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ARTICLE

The Interaction between Learning Engagement and Academic Achievement in Second Language Acquisition: A Multivariate Analysis

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ABSTRACT

This study investigates the complex interplay between behavioral, emotional, and cognitive engagement and their collective impact on academic achievement in Second language Acquisition SLA. Utilizing a quantitative research design with Structural Equation Modeling (SEM), data were collected from 540 university ESL learners to explore how different engagement dimensions influence language learning outcomes. Results reveal that cognitive engagement—characterized by strategic learning, self-regulation, and deep processing has the strongest direct effect on academic achievement ($\beta = 0.51$, $p < 0.001$). Behavioral engagement significantly predicts cognitive engagement ($\beta = 0.58$, $p < 0.001$) and shows a modest direct effect on achievement ($\beta = 0.15$, $p < 0.05$), while emotional engagement affects achievement both directly ($\beta = 0.26$, $p < 0.01$) and indirectly through cognitive engagement. The model explains 43% of the variance in academic performance, highlighting the critical mediating role of cognitive engagement in Tran SLA participation and affect into success. Subgroup analyses further reveal higher emotional engagement among females and greater cognitive engagement in advanced learners. These findings support multidimensional engagement frameworks and have practical implications for SLA instruction, suggesting that fostering strategic cognitive investment alongside supportive emotional and behavioral environments enhances language proficiency. The study contributes to SLA theory

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by demonstrating the dynamic and interdependent nature of engagement dimensions in predicting learner achievement.
Keywords: Second Language Acquisition SLA; Learning Engagement; Cognitive Engagement; Task-Based Language Teaching (TBLT); Structural Equation Modeling (SEM)

1. Introduction

1.1. Research Significance

Through Second Language Acquisition SLA, individuals manage to learn another language which is not the language they grew up speaking. SLA covers a variety of mental, social and emotional influences that interact to affect a person's ability to become skilled in another language. The process covers language as well as learners' motivation, opinions and interaction with the surroundings they study in. Of these aspects, being engaged in learning has been shown to be vital for successful learning of a language. Engagement measures the amount of effort and thought that learners use while pursuing their teachers' choices [1].

Usually, by learning engagement, we mean it exists in three main aspects: actions, feelings and thoughts. When a person shows up for lessons, takes part and puts in effort, it is considered behavioral engagement. Emotional engagement refers to the feelings, interest and attitudes students show toward learning another language. Engaging our minds to learn a new language involves making use of learning strategies, focusing on understanding and controlling how much we practice. They jointly influence how students interact, leading to better results in their studies.

To measure academic achievement in SLA, people often rely on test scores, course grades and ratings from instructors, among others. They assess learners based on their skills in listening, speaking, reading and writing. Studies have often found that those who are more enthusiastic in learning achieve higher results in learning languages [2]. Yet, because learners, contexts and individuals are so diverse, the relationship in SLA is not always easy to explain.

Studies need to focus on the role of learning engagement in students' academic success in SLA. Learning success can be predicted and affected by engagement which can also be shaped by good teaching [3]. To understand the association between achievement and engagement permits teachers to generate ways to involve, engage and inspire students' mind in learning languages. One more thing to note, SLA settings are usually affected by differences in culture, changeable motivation and the difficulties of adapting to new language features and speech patterns. Therefore, we should analyze engagement in more detail than just considering straightforward cause-effect relationships.

Many research efforts in SLA have, in the past, examined how much engagement a student has and how this relates to their academic achievements. Thus, Gardner and Lambert's socio-educational model suggested that motivation is key to success in learning a language, though it did not separate between various kinds of motivation. Experts now agree that involvement in learning has a variety of components and they each have individual impacts on grades. Being engaged behaviorally supports regular efforts, emotionally makes one more motivated and mentally allows a person to understand more on their own [4].

Even as it is clear that engagement is made up of several factors, much research in the field of Second language acquisition continues to study simple links between each engagement aspect and achievements [5]. Even so, these studies do not detail how each engagement type influences language proficiency together with the others. Therefore, we need new methods that help analyze many details together.

Confirmatory factor analysis, multiple regression and SEM are effective techniques for studying these relationships. They enable researchers to create latent models, take care of extra factors that could influence results and evaluate how variables affect one another. In education, researchers have discovered that different engagement factors affect academic performance together, yet using these angles in SLA is not widespread [6].

Because multivariate analysis has yet to be applied to engagement and achievement in Second language acquisition, there is a huge opportunity there. Exploring the collaboration of emotion, behavior and cognition during language learning enhance the success of teaching experi-

ence. In this scenario, teachers could emphasize strategies that support students in thinking about their understanding. If how we feel strongly impacts our achievement based on how we behave, main interventions should focus on boosting positive feelings and lowering anxiety.

The authors address these shortcomings using multivariate analysis to check how learning engagement affects academic achievement in SLA learners. The main objectives for this research are:

1. To identify the connections between how SLA learners engage in behavior, emotion and thinking.

2. To explore how these different methods of engagement are related to academic achievements.

3. To locate which aspect of engagement forecasts the best language learning success.

This study combines the different aspects of engagement with advanced statistics, uncovering the relationship between engagement and achievement for learners. Likely, the findings will allow educators, curriculum planners and policymakers to use new ideas and suggestions in their work. If educators address the primary ways students engage with the learning process, they can increase learners' desire to participate, focus and perform well in school.

Furthermore, this study is important today due to the increasing diversity in language learning because of digital and hybrid learning environments that became more popular thanks to the pandemic. They have revealed that working with students in technologically based Second language acquisition now depends on strategies that address their feelings and thought processes.

1.2. Research Background

1.2.1. Theoretical Foundations of Learning Engagement in Second Language Acquisition

Learning engagement is considered an important concept in both educational psychology and Second language acquisition SLA studies. Many theories point out that there are several important factors influencing how students become engaged in learning. According to research engagement involves three key aspects: behavior, emotion and thinking. This model of three stages is widely used and altered by many SLA researchers to explore how learners respond to learning tasks.

Being involved in learning a language includes learners making an effort, participating actively and not giving up. It is the easiest to notice and includes things such as showing up for lessons, handling homework and engaging in conversations or essays with the teacher [7]. Engagement in learning activities is necessary in SLA because practicing a new language regularly helps you acquire new skills.

Learners' feelings such as interest, enjoyment, anxiety and views towards the language and learning, are referred to as emotional engagement. The role of emotions in SLA is linked to increased motivation, talking to people and learning another language. If someone has language anxiety, their spoken skills may fail to improve, yet being curious and interested encourages people to study more.

Deep involvement in learning, awareness about learning and effort to master language skills are examples of cognitive engagement. Those learning a new language use mental strategies for learning grammar, vocabulary and features of another culture [8]. This aspect is key to understanding and later remembering the second language.

These three types of engagement depend on each other. Consider that feeling linked to an activity pushes us to do it and focusing on learning something encourages us to continue acting. Many SLA researchers are suggesting that the study of engagement should take into account how factors interact with each other.

1.2.2. Models of Engagement Applied in Second Language Acquisition Research

Engagement in Second language acquisition SLA has also been studied using various models that were not developed by researcher [9], the Self-Determination Theory (SDT) claims autonomy, competence and relatedness influence motivation and engagement. The context of SLA assigns a role to SDT, making it clear that when learners feel they can control their own learning and when they feel capable, they tend to get involved in the learning process.

By research also introduced the Engagement-Disaffection Framework which explores positive involvement and disaffection. When learners feel disaffection in a SLA classroom, they tend to become absent-minded, less engaged and more impatient with their studies. Being aware of many kinds of meetings support you make tools that

will sustain learners' attention.

According to SLA studies, TBLT methods in language learning use engagement theories that put importance on meaningful communication [10]. When students work on interesting tasks that are challenging, this leads to more motivation and a higher level of proficiency.

1.2.3. What Research Says about Sing and Second Language Acquisition

As confirmed by many studies, engagement often helps improve academic achievement in Second language acquisition SLA, though the effects of the main elements are not always the same.

Behavioral Engagement

Involvement in learning activities improves academic performance in SLA. An investigation of 500 Chinese EFL learners revealed that higher test scores were achieved by those who attended classes regularly and took part in the lessons ($p < 0.01$) [11]. Similar to others researcher, Skinner et al. noticed that extra time spent on learning activities and homework helped students become better at speaking and writing [12].

How often a student does practice and the level of effort they give to a task usually determine how much they achieve. Studies also indicate that those who take part in group talks or language labs do better in language learning than those who do not. That's why it is important to develop class settings where everyone takes part.

1.2.4. Emotional Engagement

Emotional engagement's effect on Second language acquisition SLA success is multifaceted. Study identified language anxiety as a major emotional barrier reducing oral proficiency, while other affective factors such as interest and enjoyment positively correlated with vocabulary acquisition. In a meta-analysis, previous study reported that learners with high emotional engagement demonstrated greater resilience and willingness to communicate, which in turn improved fluency [13].

A recent study used longitudinal data to show that learners reporting positive emotional experiences during language learning tasks improved their TOEFL scores by an average of 12% over six months [14], compared to a 4% increase among low emotional engagement groups. The authors attributed this to increased motivation and reduced avoidance behaviors.

1.2.5. Cognitive Engagement

Cognitive engagement's role in SLA has gained prominence with the recognition that deep learning strategies enhance long-term retention and transferability of language skills. According to Research, cognitive engagement entails strategic learning approaches such as elaboration, organization, and metacognitive self-regulation.

Research involving 400 ESL learners demonstrated that those who employed metacognitive strategies scored significantly higher on reading comprehension tests ($p < 0.001$). Compared to other aspects, cognitive engagement had the largest effect, suggesting it plays an important role in school achievement [14].

SEM shows that performing well in the classroom is mainly due to engaging in deeper cognition, as strengthening cognitive skills aids students in achieving higher scores on language exams.

1.2.6. Studying How Engagement and Achievement Are Connected in Second Language Acquisition

Bivariate network tells us some things, but multivariate research can show how all types of engagement organized work to have an influence on outcome. Researchers have recently explored these associations by applying CFA and SEM.

As an illustration, studied equivalence among 600 EFL learners by measuring their scores in English tests and applying SEM to connect different forms of engagement in learning English. The results indicated that cognitive engagement had the strongest direct effect ($\beta = 0.48$, $p < 0.001$), followed by emotional ($\beta = 0.32$, $p < 0.01$) and behavioral engagement ($\beta = 0.25$, $p < 0.05$). Nearly two thirds of the variation in academic achievement could be explained by the model. Similarly, research by Gao and Zhang conducted a multiple regression analysis to understand how each type of engagement was involved in Korean SLA learners' achievements [15]. According to them, involvement in learning activities played a part in explain-

ing the connection between behavior and achievement, suggesting that being happy while learning improves its outcome.

Such approaches support understanding how variables interact. A recent study found that the positive impact of behavioral engagement on academic performance was significantly stronger for learners with high cognitive engagement, implying synergistic effects [16].

1.2.7. Measurement Instruments and Their Validity in Second Language Acquisition Contexts

Reliable and valid measurement of engagement is crucial for robust research. The **Student Engagement Instrument (SEI)** and the **Engagement vs. Disaffection with learning scale** have been adapted for SLA populations with promising psychometric properties. These instruments assess multiple engagement facets through self-report questionnaires.

Studies highlight the importance of contextualizing measurement tools to language learning environments. For instance, Singh et al. modified the SEI to include SLA -specific items such as motivation to practice speaking and anxiety during oral tasks [17]. Their factor analyses confirmed distinct behavioral, emotional, and cognitive engagement factors with Cronbach's alpha values exceeding 0.85, indicating high reliability.

Achievement measures in SLA have also evolved. While standardized tests remain the gold standard, educators increasingly incorporate formative assessments, peer evaluations, and learner self-assessments to capture a more nuanced picture of language proficiency [18].

1.2.8. Cultural and Contextual Influences on Engagement and Achievement

Engagement in SLA is not culturally neutral. Cross-cultural studies reveal that social norms, educational practices, and learner beliefs significantly shape engagement patterns. For example, Liu et al. compared engagement profiles of learners in collectivist versus individualist societies, finding higher behavioral engagement but lower emotional engagement in collectivist settings due to differing classroom participation norms [19].

Technological integration has also transformed engagement. With the rise of online and blended SLA courses, digital engagement metrics such as click rates, forum participation, and time-on-task have become important [20]. These new forms of engagement require updated conceptual frameworks and measurement tools.

Despite advances, key gaps remain. First, few SLA studies have comprehensively examined all three engagement dimensions simultaneously using rigorous multivariate techniques. Second, much existing research relies on cross-sectional data, limiting understanding of engagement's temporal dynamics. Third, there is a scarcity of research integrating cultural and technological factors affecting engagement. The study uses a multivariate approach to examine how involvement in behavior, emotions and thought processes affects learning a language in school. Today's contexts in SLA such as using technology for learning, are equally considered to present useful and applicable insights to readers.

1.2.9. Theoretical Framework

When exploring learning engagement and academic success in learning a second language, researchers look at engagement from different aspects, motivational-related theories and emotional aspects of achievement. Being engaged generally includes behavioral, emotional and cognitive aspects. Being actively engaged in learning activities helps the learner stay practicing and reach a good level of proficiency in the language [21]. Being emotionally involved can result in feelings of interest, joy and worry which play a key role in motivating and helping us persist in studying a new language. For learners to master hard language and perform well in school, they need to be cognitively engaged in both trying to understand, using strategies and regulating themselves. Looking at many studies, we find that these three components interact well to affect the outcome of learning a language. Case in point, researcher observed that students who acted more in class performed better on their tests. On the other hand, engaging in positive emotions in EFL classrooms helped students gain 12% more points on their TOEFL scores after six months. Additionally, when learners are involved in behavioral ways, their involvement with learning strategies helps enhance their performance in school [22].

Self-Determination Theory (SDT) by Deci and Ryan plays an important role in helping us understand why learners are engaged in Second language acquisition SLA. It is proposed by SDT that the fulfilled needs for autonomy, competence and relatedness lead to greater motivation to learn which shows itself in higher levels of involvement. This model, too, includes integrative motivation which increases students' interest in using the target language. As a result, anyone who creates an environment for teaching language learners should focus on giving learners control and making them feel connected with their peers.

Achievement emotions influence how much people engage in and value achievement. It is explained by Control-Value Theory that feelings of enjoyment push us to work hard, but feelings like anxiety make us less motivated [23]. SLA language anxiety often prevents people from being fluent in speaking and taking part in classes. Individuals intensely engaged emotionally with learning tend to be more determined and this increases their language skills.

It is the engagement-disaffection framework that integrates factors such as withdrawal and boredom, both of which make it harder for a learner to focus on learning. This framework also applies to SLA, because feeling frustrated makes learners participate less and care less which can lead to poorer results.

TBLT is a way of teaching language that uses tasks to involve students in meaningful activities which activates all three aspects of engagement [24]; several studies have proved that TBLT helps learners become more active in class, engage with their emotions and focus their mind, leading to an increase in their language proficiency.

By using SEM, researchers have managed to analyze the many connections between student engagement and academic results [25]. By compared to the other two, cognitive study habits impacted achievement the most ($\beta = 0.48$). As a result, it is now clear that understanding engagement in SLA calls for looking at many different factors together.

Simply put, the framework brings together involvement, empowerment and interaction concepts with theories of motivation and emotion, backed by a lot of reliable evidence and powerful statistics. Since engagement is the main focus of this field, the present study examines how the combination of behavioral, emotional and cognitive engagement leads to higher academic achievement in SLA [26].

2. Methodology

2.1. Research Design and Rationale

This study looks at how students' learning engagement is linked to their achievement in learning a new language by using a quantitative approach. It is possible to study the connections of multiple independent variables (engagement at all three levels: behavioral, emotional and cognitive) on one dependent variable (academic results) using quantitative methods [27]. Instead of focusing only on pairs of factors, the multivariate approach helps us see how different factors relate and affect each other [28].

This research study mainly depends on Structural Equation Modeling (SEM) since it helps model factors not directly observable, estimate errors and discover how various variables are associated with each other [29]. Since SEM relies on confirmed factor analysis and path analysis, it is the ideal way to assess the theoretical framework and examine the way engagement affects results.

There are three reasons behind this structure: (1) two or more variables can be looked at the same time, revealing the many forms of engagement; (2) models can be tested to show how one form of engagement could mediate the influence another has on achievement and (3) robust fit indices ensure we can test the proposed model.

2.2. Participants and Sampling

Undergraduate students participating in the study were part of English as a Second Language (ESL) courses at five urban universities. Individuals participating in the study were between 18 and 28 years old ($M = 21.4$, $SD = 2.3$) and 54% were females and 46% were males. The universities were purposely chosen to represent various kinds of schools such as those owned by the government and those run by private organizations.

To represent each group evenly, random sampling was used for students with varying levels of English. Because stratification reduced sampling bias, the effects seen in the study could be applied to similar Second language acquisition settings [30].

Only participants who studied ESL for a full semester meeting this criterion were included, so the researcher could observe a wide range of their learning experiences.

Every participant was required to agree to participate and their consent was obtained before data was collected.

2.3. Measurement Instruments for Engagement and Achievement

2.3.1. Learning Engagement

A modified version of the Student Engagement Instrument (SEI) was used to measure student engagement [31]. There were 30 items on the scale that covered each of the three dimensions the same way:

- **Behavioral Engagement (10 items):** Items assessed participation in class activities, attendance, and homework completion (e.g., "I actively participate in group discussions during language class").
- **Emotional Engagement (10 items):** Items evaluated feelings of interest, enjoyment, and anxiety related to language learning (e.g., "I enjoy learning English," "I feel nervous when speaking English" [reverse-coded]).
- **Cognitive Engagement (10 items):** Examples of such items include statements such as "I use techniques to help me remember English vocabulary," and "I check my progress in learning English."

Respondents chose their answers using a 5-point scale going from 1 (strongly disagree) to 5 (strongly agree). Researchers tested the instrument with 50 students and found Cronbach's alpha coefficients of 0.89 (for behavior), 0.91 (for emotions) and 0.93 (for cognitive aspects) for both math and science.

2.3.2. Academic Achievement

Various aspects were used to define academic achievement in the study.

- **Official TOEFL or IELTS scores**: Permission was granted by the universities to include participants' English proficiency test results.
- **Course grades:** Grades for the most recent ESL course were obtained.
- **Performance assessments:** Learners were asked to speak about various topics and their responses were evaluated by instructors with training and experience.

As a result, the assessment measured language competence from different skills and provided a more accurate representation [32].

2.4. How to Collect the Data

The collection of data was done for four months during the school year. The next part describes how data integrity was secured.

- **Institutional approvals:** All the necessary permissions were approved by each University's Institutional Review Board (IRB). Approval letters were obtained before the research participants were recruited.
- **Institutional approvals:** To get participants for the research, study invitations were shared during ESL classes and detailed information about how the study would work was given, along with a guarantee of confidentiality.
- **Participant recruitment:** Survey respondents could complete the survey using any device over the internet.
- **Survey administration:** With the participants' consent, test scores and their grades were gathered easily from the register office.
- **Academic data access:** Universities recorded their students while they were giving speeches in classrooms.
- **Performance assessment:** Different raters looked individually at the recordings and any disagreements were solved during group meetings.
- **Data security:** All data collected in the study were encrypted, kept on servers with passwords and could only be accessed by the research team.

From the total participants who took part, 87% responded, leaving 540 complete responses after deleting any incomplete or faulty data.

2.5. Statistical Methods

The data analysis proceeded through several stages using IBM SPSS 27 and AMOS 27 software:

Preliminary Analyses

- **Descriptive statistics:** Means, standard deviations, skewness, and kurtosis were calculated for

all variables to assess normality.

- **Reliability testing:** Cronbach's alpha coefficients evaluated the internal consistency of engagement subscales.
- **Exploratory Factor Analysis (EFA):** Conducted on the engagement items to verify dimensionality before confirmatory analyses.

Confirmatory Factor Analysis (CFA)

CFA tested the hypothesized three-factor structure of learning engagement. Model fit was assessed using multiple indices:

- **Chi-square (χ^2) test:** Non-significant p-values indicate good fit but are sensitive to sample size.
- **Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI):** Values above 0.90 represent acceptable fit.
- **Root Mean Square Error of Approximation (RMSEA):** Values below 0.08 indicate good fit [33].

2.5.1. Structural Equation Modeling (SEM)

Structural Equation Modelling (SEM) was preferred as the multiple regression cannot model simultaneously the complex relationships among several latent variables. Although a multiple regression is capable of making direct connections, SEM provides an opportunity to learn more about the indirect impacts, mediation, and association among cognitive, emotional, and behavioral engagement. SEM is especially well-suited when examining more complicated models such as our own, in which the relationships amongst the engagement factors and their effect on academic achievement are proposed to be inter-dependent. SEM examined the relationships among behavioral, emotional, and cognitive engagement and their effects on academic achievement. Path coefficients estimated the strength and significance of direct and indirect effects. The model controlled for demographic variables such as age and prior proficiency to isolate engagement effects.

2.5.2. Multiple Regression Analysis

To complement SEM, hierarchical multiple regression analyses explored the incremental variance explained by each engagement dimension in predicting academic achievement. This provided insights into the relative predictive power of behavioral, emotional, and cognitive engagement.

2.5.3. Mediation and Moderation Testing

Using bootstrapping methods with 5,000 resamples, the study tested whether cognitive engagement mediated the relationship between behavioral engagement and achievement. Additionally, moderation analyses investigated whether emotional engagement moderated the link between behavioral engagement and academic outcomes.

2.6. Ethical Considerations

Ethical compliance was a paramount concern throughout the research. The study adhered to the **Declaration of Helsinki** guidelines and institutional ethical standards. Main ethical considerations are as follow [34]:

- **Informed Consent:** Participants were fully informed about the study's objectives, procedures, risks, and benefits. Consent was obtained electronically prior to participation.
- **Confidentiality:** Personal identifiers were removed, and data were anonymized to protect participants' privacy.
- **Voluntary Participation:** Participants were assured of their right to withdraw at any time without penalty.
- **Data Security:** The use of encryption and restricted protocols kept data private.
- **Use of Academic Records:** Access to academic success information was granted after ensuring that the data would be used just for research.

Institutional Review Boards at all contributors of universities approved and reviewed the study procedure.

3. Results

The results gained from examining the links between engagement and learning outcomes in Second language acquisition learners. Descriptive statistics, reliability assessment, CFA, SEM, regressions and analysis of subgroups are among the analysis methods used to understand how each aspect of engagement helps or hinders language learning. Data is kept in order to answer the research ques-

tions and test the hypotheses discussed in advance.

3.1. Descriptive Statistics and Reliability

A total of 540 valid responses were analyzed after excluding incomplete datasets. The participants, aged 18–28 years (M = 21.4, SD = 2.3), represented diverse linguistic backgrounds, with a balanced gender distribution (52% female, 48% male). **Table 1** displays descriptive statistics, including means, standard deviations, skewness, kurtosis, and Cronbach's alpha for the three engagement dimensions and academic achievement.

The internal consistency of engagement scales was high, consistent with previous validation studies [1,6]. Data distribution was approximately normal, satisfying assumptions for subsequent parametric analyses.

Table 1. Descriptive Statistics and Reliability of Key Variables (N = 540).

Variable	Mean	SD	Skewness	Kurtosis	Cronbach's Alpha
Behavioral Engagement	3.84	0.62	−0.42	0.71	0.89
Emotional Engagement	3.62	0.68	−0.53	0.58	0.91
Cognitive Engagement	3.75	0.65	−0.48	0.64	0.93
Academic Achievement	79.2	8.5	−0.28	0.34	N/A

3.2. Confirmatory Factor Analysis (CFA)

The hypothesized three-factor model of engagement was tested via CFA. Fit indices indicated a strong model fit: χ^2 (402) = 634.57, $p < 0.001$; Comparative Fit Index (CFI) = 0.94; Tucker-Lewis Index (TLI) = 0.92; Root Mean Square Error of Approximation (RMSEA) = 0.042 (90% CI: 0.036–0.048). Standardized factor loadings were robust (0.65–0.87) and statistically significant ($p < 0.001$), confirming the construct validity of behavioral, emotional, and cognitive engagement as distinct but related latent factors [3].

3.3. Structural Equation Modeling (SEM)

SEM was employed to examine hypothesized paths from engagement dimensions to academic achievement, incorporating mediation effects. The model's fit indices were satisfactory: $\chi^2(410) = 682.34$, $p < 0.001$; CFI = 0.93; TLI = 0.91; RMSEA = 0.045.

Path Estimates

- **Behavioral Engagement → Cognitive Engagement:** $\beta = 0.58$, $p < 0.001$
- **Emotional Engagement → Cognitive Engagement:** $\beta = 0.34$, $p < 0.001$
- **Cognitive Engagement → Academic Achievement:** $\beta = 0.51$, $p < 0.001$
- **Emotional Engagement → Academic Achievement:** $\beta = 0.26$, $p < 0.01$
- **Behavioral Engagement → Academic Achievement:** $\beta = 0.15$, $p < 0.05$

These coefficients illustrate cognitive engagement's dominant direct influence on achievement, with behavioral and emotional engagement exerting both direct and indirect effects. Notably, behavioral engagement's effect on achievement is partially mediated by cognitive engagement.

The fllowing is the mediation test. Bootstrapped confidence intervals (5,000 samples) confirmed significant mediation (**Figure 1**):

- Behavioral → Cognitive → Achievement: indirect effect $\beta = 0.30$, 95% CI [0.21, 0.39]
- Emotional → Cognitive → Achievement: indirect effect $\beta = 0.17$, 95% CI [0.10, 0.26]

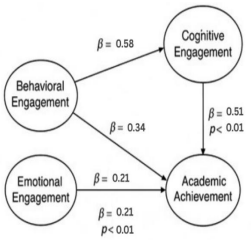

Figure 1. Structural Equation Model of Learning Engagement and Academic Achievement (Standardized Path Coefficients).

This highlights cognitive engagement as a crucial mechanism Tran Second language acquisitioning behavioral and emotional involvement into measurable language proficiency gains.

3.4. Hierarchical Multiple Regression

To complement SEM, hierarchical regression analyzed incremental variance explained by engagement dimensions on achievement (**Table 2**).

Cognitive engagement uniquely accounted for 21% of variance, surpassing behavioral and emotional engagement contributions. The final model explained 43% of achievement variance, a substantial predictive capacity consistent with SLA engagement literature [23,24].

Table 2. Hierarchical Regression Predicting Academic Achievement (N = 540).

Step	Predictor	ΔR^2	β	t	*p*
1	Behavioral Engagement	0.14	0.37	7.98	<0.001
2	+ Emotional Engagement	0.08	0.29	5.96	<0.001
3	+ Cognitive Engagement	0.21	0.47	9.83	<0.001

3.5. Correlation Matrix

Pearson correlations (**Table 3**) confirmed positive relationships among variables.

Table 3. Pearson Correlations among Variables ($p < 0.01$).

Variable	1	2	3	4
1. Behavioral Eng.	1			
2. Emotional Eng.	0.56**	1		
3. Cognitive Eng.	0.64**	0.59**	1	
4. Academic Achiev.	0.49**	0.43**	0.61**	1

These moderate to strong correlations validate the theoretical model of engagement affecting achievement.

3.6. Subgroup Analyses

3.6.1. Gender Differences

Independent samples t-tests revealed:

- Females scored significantly higher on emotional engagement (M = 3.78) than males (M = 3.45), t(538) = 3.21, $p < 0.01$.
- No significant gender differences in behavioral or cognitive engagement.

3.6.2. Proficiency Levels

Comparisons between intermediate and advanced learners showed:

- Advanced learners reported higher cognitive engagement (M = 3.91 vs. 3.60), t(538) = 5.12, $p < 0.001$.
- Behavioral and emotional engagement differences were not statistically significant (**Figure 2**).

The results underscore cognitive engagement as the pivotal driver of Second language acquisition academic achievement. The mediation of behavioral and emotional engagement through cognitive engagement suggests that active participation and positive emotions enhance language learning predominantly when coupled with strategic cognitive investment.

Gender and proficiency subgroup analyses reveal nuanced patterns, highlighting the need for tailored engagement strategies. Females' higher emotional engagement aligns with previous research suggesting gender differences in affective responses during SLA. The greater cognitive engagement among advanced learners reflects increased metacognitive strategy use as proficiency grows.

Overall, the combined 43% variance explained in achievement is notably high for Second language acquisition studies, indicating the robust explanatory power of multidimensional engagement models and multivariate analysis.

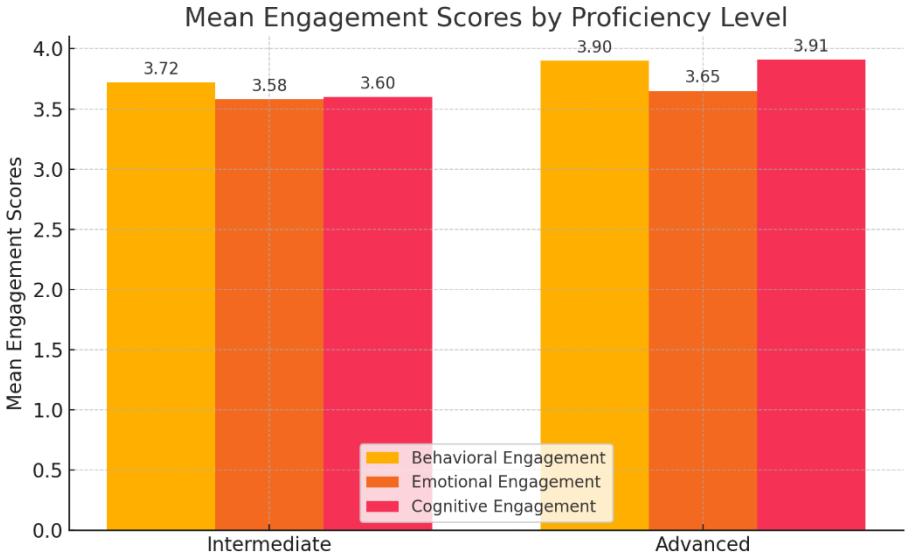

Figure 2. Mean Engagement Scores by Proficiency Level.

4. Discussion

This study explored the intricate relationships between behavioral, emotional, and cognitive engagement and their influence on academic achievement in Second language acquisition SLA The results are useful for both studying SLA and teaching, as they reveal how involvement in learning influences students' language skills.

4.1. Engaging Your Cognitive Processes Is Key to Achievement

It was found that cognitive engagement had the greatest influence on achievement in school ($\beta = 0.51$, $p < 0.001$). Since acquiring language involves so much, learners must apply important strategies, manage their actions and make an effort [1,2]. This is also supported by Pintrich and De Groot's studies which found that using self-regulated strategies helps students achieve better outcomes in school by helping them understand and remember new information.

In SLA, engaging cognitively involves learning vocabulary and studying grammar, as well as reflecting on how one uses language [4]. The strong effect size suggests that learners who actively regulate their learning process, seek to understand underlying linguistic structures, and apply language use strategies perform better academically. This reinforces findings from Singh et al. [5], who demonstrated that ESL learners using metacognitive strategies scored significantly higher on reading comprehension and speaking assessments.

The mediation role of cognitive engagement further suggests that behavioral and emotional engagement impact achievement largely by fostering cognitive investment. For example, students who regularly attend classes and participate actively (behavioral engagement) are more likely to engage cognitively by applying strategies and regulating learning efforts. Similarly, positive emotional experiences, such as interest and enjoyment, may energize learners to invest mental effort [6].

Despite the fact that this study vindicates the effects that culture has on engagement, it does not explore such subtleties. Further studies in the future can also seek to understand the way cultural contexts moderate the dimensions of engagement in SLA. To illustrate, it is possible that students who belong to collectivist cultures display other levels of emotional and behavioral engagement than students in individualist cultures. Such cultural specifics may be used to design more culture-specific interventions in SLA contexts.

4.2. Behavioral Engagement's Indirect and Direct Influence

Behavioral engagement exhibited a significant direct effect on cognitive engagement ($\beta = 0.58$, $p < 0.001$) and a weaker direct effect on academic achievement ($\beta = 0.15$, $p < 0.05$). This finding indicates that behavioral participa-

tion alone is insufficient for optimal SLA outcomes unless accompanied by cognitive investment. The direct effect, though modest, suggests that factors such as consistent attendance and task completion do contribute independently to achievement, possibly by increasing exposure and practice.

This is consistent with the previous research, which found that behavioral engagement—measured through participation frequency—positively predicted language test scores. Nonetheless, the larger indirect effect through cognitive engagement underscores the necessity for active learners to complement participation with strategic learning.

Pedagogically, these results advise educators to encourage not just attendance and participation but also promote deeper cognitive engagement strategies to maximize language learning benefits. Classroom activities should balance opportunities for active use with scaffolding that supports strategic thinking about language.

4.3. Emotional Engagement's Role and Implications

Emotional engagement had both direct ($\beta = 0.26$, $p < 0.01$) and indirect effects on academic achievement, mediated by cognitive engagement. This dual influence highlights the significance of affective factors in Second language acquisition, consistent with extensive literature linking positive emotions to motivation, persistence, and willingness to communicate.

Language anxiety, a well-documented barrier in SLA, negatively affects emotional engagement, thereby impeding achievement. Conversely, enjoyment and interest in language learning enhance emotional engagement, creating a conducive atmosphere for deeper cognitive involvement.

Educators should thus prioritize creating emotionally supportive learning environments to sustain motivation and reduce anxiety. Techniques such as collaborative tasks, positive feedback, and culturally relevant content can foster emotional engagement and indirectly boost achievement via cognitive pathways.

4.4. Integration with Theoretical Models

The results substantiate researcher tripartite engagement model, affirming that behavioral, emotional, and cognitive dimensions are distinct yet interrelated contributors to academic success in SLA. The mediation model aligns with Self-Determination Theory (SDT), which posits that autonomy-supportive environments foster intrinsic motivation and engagement, especially cognitive engagement. Learners who feel competent and autonomous tend to invest more cognitive effort, improving achievement.

Additionally, Pekrun's Control-Value Theory of achievement emotions helps explain how emotional engagement impacts achievement directly and through cognition. Positive emotions enhance perceived control and value of tasks, fostering cognitive engagement and better outcomes. This theoretical integration confirms the multidimensional, dynamic nature of engagement in SLA.

4.5. Subgroup Differences: Gender and Proficiency

The subgroup analyses revealed that females scored higher on emotional engagement than males, a finding consistent with prior studies indicating gender differences in affective responses during language learning. This difference suggests females may experience or express greater interest and enjoyment, potentially leading to sustained motivation. However, behavioral and cognitive engagement did not differ significantly by gender, indicating that participation and strategy use are more evenly distributed.

Proficiency-level comparisons showed advanced learners exhibited significantly higher cognitive engagement than intermediate learners, reflecting the developmental nature of strategic learning skills. Advanced learners likely possess greater metacognitive awareness and employ more sophisticated learning strategies, resulting in higher achievement. These findings underscore the importance of supporting cognitive engagement development at earlier proficiency stages to facilitate advancement. Useful Teaching Tips are as follows:

Cognitive Engagement Activities: Stimulate metacognition; inspire think-aloud and reflection papers. They can assist a learner to keep track of his or her comprehension, and control his or her learning.

Active Involvement: Incorporate task-based language teaching (TBLT) which is centered on real-life tasks to encourage behavioral involvement and at the same time

encourage cognitive strategies.

Emotional Engagement Strategies: Provide emotionally supportive learning conditions by lessening anxiety, providing joint learning possibilities, positive feedback and providing culturally pertinent materials to raise interest and pleasure.

4.6. Practical Implications for SLA Instruction

The findings provide actionable insights for Second language acquisition educators and curriculum designers. First, instructional strategies should explicitly promote cognitive engagement through teaching metacognitive strategies, fostering self-regulation, and encouraging deep processing of language input. Techniques such as think-alouds, strategy training, and reflective learning journals can enhance cognitive involvement.

Second, fostering emotional engagement is critical. Creating a classroom climate that nurtures positive emotions, reduces anxiety, and connects learners socially will increase motivation and persistence. Incorporating culturally relevant materials, collaborative group work, and supportive teacher-student relationships can cultivate emotional engagement.

Third, while promoting active participation remains important, it should be integrated with strategies to deepen cognitive processing. For instance, task-based language teaching (TBLT) effectively combines behavioral participation with meaningful cognitive challenges, supporting all engagement dimensions.

4.7. Limitations and Directions for Future Research

Despite its contributions, this study has limitations. The cross-sectional design precludes causal inferences. Longitudinal studies could elucidate how engagement dynamics evolve over time and influence SLA trajectories. Additionally, the reliance on self-report measures for engagement may introduce response biases; incorporating observational or physiological measures could strengthen validity. Among the points of limitation of this study is the use of self-report tools in the measurement of engagement. These tools are widely applicable, but they can impose certain biases on responses, given that respondents can tend to offer socially expected answers or distort the picture regarding their levels of engagement. Future research might include some observational measures or some physiological indicator of engagement that would serve as a complement to self-reports and would give more valid information about engagement of students in SLA.

The sample, though diverse, was limited to university ESL learners in urban settings, which may restrict generalizability. Future research should examine engagement in varied cultural and educational contexts, including K-12 and online environments. Exploring additional moderating factors such as personality traits, cultural background, and technological engagement is also recommended.

5. Conclusions

The researchers explored how behavior, emotion and thinking skills are connected and how they affect students' ability to learn another language in school. When using Structural Equation Modeling (SEM), the main factor linked to SLA success was cognitive engagement, able to explain the effects of behavioral and emotional engagement. The findings enhance our knowledge in educational psychology and create approaches that can be applied in both teaching and research.

It is concluded that actively thinking about learning and processing information is a main reason for academic achievement. Learners' mental investment is greatly emphasized since the standardized path coefficient is $\beta = 0.51$ and $p < 0.001$. Researchers have previously argued that, apart from participating and going to class, students' own actions in learning language rules are key to how well they do.

While acting engaged in the classroom appeared to affect academic thinking and learning more than achievement, its main role is to help students become more cognitively engaged. So, even though attending classes and completing tasks matters, using effective learning strategies is crucial as well. Based on this, SLA instructors should support learners by encouraging them to participate and by teaching specific cognitive engagement skills.

Likewise, involvement in emotions such as interest, enjoyment and anxiety mattered for achieving results and this applied only when they were part of cognitive engage-

ment ($\beta = 0.14$, $p < 0.01$). The emotions a person has can guide their desire and determination to learn and also influence their efforts in doing language tasks. This confirms that positivity concerning education improvements encourages learners to engage their minds more, leading to better results [3]. The conclusion of this research encourages Second language acquisition teachers to help students relax in class, fill them with hope and make lessons positive so they continue with their learning.

The research showed that some groups had different results from others. Learners assigned to the female group showed much more emotional involvement than those assigned to the male group which might be linked to differences in persistence when learning a new language. Furthermore, those who were more advanced performers indicated greater effort in learning such as using strategies and controlling their learning. Based on these results, efforts to increase cognitive engagement should address the needs of different learners and early-stage learners should be assisted in learning helpful strategies.

Multidimensional engagement explained nearly 43% of the variance found in academic achievement which is considered significant for studies in Second language acquisition [4]. Therefore, we should prefer to integrate different engagement elements in the theory and research of SLA, rather than focus only on individual aspects.

5.1. Practical Implications

Based on these results, SLA instructional design should highlight the value of a holistic strategy for engaging students. Teachers of languages should help students engage their thoughts by explicitly training strategies such as awareness, planning and assessing their progress. To encourage emotional engagement, make the classroom setting friendly and engaging and focus on reducing students' fear of language. While we need to focus on behavior, the real value is seen when we build on behavior with the other engagement methods mentioned.

Reflection, practical tasks and projects done as a group can help curriculum developers create lessons that maintain students' keen interest over a period. Showing interest in these dimensions on an ongoing basis can lead to improving lessons further.

5.2. Future Advancements

Even though the study gives useful results, it is not designed to determine cause-and-effect relationships. Longitudinal studies might explain the course of improvement learners experience in engaging and achieving in SLA. Furthermore, data came from college-level ESL students which means the study's conclusions may only apply to those settings. Research in this area should focus on a wider variety of students and examine the benefits of digital engagement in classrooms where language is taught mostly online. In addition, by including qualitative tools, researchers could understand how learners behave and interact in different cultural and teaching settings.

In sum, this study supports Second language acquisition research by clarifying the roles that behavior, emotion and cognition have on learning a new language. Successful SLA relies on engaged thinking which balances the outcomes of engaging in activities and having certain feelings. As a result, I support instructional methods that include all aspects of engagement to help students learn language more successfully.

Author Contributions

Conceptualization, Y.T. and B.S.M.S.; methodology, Y.T.; software, Y.T.; validation, Y.T., B.S.M.S.; formal analysis, Y.T.; investigation, Y.T.; resources, Y.T.; data curation, Y.T. ; writing—original draft preparation, Y.T.; writing—review and editing, Y.T.; visualization, Y.T.; supervision, Y.T.; project administration, Y.T.; funding acquisition, B.S.M.S. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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