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Advancing Language Education in Indonesia: Integrating Technology and Innovations

Senny Luckyardi[1*], Silvi Munawaroh[1], Amirullah Abduh[2], R. Rosmaladewi[3], Achmad Hufad[4], Nuria Haristian[4]

[1]Universitas Komputer Indonesia, Bandung, Indonesia
[2]Universitas Negeri Makassar, Makassar, Indonesia
[3]Politeknik Pertanian Negeri Pangkajene Kepulauan, Pangkep, Indonesia
[4]Universitas Pendidikan Indonesia, Bandung, Indonesia
*Correspondence: E-mail: senny@email.unikom.ac.id

A B S T R A C T

Language learning in Indonesia's educational environment is accelerating change due to the introduction of novel technologies and teaching methods. This paper analyzed the essential functions of digital tools, the internet, and contemporary educational approaches to enhancing Indonesian language learning results. When considering the challenges of low penetration in remote areas and fluctuating technological maturity, opportunities exist to explore the potential of technology to bridge the language acquisition gap. Drawing on a review of several projects (i.e., mobile applications, e-learning platforms, and artificial intelligence (AI)-driven language support), the current study outlines their success in fostering multilingualism, enhancing engagement rates, and developing mother tongue and second language skills. The outcome suggests that education through language for Indonesian learners will be successful if there is a balance between traditional teaching advantages, such as face-to-face teaching, and modern technology's power and freedom. Policies, pedagogical, and institutional ideas are proposed to build a sustainable, inclusive, and dynamic model for a language education framework based on the sake of its citizenry.

1. INTRODUCTION

The importance of language and multilingual learning and its impacts in Indonesia cannot be overstated. Indonesia has more than 300 ethnic groups and 700 Indigenous languages, making it the fourth-greatest country in the world. This linguistic variation presents a challenge and a chance for the country's educational system. Over the past years, the Indonesian government has implemented targeted actions to improve the quality of language teaching, mainly English, to make the country more competitive globally [1]. That is the reason why much research regarding language education (see **Table 1**).

Table 1. Previous studies relating to language education.

No	Title	Ref
1.	Promoting intercultural competence in bilingual programs in Indonesia	[2]
2.	Empowering language models through advanced prompt engineering: a comprehensive bibliometric review	[3]
3.	Introduction of Indonesian poem (pantun) as a creative effort of elementary school students in improving language skills in the covid-19 pandemic era	[4]
4.	Influence of parental involvement and school environment on pupils' academic performance in the English language	[5]
5.	Implementation of early intervention with family resourced to improve development of expressive language in children with cerebral palsy	[6]
6.	A computer-based approach to teaching foreign languages	[7]
7.	Impact of communicative language test assessments in enhancing learners' capacity	[8]
8.	Evaluation of assessment projects in English language education: a bibliometric review	[9]
9.	Efforts to improve the vocabulary of Indonesian language for 1st-grade elementary students with hearing impairment for through the application of mnemonic	[10]
10.	The weaknesses of the curriculum in the teaching of Arabic (a Muslim language) as a foreign language	[11]
11.	Linguistics and semantics difficulties in Arabic language among senior secondary schools in Ekiti, Nigeria	[12]
12.	ICT tools for teaching the Arabic language	[13]
13.	Using illustration images to enhance junior high school students' writing skills	[14]
14.	Students' strategies and self-efficacy in reading comprehension	[15]
15.	Mobilizing metacognitive strategies through zoom for EFL classrooms: an innovative practice amidst Covid-19	[16]
16.	Students' learning styles in blended English learning in an Indonesian private school	[17]
17.	Verbal phatic expressions in EFL student teachers' classroom interaction	[18]
18.	Language skills in business context: a bibliometric analysis using the VOS viewer application	[19]
19.	Research gap on differentiated learning in the EFL classroom: a conceptual framework	[20]
20.	A validation study of a self-assessment questionnaire for middle school students' self-presentation skills	[21]
21.	Research gap on oral corrective feedback in second language acquisition theory - affective filter analysis: a conceptual framework	[22]
22.	A systematic review of EFL students' self-efficacy in the learning context	[23]
23.	Improving reading comprehension of narrative text by using l-b-a (literature-based approach) at the ninth-grade students of SMP Negeri 1 Nunukan	[24]
24.	Increasing students' vocabulary using fairy tales at SMKN 6 Makassar	[25]
25.	English teachers' strategies in creating formative test questions in a public high school	[26]
26.	Area assessment of English in the application of edupreneurship in convention and event business management in a public tourism polytechnic	[27]

Table 1 (continue). Previous studies relating to language education.

No	Title	Ref
27.	How do English teachers prepare diagnostic assessment for students? insight from teachers' experiences in an Indonesian remote island	[28]
28.	Fostering self-directed learning through local wisdom project-based learning	[29]
29.	Storytelling in higher education: comparing expectancy- value in task-exposed and non-exposed English learners	[30]
30.	The importance of English language in tourism sector: a study in Socotra island	[31]
31.	Role-play in language learning: a bibliometric analysis and its impact on Thailand secondary education	[32]
32.	Tailoring CEFR to BISOL (Bahasa Indonesia for speakers of other languages): a model for integrative language teaching materials	[33]
33.	Digital native's generation enjoyment using online resources as virtual learning environment in learning English speaking	[34]
34.	Higher order thinking skills in reading literacy questions at vocational high schools in Indonesia	[35]
35.	Do mind maps really catalyze EFL grammar learning? conjunction as a case	[36]
36.	Pre-service EFL teachers' language assessment literacy satisfaction and assessment preparedness	[37]
37.	Hybrid learning in new normal times: shedding light on the current teaching practices towards second language acquisition in higher education context	[38]
38.	Exploring the effect of extensive reading on young English learners' second language writing achievement in a Vietnamese primary school setting	[39]
39.	Revealing the kafoa language vitality through the basic cultural vocabulary mastery: implications for language education	[40]
40.	The application of probing prompting learning models in mastering foreign language vocabulary	[41]
41.	The application of moderate politeness into school practices of an urban Muhammadiyah primary students in the era of global communication	[42]
42.	ASEAN students' interest in learning the Indonesian language: a descriptive study from the perspective of SEAMEO ASEAN	[43]
43.	Indigenous values of short stories in Indonesian fictional prose in higher education: implication on language education	[44]
44.	Development of an EFL curriculum components to promote intercultural communicative competence for Chinese college students	[45]
45.	The effectiveness of developing the mobile application for learning English for academic purposes in a Thai regional university	[46]
46.	How to improve healthy environment in urban school climate (USC) by communication language strategies? Arabic based communication language and statistic description analysis	[47]
47.	Interlanguage pragmatic competence of university students: an error analysis of apology speech act strategies in Japanese learners	[48]
48.	Contributing factors and challenges in mastering academic writing skills: multiple case studies of deaf students in inclusive universities in Indonesia	[49]
49.	Arabic language implementation viewed from a social and cultural perspective at Maitreechit Withayattan school Bangkok	[50]
50.	The endangered central Malay folklore: a medium for internalizing character values in Indonesian language and literature	[51]
51.	Understanding the dynamics of materials adaptation in an English Chinese bilingual storytelling curriculum for first graders	[52]
52.	Indonesian textbooks oriented on social integration and 21st century skills in higher education: validity, practicality, and effectiveness	[53]

Table 1 (continue). Previous studies relating to language education.

No	Title	Ref
53.	Enhancing ASEAN students' cross-cultural adaptability in higher education: exploring the issues of applying bilingual education in china panorama curriculum	[54]
54.	Investigating the classroom implementation of mandarin teachers' pedagogical content knowledge (PCK): exploring effective strategies and practices for teaching Chinese as a foreign language in the Philippines	[55]
55.	Enhancing paragraph writing proficiency: a study of students' performance post global English textbooks exposure	[56]
56.	Language, social conflict, and their implications for the world of education: a case study in one region of Indonesia	[57]
57.	Language choices and digital identity of high school student text messages in the new capital city of Indonesia: implication for language education	[58]
58.	Writing with cultural insight: elevating analytical exposition through local culture and project-based learning	[59]

Nevertheless, the Indonesian language education environment is characterized by challenges, including insufficient exposure to quality teaching, insufficient teacher training, and the inability of the curriculum to serve labor market needs. Seeking to address these concerns, teachers, and administrators are increasingly suggesting the use of new technologies and methods of teaching in language classes [60]. This study investigates how technological solutions and pedagogical innovations contribute to the development of language education in Indonesia. This paper presents advantages, limitations, best practices to integrate digital tools and online resources, and innovative teaching strategies into the language (class), not only in-patient outcomes and multilingualism but also in preparing the students to meet the job market requirements.

To address these issues, online learning has become a key resource for bringing technology and innovation into the language classroom. Accelerated by the COVID-19 outbreak, using platforms such as WhatsApp, Zoom, Google Classroom, and Microsoft Teams has facilitated more interactive and stimulating teaching experiences. Despite these challenges, digital tools and new pedagogies are promising to optimize student learning and multilingualism and link language education to labor market requirements.

2. LITERATURE REVIEW

Language is a dynamic and multifaceted tool that allows us to interact with the world around us. Language is produced in response to cultural and social contexts and changes with time. In these spheres, language is critical in transmitting information - fostering cross-cultural communication and enabling technology-assisted learning. As a complex, multifaceted process, language changes with social, cultural, and technological ones. Language learning today has evolved into an interactive, computerized format in the educational community [61]. The application of technologies, which include language learning applications, automatic speech recognition technology, and online learning platforms, has helped improve the efficacy of language teaching. These technologies enable wider access and provide more flexible and contextual learning opportunities.

Language in education is not immune to challenges, including the digital divide and technological infrastructure constraints. Teachers' position in integrating technological methods within language teaching is also a significant challenge. Nevertheless, technology adoption has also exciting potential to speed up the dissemination of language learning, even

in difficult-to-reach settings [62]. Technology in language teaching embodies the development of technology in promoting contemporary education. Through innovative technologies, language can still evolve to realize educational objectives in the digital age. Experience shows that it is possible to make language education more enriching, more powerful, and more meaningful to learners' concerns in this digital age [63]. The following are previous research quoted from Scopus (see **Table 2**).

Table 2. Previous research articles in Scopus.

No	Title	Ref
1.	Impact of the COVID-19 pandemic on online home learning: an explorative study of primary schools in Indonesia	[64]
2.	The Indonesian eq-5d-5l value set	[65]
3.	Secondary school language teachers' online learning engagement during the covid-19 pandemic in Indonesia	[66]
4.	Globalization, English language policy, and teacher agency: focus on Asia	[67]
5.	Students attitudes towards STEM education: voices from Indonesian junior high schools	[68]
6.	Online teaching benefits and challenges during pandemic COVID-19: a comparative study of Pakistan and Indonesia	[69]
7.	Investigating English speaking problems: implications for speaking curriculum development in Indonesia	[70]
8.	'Look, I can speak correctly': learning vocabulary and pronunciation through websites equipped with automatic speech recognition technology	[63]
9.	University students' perceptions through e-learning implementation during covid-19 pandemic: positive or negative features dominate?	[71]
10.	Integrating task and game-based learning into an online TOEFL preparatory course during the covid-19 outbreak at two Indonesian higher education institutions	[72]

3. METHODS

This research used a descriptive qualitative method to describe in detail what is happening to integrating technology and innovation in language education in Indonesia. However, this approach is not designed to be applied to testing hypotheses and experiments but to learn about various views and current knowledge regarding the research issue. Descriptive analysis is a method for systematically characterizing and explaining objects by studying a sample of persons (or objects, courses, concepts, or states of affairs) from which objects (or persons, objects, concepts) are being characterized and explained [73]. Nonetheless, the qualitative approach is often a scientific activity done in stages. Qualitative research includes scientific processes such as deciding the research topic, data collection, analysis, and understanding the phenomenon on which the study is grounded.

This study was based on a literature review which the authors read and analyzed several papers, scientific papers, journals, books, and reports related to the issue [74]. According to the literature review, this paper is concerned with the applications of technology in language learning, the problems of implementing such technology, and the outcomes of using such technology for language teaching, multilingual acquisition, and the student's preparedness to compete in the global job market.

The data collection for this study involved four main steps. First, the researcher observed relevant literature on language learning in Indonesia, focusing on technology integration in education. Afterward, additional data was gathered from selected sources, including books, articles, and case studies related to technology's impact on language learning. The collected data was then filtered for relevance, credibility, and applicability to the Indonesian context,

retaining only those that contributed to the development of language education through technological innovation. Finally, the filtered data was analyzed using thematic analysis to identify key findings and patterns used to support technology integration in language education and meet the study's objectives.

4. RESULTS AND DISCUSSION
4.1. Bibliometric Analysis

Bibliometrics have been used for analyzing research trend, as reported elsewhere (see **Table 3**). Based on the bibliometric data (**Figure 1**), the results of the present study indicate that when technology and innovative approaches are incorporated into Indonesian language teaching, evidence suggests that these mitigate some of the most critical challenges and lead to better learning performances. Thus, the object of language learning, a part of humanities, is number 2 on the top search in Scopus.

Table 3. Previous studies on bibliometric.

No	Title	Ref
1.	How to search and manage references with a specific referencing style using google scholar: From step-by-step processing for users to the practical examples in the referencing education	[75]
2.	Introducing ASEAN journal of science and engineering: a bibliometric analysis study	[76]
3.	A bibliometric analysis of chemical engineering research using VOSviewer and its correlation with Covid-19 pandemic condition	[77]
4.	A bibliometric analysis of materials research in Indonesian journal using VOSviewer	[78]
5.	Bibliometric analysis of engineering research using Vosviewer indexed by google scholar	[79]
6.	Evaluation on research effectiveness in a subject area among top class universities: a case of Indonesia's academic publication dataset on chemical and material sciences	[80]
7.	Bibliometric computational mapping analysis of publications on mechanical engineering education using VOSviewer	[81]
8.	Research trend on the use of mercury in gold mining: literature review and bibliometric analysis	[82]
9.	Domestic waste (eggshells and banana peels particles) as sustainable and renewable resources for improving resin-based brakepad performance: Bibliometric literature review, techno-economic analysis, dual-sized reinforcing experiments, to comparison with commercial product	[83]
10.	Bibliometric analysis of educational research in 2017 to 2021 using VOSviewer: Google scholar indexed research	[84]
11.	A bibliometric analysis of vocational school keywords using VOSviewer	[85]
12.	Bibliometric analysis of high school keyword using VOSviewer indexed by google scholar	[86]
13.	Bibliometric analysis of special needs education keyword using VOSviewer indexed by google scholar	[87]
14.	Bibliometric analysis for understanding the correlation between chemistry and special needs education using vosviewer indexed by google	[88]
15.	A bibliometric analysis of nanocrystalline cellulose production research as drug delivery system using VOSviewer	[89]
16.	A bibliometric analysis of covid-19 research using VOSviewer	[90]
17.	Research trends in farming system soil chemical: a bibliometric analysis using VOSviewer	[91]
18.	A bibliometric analysis of chemistry industry research using Vosviewer application with Publish or Perish	[92]
19.	A bibliometric analysis of climate smart agriculture research using VOSviewer	[93]

Table 3 (continue). Previous studies on bibliometric.

No	Title	Ref
20.	Oil palm empty fruit bunch waste pretreatment with benzotriazolium-based ionic liquids for cellulose conversion to glucose: experiments with computational bibliometric analysis	[94]
21.	Bibliometric and visualized analysis of scientific publications on geotechnics fields	[95]
22.	Bibliometric data analysis of research on resin-based brake-pads from 2012 to 2021 using VOSviewer mapping analysis computations.	[96]
23.	How bibliographic dataset portrays decreasing number of scientific publication from Indonesia	[97]
24.	A bibliometric analysis of computational mapping on publishing teaching science engineering using VOSviewer application and correlation	[98]
25.	Correlation between process engineering and special needs from bibliometric analysis perspectives	[99]
26.	Bibliometric analysis of magnetite nanoparticle production research during 2017-2021 using VOSviewer	[100]
27.	Computational bibliometric analysis on publication of techno-economic education	[101]
28.	Implementation of biotechnology in education towards green chemistry teaching: A bibliometrics study and research trends	[102]
29.	Bibliometric analysis of computational chemistry research and its correlation with Covid-19 pandemic	[103]
30.	The concise latest report on the advantages and disadvantages of pure biodiesel (B100) on engine performance: Literature review and bibliometric analysis	[104]
31.	A bibliometric analysis of management bioenergy research using VOSviewer application	[105]
32.	Computing bibliometric analysis with mapping visualization using VOSviewer on "Pharmacy" and "Special Needs" research data in 2017-2021	[106]
33.	Trends in research related to photonic crystal (PHC) from 2009 to 2019: A bibliometric and knowledge mapping analysis	[107]
34.	What is the correlation between chemical engineering and special needs education from the perspective of bibliometric analysis using vosviewer indexed by google scholar?	[108]
35.	Counseling guidance in science education: Definition, literature review, and bibliometric analysis	[109]
36.	Computational bibliometric analysis of English research in science education for students with special needs using vosviewer	[110]
37.	Research trend of local wisdom in physics education from 2018 to 2022: A bibliometric review and analysis	[111]
38.	Sustainable development goals (SDGs) in science education: definition, literature review, and bibliometric analysis	[112]
39.	A bibliometric analysis: research trend of critical thinking in science education	[113]
40.	Renewable energy online learning: a systematic literature network analysis	[114]
41.	The bibliometric analysis for identifying future research on habits of mind topic	[115]
42.	Design of robust control for vehicle steer-by-wire system	[116]
43.	Phytochemical profile and biological activities of ethylacetate extract of peanut (arachis hypogaea l.) stems: in-vitro and in-silico studies with bibliometric analysis	[117]
44.	Literature review and bibliometric mapping analysis: philosophy of science and technology education	[118]
45.	Computational bibliometric analysis of research on science and Islam with VOSviewer: Scopus database in 2012 to 2022	[119]
46.	Development analysis research on physics education by mapping keywords using the VOSviewer application	[120]
47.	Nutritional research mapping for endurance sports: a bibliometric analysis	[121]
48.	Management information systems: bibliometric analysis and its effect on decision making	[122]
49.	Past, current and future trends of salicylic acid and its derivatives: a bibliometric review of papers from the Scopus database published from 2000 to 2021	[123]
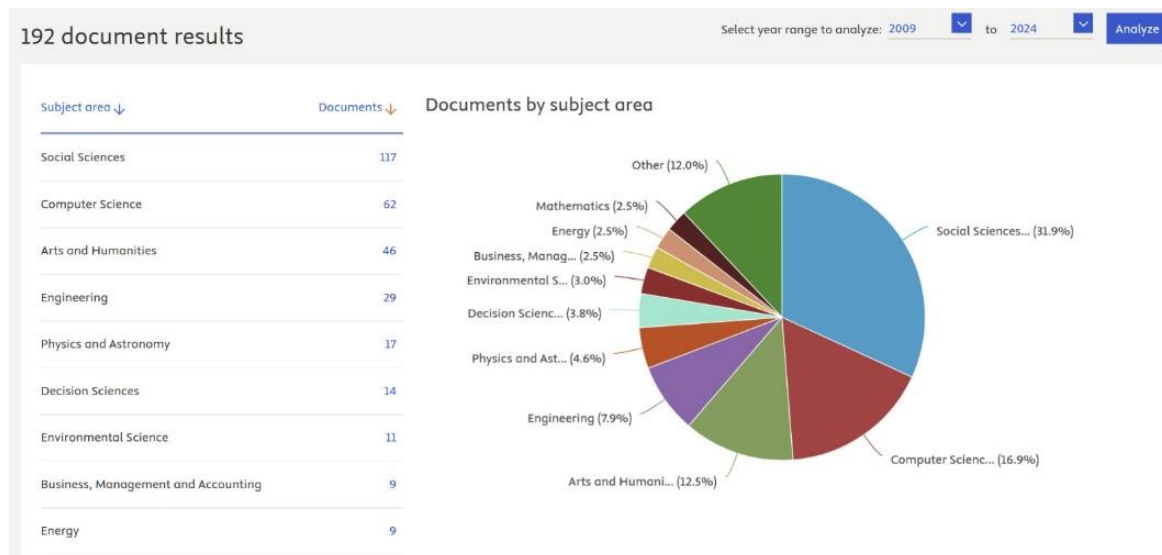
Figure 1. Bibliometric data*.*

The **Figure 1** illustrates the distribution of 192 documents concerning disciplines. Each slice in the pie chart is the proportion of documents belonging to a specific field. Some key points were obtained:

(i)   Social Sciences Dominance: Social sciences have the biggest proportion, about 31.9%. This also illustrates that most documents processed are related to social science topics, humanness, and social interaction.

(ii)   Computer Science and Humanities Balance: Computer science and humanities represent a decent share, about 16.9% and 12.5%, respectively. This shows that there is a balance between technical research and more humanistic research.

(iii) Other Sciences: Still a minority, but important sciences, including engineering, physics, and environmental science, occupy fewer percent but account for a total number of documents.

(iv)   Advantages of Language Education in the Humanities

(v)   Language education, a part of the humanities, possesses the following benefits, making it an exciting and practical area of study:

(vi)   A Deeper Understanding of Humans: Language is the primary means for humans to communicate and interact. Through languages, we better understand cultures, history, and human thinking.

(vii) Critical Skills Development: Language study involves analyzing texts, interpreting meaning, and arguing. These abilities are critical for the development of critical thinking and problem-solving skills.

(viii) Relevance in a Global World: Foreign language abilities are becoming increasingly important in a world where communication is increasingly interconnected. Teaching a foreign language opens up professional possibilities and gives us a wider view of the rest of the world.

(ix)   Contribution to Other Fields: Language comprehension has the potential to be valuable in many other disciplines, including social sciences, humanities, business, and technology. For example, in business, foreign language skills can help establish international cooperation.

(x)   Cultural Preservation: Language is an integral part of culture. Language learning enables us to contribute to the preservation of cultural heritage and the prevention of language death.

Figure 1 provides an overview of the distribution of documents by field of study. Even though social sciences are the majority, language education is not one of them, and it has important advantages. Language learning provides various benefits, from the sheer psychological perspective of how humans work up to relevance in an increasingly globalized society. Thus, language teaching continues to be an intriguing and viable area of research. Moreover, the results of this study include the following, include:

4.1.1. Greater significance of digital technologies for teaching English

The COVID-19 pandemic significantly changed the delivery of education, specifically English language teaching, worldwide, causing an immense, sudden, total transformation in favor of incorporating digital technologies. With schools, colleges, and universities already having to shut down physical campuses to slow the spread of the virus, digital technologies were a lifeline in keeping education going. Many reports regarding COVID-19 in education have been well-documented (see **Table 4**).

Table 4. Report regarding COVID-19 in education.

No	Title	Ref
1.	Health-related factors and teaching performance of physical education teachers amidst COVID-19 pandemic	[124]
2.	Impact of knowledge training on covid-19 management among individuals with intellectual disability in Nigeria	[125]
3.	The application of multicultural counseling to help mental health problems during the covid-19 pandemic in Malaysia	[126]
4.	Physical education online class for students with hearing impairment during covid-19 pandemic	[127]
5.	Use of ice-breaking methods in increasing student concentration amid online learning during COVID-19 pandemic	[128]
6.	Comparison analysis of the effectiveness of online and offline clasess in following tax brevet training on accounting students of Universitas Komputer Indonesia during the Covid-19 pandemi	[129]
7.	Utilization of educational video as a media for learning simple accounting for elementary school students' during the COVID-19 period	[130]
8.	Factor affecting the acceptance of online learning by primary school teachers during the covid -19 pandemic: a structural study using the unified theory of acceptance and use of technology (UTAUT) model	[131]
9.	Understanding the advantages and disadvantages of online class during the COVID-19 pandemic lockdowns in Southern Philippines	[132]
10.	The impact of movement control orders on Malaysian school administrators during covid-19	[133]
11.	Response of junior high school students on online learning in suppressing the spread of COVID-19	[134]
12.	Online learning using audio-visual for elementary school students during the Covid-19 pandemic	[135]

Technologies such as computers, mobile devices, the internet, and a wide array of digital applications emerged as vital components facilitating online teaching and learning environments. These technologies ensured that lessons could continue in a remote setting and introduced new possibilities for interactive and engaging teaching methods, which were previously not explored to such an extent. Digital platforms, virtual classrooms, and collaborative tools enabled educators to maintain connections with students and provide a dynamic, flexible learning experience in ways that were not possible before the pandemic

(Sailin Mahmor, 2018). Therefore, the dependency on these digital tools has further emphasized the need for technology incorporation in English language teaching and thus began a new era of blended and technology-powerful learning.

4.1.2. Teacher Preparedness and Digital Literacy

Teachers play an important role in utilizing technology well to improve the teaching and learning, and the capability of teachers to implement these technologies in the classroom directly impacts the effectiveness of digital-based education (see **Table 5**). As digital technologies continue to evolve, it becomes increasingly important for teachers to understand how to use various technological tools and develop a level of digital literacy that enables them to navigate and utilize these resources effectively. There is a growing amount of research confirming the importance of the educational preparation of teachers for technologies of information and communication devices to make the best use of the potential these devices can offer for education.

Table 5. Top article relevant to education and technology.

No	Title	Ref
1.	Green skills understanding of agricultural vocational school teachers around West Java Indonesia	[136]
2.	Potential biodiversity from ethnozoology of Enggano Island: utilization, a quantitative analysis, list of animals conserved by local people, and application of research findings empowering species literacy in biology student teachers	[137]
3.	Job satisfaction of teachers and student's performance in academics in public secondary schools in Lagos state	[138]
4.	Examining facilitating condition and social influence as determinants of secondary school teachers' behavioural intention to use mobile technologies for instruction	[139]
5.	An investigation into the conditions of ICT application at the teacher education	[140]
6.	Teachers' perspectives on interpreting services	[141]
7.	Authentic assessment tools: Implication to enhancement of learning among undergraduate science student-teachers	[142]
8.	Availability, accessibility, and utilization of intelligent tutoring system for instruction among secondary school teachers in Ilorin, Kwara State, Nigeria	[143]
9.	Information and communication technology as predictor for quality instructional delivery approach among pre-service teachers	[144]

The ability to confidently and competently use digital platforms and tools can empower teachers to create more interactive, personalized, and engaging learning environments that foster deeper student participation and collaboration. Indeed, research indicates that when teachers are well integrated into bringing technology into their lessons, they can customize the learning experience to accommodate their students' individual needs and interests, resulting in higher motivation levels and better educational results. By developing strong digital literacy skills, teachers can keep pace with technological advancements and enhance their professional development, thereby positioning themselves as leaders in the increasingly digital landscape of modern education. This, in turn, guarantees that students will have opportunities to experience meaningful, technology-enabled language learning activities.

4.1.3. Interconnectedness of Digital Tools, Language, and Content

The framework [145] stresses the role of the key interaction of digital resources, language, and content in contemporary education. According to their framework, integrating these three elements forms a dynamic, interconnected environment that enhances learning,

particularly in language acquisition. A digitally literate teacher who can work with and make sense of a range of digital resources has a highly desirable position to unite the potential of technologies, language, and educational materials to their most remarkable possible learning effectiveness. By seamlessly incorporating digital tools into their teaching practices, educators can create an interactive and engaging space for students to develop their linguistic skills, critical thinking, creativity, and technological competence. That is the reason for many reports regarding digital in education (see **Table 6).**

Table 6. Reports regarding digital in education.

No	Title	Ref
1.	Undergraduate awareness and perception on the use of digital collaborative tools in facilitating learning in selected universities within the Ilorin metropolis	[146]
2.	Development and validation of digital photo series for the teaching of BT in Ilorin, Nigeria	[147]
3.	Bibliometric analysis of the integration of digital tools in marine conservation education	[148]
4.	The digital frontier: AI-enabled transformations in higher education management	[149]
5.	Memetized learning: How humor-infused stories can engage geography students in the digital age	[150]
6.	The effectiveness of learning videos as a source of digital literacy on poster learning in elementary schools	[151]
7.	Factors affecting satisfaction on online education on students digital teaching page in Ho Chi Minh City, Vietnam	[152]
8.	Utilization of electronic community library as a localhost-based digital library in optimizing learning resources	[153]
9.	Bibliometric analysis of research trends in conceptual understanding and sustainability awareness through artificial intelligence (AI) and digital learning media	[154]
10.	Postgraduate students' attitude towards the use of digital library repositories for research in Kwara State	[155]
11.	Measurement of the level of digital competence of vocational teachers in learning development	[156]
12.	Embracing digitalization in higher education: a constructivist perspective	[157]
13.	Development of digital-based interactive teaching materials in draping courses	[158]
14.	The effects of digital media instruction on senior high school students' performance in organic chemistry nomenclature	[159]
15.	Digital to face-to-face classes: students' challenges during the transitions of educational modes	[160]
16.	Optimizing instagram in sociology materials to improve digital literacy for junior high school students	[161]
17.	Implementation of the educational personnel program for elementary school students in the digital age using google classroom	[162]
18.	Distance teaching of stress materials to junior high school students using digital media	[163]
19.	Fun simple style and airplane science teaching to digital-based elementary school students	[164]
20.	Weather and Its effect learning on digital-based early childhood education students	[165]
21.	Socialization of digital literacy in compiling a balanced healthy menu to members of POKJA III the PKK movement team of Purwakarta regency	[166]
22.	A digital accessibility and inclusive design-based e-module in higher education: Does it work in a classroom with a deaf student?	[167]
23.	Digital transformation in special needs education: Computational bibliometrics	[168]

Through this converging approach, language is better understood in context-sensitive and content-rich activity, allowing students to communicate more effectively and create creative, cogent content with contemporary digital media. As a result, learners improve their communication abilities in the target language and gain the skills needed to navigate the increasingly digital world in which they live. This holistic integration of digital tools into

language education supports the development of more capable, adaptable, and tech-savvy individuals who can effectively contribute to society in an interconnected digital age.

4.1.4. Student Perspectives on ICT in Language Learning

Recently, studies in Azerbaijan have shown the prominent role of Information and Communication Technology (ICT) in supporting English language teaching and learning in different ways. The inclusion of ICT in English classrooms results in significant changes concerning students' motivation as a facilitator of language learning success. Using digital tools, multimedia materials, and interactive technologies, students are deeply involved in the learning process because they can make the lessons dynamic, exciting, and especially out of relevant to their everyday lives. Concurrently, ICT integration promotes active learning and thereby improves communication among students. It provides learners with the means to practice speaking, listening, reading, and writing more diversely and innovatively and, as a result, enhances their communicative effectiveness in English. Additionally, this study proposes that ICT contributes to students' capacity to develop a second or foreign language. Many reports regarding ICT have been well-developed (see **Table 7**).

Table 7. Reports regarding ICT.

No	Title	Ref
1.	Utilization and quality of information system for administration services based on ICT in Patehan, Kraton, Yogyakarta	[169]
2.	Teaching and learning with technology: effectiveness of ICT integration in schools	[170]
3.	Motivation and ICT in secondary school mathematics using unified theory of acceptance and use of technology model	[171]
4.	Usability and utilization of ICT among educational administrators in secondary students in public school	[172]
5.	Usability of ICT for class size remediation and learning among secondary schools.	[173]
6.	An investigation into the conditions of ICT application at the teacher education.	[140]
7.	Information communication technology (ICT) on implementation of higher education	[174]
8.	Accessibility, usability, and readiness towards ICT tools for monitoring educational practice in secondary schools	[175]
9.	Information communication technology (ICT)-based instructional software and its effectiveness in teaching high school geometry	[176]
10.	Lecturers' efficacy and readiness towards utilization of ICT for academic research in college of education	[177]
11.	An assessment strategy using visual basic application in PowerPoint: A free interactive quiz application for ICT class	[178]
12.	Competency level in information and communications technology (ICT) of teachers: Basis for a technological, pedagogical and content knowledge (TPACK) readiness training program	[179]
13.	Improved information literacy of elementary school students about living pharmacies through information and communication media (ICT)	[180]
14.	Utilization of ICT resources for teaching among some selected lecturers in colleges of education in Kwara State	[181]
15.	Information and communication technology (ICT) integration: A veritable technique for quality secondary education	[182]
16.	ICT tools for teaching the Arabic language	[13]
17.	Influence of ICT availability, accessibility, and utilization on agriculture students' academic performance in universities	[183]
18.	Motivation and ICT in secondary school mathematics using unified theory of acceptance and use of technology model	[171]

The reliance on actual content, interactions with other learners as part of an active virtual community, and multiple linguistic resources exposes the learners to a more complete understanding of language structural structure, contextual meaning, and natural language use. As such, the findings emphasize the transformative power of ICT in motivating students and facilitating a more comprehensive and immersive approach to language learning, thereby supporting the development of proficient and confident language users.

4.2 Discussion
4.2.1. Integration and Impact of Digital Technologies

The increasing use of digital technologies in ELT shows the ELT industry's remarkable flexibility and continual development in meeting unfolding changes in the educational environment. Over recent years, the merger of digital technologies has transformed both teaching practices and learning in deep ways. Tools (e.g., online-based platforms, multimedia, language-learning applications, digital collaborative spaces) are transforming the old didactic procedures toward more interactive, student-oriented ones. These advances inspire students to become more engaged in their learning, providing the potential for flexible, personalized, and individualized education that caters to each student's distinctive needs and ways of learning. Additionally, digital technologies offer a range of interactive resources, such as video and even real-time language interaction, making the learning process enjoyable and practical and producing better-term learning.

Not only has the transition to digital environments made lessons more dynamic and interactive, but it also plays a role in closing the classroom experience feedstock. As students engage with tools such as online language communities, interactive grammar tutorials, and mobile apps, they are equipped with essential communication skills that go beyond theoretical knowledge.

Using authentic texts, joint work, and communication with speakers of different cultural backgrounds through virtual means facilitates the capacity to produce fluent output in the target language. Lastly, introducing digital instruments in English teaching gives students the language competence required to achieve academic success and the practical communication skills required to progress in a modern globalized society.

4.2.2. Challenges in Implementation

Although there are many positive aspects of using digital technologies in English language teaching, many issues must be addressed to guarantee a successful adoption. One of the most prominent issues is teacher preparedness. Teachers need digital literacy for digital tools to be meaningfully incorporated into the classroom. Without the required skills and confidence to use and work with a wide range of technological resources, the power of Information and Communication Technologies (ICT) to improve L2 learning may be unformed. Thus, it is critical to introduce broad professional development programs that aim to develop teachers' digital skills. Such programs not only need to teach the technical skill of using digital technology, but they also need to teach strategies for using technologies to enrich student learning and engagement. Along with preceptorships, the availability of ICT infrastructure continues to be a significant obstacle, especially in the developing world where such facilities can be lacking.

Schools in these regions often lack the hardware, stable internet access, and updated software necessary to use digital learning tools effectively. This lack of infrastructure, therefore, results in differential access to technology-enhanced learning experiences, which restricts its potential advantages only to groups more likely to be in higher-density urban areas or economically well-off communities.

Because of this, the digital divide fosters educational inequities, so some students are not fully benefiting from technology-integrated language learning. Significant financial resources are needed to overcome these issues, enhance access to ICT infrastructure, and fully equip teachers to implement digital tools. Thus, it will be possible for all children, regardless of their geographical or social location, to reap the benefits of those opportunities provided by digital technologies in language learning.

4.2.3. Opportunities for Advancement

The introduction of digital tools in language teaching has the potential to generate numerous new opportunities that greatly improve teaching and learning. Developing several essential skills is one of the most marked features in students. Digital technologies facilitate autonomous learning, allowing learners to engage with language outside the traditional classroom setting. Measuring self-directed through the use of digital platforms, language, and web-based resources, students have the opportunity to engage in language learning at their own pace and to their own needs and learning styles, i.e.

This autonomy fosters self-directed learning, in which students assume ownership of their learning experience, actively finding language material, engaging in interactive activities, and finding living situations where the language is used. By allowing themselves the opportunity to interact with language practically, the understanding and skills of individuals improve. Meanwhile, their grasp of the dynamics of language as the result of different contexts improves. In addition, the digital tools support the localization of language acquisition in real situations by offering authentic materials, i.e., news reports, videos, podcasts, and dialogues with native speakers, thereby strengthening the real-life utilization of language abilities.

A further significant advantage is the enhanced engagement and motivation digital tools provide in learning. The interactive nature of ICT tools, such as multimedia resources, gamified learning apps, and virtual classrooms, keeps students more engaged in their studies. Digital technologies provide a richer, more active, and immersive experience compared to traditional textbooks.

Figure 2 above provides an overview of the funding sources of the 192 documents studied. Each bar on the graph shows the number of documents funded by a specific institution or organization.

(i)   The Education Fund Management Institution is the largest funding source, funding 12 documents. This suggests that this institution is important in facilitating research or any project that creates these documents.

(ii)   Role of the Government: The Republic of Indonesia's Ministry of Education and Culture and the Republic of Indonesia's Ministry of Finance also represent relatively substantial capital providers. This demonstrates that the government pays sufficient attention to research and development in all areas.

(iii) Binus University and the Japan Society for the Promotion of Science are also listed as funding partners but with lesser amounts. This shows that domestic educational institutions collaborate with international institutions in conducting research.

(iv) Variation in Funding Sources: This chart indicates various funding levels. In addition to government institutions and universities, other institutions, such as the Directorate of Research and Community Service, contribute to funding research.

Students may participate actively in online interaction, work together as peers online, and find numerous learning resources that enrich the educational experience and make it more diverse and interesting. These dynamic and interactive features increase the attraction to learning languages and the pleasure of learning languages. Students become increasingly

keen to complete their studies by learning to use digital tools for communication, practice, and creation related to the target language. The positive reinforcement loop of learning and progress keeps interest and pleasure high. Thus, the activity of getting communication skills is not just fun but practical as well. This boost of motivation is significant for maintaining long-term learning and attainment, especially when confronted with the richness of the complexity and challenges of mastering a new language.
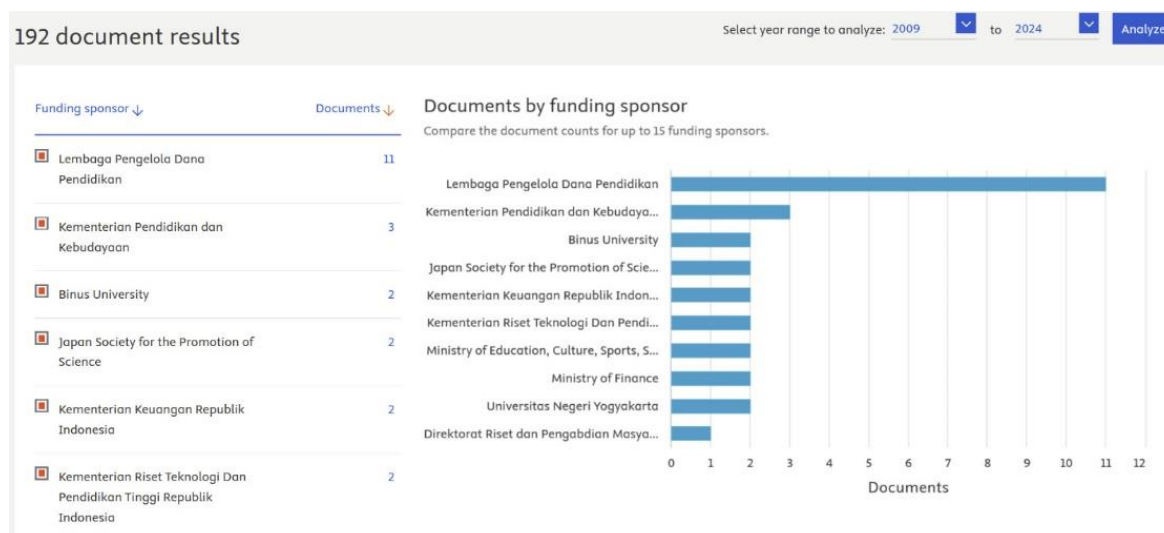
Figure 2. Funding Sponsor.

5. CONCLUSION

Using technology and new approaches in language teaching in Indonesia has significant potential to enhance learning results. This can be seen from the technologies' capacity to overcome some of the major hurdles in teaching language, including limited access to high-quality teaching and lack of equipment in underdeveloped areas. The COVID-19 pandemic has driven even greater adoption of digital technologies in the teaching and learning of English, including online platforms, multimedia materials, and language learning apps.

Research indicates that ICT in EFL classrooms not only enhances students' motivation, communication ability, and efforts to learn a second or foreign language(s) but can also lead to more frequent satisfaction(s), achievement (es), and gain(s) from this (their) learning. Nevertheless, the level of teachers' learning readiness about digital literacy and the availability of ICT resources/infrastructure, particularly in developing regions, remains a hurdle that needs to be addressed.

To implement the full capabilities of ICT in language teaching, the following are suggested:
(i) Improve teachers' digital literacy through professional development programs.
(ii) Improve access to ICT infrastructure in developing areas.
(iii) Encourage independent and contextual learning by utilizing digital technology.
(iv) Take advantage of the interactive component of ICT tools to improve student engagement and motivation in language acquisition.

It is crucial to ensure that traditional face-to-face learning's advantages are not overshadowed by modern technologies' ability to offer scalability and portability. Policies, pedagogical approaches, and institutions should be designed to enable the development of an enduring, equitable, and contemporary framework of language education.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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