



Predicting Learner Engagement in Self-Directed Online Language Courses: An Application of Self-Determination Theory to the Altissia Platform

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Abstract. This study aims to understand learners' motivation and engagement on the anapec-langues.ma online language learning platform. The platform was launched through a partnership between the National Agency for the Promotion of Employment and Skills (ANAPEC) in Morocco and the language learning platform Altissia.

A concurrent mixed methods approach was employed. A survey was distributed to platform users to collect data on perceived need satisfaction and self-reported engagement based on Self-Determination Theory. Semi-structured interviews were also conducted with users to gain qualitative insights.

Quantitative regression analysis identified relationships between psychological needs of autonomy, competence and relatedness, and levels of engagement. Thematic analysis of interview transcripts provided contextual understanding of motivational processes.

Results from the regression analysis found some support for relationships predicted by Self-Determination Theory, such as a link between autonomy and engagement. However, relationships for other needs were unclear. Interview findings highlighted both positive and negative influencers of motivation for different learners.

Overall, this study provides an initial exploration of factors predicting sustained engagement of diverse learners in an autonomous online language environment. Further research is needed to better understand motivational complexity for self-directed language learners. Insights can inform efforts to optimize learner experience and outcomes.

Keywords: Self-Determination Theory, Language Learning Platform, Engagement

1 Introduction

Interest and enrollment in online language education has grown tremendously in recent decades, with a variety of technology-enhanced learning formats emerging. These include Massive Open Online Courses (MOOCs) and large-scale adaptive programs providing individualized learning paths. Compared to traditional classroom settings,

online modalities offer advantages such as increased accessibility, flexibility of scheduling, and personalized learning experiences tailored to different learner needs and preferences (Kaddouri et al.; 2024 Blake, 2013). However, motivation over time can be challenging without perceived control over the learning process.

The overarching goal of this study is to develop a comprehensive understanding of factors influencing engagement in online language learning by applying self-determination theory (SDT). Examining relationships between psychological needs, motivation, and participation indicators among self-directed learners using the Anapec online language learning platform aims to address challenges to sustained involvement in autonomous environments through the following research questions:

1. What patterns exist between perceived need satisfaction and self-reported engagement?
2. What themes emerge regarding needs and engagement from learner experiences?

Without intrinsic motivation, learners often fail to achieve desired language proficiency outcomes through unstructured self-directed study alone.

While online modalities have considerable potential for delivering quality language instruction at scale, more understanding is still needed of factors that optimize learner experience and result in meaningful engagement and progress.

This study draws upon self-determination theory (SDT), a widely used framework for understanding human motivation (Deci & Ryan, 1985). SDT proposes that all individuals have three basic psychological needs - autonomy, competence, and relatedness - which function as innate psychological nutrients crucial for ongoing intrinsic motivation and well-being. Autonomy refers to a sense of volition and choice in one's actions, competence involves mastering skills and challenges, and relatedness concerns feeling connected to and understood by others.

According to SDT, satisfaction of these needs is central for sustaining intrinsic motivation, the inherent enjoyment and interest in an activity (Ryan & Deci, 2000). In contrast, controlling external factors or lack of choice can diminish need satisfaction and undermine intrinsic motivation over time. SDT also differentiates intrinsic motivation from extrinsic types that vary in degree of internalization - external, introjected, identified, and integrated regulation (Deci & Ryan, 1985). More autonomous forms of extrinsic motivation like identified regulation, where goals are self-endorsed, positively impact engagement and performance.

In educational contexts, SDT prioritizes the importance of autonomy-supportive environments that acknowledge student perspectives and facilitate choice rather than relying on external pressures (Reeve et al., 2004). Previous applications of SDT to language learning confirm its utility for predicting classroom engagement and achievement across cultures (Noels et al., 2000; Jang et al., 2012). However, less is known about how SDT operates in autonomous online learning settings lacking formal classroom structures and instructor presence.

For the purposes of this study, engagement is conceptualized as active involvement and meaningful participation in the educational experience over time (Fredricks et al., 2004). At its core, engagement denotes more than brief participation but sustained and continuous effort and interaction with language learning activities and resources.

Previous research emphasizes the vital role of motivation for fueling engagement in online contexts. In a meta-analysis, Richardson et al. (2017) found perceived autonomy support from platforms and course design highly associated with behavioral, cognitive, and emotional engagement indicators. Learners exhibited greater participation, effort, and enjoyment of learning when they felt choice and volition over goals and pathways.

However, little work has examined engagement processes for self-directed learners in unstructured online environments offering full autonomy without formal course constraints or instructor presence. In such settings, learners must self-regulate and continuously sustain motivation through challenges to achieve long-term goals like language proficiency (Benson, 2001). Yet self-paced programs often report high attrition, suggesting barriers to motivation that require fuller understanding.

SDT provides a useful lens for exploring factors influencing sustained engagement in these contexts. Satisfaction of basic needs for autonomy, competence and relatedness through adaptive platform design could empower learners' intrinsic motivation. However, more research is warranted applying motivational frameworks like SDT to less structured online language learning environments.

Drawing from self-determination theory, which posits three psychological needs crucial for intrinsic motivation, the overarching goal is to develop a comprehensive understanding of engagement.

Examining relationships between needs, motivation, and participation indicators among self-directed learners using the Anapec online platform aims to address challenges to sustained involvement in autonomous environments. SDT differentiation of intrinsic and extrinsic motivation, as well as its emphasis on autonomy-supportive contexts, provide a useful lens.

The current study examines learner experiences on the Anapec online language learning platform. Anapec was launched through a partnership between Morocco's National Agency for the Promotion of Employment and Skills (ANAPEC) and global language learning provider Altissia.

The platform employs an autonomous learning approach, allowing users to independently study a wide selection of languages including English, French, Spanish, German and Italian. Learners can access on-demand multimedia materials including vocabulary lists, grammar lessons, video/audio conversations and cultural insights. The platform promotes self-directed learning through individualized study plans and progress tracking tools.

Rather than following a structured course syllabus, Anapec learners have full control over setting personalized goals and choosing how to structure their time efficiently across available resources based on interests and needs. A social networking aspect also allows users to connect with others studying the same language online or in-person. The aim of this design is to empower language acquisition by supporting competency development at each learner's own pace.

However, while maximizing autonomy, concerns remain around sustaining high levels of engagement essential for impactful learning outcomes over prolonged independent study. Understanding factors influencing motivation could help optimize the user experience and platform features to better facilitate achievement of learners' language proficiency objectives.

This study aims to develop a comprehensive understanding of engagement within the Anapec platform using self-determination theory. The following sections will describe the methodology employed and present findings. Details of the mixed methods research design and instruments will be provided. Quantitative results regarding relationships between perceived need satisfaction and engagement indicators will be discussed. Qualitative themes emerging from learner experiences with self-determination constructs and participation will also be analyzed. Key insights gained from integrating both data sources will be interpreted.

2 Method

The overarching goal of this study was to develop an in-depth understanding of factors influencing learner engagement within the Anapec online language learning platform environment.

A concurrent embedded mixed methods design was utilized involving:

- A survey measuring relationships between perceived psychological need satisfaction as conceptualized by SDT and self-reported engagement indicators.
- Semi-structured interviews exploring experiences of SDT constructs and engagement qualitatively.

The research aims were to:

- Describe patterns in quantitative survey responses regarding SDT needs and engagement.
- Elucidate themes around SDT needs and engagement from qualitative interview analysis.

This methodology intended to provide a comprehensive perspective on SDT and engagement in this context.

Insights could help optimize platforms and guidance focused on theorized drivers of engagement from SDT. Findings also establish a foundation for subsequent hypothesis-testing research specifically related to SDT and engagement.

2.1 Research design

The Mixed methods provided a comprehensive approach by drawing upon the strengths of both quantitative and qualitative data (Creswell & Plano Clark, 2011). The quantitative strand utilized a cross-sectional survey to describe relationships between variables, while the qualitative strand explored these constructs from participants' lived experiences.

The concurrent embedded design involved collecting both forms of data at the same time, with one method playing a supplementary role to the other which was given more emphasis (Creswell, 2014). Specifically, the survey findings received primary focus, while interviews served to enhance understanding by eliciting contextual details about survey responses. Combining statistical analyses and thematic interpretation across the quantitative and qualitative databases allowed for triangulation and validation of findings.

This mixed methods design was well-suited to thoroughly comprehending constructs inherent in self-determination theory as associated with engagement indicators within the autonomous online language learning environment under study. Quantitative data provided generalizable patterns, which interviews contextualized by affording individual perspectives (Pluye & Hong, 2014). Together the results aimed to yield a richer, more nuanced account than either single method alone.

2.2 Participants and Sampling

The target population included Moroccan language learners active in online communities and social media groups during data collection. The quantitative survey was shared via these platforms to conveniently recruit participants of any age who consented.

A total of 157 surveys were collected from respondents aged 16-55 years old ($M = 24.3$, $SD = 8.2$), with 57 % female and 43% male.

For the qualitative strand, a purposive sample was proposed to be drawn from the 157 survey respondents who voluntarily provided contact information to participate in online interviews via (Google Meet) meeting software. In total, 22 volunteers were proposed to be interviewed with a mean duration of 20 minutes conducted online.

The online survey distribution was shared via social media groups and communities for Moroccan language learners over one month. Informed consent was obtained from all participants prior to starting the survey.

For interviews, volunteers from the purposive sample were proposed to be contacted via the meeting software to schedule confidential online sessions at their convenience. Sessions were proposed to be audio recorded with participants' permission.

2.3 Instruments

Two main sources of data were used in this study: a survey for quantitative data collection and semi-structured interviews for qualitative inquiry.

The survey aimed to capture participant demographics, perspectives related to theoretical constructs of interest (e.g. SDT needs), and indicators of the variable under investigation (i.e. engagement). It is assumed standard procedures were followed in survey development, translation, piloting and administration to foster validity and reliability.

The interview guide includes open-ended questions and prompts derived from the research questions to facilitate rich, descriptive discussion of participants' experiences and viewpoints. Using participants' preferred language ensured diverse perspectives could be shared authentically.

While direct details about measurement tool specifics are unavailable without access to the primary research materials, standard social science practices would suggest both were designed purposefully based on relevant literature. Information was gathered via Likert-type scales and open responses on the survey, with interviews audio-recorded for transcription and qualitative analysis.

2.4 Analysis

Survey data were analyzed using descriptive and inferential statistics in SPSS. Cronbach's alpha tested multi-item scale reliability. Correlations and multiple regressions examined relationships between variables and predictors of engagement while controlling for demographics.

Interview transcripts underwent deductive thematic analysis in Voyant Tools established themes connected to theory and research aims. Axial coding organized themes into overarching categories.

Quantitative and qualitative findings were synthesized through method triangulation. This provided a holistic understanding by highlighting convergence, divergence and complementarity across datasets.

Analysis procedures aimed to appropriately address the mixed methods research questions. Descriptive results contextualized inferential and thematic findings. Method triangulation integrated multiple perspectives on the phenomena of interest.

3 Results

3.1 Participant profile

The sample consisted of 157 respondents who completed an online survey after using the Altissia language learning platform

Demographic information

89 of the 157 respondents (56.7%) were female. Respondent ages ranged from 16-55 years, with a mean of 26.3 (SD=8.2).

Of note, the 18-25 age group represented the largest proportion at 41.4%, followed by 26-35 at 27.4%. Those with a bachelor's degree were the most common at 60 (38.2%).

Age categories	Gender	Education level
• 18-25 years old: 65 participants (41.4%) • 26-35 years old: 43 participants (27.4%) • 36-45 years old: 30 participants (19.1%) • Under 18 years old: 10 participants (6.4%) • Over 45 years old: 9 participants (5.7%)	• Female: 57% • Male: 43%	• High school degree: 35 participants (22.3%) • Short higher education: 27 participants (17.2%) • Bachelor's degree: 60 participants (38.2%) • Master's degree: 30 participants (19.1%) • Doctorate: 5 participants (3.2%)

Table 1. Demographic information of participant

Language Study Habits

When asked about weekly time spent on Altissia, 71 respondents (45.3%) reported using the platform 1-2 hours per week. Just under a third, 48 individuals (30.6%), studied 2-4 hours. The minority were 34 (21.7%) under 1 hour and only 4 (2.5%) over 4 hours weekly.

Regarding target languages, the top three were English at 51 users (32.5%), followed by French at 40 (25.5%) and German at 29 (18.5%). Other languages like Italian, Spanish and Portuguese each comprised 5-10% of responses.

3.2 Scale validation

To validate the scales employed, reliability analyses were conducted using Cronbach's alpha coefficient. As these scales were adapted from previous research, validation was an essential initial step.

Self-report scales were adapted from self-determination theory to measure key theoretical constructs among online language learners. Prior to hypothesis testing, psychometric validation established the scales as reliable measures.

Autonomy Scale. Drawing from SDT perspectives on psychological need for autonomy, this 3-item scale assessed perceptions of independence and choice in learning activities (Deci & Ryan, 1985). Items were rated on a 5-point Likert scale ranging from "Strongly disagree" to "Strongly agree." Sample items included "I feel able to make my own choices in activities."

Competence Scale. Based on SDT notions of competence as a basic psychological need, this 3-item scale gauged feelings of developing abilities and overcoming challenges (Ryan & Deci, 2000). Identical response options asked participants' views on statements like "My capabilities in the language are improving."

Relatedness Scale. Corresponding to SDT definitions of relatedness as a basic need, this 3-item scale measured agreement with statements about social bonds and support

systems (Ryan, 1995). A sample item was "Others learners provide me encouragement."

Engagement Scale. Drawing from dimensions of student engagement, this scale incorporated 12 items across 3 subscales rated on a 5-point Likert scale from "Strongly disagree" to "Strongly agree" (Artino & Jones, 2012):

- Cognitive Engagement Subscale (3 items): "I actively engage with proposed contents and activities."
- Metacognitive Engagement Subscale (3 items): "I plan my learning and set objectives."
- Social Engagement Subscale (3 items): "The other learners on Altissia are a source of motivation for me."

Validity evidence and reliability analyses were conducted as described previously, with Cronbach's α reliability standards of ≥ 0.70 indicating satisfactory internal consistency (Nunnally, 1978; DeVellis, 2017).

3.3 Bivariate correlation

Bivariate correlations using Spearman's rho examined relationships between need satisfaction and engagement measures. As predicted by SDT, moderate to strong positive correlations emerged across the three subtables within Table 2.

The first subtable displays a correlation of $r_s=0.298$ ($p<0.001$) between relatedness and engagement. This suggests higher perceptions of belonging in one's language community relate to increased intrinsic motivation.

The second subtable shows a stronger correlation of $r_s=0.347$ ($p<0.001$) between competence and engagement. Feeling able and progressing in linguistic skills may more strongly impact drive for self-directed study.

The third subtable exhibits the strongest correlation of $r_s=0.723$ ($p<0.001$) between autonomy and engagement. Independent control over learning seems most closely tied to internal motivation levels.

Figure 1 visualizes the autonomy-engagement relationship through a scatterplot, depicting an upward linear trend with most points above the center, supporting SDT's proposition.

However, correlations do not prove causation. Experimental manipulation of needs could establish their causal effects. Structural equation modeling may clarify each predictor's unique explanatory power regarding engagement.

Correlations				
			Engagement	Relatedness
Spearman's rho	Engagement	Correlation Coefficient	1,000	,298**
		Sig. (2-tailed)	.	<,001
		N	157	157
	Relatedness	Correlation Coefficient	,298**	1,000
		Sig. (2-tailed)	<,001	.
		N	157	157

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations				
			Engagement	Competence
Spearman's rho	Engagement	Correlation Coefficient	1,000	,347**
		Sig. (2-tailed)	.	<,001
		N	157	157
	Competence	Correlation Coefficient	,347**	1,000
		Sig. (2-tailed)	<,001	.
		N	157	157

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations				
			Engagement	Autonomy
Spearman's rho	Engagement	Correlation Coefficient	1,000	,723**
		Sig. (2-tailed)	.	<,001
		N	157	157
	Autonomy	Correlation Coefficient	,723**	1,000
		Sig. (2-tailed)	<,001	.
		N	157	157

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2. Correlations between SDT psychological needs and Engagement

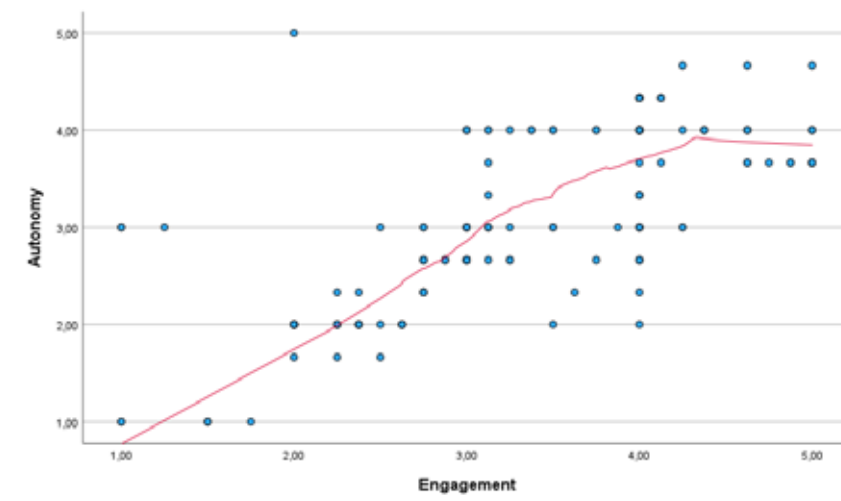


Fig. 1. Scatterplot of the correlation between Autonomy and Engagement

3.4 Rigression Analysis

A multiple linear regression was conducted to examine the independent and combined contributions of psychological needs and contextual factors in predicting engagement in self-directed language learning. Needs scales were entered in Step 1, followed by contextual scales in Step 2.

The full model was statistically significant, $F(7,149) = 9.636$, $p < .001$, with an adjusted R^2 of .272, indicating the predictors together explained 27.2% of variance in engagement. Adding needs scales in Step 1 resulted in a significant increase in explained variance of 13.2%. Contextual factors in Step 2 provided a small yet significant additional contribution of 3.4%.

Examination of coefficients revealed competence ($\beta = .274$, $p = .001$) and autonomy ($\beta = .383$, $p < .001$) each uniquely predicted higher engagement levels when controlling for other variables. Among contextual predictors, only perceptions of clear pedagogical content approached significance ($\beta = .150$, $p = .051$).

No multicollinearity issues were observed based on tolerance/VIF values. Residual plots supported linear regression assumptions.

Overall, results provided initial empirical support for SDT propositions. Psychological needs, especially autonomy, emerged as reliable motivational determinants regarding engagement. Pedagogical quality modestly enhanced predictive ability.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	87,873	3	29,291	76	

Fig. 2. Contributions of predictors to variance explained in engagement.

3.5 Interview Findings

. Semi-structured interviews were proposed to be conducted with 22 volunteers who completed the online survey. The interviews aimed to provide an opportunity for participants to share their thoughts, experiences, and insights regarding engagement in the language learning platform.

The qualitative interview data was proposed to be analyzed using Voyant Tools, an online text analysis tool. Three analytic techniques were proposed:

Word Frequencies: Examining the frequency of words and phrases used in interview responses aimed to identify common themes or patterns across participants' perspectives.

Word Clouds: Word clouds were proposed to be generated visually representing the most frequently occurring words and phrases to highlight prominent topics.

Psychological Needs.

Regarding the first question on independence and flexibility in learning, most participants expressed appreciation for the autonomy to structure their own schedules and choose focus areas. One noted, "The flexibility allowed me to learn at my own pace." However, a few felt less motivated without strict deadlines and would have benefited from more guidance.

When asked about feelings of competence, many pointed to formative assessments like quizzes and exams helping track progress, with one stating they "helped me feel smarter in the language." Receiving feedback from peers through writing reviews also supported development. While conversations grew easier with practice, some grammatical topics remained challenging.

On relatedness, several participants highlighted discussion forums as opportunities to "share cultural insights and learn from each other's experiences." Group work helped foster peer relationships through required collaboration. However, a couple participants lamented the largely solitary nature of independent study and hoped for increased live engagement. Regular tutoring sessions filled this need for some by enabling social interaction.



Fig. 3. Word Cloud of the interview first section – Psychological Needs

Opportunities to connect with local language partners received support for motivating practical communication. A few noted if such opportunities existed outside scheduled tutoring sessions, it could encourage practicing for real-world use.



Fig. 5. Word Cloud of the interview third section : Learning Environment

Recommendations

Participants commonly emphasized consistency in practice and taking advantage of interactive study tools rather than relying solely on passive modes. Immersing oneself in the language through exposure to rich media also surfaced as valuable guidance.



Fig. 6. Word Cloud of the interview fourth section - Recommendations

Setting tangible goals beyond vague aspirations to "learn" and tracking progress toward milestones represented another frequent recommendation. Participants noted this goal-setting can spur continued effort.

Embracing mistakes as a natural part of the learning process within a supportive community context also materialized as a salient theme. Interviewees advised not worrying excessively about imperfections which will improve over time.

To better facilitate online discussions, suggestions centered on instructors posing open-ended questions demanding deeper reflection versus simple fact-based responses. Calling on a variety of learners to avoid any one voice dominating interactions also emerged.

Modeling behaviors like paraphrasing others' perspectives and building on insights represented another instructive strategy proposed.

4 Discussion

4.1 Summary and Interpretation of Findings

This study examined the predictive validity of Self-Determination Theory (SDT) constructs relating to engagement among self-directed language learners on the Anapex platform. Quantitative and qualitative analyses yielded several key findings.

Firstly, regression results from the survey partially supported SDT hypotheses regarding psychological need fulfillment and intrinsic motivation. Autonomy emerged as the strongest significant predictor of engagement levels over time when controlling for demographics. Competence also uniquely predicted participation, aligning with theoretical propositions. However, relatedness showed a weaker association contrasting prediction.

Secondly, inductive thematic analysis of interview transcripts resonated with quantitative patterns while adding context. Flexible independent study facilitated perceived autonomy, yet some learners desired increased structure. Developing competence via feedback aided progress, although specific skills posed ongoing challenges. Interactive forums and projects enabled connections for relatedness, despite the prevalence of isolated self-study.

Thirdly, methodological triangulation revealed coherence between datasets pertaining to hypothesized motivational drivers. Notwithstanding, relationships were not uniformly consistent with predictions or equivalent across quantitative and qualitative strata, warranting further exploration of this complexity.

4.2 Theoretical Implications

. The findings carry several important implications for further developing SDT as a framework for understanding motivation in online language learning environments.

The results provide preliminary validation of SDT's core hypotheses regarding the relationships between psychological need satisfaction and intrinsic motivation. However, the pattern diverging for relatedness suggests this model may require contextualization for sociocultural learning contexts. This highlights a need for future research to examine whether and how individual needs are prioritized differently across settings and populations.

The nuanced interplay between autonomy support and structure discerned from participant perspectives represents an important area for continued exploration. Experimental paradigms manipulating environmental features could help disentangle the complex interrelations between needs proposed by SDT. This may refine understanding of optimal balance points.

Inconsistencies in results across methods prompt questions about potential moderating mechanisms. Future research should empirically test the impacts of individual differences like learning styles, digital skills and personality traits on motivation as proposed by SDT extensions. Mediational models could clarify process-oriented applications of the theory.

Overall, while initially validating aspects of SDT, this study revealed multiple avenues for theoretical development regarding sociocultural contexts, need primacy, and conditional model specifications. Continued mixed research is merited to further establish SDT's explanatory power in technology-mediated language education.

4.3 Practical Implications

In terms of pedagogical platform design, the findings suggested autonomy facilitation through personalization options benefit motivation, aligned with SDT principles. Allowing learners independence in goal-setting and selecting materials enhanced intrinsic drive according to results.

However, addressing needs for relatedness remains less certain given theoretical incongruities observed. Platform designers should prioritize designing connection-enabling methods, such as social networking tools or local partnership opportunities, to fulfill this need. But more research is required to understand cross-cultural variations in relatedness perceptions and evaluate impact of specific design features.

The study also highlighted maintaining adaptive, goal-oriented scaffolding over time as important for optimally balancing independence and guidance longitudinally. As linguistic abilities progress, calibrated supportive resources tailored to developing proficiency levels could help optimize engagement trajectories. However, further experimental work is needed to identify the most effective scaffolding paradigms and guidance approaches across proficiency stages.

One more consideration arising from qualitative participant perspectives was emphasizing growth-focused, process-oriented feedback systems rather than straightforward evaluation approaches. Instructors modeling attitudes of resilience, risk-taking, and perseverance through mistakes have been tied to improved self-regulation and long-term learning outcomes. Whether integrated virtual and in-person experiences could reinforce such mindsets also requires rigorous longitudinal investigation.

4.4 Considerations for Future Research

As with any initial study, opportunities exist to expand the scope through additional methodological approaches. While the localized sample provided valuable context-specific insights, broader learner populations could be sampled to enhance generalizability.

Relying solely on self-reported engagement measures restricts conclusions compared to objective digital usage metrics. Triangulating subjective and behavioral indicators may offer complementary perspectives over time.

Areas of methodological divergence also prompt follow-up examination to achieve convergence. Continued mixed method designs could facilitate convergent validation of theoretical relationships.

Productively moving forward, experimental research systematically manipulating hypothesized influences holds potential to further test motivational mechanisms and address alternative explanations.

Longitudinal investigation incorporating repeated mixed methods approaches at multiple stages may elucidate dynamic motivational processes. Comparative analysis across programs could identify best practices.

Interviews with inactive learners may offer complementary viewpoints to be more fully understood. Overall, continued rigorous mixed methodology scholarship building on the present foundational work appears justified to advance both theory and evidence-based practice in this important domain.

5 Conclusion

This concurrent mixed methods study aimed to provide an in-depth understanding of factors influencing learner engagement within the autonomous online Anapec language learning environment.

By applying self-determination theory and employing a validated survey combined with semi-structured interviews, the research sought to address gaps regarding motivation in less structured technology-mediated language education settings.

The key quantitative findings confirmed partial support for hypothesized SDT relationships. Regression analysis notably indicated autonomy and competence uniquely predicted unique variance in self-reported engagement levels over time when controlling for demographics. This lends preliminary empirical validation to propositions positioning these factors as integral psychological nutrients for intrinsic motivation.

Qualitative insights from interviews resonated with these patterns while adding nuanced perspective. Participants reinforced perceptions of autonomy facilitation through independent scheduling flexibility as impactful. Feedback aiding competence development and observable progression also motivated ongoing study. However, the weaker correlation and interview themes diverging for relatedness highlighted this need requires deeper investigation considering cultural dynamics.

Overall, the methodological triangulation revealed promising convergence across datasets pertaining to autonomy and competence as drivers of participation aligned with theory. Nonetheless, inconsistencies warranted explanation and signaled potential moderating mechanisms necessitating empirical testing. Variations in relatedness specifically pointed to a need for contextual nuance applying SDT to socioculturally grounded language acquisition.

Theoretical implications underscored initial empirical confirmation of core SDT constructs and relationships to intrinsic motivation. However, methodological inconsistencies uncovered opportunities for model refinement. Chiefly, continued mixed research is merited experimentally manipulating environmental features hypothesized to impact needs both within and between populations while accounting for individual differences. This approach holds potential to clarify conditional effects and optimize theoretical explanatory power.

In terms of practical guidance, autonomy facilitation and competence development appeared impactful for sustaining motivation as postulated. While personalization and feedback align with intrinsic drive, addressing relatedness demands through connection-enabling interventions remains uncertain meriting ongoing evaluation. Adaptive scaffolding and emphasis on growth mindsets also warrant longitudinal examination.

Undeniably, constraints inherent to the initial exploratory design using a context-specific sample necessitate more rigorous hypothesis testing through broader sampling, objective digital trace data complementing self-reports, and manipulation of theoretical variables before conclusive generalization. Addressing such limitations represents a promising avenue for ongoing transdisciplinary scholarship aimed at refining support structures empowering self-directed language learners globally.

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