Mapping Motivational Diversity: A Q-Method Study of Basic Psychological Need Satisfaction in AI-Assisted Corpus-Based DDL Argumentative Writing

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Abstract. Drawing on basic psychological needs theory (BPNT: competence, autonomy, relatedness), we explored 20 EFL undergraduates' need satisfaction when using an AI-powered corpus-based writing platform (AI-Corpus Writing). Within a data-driven learning (DDL) context, the platform provides corpus-derived suggestions based on curated materials. Using Q methodology, analysis of 20 Q-sorts revealed four distinct basic psychological needs (BPNs) satisfaction profiles: (1) cautious users preserve autonomy by directing AI suggestions rather than being directed; (2) relational resistors satisfy competence and relatedness almost exclusively through human feedback, rejecting AI's social utility; (3) pessimistic dependents exhibit a triple BPN deficit (low autonomy, low competence, absent relatedness), passively copying AI outputs; (4) skill-empowered optimists reframe AI proficiency as a higher-order competence, maintaining autonomy by filtering suggestions. Across all profiles, learners agreed that AI-corpus suggestions are reliable and expand expression, but excessive suggestions overload decision-making, directly threatening autonomy. The findings show that the same corpus-based AI platform differentially satisfies BPNs empowering optimists and cautious users while demotivating pessimistic dependents. We conclude that psychologically calibrated AI writing tools must limit suggestion overload, preserve learner agency, and leave room for human feedback, or risk widening BPN-based learning disparities. This study contributes to existing scholarship by moving beyond monolithic attitudes to show that the same corpus-based AI platform differentially satisfies autonomy, competence, and relatedness across learners. The discussion of these findings is expected to inform pedagogical practices and designs for building psychologically supportive AI-supported writing environments.

Keywords: Basic Psychological Needs Satisfaction, Data-Driven Learning, AI-powered Corpus Tools, Q Methodology, Argumentative Writing.

1 Introduction

According to Self-Determination Theory (SDT), human motivation is sustained by the satisfaction of three basic psychological needs (BPNs): autonomy, competence, and relatedness (Ryan & Deci, 2017; Vansteenkiste et al., 2020). Traditionally examined in teacher-student interactions (Froiland et al., 2019), these needs have become increasingly relevant with the rise of generative AI (GenAI) in education. To fully realize the potential of GenAI systems, it is essential to understand how learners' BPNs are addressed. In language and writing education, data-driven learning (DDL) has long empowered learners by engaging them directly with corpus evidence (Crosthwaite & Baisa, 2023). However, recent studies advocate for AI-powered corpus-based DDL platforms to maximize the complementary strengths of both corpus querying and GenAI generation (Cheung & Crosthwaite, 2025). Despite this advocacy, empirical research on BPN within DDL contexts remains scarce, and even more so for AI-powered DDL. Moreover, existing studies largely adopt variable-based approaches, overlooking learners' in-depth perceptions, a critical gap in motivational and educational psychology research (Feng et al., 2025). To address these gaps, this study employs Q methodology, a mixed-methods approach that systematically captures subjective viewpoints and clusters them into shared patterns (Watts & Stenner, 2012). It explores how an AI-powered corpus-based DDL platform (AI-Corpus Writing; hereafter "AI platform" or "the platform") satisfies or fails to satisfy learners' needs for autonomy, competence, and relatedness in argumentative writing. By illuminating nuanced, person-centered insights into BPN satisfaction, this study contributes to the design of learner-centered AI writing environments that support rather than undermine motivation.

2 Literature Review

2.1 Theoretical Framework: Basic Psychological Needs Theory

Self-Determination Theory (SDT) conceptualizes human motivation in terms of three basic psychological needs (BPNs): autonomy, competence, and relatedness (Ryan & Deci, 2017). In language education, the satisfaction of these needs supports intrinsic motivation, sustained engagement, and stronger learning outcomes (Davis, 2018). In this study, these needs are understood in the context of AI-Corpus Writing as follows. Autonomy satisfaction is the degree to which learners feel volition and self-direction when using the platform; Competence satisfaction is the degree to which they feel capable and confident in completing writing tasks with the platform's support; Relatedness satisfaction is the degree to which they feel connected, understood, and supported within the platform environment, both by the tool and by other people in the learning process.

2.2 Empirical Evidence of Basic Psychological Needs in GenAI/DDL Contexts

A growing body of research has shifting focus from academic outcomes to learner motivation, examining the role of BPNs in GenAI- and AI-mediated language learning (Dou & Sun, 2025). Most studies suggest that AI feedback can strengthen competence and motivation by providing immediate and personalized responses (Larasati et al., 2026). Findings on autonomy, however, are more mixed: while some learners appreciate the flexibility offered by AI tools, others report feeling constrained by feedback that is vague, generic, or insufficiently transparent (Xu et al., 2024, 2025). Relatedness remains the least explored need. Because GenAI tools rarely support genuine social interaction, learners often express a desire for human connection that is difficult to satisfy in AI-mediated writing environments (Crawford et al., 2026;). More broadly, the existing literature is still largely variable-centered, focusing on average relationships rather than on the subjective configurations of need satisfaction that individual learners experience (Vansteenkiste et al., 2020). In DDL contexts, learners must work with corpora, interpret patterns, and make inductive inferences, which places considerable cognitive and technical demands on them (Csomay et al., 2025). These demands may weaken the very autonomy and competence that DDL is intended to foster. Therefore, recent research has advocated integrating the complementary strengths of GenAI and corpus platforms (Cheung & Crosthwaite, 2025). However, empirical research on learners' BPN satisfaction in AI-powered DDL platforms remains limited. More importantly, no prior study has adopted a person-centered approach to examine how different combinations of competence, autonomy, and relatedness emerge in learners' interactions with such tools. To address these gaps, this Q-method study identifies distinct BPN profiles among EFL undergraduates using AI-Corpus Writing, a self-developed AI-powered corpus-based DDL platform for argumentative writing. Specifically, the following research questions (RQs) will be addressed: **(1)** What distinct viewpoints exist among learners regarding their basic psychological needs satisfaction when using the AI-Corpora platform for argumentative writing?; and (2)What are the different patterns of perceived autonomy, competence, and relatedness satisfaction among learners using the AI-Corpora platform?

3 Methods

3.1 Participants (P-set)

The P-set comprised 20 EFL undergraduates from universities in the Greater Bay Area. Participants were recruited purposively from the cohort that had completed two weeks of training in argumentative writing using the AI-Corpus Writing platform, as they were already familiar with the platform and able to reflect on their experience. The P-set was designed to include students with different English proficiency levels and varied prior experience with AI, so as to capture a broader range of viewpoints.

3.2 Q-methodology

Q methodology was selected as it enables systematic comparison of participants' shared and divergent views while retaining the interpretive depth needed for this study (Watts & Stenner, 2012). *Q-set development.* The Q-set was developed by integrating participant-generated perspectives with existing literature (Watts & Stenner, 2012). Preliminary viewpoints on perceived BPN were collected from 31 AI-Corpus Writing users through open-ended questions. These responses, together with 30 empirical studies on BPN and AI/DDL platforms, informed an initial set of 69 statements. After pilot testing with six platform users (not included in the main study) and refining wording for clarity and non-redundancy, a final Q-set of 39 statements was obtained. *Q-sorting activity.* The Q-sort was administered online using EQ Web Sort (Banasick, 2024). Before sorting, participants reviewed the platform functions. The procedure consisted of three stages: (1) *pre-sort.* participants classified the 39 statements into disagree, neutral, and agree; (2) *sort.* participants completed a forced distribution on a Q-sort grid (see Fig 1.); (3) *post-sort*. Volunteers explained why they placed certain statements at the extremes (-4 and +4).

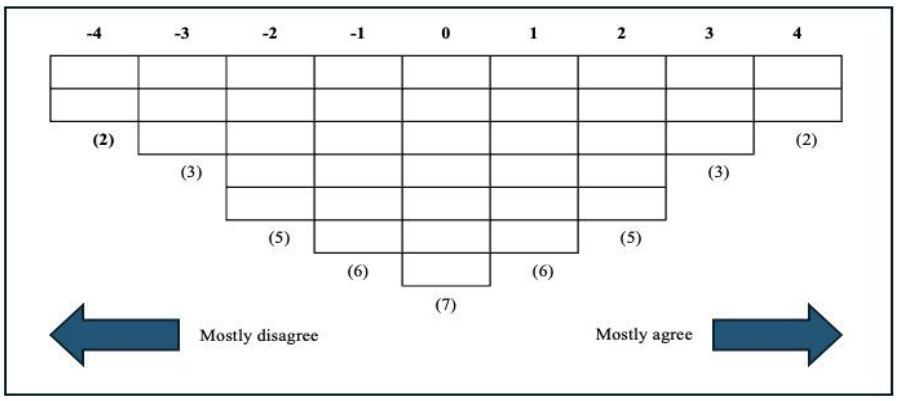

Fig. 1. Forced distribution continuum for 39-item Q-sorts

Q Factor Analysis and Interpretation. Data from 20 participants were analyzed using KEN-Q software version 2.0.1 (Banasick, 2023). The number of factors was determined by considering eigenvalues, explained variance, and the number of participants loading significantly on each factor. Principal component analysis was performed to obtain the correlation matrix and eigenvalues, followed by varimax rotation of factors with eigenvalues greater than one. This analysis yielded four factors that collectively explained 62% of the total opinion variance. Following Brown (1996), factor loadings were considered significant when they exceeded the threshold of $2.58/\sqrt{n}$ (where n=20), resulting in a critical value of 0.58 ($p<0.01$). However, given the relatively small sample size, participants with loadings close to this threshold (e.g., ≥ 0.5) and showing a clear primary factor were retained as defining participants (Fornell & Larker, 1981). Accordingly, 17 of 20 participants were classified into four distinct types (F1-F4; See Table 1.)

Table 1. Quantitative summary of emerging factors

Emerging factor	F-1	F-2	F-3	F-4	Null
Loading	4	3	3	7	3
Explained variance	32%	13%	10%	7%	---

The qualitative data from participants' post-sort justifications will be analyzed to deepen factor interpretation (Weller, 2014).

4 Results

To characterize each factor, the distinguishing statements ($p < 0.0005$) were examined. The Q-method analysis identified four distinct cognitive preference types among learners regarding the use of AI writing platforms: cautious users, relational resistors, pessimistic dependents, and skill-empowered optimist.

Factor 1 Cautious user. These learners (n=4) view AI as a tool that requires human direction. They firmly believe that complete dependence harms learning quality (S12, –4) and therefore maintain autonomy by refusing to let AI direct their writing (S5, –2). While they mildly acknowledge AI's social utility (S35, +1), they do not rely on it for belonging but engaging in active, critical dialogue with the platform, using it to clarify thinking and argue back while always adding their own ideas (S3, +4). For them, competence comes from transforming AI content rather than copying it (S4, –4). ***Factor 2 Relational resistor.*** These learners (n=3) reject AI's ability to reduce writing anxiety (S29, –4) or serve as a legitimate shortcut (S8, –2). Their competence and relatedness needs are fulfilled almost exclusively through human feedback (S38, +4), and they believe that only unaided writing can prove genuine ability (S16, +3). Justifications confirm this stance: AI is seen as "confined to preset knowledge" and "merely a tool" that cannot understand individual weaknesses. ***Factor 3 Pessimistic dependent.*** These learners (n=3) reluctantly accept copying AI content (S4, +4) while simultaneously rejecting human feedback (S38, –4). They show little commitment to critical evaluation (S19, 0) and only slightly disagree that complete dependence harms learning quality (S12, –1), indicating an awareness of harm but passive resignation. justifications reveal that AI reduces deep thinking and is used only to complete tasks passively. Taken together, this factor represents a triple deficit in autonomy, competence, and relatedness.***Factor 4 Skill-empowered optimist***. These learners (n=7) experience high competence satisfaction by treating AI proficiency as a transferable skill (S25, –3). They maintain autonomy by disagreeing that AI feedback crowds out their own thinking (S10, –2) and reject the notion that AI is merely a tool (S31, –2). Comments highlight their use of AI as a coach: they keep their own rhythm, transform AI outputs, and view the ability to command and filter AI as a higher-order writing skill. They do not expect belonging from AI, nor are they disturbed by its absence, focusing instead on augmenting their writing repertoire.

Consensus across the four factors. Three cross-factor consensual perceptions were observed. All participants consistently agreed that: (1) an excessive number of AI

suggestions increases learners' decision-making burden and interferes with autonomous writing decisions; (2) AI platforms provide opportunities for learners to acquire new ways of expression; and (3) the suggestions offered by AI platforms are generally reliable and of reference value.

5 Discussion

This Q-method study identified four distinct motivational profiles among learners using AI writing platforms, each reflecting a different balance of autonomy, competence, and relatedness.

Factor meanings. Cautious users (F-1) preserve autonomy by directing AI rather than being directed. They transform AI output, indicating high competence satisfaction through active control. Their low reliance on the platform for belonging suggests relatedness is sought elsewhere, forming a balanced but externally oriented need profile. Relational resistors (F-2) derive competence and relatedness almost exclusively from human feedback. For them, the plaform is not only unhelpful but potentially threatening to the authentic writing self. Pessimistic dependents show a triple deficit: low autonomy as they passively copy, low competence marked by resigned acceptance, and absent relatedness because they reject human feedback yet gain no sense of belonging from AI. This pattern reflects need frustration is associated with and can undermine learner engagement (Vansteenkiste et al., 2020). Skill-empowered optimists achieve high competence by treating AI as a coach. They maintain autonomy through selective filtering and are unaffected by AI's lack of relatedness, reflecting a self-sufficient motivational profile (Pan & Zhang, 2025). Notably, the same statement that human feedback is more valuable than AI was placed at opposite extremes. Relational resistors strongly endorsed it (+4), while pessimistic dependents strongly rejected it (-4). This reveals that the two groups diverge not merely in AI attitudes but in whether human relationships remain a meaningful source of learning at all. Such opposing stances suggest that designing effective support for AI- mediated writing must not only address learning outcomes or technological features but also attend to learners' underlying relational orientations and trust in human versus machine feedback (Dou & Sun, 2025). ***Consensus as a bridge.*** Despite their differences, all four profiles agreed that AI suggestions are generally reliable and useful for expanding expression, but that too many of them overload decision-making and undermine autonomous judgment (Jose et al., 2025; Zhai et al., 2024). This shared ground shows that the platform itself is valued, but its design creates friction that overwhelms learners and can impair critical thinking (Jose et al., 2025). Consensus narrows the debate: To promote BPN, educators should focus more on reducing cognitive load, rather than whether AI is inherently good or bad.

Theoretical and practical implications. The AI-Corpus Writing platform appears to support competence most consistently as learners gain new expressions through platform interactions. However, it supports relatedness poorly, as no distinct profile emerged belonging from AI. Autonomy is experienced unevenly: optimists and cautious users retain agency, while pessimistic dependents lose it. This explains why

the same platform can be empowering for some and debilitating for others. To encourage agentic use among pessimistic dependents, autonomy-supportive design features such as user-controlled suggestion density and transparent feedback filtering are needed (Williams et al., 2006; Gerstenberg et al., 2024). Practically, for educators and Edtech designers, addressing divergent BPN experiences requires pedagogy and systems that flexibly support autonomy, build competence through critical AI use, and integrate structured opportunities for human feedback as an alternative to machine-mediated interaction. ***Limitations.*** Due to the short duration and small sample, the findings have limited generalizability. Meanwhile, without follow-up interviews, deeper reasoning remains unexplored. Future research should adopt longitudinal designs, broader samples, diverse writing tasks, and varied AI tools to validate and extend these observations.

6 Conclusion

Overall, this study demonstrates that EFL undergraduates' psychological needs satisfaction with an AI writing platform is not uniform but clusters into four qualitatively different profiles. For teachers, effective AI writing instruction requires not just technical reliability but psychological calibration: reduce overload, protect autonomy, and leave room for human connection. For Edtech designers, AI writing tools must reduce cognitive load by limiting suggestion volume, preserve learner agency by requiring active acceptance rather than auto-insertion, and leave space for genuine human feedback. Without such psychological safeguards, AI risks widening the gap between confident optimists and resigned dependents (Block, 2024). With thoughtful design, however, AI can serve as a genuine partner in writing development, not by replacing human judgment, but by augmenting it. Future research should explore whether targeted interventions can move pessimistic dependents toward more agentic, skill-empowered use.

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