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Concept Analysis of Adaptive Learning Strategy in English Language Teaching (ALS-ELT)

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Abstract

Adaptive Learning Strategies (ALS) are revolutionary forces in the ever-changing educational landscape, where varied learning contexts and technological breakthroughs converge. This study aimed to acquire a nuanced understanding of the concept while providing empirical support and new information on the usefulness and effects of ALS on language learning outcomes. Research articles from open-access databases such as Google Scholar, CrossRef, and OpenAlex published from 2019-2024 were carefully analyzed using Walker and Avant's eight-step analysis. Keywords utilized were adaptive learning, knowledge translation, and English language teaching. The 17 research articles analyzed determined five attributes of adaptive learning pedagogy: enhanced motivation and involvement, personalization and customization, improvement in language proficiency and communication skills, support for autonomous and independent learning, and technological integration and innovation. Antecedents included five themes: learner needs and context, availability of technology and resources, teacher training and proficiency, administrability support and policy alignment, and student motivation and engagement. Consequences also generated five themes: personalized learning experiences, enhanced technological integration and innovative learning tools, effective implementation of ALS, institutional commitment to ALS adoption, active student participation, and improved learning outcomes. Adaptive learning strategy in English language teaching (ELT) effectively engages students by aligning content with their interests and providing relevant challenges, fostering active participation and motivation. Individualized learning paths and real-time feedback enhance learning outcomes, improving language proficiency and communication skills. The seamless incorporation of technology, such as language learning apps and AI-driven tools, enables personalized experiences and data-driven adaptation, promoting student autonomy and independence.

Keywords: Adaptive learning strategy (ALS), Concept analysis, English Language teaching (ELT),

1. Introduction

In the dynamic landscape of education, where technological advancements and diverse learning contexts intersect, Adaptive Learning Strategy (ALS) emerges as a transformative force. It transcends traditional teaching paradigms, embracing flexibility, responsiveness, and innovation. Even in the post-pandemic era, learning adaptability and leveraging technology in the classroom has been widely used (Rapanta et al., 2021).

Adaptive learning strategy is an educational method that uses technology to tailor learning experiences to the individual needs of each student. This approach leverages data analytics to monitor students' progress and adjust instructional content, accordingly, ensuring learners receive personalized support and challenges appropriate to their skill levels (Hwang et al., 2020). By continually assessing student performance, adaptive learning can provide timely feedback and interventions, helping to improve learning outcomes and engagement (Fisher, 2018; Hedman & Fisher, 2022). Moreover, it supports differentiated instruction, addressing diverse learning styles and paces within a single classroom setting (Kerr et al., 2020). As a result, adaptive learning has enhanced academic achievement and student motivation, contributing to a more effective and inclusive educational environment (Means et al., 2014).

1.1. Adaptive Learning

Using technology to build adaptable learning environments—interactive exercises and real-time feedback systems to improve student engagement and progress—is a crucial aspect of adaptive learning (Shute & Towle, 2003). In a study conducted by Harrigan et al. (2009), the advantages of technology-enhanced learning environments include reusability, personalized provision of relevant learning materials, efficient adaptive educational hypermedia systems tailored to individual users, increased student motivation, avoidance of information overload, automation, flexibility, and monitoring of temporal and spatial relevance. Research findings by Gligorea et al. (2023) indicate that AI or machine learning algorithms play a crucial role in customizing learning experiences. These technologies optimize learning paths, boost engagement, and improve academic

performance, including higher test scores. Integrating AI or machine learning into e-learning platforms significantly enhances personalization and overall effectiveness in education. As e-learning continues to evolve rapidly, driven by advancements in artificial intelligence and machine learning, there is a growing need to explore how AI or machine learning integration can enhance adaptive learning systems and educational outcomes. Adaptive and e-learning ensure that education stays in line with each student's changing needs by incorporating ongoing evaluations, which enable quick modifications in teaching strategies (Nicol & Macfarlane-Dick, 2006).

Moreover, adaptive learning fosters a learner-centered environment that encourages active participation and autonomy, empowering students to take control of their learning journey (Little, 2007). This adaptable and dynamic method enhances overall educational efficacy while enhancing language acquisition results. While this is a breakthrough in education, its implementation presents several problems, such as the substantial financial outlay for technology and the continual, resource-intensive training of teachers (Means et al., 2014). Furthermore, managing and customizing learning routes for every student can be difficult and time-consuming, necessitating extensive data analysis and instructional design (Shute & Towle, 2003). Concerns about fairness also arise from the possibility that students will need access to the internet or the required technology tools, which could increase the digital divide (Selwyn, 2016). Another crucial problem that requires careful consideration is ensuring data privacy and security for learners' personal information (Dabbagh & Kitsantas, 2012). Ultimately, the inconsistency in educators' technological competence may compromise the successful application of adaptive pedagogies in learning, hence requiring ongoing professional development and assistance (Jiménez et al., 2019).

Adaptive learning is an educational method that leverages technology to customize instruction for individual learners, enhancing their learning experience (Chen, 2020). Sophistic algorithms and data analytics are central to adaptive learning, which analyzes student performance and adjusts content delivery accordingly (Kerr, 2019). By employing artificial intelligence, adaptive learning systems can dynamically modify content difficulty and provide personalized feedback in real-time (Johnson et al., 2021). A crucial term in this context is "learning pathways," which refers to the customized routes students take through educational material (Lo & Hew, 2021). "Real-time feedback" is essential, offering immediate insights and corrections based on student interactions (Xu et al., 2020). "Differentiated instruction" underlies adaptive learning, emphasizing the customization of teaching methods to meet diverse learner needs (Subramanian et al., 2023). Adaptive learning often involves "intelligent tutoring systems," which simulate one-on-one tutoring and adapt to the learner's progress (Bernacki et al., 2021). Another related approach is "competency-based learning," which focuses on mastery of skills rather than time spent on a subject (Moldasan et al., 2023). "Learning analytics" is pivotal in adaptive learning, collecting, analyzing, and reporting data about learners and their contexts. Lastly, "scaffolded learning" is a crucial concept, describing the support provided to students to achieve their learning goals, gradually removed as they gain competence (Pan & Liu, 2022).

1.2. Defining Concept Analysis

Concept analysis is a methodological approach used to clarify and define concepts often ambiguous or used inconsistently within a field, enhancing the precision and clarity of theoretical and empirical research (Walker & Avant, 2019). This process involves systematically examining a concept's attributes, antecedents, and consequences to develop a clear and operational definition that can be used consistently in research and practice (Rodgers, 2020). Concept analysis is valuable for developing theoretical frameworks, informing research design, and enhancing the rigor and clarity of scientific inquiry. A structured approach to defining and refining concepts supports advancing knowledge and applying research findings in practice (Meleis, 2021). This methodological approach is widely used in fields such as nursing, education, and social sciences, where precise and consistent use of concepts is critical for effective communication and advancement of the discipline (Casey et al., 2022).

1.3. Revolutionary Approach to English Language Teaching

There has been a transformative shift in language education in recent years, driven by technological advancements and innovative teaching practices. Meanwhile, adaptive learning strategy has significantly impacted English language teaching (ELT), which designs educational experiences for each student's needs. Studies reveal that individualized training based on each learner's competence level and preferred learning method increases student motivation and engagement (Jiménez et al., 2019). By allowing for real-time modifications based on continuing evaluations, this individualized approach guarantees that training is constantly in line with the learner's present abilities and progress (Kulik, 2019). Technology-enhanced ELT positively impacts academic outcomes, including test scores and language proficiency. Beyond academic achievement, e-learning promotes lifelong learning, digital literacy, and global communication skills (Cambridge University Press, 2020).

It is significant to reiterate that technology is essential to ALS because it offers resources that support more adaptable environments. For example, it has been demonstrated that adopting AI-driven platforms and adaptive learning tools, which provide tailored feedback and focused practice activities, improves language acquisition outcomes (Johnson & Samora, 2021). Moreover, ALS fosters the growth of self-directed learning abilities, enabling learners to take charge of their language acquisition process, an essential component of lifelong learning (Littlejohn, Hood, Milligan, & Mustain, 2019). Also, ALS' collaborative structure fosters peer support and interaction, which can improve language acquisition by encouraging social involvement and the exchange of different viewpoints (Wang, 2020).

Consequently, educators and legislators must address the growing problem of guaranteeing data security and privacy in adaptive learning settings (Thompson & Lodge, 2022). Overall, ALS significantly impacts ELT and offers a more individualized, engaging, and successful method of language instruction; however, to fully achieve its potential, implementation obstacles and equity concerns must be carefully considered (Brown, 2023).

This study addresses the need for more clarity and specificity in the adaptive learning strategy (ALS). Additionally, the concept needs more empirical validation and testing, limiting insights into ALS's practical effectiveness and impact on language teaching outcomes. Addressing these gaps is crucial for enhancing the applicability and relevance of ALS in diverse language-learning contexts.

2. Method

2.1. Research Design

This study will utilize concept analysis to uncover and achieve a deeper understanding and a more comprehensive view of the concept of adaptive learning strategy. Concept analysis involves integrating knowledge from various sources to generate new insights or understandings of a particular concept. It aims to provide a comprehensive view by combining different perspectives and findings related to the concept under study (Walker & Avant, 2019). This method allows researchers to create a unified framework or model encompassing the concept's diverse aspects and dimensions, facilitating a deeper understanding and analysis (Hsieh et al., 2016). Concept analysis often involves analyzing qualitative and quantitative data, theories, and empirical findings to develop cohesive explanations or hypotheses (Iranzo-Domingo & Moura, 2023). It is widely used in healthcare, education, and social sciences to advance theoretical understanding and inform practical applications.

This study mainly utilized this method to acquire a nuanced understanding of the concept and generate a more empirical basis on how adaptive learning strategies can be better used as instructional strategies to improve student learning outcomes. Furthermore, a specific and profound definition of adaptive learning pedagogy was conceptualized from rich online data sources.

2.2. Search Strategy

Open-access academic databases such as Google Scholar, Crossref, and OpenAlex were used in this study to mine the numerous research publications on adaptive learning pedagogy that were published between 2019 and 2024. These were utilized as they were the only accessible databases in the software. Through Publish or Perish software (Harzing, 2024), the various data were gathered using the following keywords: (a) adaptive language learning, (b) concept analysis, (c) knowledge translation, and (d) English language. The relevant articles were downloaded and screened using the Critical Appraisal Skills Programme (CASP) for Qualitative Research for relevance based on the set inclusion and exclusion criteria. Moreover, a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram organized the extracted data.

2.3. Inclusion and Exclusion Criteria

According to Polit and Beck (2017), establishing inclusion and exclusion criteria is essential because it establishes parameters for participant selection and guarantees the validity and applicability of the research. Researchers can ensure consistency and validity in their findings by precisely defining eligibility criteria. In addition, inclusion and exclusion criteria help reduce biases and confounding variables, facilitating a more straightforward interpretation of the data and more precise findings (Freeman, 2017). In this study, the research articles that were chosen for inclusion have met the following criteria: (1) the article was published between 2019 and 2024, (2) English is the primary language used in the paper, (3) the paper has clear abstract and discussion of results, (4) the study pertains to adaptive learning pedagogy and its related concepts. Research studies beyond these inclusion criteria were not included.

2.4. Walker and Avant's Concept Analysis Method

Walker and Avant's concept analysis systematically clarifies the meaning of terms and concepts in nursing and other disciplines. This methodology is widely recognized for its structured approach, which includes the following steps: (1) selecting a concept, (2) determining the aims of the analysis, (3) identifying all uses of the concept, and (4) defining attributes, antecedents, and consequences, (5) identifying a model case and additional cases, (6) identifying antecedents, (7) Identifying consequences, and (8) defining empirical referents (Walker & Avant, 2019). The concept analysis helps build theoretical frameworks and improve the clarity and consistency of terms used in research and practice. It involves identifying model cases that exemplify the concept and borderline, related, and contrary cases to understand its boundaries (Walker & Avant, 2020). In education, Walker and Avant's concept analysis method is valuable for clarifying and defining key concepts. Furthermore, this method helps in developing a clearer understanding of concepts such as "student engagement," "educational equity," and "critical thinking" (Brown & Clark, 2020).

Recent studies have utilized Walker and Avant's method to analyze "inclusive education," identifying key attributes such as accessibility, diversity, and support (Jones et al., 2021). Another application of this method in education focused on "digital literacy," highlighting attributes like technological proficiency, critical evaluation, and ethical use of information (Smith & Lee, 2022). These analyses have provided educators and policymakers with a more precise vocabulary and framework to address these critical issues.

Walker and Avant's concept analysis also supports curriculum development by offering a structured approach to integrating new and complex concepts into educational programs (Walker & Avant, 2020). For instance, a concept analysis of "blended learning" identified critical attributes such as flexibility, interaction, and student-centeredness, which informed the design of effective blended learning environments (Johnson & White, 2023). Additionally, the method has been used to examine "teacher resilience," identifying attributes such as adaptability, perseverance, and self-efficacy, which are crucial for teacher training and support programs (Green & Black, 2023).

2.5. Data Collection

A total of 2887 studies were retrieved from the three open-access databases: Google Scholar (1200), OpenAlex (687), and CrossRef (1000). All articles were reviewed for relevance and duplicate records before the actual screening of the articles. After a thorough reading, 175 research articles were screened, and 87 were excluded after the intensive screening, leaving 160 articles subject to assessment for eligibility. After considering inaccessible papers (N=27), research articles with no abstract (N=7), articles whose abstracts are not in the English language (N=5), and articles that are not related to adaptive learning pedagogy (N=17), only 17 research articles were finally included for the systematic review.

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) is used in meta-analysis to ensure clarity, transparency, and completeness in reporting research findings. By providing a standardized checklist and flow diagram, PRISMA helps researchers systematically identify, select, and critically appraise relevant studies, minimizing bias and enhancing reproducibility (Page et al., 2023). It facilitates the synthesis of evidence by ensuring that all relevant data are considered, and the methodology is documented, which aids in the

validation and replication of results. Meanwhile, the Critical Appraisal Skills Programme (CASP) for Qualitative Research is used in concept analysis to systematically evaluate qualitative studies' quality and rigor, ensuring the findings' reliability and validity (Long et al., 2022). CASP provides a structured framework to assess various aspects of qualitative research, including the clarity of the research question, the appropriateness of the methodology, and the robustness of the data analysis, which is essential for drawing accurate and meaningful conclusions in concept analysis (Aveyard & Bradbury-Jones, 2019). Using CASP, researchers can identify potential biases, strengths, and limitations in qualitative studies, thereby enhancing the overall credibility and trustworthiness of the concept analysis (Long et al., 2020).

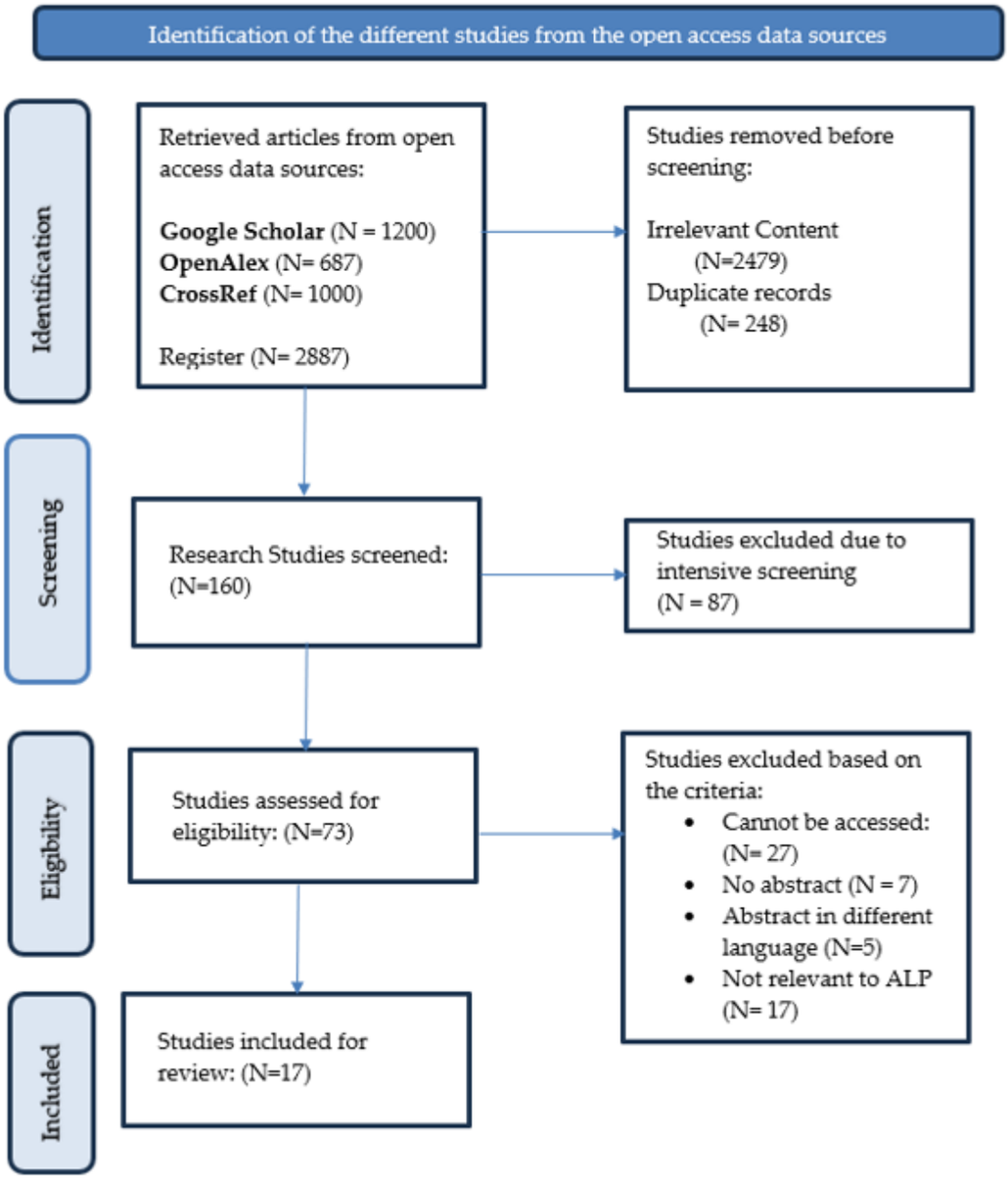

Figure 1. Presents the PRISMA flow diagram of the studies included for analysis.

3. Results and Discussion

3.1. Selection of a Concept

The necessity to unlock the concept of adaptive learning strategy is due to its broad coverage and wide applications across diverse educational contexts. Its ability to tailor educational experiences to individual learner needs encompasses a variety of methods, tools, and theoretical frameworks, necessitating a clear and consistent understanding of the concept (Noroozi & Sahin, 2023). This broad applicability spans different educational levels and subjects, making it essential to delineate its core attributes and boundaries for effective implementation and research (Wang & Heffernan, 2022). The integration of adaptive learning in both traditional and digital learning environments further underscores the need for a comprehensive analysis to address its various pedagogical and technological aspects (Lim et al., 2022). Moreover, adaptive learning's potential to enhance personalized education through data-driven insights and real-time feedback mechanisms highlights the importance of analyzing its effectiveness and challenges (Azevedo et al., 2022). Educators and researchers can ensure its optimal use by systematically examining adaptive learning, contributing to improved learner outcomes and educational equity (Xie et al., 2023).

3.2. Determine the Aims or Purpose of the Analysis

This concept analysis aims to have a nuanced understanding of adaptive learning strategy, making it more precise and applicable in educational settings. Determining the characteristics, causes, and effects of adaptive learning makes it possible to apply the concept more consistently and successfully in various situations (Cardiel et al., 2022). According to Mejeh and Rehm (2024), researchers can improve personalized education through technology by methodically studying adaptive learning to understand better how it adjusts to the demands of

individual learners. Students are at different levels of readiness, interest, and approach to learning, so adaptive teaching aims to provide education that meets these students' needs for flexible learning (Main, 2023). The particular process helps teachers align specific behaviors of students, thus eliminating obstacles to learning and making educational experiences relevant to all learners ("Translation in Language Teaching and Learning - Teaching English With Oxford," 2012). Moreover, this analysis also aids in developing a theoretical framework that guides the practical application of adaptive learning, ensuring it aligns with pedagogical principles and improves student outcomes (Bayounes et al., 2022; Contrino et al., 2024)

3.3. Identify All Uses of the Concept

Walker and Avant's method of concept analysis involves a comprehensive exploration of how the concept is utilized across various contexts and disciplines to ensure a thorough understanding (Walker & Avant, 2019). This step includes examining literature, dictionaries, and thesauruses and seeking expert opinions to uncover the concept's possible applications and meanings (Walker & Avant, 2011). By identifying all uses, researchers can clarify the concept's attributes, refine its definition, and ensure its relevance and applicability in different fields (Walker & Avant, 2019).

Table 1. Uses of adaptive learning strategy in different contexts.

Context	Definition	Reference
K-12 education	Personalizes learning experiences by adjusting task difficulty based on students' performance to support differentiated instruction and improve outcomes.	Pane et al., 2017
Higher education	She was employed in online courses to provide personalized feedback and resources, enabling self-paced progression and focus on areas needing improvement.	Dziuban et al., 2018
Corporate training	Utilizes technology to create customized employee learning pathways, enhancing skills development and knowledge retention.	Hung & Zhang, 2020
Language learning	Provides personalized vocabulary and grammar exercises based on learners' proficiency levels and learning styles to improve language acquisition and retention.	Sokolova & Lapina, 2021
Healthcare education	Uses scenario-based training that adapts to learners' progress, ensuring mastery of critical skills and knowledge.	Cook et al., 2019
Military training	Simulates real-world scenarios that adjust in complexity based on trainee performance, enhancing preparedness and decision-making skills.	Hoffman et al., 2020
Special education	Supports students with diverse learning needs by providing individualized learning experiences that address specific challenges and promote inclusive education.	Masruroh et al., 2024
Professional development	Continuously assesses and improves teaching strategies through adaptive learning tools, fostering personalized professional growth.	Kaya & Altun, 2020
STEM education	Offers customized problem-solving exercises and instant feedback, helping students develop critical thinking and analytical skills more effectively.	Lajoie et al., 2020

3.4. Determine the Defining Attributes

Various recent publications (2019–2024), as shown in Table 2, were examined to identify the attributes of adaptive learning pedagogy in the context of English language teaching. These attributes generated the following themes: (1) enhanced motivation and involvement; (2) personalization and customization; (3) improvement in language proficiency and communication skills; (4) support for autonomous and independent learning; and (5) technological integration and innovation.

Table 2. Descriptive data of the research studies on adaptive learning.

No.	Author/s	Year	Setting	Attributes of Adaptive Learning in English language learning
1	Morze et al. (A1)	2021	Ukraine	• A methodology that allows the identification of the level of student's knowledge and their learning styles and transforms materials, tasks, and ways of their delivery according to the needs of learning process participants
				• A tool to vary all stages of a learning process, starting with the delivery of information and ending with assessment.
2	Koka et al. (A2)	2023	China	• Students are made more aware of their performance, and their educational materials are equally tailored to meet their requirements and preferences for how they like to study.
				• Motivates online learners
3	Dasuki et al. (A3)	2023	Indonesia	• Positively affects students' language proficiency
				• Improves students' independent learning
				• Motivates individuals to use the language in actual situations and engage in educational settings.
				• Helps students feel less anxious and stressed
4	Dewi and Sulistyawati (A4)	2023	Indonesia	• Enhances engagement, motivation, and language progress among Generation Z students
				• Personalized learning pathways and instructional materials

				• Customization of learning materials and direct feedback, which is crucial for language skill development
				• Emphasizes social elements, provides students with diverse learning experiences, meets individualized learning needs, and overcomes some shortcomings of traditional teaching methods.
5	Li (A5)	2023	China	• Helps to improve student's learning interest, interpersonal communication skills, and intercultural communication abilities, and optimizes teaching strategies and methods based on intelligent teaching assessment and feedback mechanisms
6	Al-Mutairi (A6)	2024	China	• Adaptability in various learning settings.
				• Flexible techniques are specific to the English language context.
				• Personalized learning styles and adaptive strategies
7	Shu and Xu (A7)	2022	China	• Self-adaptive learning ensures the quality of students' autonomous English homework.
				• Key to improving learners' English proficiency
				• Cultivates students' stable and good mobility and improves the purpose and comprehensiveness of cognitive learning.
				• Students can improve and analyze data more effectively to facilitate learning.
8	Elborolosy and Almujali (A8)	2020	Riyadh, Saudi Arabia	• effective in enhancing students' argumentative essay writing.
				• Had a positive attitude towards learning English than the traditional method of teaching
9	Herasymenko (A9)	2024	Ukraine	• Underscores the transformative potential of leveraging technology-enhanced learning environment
				• Promotes learner autonomy within the English language curriculum
				• Enhances the efficacy and accessibility of language learning experiences.
				• Facilitates personalized, immersive, and adaptive learning environments that cater to diverse learner needs and preferences.
				• Foster Engagement, interactivity, and collaboration
				• promotes deeper learning outcomes and linguistic proficiency among students.
10	Abdurazakova (A10)	2024	Uzbekistan	• Emphasizes the individual needs of each learner, real-time feedback, and engaging, context-rich learning environments
				• Increasing motivation and facilitating the practical application of language skills in simulated real-world conditions.
				• Provide more accurate and personalized evaluations of language proficiency.
				• It improves language acquisition outcomes and reinvents traditional approaches to language instruction.
11	Mushthoza et al. (A11)	2023	Indonesia	• Offers an efficient and consistent evaluation of language proficiency.
				• Teachers must adapt their roles to become facilitators, guiding learners and effectively providing meaningful interaction and support.
12	Novawan et al. (A12)	2024	Indonesia	• Enriches teachers' perspectives,
				• Enhances materials development,
				• Enlivens in-class teaching
				• Facilitates efficient assessments
13	Yu. M. Shcherbyna (A13)	2023	Ukraine	• Use of AI-powered adaptive learning systems in teaching English is accessible
				• The adaptive learning system is interesting and effective
				• AI services and tools help students get individual training
				• Potential benefits provide students with the to master a foreign language
14	Kostolanyova and Nedbalova (A14)	2020	Czech Republic	• Education process can be personalized through ICT
				• Implementation of modern information and communication technologies in education
				• Improve linguistic-didactic aspects of foreign language teaching
15	Xiaojie (A15)	2022	China	• Requires more effort
				• Development process be outsourced to software programmers
16	Delgado et al.	2020	Brazil	• Offer students more inclusive opportunities

	(A16)			• Tailoring instruction to address students 'needs • Become more responsible for their schooling
17	Alkhatnai (A17)	2022	Canada	• Online language learning was difficult • Providing training, webinars, and workshops on coping strategies for online learning • Upskilling them so that they can cope better with adaptive online language learning methodologies

They have enhanced motivation and involvement. Adaptive learning strategy significantly increases interest and involvement (A2, A3, A4) in English language classes. According to a study by Lim et al. (2022), using tailored and engaging multimedia content—like movies and gamified activities—captures students' attention and keeps it, which raises engagement levels. Students are constantly pushed at an appropriate level when they receive real-time feedback (A4, A5, A10) and adaptive modifications to the learning materials. This reduces frustration, fosters a sense of accomplishment, and increases motivation (Azevedo et al., 2022). Moreover, Noroozi Sahin's research from 2023 highlights how adaptive learning systems provide students more control over their education by promoting self-management and goal setting, which increases their intrinsic motivation.

Personalization and customization. Rather than a one-size-fits-all approach, ALS tailors the learning experience to each student's unique needs, abilities, and pace. Adaptive learning adjusts learning objectives based on the learner's progress and performance (A1, A4, A6). Differentiated approaches are used based on individual requirements. Personalized learning is a broader concept that extends beyond technology. It aims to tailor the learning experience to individual learners' needs, preferences, and interests (Sabbott, 2015). Personalization can occur through adaptive technologies, but it also encompasses other strategies. Customization refers to adjusting instructional methods, resources, and content to meet individual learners' specific requirements (A9, A12, A16). It recognizes that learners have diverse backgrounds, learning styles, and abilities (Tetzlaff et al., 2020). Adaptive systems can create a more personalized learning journey by analyzing data and adjusting content delivery. Customization can involve providing additional resources, scaffolding, or alternative approaches to address individual differences (Cornell, 2024). An adaptive learning strategy in ELT can tailor content and individualized practice, address learner variability, enhance engagement, and support teacher roles (A11, A12, A17).

Improvement in language proficiency and communication skills. In ELT, peer interaction refers to conversational speaking and listening with other language learners. These interactions occur with fellow students who are also learning the target language (A3, A6, A11). Peer interactions provide students with opportunities for language exploration and learning that are less likely to occur in communication (A13, A14) with a teacher or other competent speakers of the target language (Alomari, 2023). Learners receive help from their peers while producing language, allowing them to express ideas they might struggle with independently. Interaction connects what learners hear and say with their internal cognitive capacities for attending to language, noticing features of the input, and forming hypotheses about language use (Wang et al., 2024). While explicit teaching of vocabulary and grammar is essential, implicit learning occurs through making sense of what learners hear and read and expressing their ideas in speech and writing (Rebuschat, 2022). ALS in the context of English teaching ignites student motivation by delivering contextually meaningful and applicable learning experiences (Alomari, 2023).

Support for autonomous and independent learning. Adaptive learning strategy encourages learners to take charge of their learning process. Learners can choose their learning paths, explore topics of interest, and set their pace (A4, A7, A9). Autonomous learners actively engage with content, seek additional resources, and reflect on their learning (Klimova & Zamborova, 2023). Adaptive platforms allow learners to access content anytime, anywhere. Learners face tasks aligned with their abilities, fostering independence. Real-time feedback helps learners monitor their progress and adjust their strategies ("Developing Responsible and Autonomous Learners: A Key to Motivating Students," n.d.). Independent learners develop critical thinking skills by evaluating information and making informed choices. Independent learning often involves technology; learners need digital literacy skills. Thus, developing autonomy prepares learners for continuous learning beyond formal education.

Technological integration and innovation. This refers to the seamless incorporation of digital tools, software, and platforms into educational practices in this context, in English learning and teaching adaptability (A13, A14, A15). Technology enriches language learning by providing interactive content, multimedia resources, and personalized activities. Learners can access authentic texts, videos, and audio recordings relevant to real-world contexts. Technology enables adaptive learning systems that tailor content to individual learners' needs and progress (A1, A7, A10). Innovative adaptive systems use AI, natural language processing, and machine learning algorithms to personalize instruction and contextualize language learning materials (Liu, 2024; Lim et al., 2022). Innovative language apps and platforms incorporate game elements to engage learners and reinforce language learning. Mobile devices enable learning anytime and anywhere, fostering independence and flexibility (A14, A15). Technological integration and innovation are at the heart of adaptive learning pedagogy in ELT (Johnson, 2021).

Adaptive learning designs instructional content to individual student needs, ensuring sustained interest and active engagement. It transcends generic approaches by customizing learning paths for each student, considering their preferences and prior knowledge (Athanases et al., 2015). The system dynamically adjusts content delivery based on student progress. This approach emphasizes targeted practice, directly impacting language proficiency and communication skills. Over time, consistent practice leads to skill gains. Personalized education fosters student initiative and independence, empowering learners to take charge of their educational journey (Contrino et al., 2024). AI-driven adaptability ensures timely modifications, while seamless digital integration enhances teaching methods. In ELT, adaptive learning harmonizes personalization, technology, and learner-centered strategies.

3.5. Identify a Model Case

Jerry is an English language learner in a diverse classroom. He struggles with vocabulary retention and prefers visual learning. Jerry's adaptive learning system assesses his prior knowledge and learning style. It identifies his vocabulary gaps and areas of interest. Jerry receives vocabulary exercises tailored to his needs. Visual aids, such as interactive flashcards, enhance his engagement. As Jerry progresses, the system adapts; if he masters certain words, it introduces more challenging ones, and if he struggles, it provides additional practice. Jerry's consistent practice leads to improved vocabulary. He gains confidence in using new words in conversations. He actively participates in

his learning journey by taking ownership of his learning, setting goals, and tracking his progress. The adaptive learning pedagogy is seamlessly integrated with the ELT curriculum. Jerry benefits from real-time feedback and data-driven insights.

In this case, it is very evident how the defining attributes of adaptive learning pedagogy are illustrated. Assessing Jerry's prior knowledge ensures that the learning activities will be designed according to his needs, interests, and abilities. This personalized approach helps the learner determine specific learning gaps and customizes the learning environment based on the learner's needs. In addition, technological integration and innovation were also reflected in the case, as interactive flashcards and other challenging coursework were also provided to master and improve Jerry's vocabulary. Through these, Jerry became motivated, and he showed active participation in the learning process by setting personal goals and tracking his progress, which reflects support for autonomous learning and independent learning. Finally, real-time feedback through adaptive learning technologies and the teachers' feedback enabled Jerry to improve his language proficiency by becoming more confident in using new words in conversations.

3.6. Identify Borderline and Related Cases

James, a high school sophomore, struggled with his English Language Arts class. He often found the traditional teaching methods unengaging and felt his language skills were stagnating. This changed when his school adopted an adaptive learning system to enhance student engagement and improve language proficiency. The new system introduced James to interactive and multimedia content, including videos, games, and virtual discussions, which captivated his interest. The gamified activities turned learning into an enjoyable challenge, motivating him to participate actively in class. He no longer saw English lessons as a chore but as an exciting part of his day. Over time, James noticed significant improvements in his language proficiency. He became more confident in his speaking and writing abilities, reflected in his class participation and grades. By the end of the semester, James not only improved his English language skills but also developed a newfound enthusiasm for the subject.

This scenario is a borderline case of adaptive learning pedagogy, exhibiting some but not all defining attributes. Notably, there was a lack of initial diagnostic assessment to ascertain James' needs, interests, and abilities. Although an adaptive learning system was implemented, the interactive multimedia content—such as videos, games, and virtual discussions—was not personalized to address individual learning requirements or specific gaps in James' understanding. However, the gamified activities notably boosted James' motivation and engagement, becoming a highlight of his daily learning experience. Active participation in these gamified elements notably enhanced his language proficiency and communication skills. Integrating adaptive learning technology alongside gamification has profoundly impacted James, evident in improved participation, grades, and a newfound enthusiasm for the course.

3.7. Identify Antecedents and Consequences

Antecedents are the attributes or circumstances that must exist before a concept manifests itself (Walker & Avant, 2019). In the article on adaptive learning in English language teaching, researchers reviewed articles related to adaptive learning pedagogy in English language teaching. They identified specific factors that serve as antecedents for adaptive learning strategy (ALS) and categorized them into five main groups: (1) Learner Needs and Context, (2) Availability of Technology and Resources, (3) Teacher Training and Proficiency, (4) Administrative Support and Policy Alignment, and (5) Student Motivation and Engagement.

Adaptive learning relies on understanding individual learner profiles, including their language proficiency, cultural backgrounds, and learning preferences, to personalize educational experiences (Wang et al., 2024). This approach ensures that learning content and activities are relevant and engaging, enhancing student motivation and learning outcomes. Also, integrating technology in adaptive learning, such as learning analytics and AI-driven systems, supports personalized feedback and content adaptation, facilitating more effective teaching and learning processes (Rienties et al., 2019). Access to digital resources and adaptive software is crucial for implementing adaptive strategies that cater to diverse learner needs (Boelens et al., 2017). Meanwhile, educators' proficiency in adaptive teaching methods and technology use is essential for successful implementation (Kerr et al., 2020). Training programs that equip teachers with the skills to interpret data from adaptive systems and create personalized learning paths are crucial for optimizing student learning experiences (A12, A17).

Moreover, institutional support and alignment with educational policies are critical for fostering a conducive environment for adaptive learning initiatives (Maulana et al.,2023). Clear guidelines and adequate resources ensure consistency and sustainability in implementing adaptive approaches across educational settings. Motivating students to engage with adaptive learning tools and materials actively is essential for their effectiveness (Wang et al., 2024). Strategies that enhance student autonomy and provide meaningful learning experiences contribute to sustained engagement and improved learning outcomes. With the help of these antecedents, adaptive learning strategies can be successfully implemented in ELT, enabling teachers to modify their designed lessons to suit the needs of each student and make good use of technology.

On the other hand, Walker and Avant (2019) define the consequences as "those events or incidents that occur as a result of the occurrence of the concepts." Based on these antecedents, the identifying consequences for adaptive learning strategies (ALS) in English language teaching (ELT) are as follows: personalized learning experiences that address individual learner needs, enhanced technological integration and innovative learning tools, effective implementation of adaptive learning strategies, institutional commitment to ALS adoption, and active student participation and improved learning outcomes.

According to Rasheed and Kamsin (2021), adaptive learning systems offer customized educational opportunities that address the unique requirements of each learner, fostering motivation and involvement. Integrating advanced technologies such as AI and learning analytics enhances the effectiveness of adaptive learning by providing real-time feedback and adaptive content delivery (Hung & Zhang, 2020). Adaptive learning (ALS) strategies require comprehensive support structures, including teacher training and institutional commitment, to ensure sustained adoption and impact (Ally, 2020). Institutional commitment is crucial for scaling adaptive learning initiatives, providing necessary resources, and aligning policies to support innovation in education

(Barbour et al., 2020). Nevertheless, active student participation in adaptive learning environments improves learning outcomes through personalized learning paths and increased engagement (Sims & Sims, 2019).

3.8. Define Empirical Referents

In the concept analysis process, defining empirical referents is the final step. According to Walker and Avant (2019), empirical referents are observable classes or categories of real-world phenomena that demonstrate the occurrence of the concept itself. In the context of adaptive learning pedagogy in English language teaching (ELT), observable classes or categories of real-world phenomena that demonstrate the occurrence of this concept include:

(a) *Student Engagement and Motivation.* Adaptive learning environments significantly enhance Student engagement and motivation due to personalized content and interactive experiences (A2, A4, A6). This is affirmed by Vedder-Weiss and Fortus (2019), who found that customized learning paths keep students more engaged by aligning educational materials with their interests and learning needs. This alignment fosters intrinsic motivation as students find the content more relevant and enjoyable (Trilling & Fadel, 2019). Moreover, adaptive learning systems that provide timely feedback and appropriate challenges can maintain high levels of student engagement, as noted by Heitink et al. (2016). Additionally, using technology in adaptive learning, such as gamification elements and interactive tasks, further boosts student motivation and participation (A11, A13, A14) (Durlak et al., 2011). Students actively participate in adaptive language activities, showing interest and motivation. Adaptive learning pedagogy aims to engage learners by aligning content with their interests and providing relevant challenges.

(b)*Individualized Learning Paths.* Individualized learning paths in adaptive learning cater to each student's unique needs, pace, and learning style. According to Pane et al. (2017), personalized learning pathways enable students to progress through the curriculum quickly, resulting in improved academic performance and more profound understanding (A4, A6, A9). These tailored paths are supported by data-driven insights, which continuously adjust the content and difficulty based on ongoing assessments of student performance (Kerr et al., 2020). This approach ensures that students are consistently challenged and supported in areas where they need improvement, enhancing overall learning outcomes (Trilling & Fadel, 2019). Furthermore, individualized learning paths help address diverse learner needs and promote equity by providing each student with the necessary resources and support to succeed (Tomlinson, 2014).

(c) *Real-Time Feedback and Adaptation.* Adaptation and real-time feedback are essential elements of adaptive learning that allow for quick responses to the demands and performance of students (A4, A10). According to Rienties et al. (2019), learning analytics can give teachers immediate feedback, enabling them to modify their lesson plans to assist students' learning better. This immediate feedback improves learning outcomes by allowing the students to see their errors and make quick corrections (A3, A7) (Koedinger & Corbett, 2006). Furthermore, incorporating artificial intelligence (AI) into adaptive learning systems improves the accuracy and promptness of feedback, rendering it more customized and efficient (Sharples et al., 2014). According to Black and Wiliam (2009), formative assessments of this kind are crucial for ongoing learning improvement because they allow for customized interventions based on the needs of individual students (A1, A12).

(d) *Technology Integration.* Technology integration is a pivotal empirical referent in adaptive learning that enables the customization of educational experiences to individual student needs. Rienties et al. (2019) emphasize that advanced learning analytics and AI technologies facilitate real-time adaptation of content and instruction based on student performance data (A10, A13, A14). These technologies support personalized feedback and scaffolding, enhancing student engagement and learning outcomes (Sharples et al., 2014). Additionally, Liu and Moore (2017) highlight that technology integration provides access to diverse and authentic learning resources, which can be tailored to fit various learning styles and preferences. The seamless incorporation of digital tools in adaptive learning environments ensures a more flexible and responsive educational experience, promoting greater student autonomy (A7, A9) and motivation (A2, A3) (Johnson et al., 2015).

These observable phenomena demonstrate the knowledge translation of Adaptive Learning Pedagogy (ALP) in English Language Teaching (ELT), emphasizing personalized pathways, real-time feedback, technology integration, and student engagement. The model can represent the conceptual analysis, as shown in Figure 2 below.

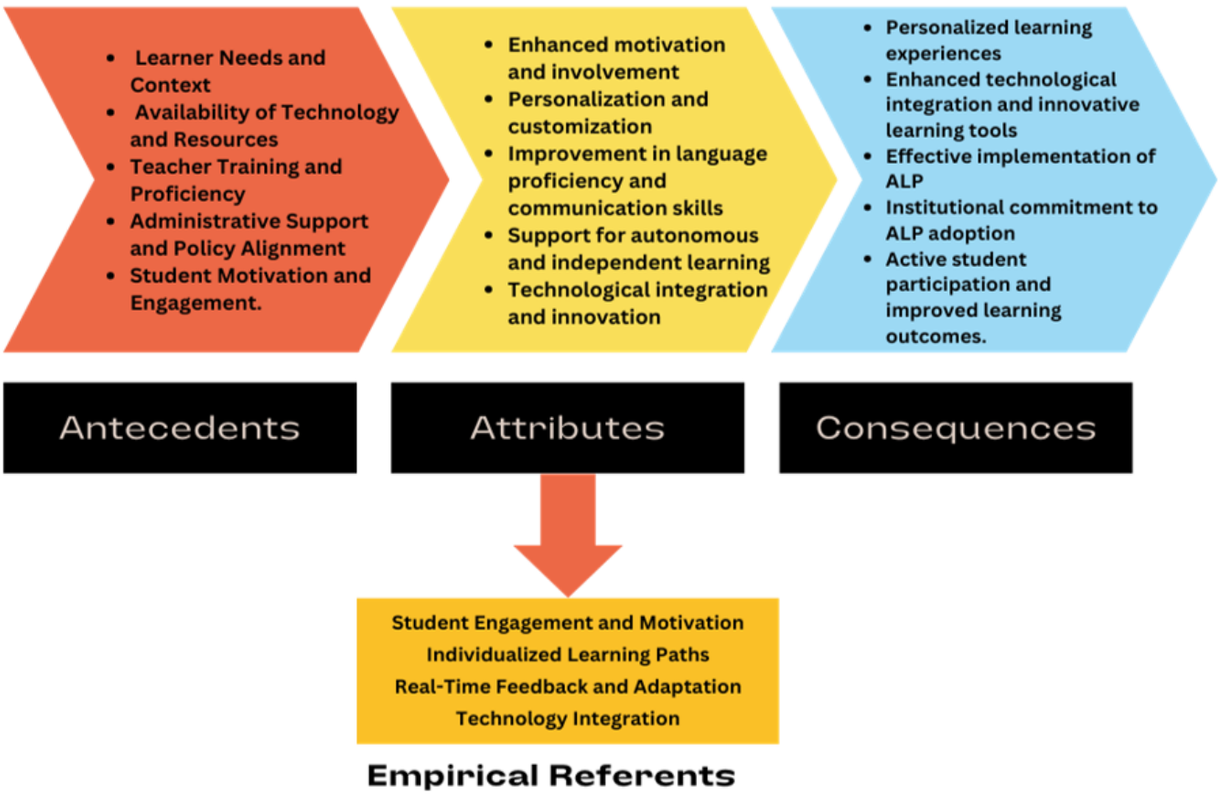

Figure 2. Conceptual model of adaptive learning strategy in English language teaching

4. Conclusion

Adaptive learning strategy in English language teaching (ELT) encompasses several vital attributes. These attributes contribute to the effectiveness of adaptive approaches in ELT. Adaptive learning engages students by aligning content with their interests and providing relevant challenges. Active participation and motivation are observable. Students follow individualized learning paths tailored to their needs, progress, and preferences. Adaptive systems adjust content and assessments accordingly. Real-time feedback and adaptation enhance learning outcomes, improving language proficiency and effective communication. Adaptive learning strategy empowers students to take ownership of their learning process, promoting autonomy and independence. Seamless incorporation of technology—such as language learning apps and AI-driven tools—enables personalized experiences and data-driven adaptation.

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