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Autonomous Learning and Information and Communications Technology in Language Teaching and Learning: A Systematic Review

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Abstract: *This systematic review aims to identify the divergence among the chosen articles and compare their research methods, participants, and main results. Searching by configured technique and synthesizing the relationship between Information and Communication Technology (ICT) and autonomous learning, we found that 1) researchers often select college students as their preferred participants for studies; 2) qualitative research orientated articles focused on explaining conception theories and often reach to a longitudinal conclusion; 3) quantitative articles employed educational experiment and practice methods and draw a cross-sectional conclusion; 4) mix-method articles adopted questionnaire, interview and document analysis and make conclusions with better validity.*

Keywords: *Autonomous Learning; ICT; EFL Learners; ESL Learners; Systematic Review*

1. Introduction

Learner autonomy is an influential concept in the field of language teaching and education which refers to the ability of a learner to take control of their learning, which involves setting learning goals, monitoring progress, and self-evaluating their performance[1]. In the contemporary age, autonomy has been viewed as a crucial ingredient for effective learning as it leads to greater learner engagement, improved motivation, and better learning outcomes[2].

In the realm of education, ICT has significantly impacted learner autonomy, empowering individuals to take control of their own learning process. There has always been a perceived relationship between educational technology and learner autonomy. This is taking educational technology in its broadest sense and taking learner autonomy as the superordinate term[3]. With the advent of ICT, learners now have unprecedented access to a vast array of resources, tools, and opportunities for self-directed learning. ICT offers learners access to a vast range of digital resources, online platforms, and interactive tools that support self-directed learning. Learners can navigate through a wealth of information, choose relevant materials, and engage in activities that align with their interests and learning preferences[4]. By utilizing ICT, learners can actively participate in their education, leading to increased motivation and engagement[5]. By leveraging ICT, learners can become active participants in their education, shaping their own learning pathways and acquiring skills that are crucial for lifelong learning. On the other hand, ICT's role in education has grown tremendously, with its potential to transform teaching and learning processes being recognized globally. ICTs provide opportunities for interactive, student-centered learning experiences and allow for greater access to resources and materials beyond traditional classroom boundaries[6]. Recent research indicates that effective use of ICT can stimulate learner autonomy by providing diverse learning resources, enabling personalized learning paths, and facilitating collaborative learning communities[7].

However, data indicated that there are significant differences in the constructs of technical perspectives on learner autonomy, benefits of learner autonomy to language learning, the role of the teacher in promoting autonomy and proficiency, and learner autonomy. A note of caution is warranted. The promotion of learner autonomy through ICT requires careful pedagogical planning and consideration of individual learner needs and capacities.

Additionally, issues of digital literacy, equity, and access also need to be addressed to ensure all

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learners can benefit[8]. Moreover, previous studies manifested little comparative results on participants, research methodology and the conclusions. They either was a short-term setting or limited in effective assessment for evaluating learner autonomy in the context of ICT integration. Hence, this paper will aim at:

1) Comparing research participants and methods in the chosen literature;

2) Finding out the preference of researchers' choice of participants and methods;

3) Comparing the research results and exploring the connections among them.

As a result, the research questions of this paper would be:

1) What's the difference of research participants and methods in terms of the selected literature materials?

2) What's the divergence and associations among the results of selected literature materials?

2. Literature Review

Since these years, the concept of learning autonomy has garnered much interest in the study of foreign language education. In the 1970s, Henri Holec conducted extensive research on learner autonomy and introduced the term "autonomy" in the field of language learning. He emphasized the importance of learners taking responsibility for their own learning and advocated for a shift from teacher-centered to learner-centered approaches in education. Learner autonomy empowers individuals to take control of their learning and become active participants in their own education, leading to more meaningful and effective learning outcomes. McDevitt (1997) pointed out that cultivating independent learners is the ultimate goal of education. Benson and Voller also made the view that learner autonomy should be the "ultimate" goal in the realm of foreign and second language (FL/SL) education.

Some researchers examined how a group of tutees' exposure to an online-based peer-tutoring model shapes their autonomy[9]. Pawlak, M., & Kruk, M. (2012), by conducting an experiment of 46 Polish senior high school students, found that the experimental students manifested greater independence after the intervention and they also outperformed the controls on language tests[10]. To improve the English proficiency of college students, Han (2019) attempted to promote autonomous English learning among these students using artificial intelligence technology[11]. Cui (2021) design a college English writing teaching model based on big data technology to highlight the teaching focus of lexical chunks[12]. This research then reveals three language learning services believed to be suitable for elementary school students. Some would give implications on promoting students' autonomy by ICT as well as teachers' roles and interactions with them. Putra (2021) provided solutions for the teachers to motivate their students to apply these resources for learning English autonomously and with minimal teacher guidance during pandemic period[13]. Mo et. al., (2021) analyzed the issues in the autonomous learning of the English language among higher vocational college students and discussed strategies to improve their autonomous learning ability based on informationization to promote bidirectional interaction between teachers and students, cultivate students' consciousness of lifelong learning, improve teachers' technical skills, and perfect the development of a connotative system in higher vocational colleges[14]. However, existing studies have primarily focused on learners' perspectives, neglecting the important role of teachers in fostering learner autonomy through ICT. They either discussed autonomous learning or technology rather than synthesize them together to process intact analysis. Therefore, it is necessary to re-examine the existing studies in terms of their methodologies, genres, and participants.

3. Methodology

This review referred to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement when selecting the relevant articles. The researchers referred the study protocol by the recommended reporting subjects for systematic reviews and meta-analyses (PRISMA) technique[15]. Bibri (2020) considers PRISMA as an evidence-based approach to systematic reviews and meta-analyses[16]. So, the checklist for items and abstract was considered before searching the database.

3.1. Searching Process

The researchers defined Scopus, Wiley, and Science Direct as the designated databases for the study.

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The chosen keywords for our preliminary search were learner autonomy (LA) and information and communication technology (ICT). Also, the researchers incorporated synonymous terms such as autonomous learning and technology-based instruction during the second round of searching. The fuzzy search method was employed to find related key words with LA and ICT as well. In the third round searching, one of the researchers increased the key words "English learning" "language learning" to limit the scale. All the selected papers limited to English writing and the time duration is 2013 - 2023. (See table 1).

Table 1 Searching Protocol

Items	Description
Selected Database	Scopus, Wiley, Science Direct
Publication Criteria	Peer-reviewed journals; mainstream publishers
Language	English-language articles
Time duration	2013-2023
Search terms	Autonomous learning, English learners, and ICT
Search scope	Title, Abstract and Keywords

3.2. Inclusion Criteria

Since the results of the initial screening are overboard to the disadvantage of later selecting. So, the inclusion criteria are illustrated as follows:

a) Own an explicit study design.

b) Include primary research studies that employ empirical, quantitative, qualitative, or mixed methods designs.

c) Include studies involving learners of educational level who are engaged in autonomous learning activities.

d) Include studies that explore the use of ICT as a tool or resource to support autonomous learning.

e) Include studies that report on the effects, impacts, or outcomes of using ICT for autonomous learning.

3.3. Exclusion Criteria

In parallel with this, the exclusion criteria would be:

1) Exclude studies that do not specifically address the relationship between autonomous learning and ICT. Omit irrelevant topics.

2) Exclude reviews, opinion pieces, editorials, or other non-primary research articles.

3) Exclude studies focusing exclusively on instructor-led or traditional classroom-based learning without autonomous learning components.

4) Exclude studies that do not involve the use of ICT tools or technologies to support autonomous learning.

5) Exclude studies that do not report on outcomes related to autonomous learning or ICT.

3.4. Data Collection

A systematic review flow diagram was adapted from *Factors influencing completion of multi-dose vaccine schedules in adolescents: a systematic review*[17] (See figure 1). Finally, the selection has been narrowed down to 15 articles.

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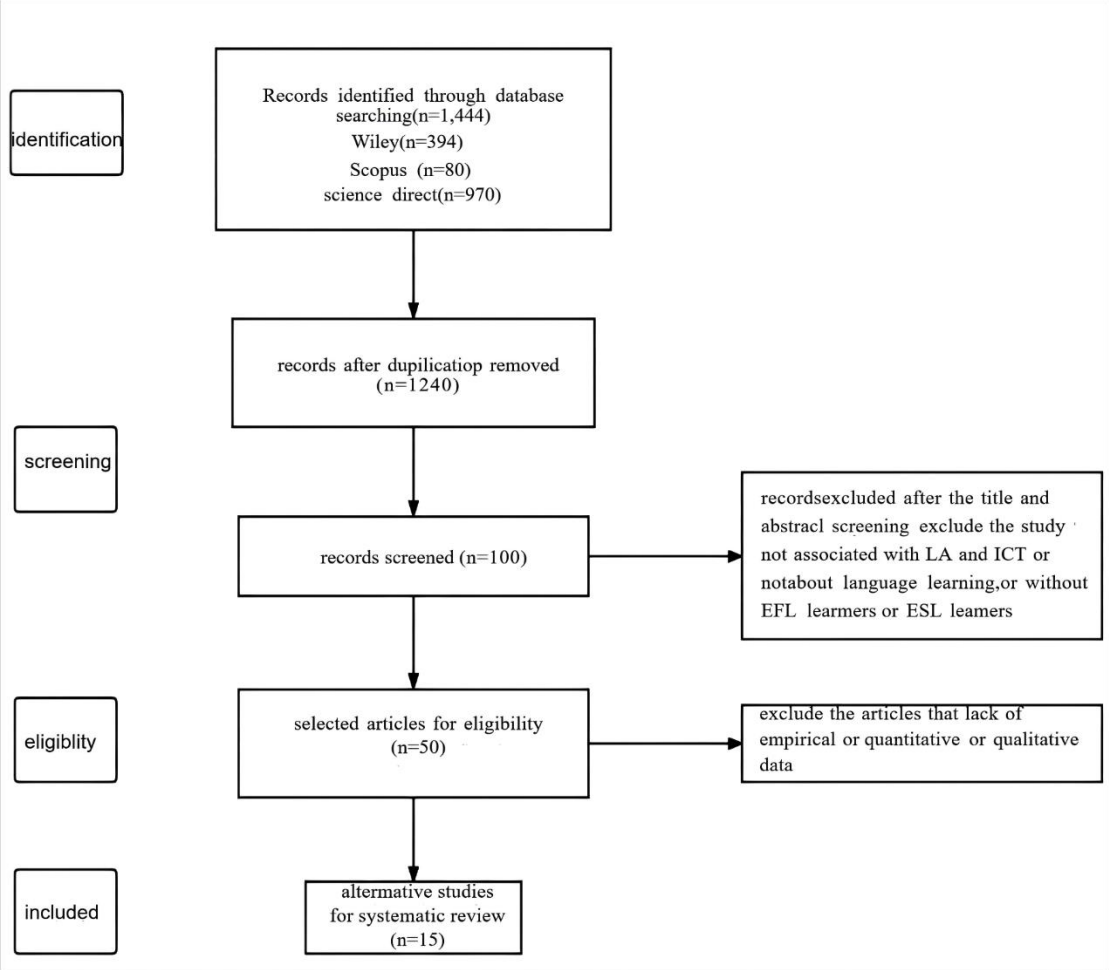

Figure 1: Flowchart of Including Articles

4. Findings

As to the findings, a series of excel form was compiled into Google Share to illustrate the extracted information from the selected articles which can be accessed from following website:

https://docs.google.com/document/d/1EhUVyXPXWRKptk4YXKFJ264BLKUoPdQFMdruu7gp5EM/edit?usp=sharing

The reviewed literature provides diverse insights into the application of technology and artificial intelligence (AI) in fostering autonomous English language learning across different educational contexts. Several key themes emerge from the analysis, including the role of AI in supporting self-directed learning, the integration of information and communication technology (ICT) in education, and the challenges faced by both learners and educators in leveraging technology for autonomy.

4.1. AI and Autonomous Learning

Bing Han (2019), Asieh Farivar and Ali Rahimi (2014) highlight the transformative role of AI in improving learner autonomy. Han's study emphasizes the use of AI-driven self-evaluation and feedback mechanisms to enhance learning[11], while Farivar and Rahimi show that computer-assisted language learning (CALL) can significantly boost learner autonomy[18]. These studies point to the potential of AI and CALL technologies to create more personalized learning experiences, empowering students to take control of their learning journey. However, while AI appears promising, it requires careful implementation to ensure that it addresses learners' specific needs and contexts.

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4.2. ICT and Learner Autonomy

Several studies, including those by Hui Mo and Xuejuan Yan (2021), Syafryadin et al. (2022), and Edwards et al. (2019), underscore the importance of ICT in promoting learner autonomy, particularly through strategies that enhance teacher-student interactions and support self-directed learning[19][20]. Mo and Yan's (2021) research highlights the necessity of integrating cyclic and supporting strategies in vocational education to improve student autonomy[14]. Similarly, Edwards et al. (2019) illustrate the positive impact of collaborative online learning platforms on student motivation and engagement. However, the studies indicate that successful implementation of ICT requires educators to be adequately prepared and supported. Syafryadin et al. (2022) emphasize the challenges teachers face in using ICT to foster autonomy, including technical limitations and a lack of training[19].

4.3. Technology in Flipped and Blended Learning Models

The integration of technology in flipped and blended learning environments is another prominent theme in the literature. Yea-Ru Tsai (2019) argued that flipped and blended learning approaches enhance learner autonomy by offering more flexible and personalized learning opportunities[21]. Tsai's study confirms that the flipped classroom model promotes autonomy from multiple dimensions—psychological, technical, and sociocultural—while Lander shows that blended learning components can improve test scores and technology awareness. These findings suggest that the structured use of technology in these models can facilitate autonomous learning, though the degree of effectiveness may vary depending on the students' motivation and the teacher's ability to guide the learning process.

4.4. Challenges and Limitations

While the potential of technology to foster autonomous learning is clear, several studies reveal critical challenges. Misbachuddin Akbar Putra (2021) explores the difficulties of managing overcrowded online classes during the pandemic, highlighting that despite the availability of technology, effective implementation remains a significant barrier[13]. Similarly, the findings from previous studies raise concerns about the functionality and usability of educational websites, emphasizing that even high-quality content can be inaccessible if technical criteria are not met. For example, Ahmadi & Tabatabaei (2021) note that while platforms like Instagram can enhance autonomous learning, their effectiveness depends on how well they are integrated into the overall learning strategy[22].

4.5. Learner and Teacher Perspectives

The studies also provide important insights into both learner and teacher perspectives on autonomy. For learners, technology fosters motivation, metacognitive awareness, and self-confidence, as demonstrated by Warni et al. (2018)[23]. However, learner autonomy is not only shaped by access to technology but also by learners' beliefs and attitudes, as discussed by Chui Lai (2019). Lai's study highlights the dynamic relationship between learner beliefs and their use of technology, which evolves based on different stages of language learning and external contexts[24]. On the other hand, teachers play a crucial role in creating an environment conducive to autonomy. As noted by Syafryadin et al. (2022), teacher readiness and support are essential in enabling students to use ICT effectively for autonomous learning[19].

5. Results and Discussions

5.1. Reviewing Participants

From the Google link given, it is evident that one-third of the subjects mentioned in these articles are college students. Other participants encompassed teachers, high school students, primary students and learning resources. From what have been reviewed, autonomous learning (AL) is contemporarily constructed as a theoretical framework and ICT is considered as a medium or intervention in associated research. Most participants or experimental subjects are adult learners. But in fact, the discussion of autonomy learning theory encompasses learners across various age groups, including both adult learners and students in middle school and primary school. Little (1991) addressed the definition and practical issues related to learner autonomy[25]. It explores the concept in various learning contexts and age groups. Paris et al. (2001) argued the applications of self-regulated learning (which includes autonomous learning)

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in the classroom, highlighting its relevance to learners across different age groups[26]. Stefanou et al. (2004) discussed the role of teachers in encouraging autonomy among students in the classroom, suggesting that autonomy-supportive methods can be effective for students of all age groups[27].

While autonomy learning theory has traditionally been associated with adult learners in educational and professional settings, there is also a growing recognition of its relevance and applicability to younger students. The principles and practices of autonomy learning can be adapted and implemented to varying degrees depending on the developmental stage and educational context of the learners. Thus, autonomy learning theory is not limited to any specific age group and can be explored and applied in a wide range of educational settings.

5.2. Reviewing research method

From what have been reviewed in the table from Google link, conception explanation, qualitative method, quantitative method, and mix-method are employed in different kinds of studies (see figure 2).

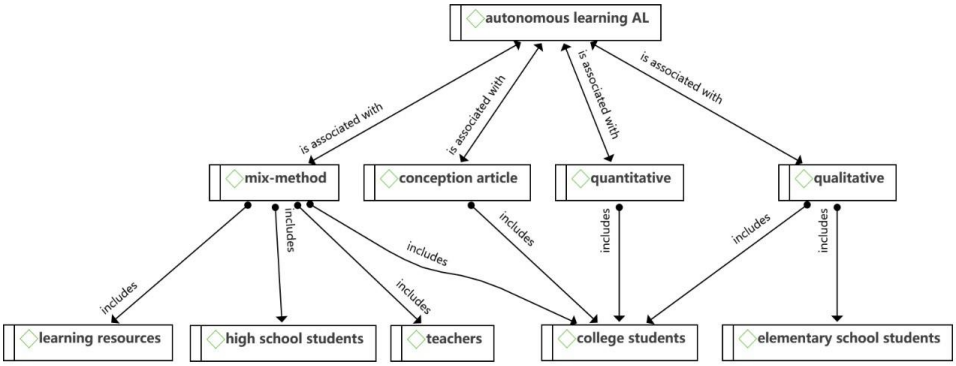

Figure 2: The Network of Key conceptions

It appears that researchers demonstrated a propensity for selecting college students as their primary research subjects irrespective of the research methodology they have employed. Quantitative studies included in the Table focusing on autonomous learning often employ questionnaires, quasi-experiment, or standardized tests to collect data. These methods offer a convenient way to gather large amounts of information from a diverse range of participants. However, they may overlook the complex nature of autonomous learning and fail to capture the nuanced aspects of learner autonomy. Additionally, self-reporting measures like e-journals in surveys may be prone to response biases, potentially affecting the accuracy of the results. To address these limitations, researchers consider incorporating qualitative methods to complement quantitative findings and provide a more comprehensive understanding.

Qualitative research methods, such as interviews and observations reflected by the Table, offer valuable insights into the intricate processes and experiences associated with autonomous learning. By capturing the relationship across different stages of language learning and relative in response to different language learning and use situations (Chun, 2019), he found that a cyclic relationship between learner beliefs and learners' self-directed use of technology. Qualitative approaches contribute to a deeper understanding of the multifaceted nature of autonomous learning and address the overt association between ICT and autonomous.

Combining both quantitative and qualitative methods, mixed methods research can provide a more robust and holistic understanding of autonomous learning. As the Table present, the results from mix-method demonstrated more insightful and in-depth ideas than pure qualitative research. Learners appear to be more appreciate to ICT and teachers readily create learning autonomy in the ICT-based English learning process (Syafryadin, S.,et al). The use of technology in English learning has been a driving force in the development of their autonomy (Warni et al., 2018).

6. Conclusion

From what have been reviewed, the pivotal role of Information and Communication Technology (ICT) in bolstering students' motivation, confidence, engagement, and self-evaluation capabilities in autonomous learning scenarios has been unequivocally established. It precisely echoed the previous results of some studies, which identified that the utilization of ICT in English language learning process

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at higher educational level has provided great advantages in terms of learners' belief and motivation(Saptopramono & Padang, 2019)[28].The empirical experiment conducted adds considerable weight to the argument that autonomous learning, which empowered through ICT, is not only instrumental in managing the complexities of overcrowded classrooms, but also cultivates learners' autonomy.

Furthermore, the innovative concept of the flipped classroom model, a direct derivative of ICT and autonomous learning intersection, profoundly enhances learners' independence and intrinsic motivation for active learning. Simultaneously, the autonomous learning approach evokes students' awareness of technology, a quintessential competence in the digital era. As such, these findings hold significant implications for the future of educational practice and policy, particularly within the context of ICT integration in classroom settings, where the goal is to create learning environments that develop students' autonomy and facilitate optimal learning outcomes.

Overall, the reviewed literature shows that while technology and AI have the potential to significantly enhance learner autonomy, their effectiveness is contingent on multiple factors, including the quality of the technology, the readiness of both learners and educators, and the instructional strategies employed. Successful integration of technology in autonomous learning requires a comprehensive approach that addresses both the technical and pedagogical aspects, ensuring that both teachers and students are equipped to fully harness its potential. Moving forward, further research is needed to explore the long-term impact of these technologies and to develop more nuanced strategies that can adapt to diverse educational contexts.

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