.260***	.551***	.550***								
6.EXTREG	.250***	.150*	.320***	.292***	.751***							
7.INTREG	.267***	.242***	.475***	.516***	.812***	.409***						
8.IDNREG	.364***	.224**	.508***	.491***	.816***	.409***	.515***					
9.IM	.351***	.345***	.661***	.634***	.604***	.237***	.546***	.639***				
10.KNOWL	.335***	.314***	.645***	.575***	.535***	.175**	.504***	.577***	.896***			
11.ACCOM	.345***	.323***	.628***	.599***	.584***	.315***	.513***	.553***	.902***	.707***		
12.STIMU	.269***	.296***	.516***	.540***	.515***	.150*	.461***	.598***	.907***	.723***	.730***	
Mean	28.10	138.57	3.73	3.82	4.12	4.69	3.58	4.12	3.98	3.65	4.14	4.14
SD	14.76	21.17	1.13	1.03	1.00	1.20	1.28	1.30	1.16	1.27	1.31	1.29

Note: *N*=230. VOCASIZ=vocabulary size; VOCADEP=vocabulary depth; METASTR=metacognitive strategies; COGSTR=cognitive strategies; EM=extrinsic motivation; EXTREG=external regulation; INTREG=introjected regulation; IDNREG=identified regulation; IM=intrinsic motivation;
KNOWL=knowledge; ACCOM=accomplishment; STIMU=stimulation.
* $p < .05$ ** $p < .01$ *** $p < .001$

As shown in Table 2, in the structural model, the factor of motivation significantly predicted that of strategy use (β=.83, p=.003), and accounted for 69% of the total variance of strategy use, suggesting a very close relationship between learners' motivation and their use of vocabulary strategies. The factors of motivation and strategy use together explained approximately 52% of the total variance of the factor of vocabulary knowledge. Over and above motivation, strategy use uniquely and significantly contributed to vocabulary knowledge (β=.84, p=.002). However, the direct effect of motivation on vocabulary knowledge, after controlling for strategy use, did not achieve significance (β= -.146, p=.368). Given the close relationship between motivation and strategy use on the one hand, and that between strategy use and vocabulary knowledge on the other hand, we tested a possible indirect effect of motivation on vocabulary knowledge through the mediation of strategy use; such an effect turned out to be significant (β=.697, p=.001). Figure 1 shows a graphic representation of the model.

Table 2

SEM analysis testing the effects of motivation and strategy use on vocabulary knowledge

	Path Coefficient				
	β	SE	p	BC Bootstrap 95% CI	
				Lower	Upper
Total effects					
MOT → STR	.83	.05	.003	.723	.909
STR → VK	.84	.19	.002	.538	1.284
MOT → VK	.55	.08	.003	.381	.694
Direct effects					
MOT → STR	.83	.05	.003	.723	.909
STR → VK	.84	.19	.002	.538	1.284
MOT → VK	-.15	.20	.368	-.602	.187
Indirect effects					
MOT → VK	.70	.18	.001	.468	1.227

Note. MOT=factor of motivation (intrinsic and extrinsic), STR=factor of vocabulary learning stragtegy use (cognitive and metacognitive), VK=factor of vocabulary knowledge (size and depth)

Effects of Different Types of Motivation on Vocabulary Knowledge

The previous analysis focused on motivation as a higher-level construct comprised of both IM and EM, given the close and positive relationship found between the two types of motivation

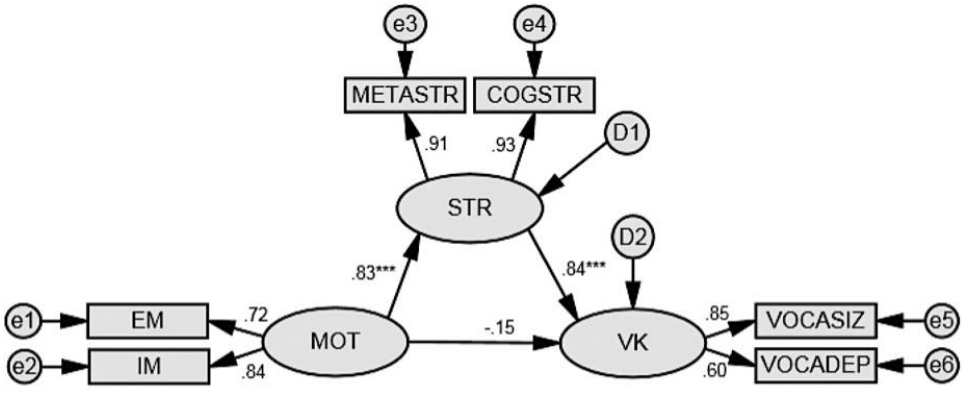

Figure 1. Structural model representation of the relationships between motivation, vocabulary learning strategies, and vocabulary knowledge. MOT=factor of motivation, EM=extrinsic motivation, IM=intrinsic motivation, STR=factor of strategy use, METASTR=metacognitive strategies, COGSTR=cognitive strategies, VK=factor of vocabulary knowledge, VOCADEP=vocabulary depth, VOCASIZ=vocabulary size. Parameter estimates are standardized structural regression weights. All paths are statistically significant at the level of .001 (two-tailed) while the path from MOT to VK is not statistically significant (p = .368).

(see Table 1). To gain deeper knowledge about the specific contribution of different types of motivation, together with vocabulary learning strategies, to vocabulary knowledge, two additional sets of SEM analyses were conducted for the latent variables of EM (EM-L) and IM (IM-L), respectively. In the conceptual model for EM-L, which had three indicators (i.e., external regulation, introjected regulation, and identified regulation), EM-L positively predicted strategy use, and together with strategy use, it positively predicted vocabulary knowledge. Similarly, in the conceptual model for IM-L, which also had three indicators (i.e., knowledge, accomplishment, and stimulation), IM-L positively predicted strategy use and both IM-L and strategy use positively predicted vocabulary knowledge. In both models, like the previous analysis, the factor of strategy use was represented by cognitive and metacognitive strategies, and that of vocabulary knowledge by size and depth measures.

Table 3

SEM analysis testing effects of extrinsic motivation and strategy use on vocabulary knowledge

	Path Coefficient				
	β	SE	*p*	BC Bootstrap 95% CI	
				Lower	Upper
Total effects					
EM-L → STR	.71	.07	.004	.556	.820
STR → VK	.72	.12	.002	.456	.932
EM-L → VK	.52	.09	.002	.349	.681
Direct effects					
EM-L → STR	.71	.07	.004	.556	.820
STR → VK	.72	.12	.002	.456	.932
EM-L → VK	.00	.13	.943	-.245	.302
Indirect effects					
EM-L → VK	.51	.10	.001	.338	.734

Note. EM-L=factor of extrinsic motivation (external regulation, introjected regulation, and identified regulation), STR=factor of vocabulary learning strategy use (cognitive and metacognitive), VK=factor of vocabulary knowledge (size and depth)

The EM-L model showed a good model fit with $\chi^2(11) = 16.7$ ($p > .05$), GFI = .981, CFI = .992, TLI = .984, SRMR = .023, and RMSEA = .048. The three observed variables of EM-L, including external, introjected, and identified motivation, significantly loaded on EM-L, $\beta = .53$, $\beta = .73$, and $\beta = .73$ (all *p*s < .001), respectively. As Table 3 shows, EM-L significantly and positively predicted strategy use ($\beta = .71$, p = .004), and accounted for 50.8% of the total variance of strategy use. EM-L in combination with strategy use explained about 51.8% of the total variance of vocabulary knowledge. Strategy use significantly and positively predicted vocabulary knowledge ($\beta = .72$, $p = .002$) after controlling for the effect of EM-L. The direct or unique effect of EM-L on vocabulary knowledge, however, did not achieve the level of significance after the effect of strategy use was adjusted for ($\beta = .00$, $p = .943$). Once again, we tested the indirect effect of EM-L on vocabulary knowledge through the mediation of strategy use, and such an effect was significantly positive ($\beta = .51$, $p = .001$). Figure 2 shows a graphic representation of the model.

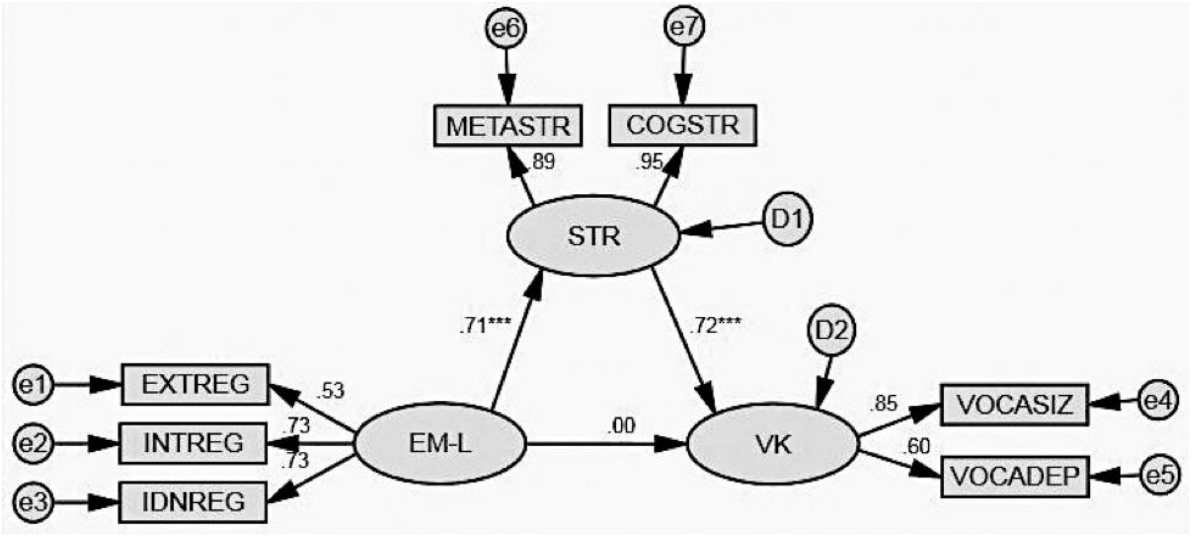

Figure 2. Structural model representation of the relationship between extrinsic motivation, vocabulary learning strategies, and vocabulary knowledge. EM-L=factor of extrinsic motivation, EXTREG=external regulation, INTREG=introjected regulation, IDNREG= identified regulation, STR=factor of strategy use, METASTR=metacognitive strategies, COGSTR=cognitive strategies, VK=factor of vocabulary knowledge, VOCADEP=vocabulary depth, VOCASIZ=vocabulary size. Parameter estimates are standardized structural regression weights. All paths are statistically significant at the level of .001 (two-tailed) while the path from EM-L to VK is not statistically significant (p = .943).

The model with IM-L predicting vocabulary knowledge together with strategy use showed a similar pattern. Overall, the model had a good model fit, $\chi^2(11) = 35.74$ ($p < .001$), GFI = .962, CFI = .975, TLI = .953, and SRMR = .036, RMSEA = .09. The three observed variables of IM-L, including knowledge, accomplish, and stimulation, significantly loaded on IM-L, $\beta = .85$, $\beta = .86$, $\beta = .84$ (all ps < .001), respectively. In the structural model, as Table 4 shows, IM-L significantly and positively predicted strategy use ($\beta = .75$, $p = .002$), and accounted for 55.6% of the total variance of strategy use. IM-L and strategy use together explained about 52.1% of the total variance of vocabulary knowledge. Strategy use made a significant and positive contribution to vocabulary knowledge ($\beta = .82$, $p = .001$) after controlling for the effect of IM-L. The unique effect of IM-L on vocabulary knowledge was negative but not significant ($\beta = -.15$, $p = .204$), after the effect of strategy use on vocabulary knowledge was partialed out. Like EM-L, the indirect effect of IM-L on vocabulary knowledge via the influence of strategy use was significantly positive ($\beta = .614$, $p = .001$). Figure 3 shows a graphic representation of this model.

Table 4

SEM analysis testing effects of intrinsic motivation and strategy use on vocabulary knowledge

		Path Coefficient				
		β	SE	*p*	BC Bootstrap 95% CI	
					Lower	Upper
Total effects						
IM-L →	STR	.75	.04	.002	.664	.820
STR →	VK	.82	.10	.001	.644	1.063
IM-L →	VK	.47	.07	.004	.308	.602
Direct effects						
IM-L →	STR	.75	.04	.002	.664	.820
STR →	VK	.82	.10	.001	.644	1.063
IM-L →	VK	-.15	.12	.204	-.420	.063
Indirect effects						
IM-L →	VK	.61	.09	.001	.462	.848

Note. IM-L=factor of intrinsic motivation (knowledge, accomplishment, and stimulation), STR=factor of vocabulary learning strategy use (cognitive and metacognitive), VK=factor of vocabulary knowledge (size and depth).

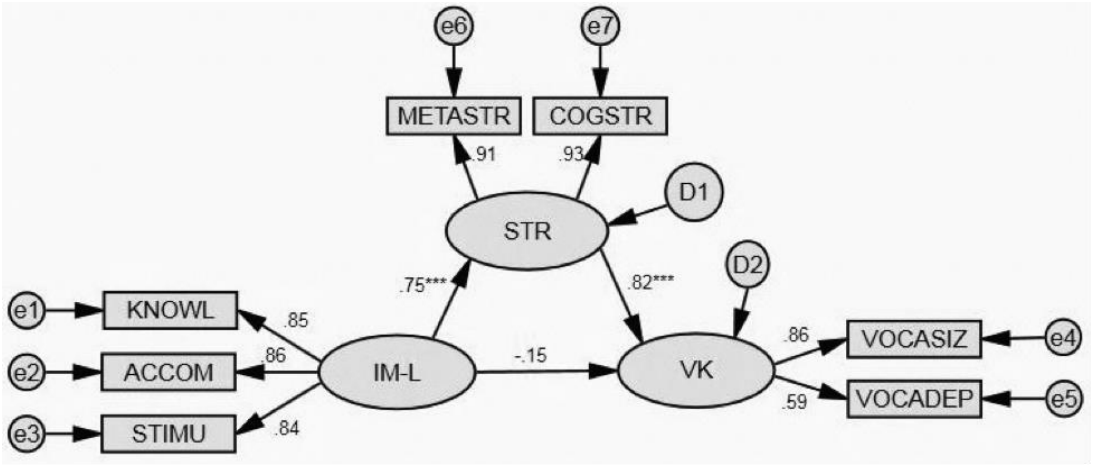

Figure 3. Structural model representation of the relationship between intrinsic motivation, vocabulary learning strategy, and vocabulary knowledge. IM-L=factor of intrinsic motivation, KNOWL=knowledge, ACCOM=accomplish, STIMU=stimulation, STR=factor of strategy use, METASTR=metacognitive strategies, COGSTR=cognitive strategies, VK=factor of vocabulary knowledge, VOCADEP= vocabulary depth, VOCASIZ=vocabulary size. Parameter estimates are standardized structural regression weights. All paths are statistically significant at the level of .001 (two-tailed) while the path from IM-L to VK is not statistically significant (p = .204).

Discussion

Focusing on high-school EFL learners in Korea, this study examined how motivational factors and the use of learning strategies worked together in predicting L2 vocabulary knowledge. To address our first research question, our SEM analysis revealed that the use of vocabulary learning strategies significantly and positively predicted vocabulary knowledge, which confirms previous findings about the importance of strategies in L2 vocabulary development (e.g., Oxford, 2011). Motivation also significantly predicted strategy use. However, over and above the influence of strategy use, motivation failed to predict vocabulary knowledge significantly. SEM results showed that motivation had only a significant indirect effect on vocabulary knowledge through the mediation of strategy use. Regarding the second research question, such findings also held for IM and EM (i.e., a similar pattern of indirect effect on vocabulary knowledge via strategy use), which significantly and positively correlated with each other as well as with all other variables.

A significant indirect effect of motivation on vocabulary knowledge via strategy use was not unexpected, given the tenet of the SRL framework that learners are motivated by different reasons to use self-regulatory strategies to achieve their learning goals (Zimmerman, 2008; Zimmerman & Schunk, 2008). Notably, SEM analyses revealed that all tested models showed a full mediation effect of the use of vocabulary learning strategies. This suggests that motivation in learning without concomitant use of learning strategies would not lead to a significant achievement in EFL vocabulary learning. Such findings also agree with the argument of Csizér and Dörnyei (2005) that motivation itself is a concept accounting for why people behave as they do rather than how successful their behaviors will be, so the indirect relation of motivation to learning achievement is justifiable.

Empirically, the importance of IM in learning or an influence of IM on learning through strategy use also accords with the findings of many previous studies (Noels et al., 2000; Pae, 2008; Pintrich & De Groot, 1990). Pintrich and De Groot (1990) showed that students with high intrinsic value were more likely to use strategies than were students with low intrinsic value, and self-regulation and strategy use were found to be strong predictors of academic achievement. In L2 vocabulary research, Tseng and Schmitt (2008) found a cyclic and systematic process of vocabulary learning where learners' motivation influenced the use of vocabulary learning strategies channeled through self-regulation, which, in turn, played a role in explaining vocabulary knowledge. In the Korean context, Pae (2008) found that Korean university students' intrinsic motivation was indirectly

related to their English achievement.

On the other hand, it is interesting to note that in the current study, EM also had a significant and positive indirect effect on vocabulary knowledge. Its effect on strategy use was significant and positive. It also positively correlated with IM. Previous studies in SRL, while emphasizing IM's role as an important precursor of SRL, argued that extrinsic rewards undermined IM and led to low performance (Deci, Koestner, & Ryan, 1999), or found that EM did not lead to the use of strategy, or EM and strategy use were negatively correlated (Lau & Chan, 2003). However, in the present study with Korean EFL learners' vocabulary learning, EM did not seem to undermine IM, nor was it associated negatively with strategy use and vocabulary knowledge. There seemed to be no fundamental difference between EM and IM in their relationships with strategy use and vocabulary learning (see Tables 3 and 4).

The question now becomes why extrinsically-motivated learners actually exerted themselves to use learning strategies and then led to positive influence on their vocabulary learning. We contend this might be related to the unique context of EFL learning in Korea. As the significance of English as a global language has increased, a high level of English proficiency has become important in Korea (and certainly in many other EFL contexts also). Specifically, a good command of English seems to be one of the most critical skills that has direct practical significance to youths in Korea, such as school performance, high school or university entrance, and opportunities to study abroad. Among high school students, the perception seems particularly strong as English test scores tend to have a determining effect on their performance in the university entrance examination and, subsequently, the prestige of the universities in which they desire to be enrolled (Seth, 2002). The high-stake of English learning seems to have resulted in a strong extrinsic motivation among Korean high school students and led to their investment of considerable time, money, and energy, and more importantly, active use of various strategies in their English learning. Given the critical importance of vocabulary in learning any language, the positive relationship of EM and vocabulary learning (and strategy use) seems reasonable.

The next question is why such a close relationship between extrinsic motivation and L2 learning failed to surface in some previous studies that examined this issue (Noels et al., 1999; Noels, Clement, & Pelletier, 2001; Pae, 2008; F. Wang, 2008). For example, Noels et al. (2001) found no significant correlation between EM (as opposed to IM) and final course grades among learners of Spanish as a foreign language. F. Wang (2008) showed that external utility regulation, one factor

of EM, correlated negatively with IM and English achievement in Chinese college EFL learners. Pae (2008) also found that EM had no significant association with Korean college learners' English proficiency, whereas IM was significantly and indirectly related to English achievement.

A possible explanation might reside in how learners perceived the immediate benefits of the type of learning highlighted in the items of the motivation questionnaires, which varied across studies. In the present study, the motivation questionnaire was customized to the L2 vocabulary domain with items that addressed the factor of immediate relevance to their learning of words in English (e.g., *I learn vocabulary because my teacher says it is important to improve English; I learn vocabulary in order to get high scores in English exams*). This means that extrinsically-motivated students learned vocabulary not merely because of external rewards or benefits they might receive from their learning. Rather, they learned vocabulary because they believed it would lead to good grades on English exams or quizzes or a higher level of English proficiency. The immediate benefits of vocabulary learning highlighted in the items of the motivation questionnaire differentiate the present study from previous ones where the focus seemed to be on long-term or less immediate goals of English language learning (e.g., getting a good job). Consequently, a significant positive relationship between EM, active use of strategies, and English learning failed to emerge in those studies.

Another reason might be contextual variations across studies in relation to the purpose of foreign language learning. For example, in Noels et al (2001), although the target language was learned in a foreign context (i.e., California, United States), the purpose of students' learning of the target language might be to serve their long-term benefits such as better communication with Spanish-speaking immigrants there rather than simply achieving a good test score or university GPA. Therefore, it seems reasonable that a significant relationship between EM and L2 learning failed to surface in that study. A lack of a significant effect of EM on Korean EFL learners' achievement in Pae's (2008) study seems explicable in a similar vein. In that study, participants already had been admitted to university, so likely would feel less pressure regarding tests, exams, and grade attainments in English than would high school students in the present study who still faced the critical challenge of gaining such admission with good grades on tested subjects that included English.

The present study enriches the literature of self-regulated learning and academic achievement by highlighting a similarly-important role of intrinsic as well as extrinsic motivation in vocabulary

learning in a foreign language context. However, a few limitations also are noted. First, based on the SDT, EM is divided into different types based on autonomy. Possibly the relationships of these sub-types of EM with strategy use and vocabulary knowledge might vary. Table 1 shows correlations of different strengths between different types of EM (and IM) with strategy use and vocabulary knowledge variables. Given the purpose of the present study, we did not focus our SEM analysis on the different subtypes of EM (and IM). Future studies may want to explore how different types of EM and IM might function differentially in predicting L2 strategy use and learning outcome. Another limitation concerns the possibility of a reciprocal influence of variables adopted in the current study. Although the SRL framework states that motivation serves as a precursor for students to self-regulate and engage themselves in active learning, a possibility exists that the relationship between motivation and strategy use might be an interactive-, an interdependent-, or even a cyclical process in learning (Zimmerman & Schunk, 2008). That is, motivational factors might be not only a precursor to, but also the subsequent result of, strategic learning. To discern clear relationships among motivational beliefs, learning strategies, and L2 competence, including vocabulary knowledge, longitudinal studies are needed that track learners' development regarding these variables. With multiple waves of data, statistical methods such as Latent Growth Modeling then could be used to explore possible reciprocal relationships among these variables.

Conclusion

To understand what makes a good language learner, it is critical to know why one wants to learn the particular language and what one does to meet that goal. SRL provides us with a nice framework to understand the interplay of motivation and use of learning strategies in L2 vocabulary learning among adolescent Korean EFL learners. Specifically, we found that learners' motivation for vocabulary learning positively impacts their vocabulary knowledge through their use of vocabulary learning strategies. The findings particularly highlighted the importance of EM, as well as IM, to vocabulary learning in a foreign language context. The study enriches our knowledge of self-regulated learning of an L2 and prompts us to further explore how the influence of different types of motivational beliefs on L2 strategy use and learning achievement may be responsive to the context of learning.

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