

A SYSTEMATIC REVIEW OF SELF-REGULATED LEARNING APPROACH THROUGH DIGITAL LEARNING MEDIA IN ENHANCING STUDENTS' EFL SPEAKING COMPETENCES

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ABSTRACT

This study explores the substantial role of digital learning media in ensuring continuous learning regardless of location or circumstances. With many digital platforms available for teaching and learning, this paper investigates the benefits and characteristics associated with the utilization of digital learning media. Employing self-regulated learning approaches, the study aims to enhance students' English as a Foreign Language (EFL) competencies. Conducting a systematic literature review covering the period from 2018 to 2023, the research follows the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines. Examining 25 articles from reputable databases (i.e., Scopus, Science Direct), the study identifies a positive correlation between the use of digital learning media, including Learning Management Systems (LMS) and Android-based smartphone applications, and improved student achievements. The findings emphasize the significance of digital tools that meet specific qualifications: being beneficial, organizing indicators effectively, and featuring robust and interactive visualizations. This research offers valuable insights for educators, policymakers, and researchers to enhance technology-based learning experiences in EFL education.

Keywords: *digital learning media, EFL speaking, learning outcomes, self-regulated learning.*

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INTRODUCTION

Data from UNESCO has recorded that in early March 2020, there were more than 84% of students around the world conducted online teaching and learning activities by using any digital platforms to minimize the spread of the Covid-19 virus (Mishra & Warr, 2021). To maintain learning continuity, various learning media platforms are used as media to deliver material from lecturers to students and vice versa. Various digital technology devices such as smartphones, tablets, computers, and others are used more effectively to gain knowledge and skills (Aditya, 2021). Distance learning with digital media is carried out synchronously, lecturers and students conduct online meetings by using certain video conference platforms and asynchronously by using the LMS platform which contains learning materials which accessible anytime and anywhere (Amiti, 2020). The virtual classroom used a Learning Management System (LMS) such as Schoology, Moodle, Google Classroom, and platforms that were developed by each educational institution. LMS is a form of innovative integration of technology, namely technology as an instructional and learning tool (Landa et al., 2021).

Currently, various kinds of digital English learning media are very accessible to students. These digital learning media have been in the form of digital media in the form of websites, augmented reality, virtual reality, or applications on Android smartphones (Viberg et al., 2023); (Andreani & Ying, 2019), LMS e-portfolio (Miyoshi et al., 2021), Massive Open Online Course (MOOC) (Pérez-Álvarez et al., 2018). Wang et al. (2021) developed a personalized mobile-assisted system with self-regulated learning (SRL) to support EFL students in studying English Grammar. The result indicates that students with this learning tool demonstrate positive performance on their grammar tests. This shows the effectiveness of the personalized mobile-assisted system with SRL in improving students' grammar test scores. The system also provides a flexible learning environment for learners to study grammar at their own pace, and individual learning experiences which facilitates autonomy and independence in learning (Wang et al., 2021). Yang and Bae (2022) used Class Cards and Kahoot as the media for investigating the effects of students' vocabulary retention (Yang & Bae, 2022). MLERWS (Mobile Learning Application for English Reading and Writing Skills) was designed and developed for English Reading and

Writing Skills in Senior High Schools (Llema & Vilela-Malabanan, 2019). Another research used a VR game-based English mobile learning application to investigate students learning effectiveness (Chen & Hsu, 2020). A web-based teaching material was also developed for intermediate-level students of Indonesian for foreign speakers (BIPA) (Yulianeta et al., 2022). Those previous studies have confirmed that using online courses with a kind of learning management system based on self-regulated learning helps students to enhance students outcomes (Alkhasawneh & Alqahtani, 2019), satisfaction, and support students SRL activities (Pinilla et al., 2021), problem-solving skills (Kusuma et al., 2021) in higher education (Saadati et al., 2021). Digital device usage to promote self-regulated learning has shown a positive impact on students' speaking ability by using smartphones (Menggo et al., 2022) or computer-assisted intelligent tutoring systems (Mohammadzadeh et al., 2018).

SRL is defined as the process for students to activate and maintain the continuity of cognition, impact, and attitudes which are systematically oriented toward achieving personal goals that involve skills and willingness to learn (Greene, 2018). In Zimmerman and Schunk's (1989) view, self-regulated learning occurs when learners meta-cognitively, motivationally, and behaviorally actively participate in their respective learning processes (Zimmerman & Schunk, 1989). The use of digital learning media such as LMS, based on many previous researches, was applied to promote self-regulated learning (Kang, 2022). Distance learning with digital media is carried out synchronously, lecturers and students conduct online meetings by using certain video conference platforms and asynchronously by using the LMS platform which contains learning materials which accessible anytime and anywhere (Amiti, 2020). The virtual classroom used LMS such as Schoology, Moodle, Google Classroom, and platforms that were developed by each educational institution. LMS is a form of innovative integration of technology, namely technology as an instructional and learning tool (Landa et al., 2021).

Understanding grammar, vocabulary, pronunciation, and discourse is not enough for language learners. They should apply their knowledge to an action or practice, then it will become a language skill. There are four categories of core speaking skills that learners need to develop (Goh & Burns, 2012). The four categories are Pronunciation - produces the sounds of the target language of the segmental and suprasegmental levels, Speech function - performs a precise communicative function or

speech act, Interaction management - regulates conversations and discussions during interactions, Discourse organization - creates extended discourse in various spoken genres, according to socio-culturally appropriate conventions of language.

Related to the positive impacts of digital learning media such as LMS based on self-regulated learning in improving students' learning outcomes, the researcher conducted an updated, comprehensive systematic literature review to inform recent research findings about the use of digital language learning media with self-regulated learning approach to enhance students' EFL speaking competences. In short, this systematic literature review was conducted to answer the following research question:

1. What are the benefits of using digital learning with a self-regulated learning approach?
2. What is the trend of studies focusing on the use of digital learning media by using self-regulated learning approaches?

RESEARCH METHODOLOGY

This research was conducted based on a systematic literature review adapted from the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA). The PRISMA 2020 also provides updated reporting guidance for systematic reviews and flow diagrams for original and the latest reviews (Page et al., 2021). The report consists of a 27-item checklist and a four-phase flow diagram to review and analyze the articles (Moher et al., 2010). In this study, the researcher began to identify articles related to learning management systems (digital learning media) and self-regulated learning in Scopus and Science Direct databases. The four phases involved in this systematic literature review are the identification phase, screening phase, eligibility phase, and exclusion phase.

Phase 1: Identification Phase

The selected articles had to meet the pre-defined criteria. First, the databases used in this systematic review were Scopus and Science Direct. The articles were published from 2018 to 2023. The articles were identified based on the two search engines needed through the following keywords as shown in Table 1.

Table 1. Keywords to Find Relevant Articles.

<i>Databases</i>	<i>Keywords</i>
Scopus	self-regulated AND digital and learning AND speaking and skill, <i>online</i> AND <i>learning</i> AND <i>EFL</i> AND <i>speaking</i> AND <i>self-regulated</i> , <i>learning</i> , <i>LMS</i> AND <i>self-regulated</i> AND <i>learning</i> , <i>SRL</i> AND <i>speaking</i> .
Science Direct	self-regulated AND digital learning AND speaking skill AND vocational higher education, self-regulated learning AND digital AND English speaking.

Phase 2: Screening Phase

Data from Scopus and Science Direct were selected by the titles and abstracts. The titles were screened as they matched the keywords used in search engines. The abstracts of each article were skimmed and scanned. The abstracts of the articles were read at the same time the researcher considered the inclusion and exclusion criteria.

Phase 3: Eligibility Phase

The articles were analyzed and checked for their eligibility. The articles should follow the inclusion and exclusion criteria as in Table 2. The open-access articles which could be fully downloaded were eligible, but the restricted articles were excluded.

Table 2. The Inclusion and Exclusion Criteria.

<i>Inclusion Criteria</i>	<i>Exclusion Criteria</i>
a. Journal articles	a. meta-analysis paper, book, book chapters, proceedings, review articles
b. Articles published between 2018-2023	b. articles published out of 2018-2023
c. articles discussed LMS-based self-regulated learning to enhance speaking skills	c. articles published in non-English language
d. sample of respondents are from various education levels	d. articles not focusing on LMS, self-regulated learning, speaking skills
e. articles published in the English language	

Phase 4: Inclusion Phase

This paper includes articles that meet the inclusion criteria, excluding meta-analyses, books, book chapters, review articles, proceedings books, and non-English articles. The review focuses on articles published between 2018 and 2023, refining the search to

specifically relevant studies addressing LMS with a self-regulated learning approach to improve students' EFL speaking competences.

RESULT AND DISCUSSION

Overview of the Studies Reviewed

There are 25 articles chosen as the final result in selecting articles based on the inclusion and exclusion criteria. Those 25 articles match the inclusion criteria of the variables were deeply analyzed. The variables are related to digital learning media in any kind of digital devices, self-regulated learning, and ESP speaking competences. The articles which are selected in this systematic review are displayed in the appendix. It was shown in Figure 1 that most of the studies applied digital learning media such as e-books (Chen & Su, 2019; Susantini et al., 2021), apps in smartphones (Hendikawati et al., 2019; Menggo et al., 2022; Nasrullah et al., 2022), LMS (Alkhasawneh & Alqahtani, 2019; Almoeather, 2020; Chen & Su, 2019; Li, 2019; Lim et al., 2020; Miyoshi et al., 2021; Mohammadzadeh et al., 2018; Pérez-Álvarez et al., 2018; Saadati et al., 2021; Salehian Kia et al., 2021), social media (Chen et al., 2021), artificial intelligent (Wang & Lin, 2023), and digital portfolio in google drive (Al-Hawamleh et al., 2022). Most of the studies applied kinds of Learning Management System (LMS) as the media to promote self-regulated learning (n=10 articles), followed by other various platforms (n=6 articles), android apps (n=3 articles), and e-books (n=2 articles). Only 4 out of 25 articles did not apply digital learning media as seen in Figure 1.

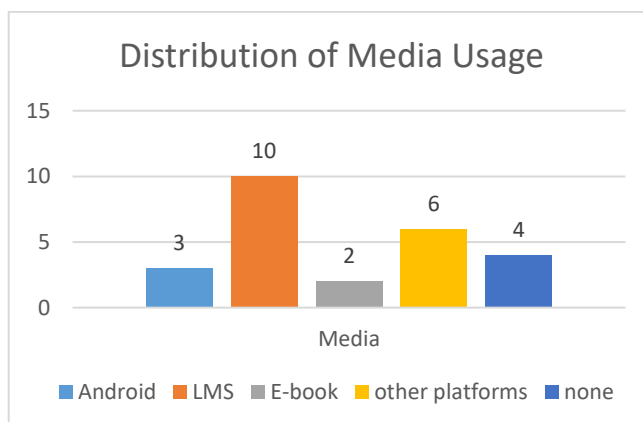


Figure 1. The Distribution of Media Usage.

The research methods used in the 25 articles reviewed as shown in Figure 2. Included mixed-methods, quantitative, developmental research, descriptive, and qualitative. The majority of the articles (n=13 articles) applied quantitative research methods to collect the data. Almoeather (2020), for instance, investigated the effectiveness of Blackboard and Edmodo by using the SRL scale to measure university students' self-regulation skills. It consists of nine items illustrating the contributions of the use of a learning management system for developing students' SRL skills. The scale was measured for validity and reliability (Almoeather, 2020). Eleven studies (44%) were exclusively mixed-methods. For instance, Al-Hawamleh et al. (2022), applied mixed methods to describe and analyze the contribution of digital learning portfolios with self-regulated learning strategies of high school students during speaking activities in Kuwait classes (Al-Hawamleh et al., 2022). Alkhasawneh and Alqahtani (2019) applied a quasi-experimental research design to observe the effects of using online undergraduate courses based on SRL strategies to enhance students' self-regulation and learning outcomes at the University of Bisha (Alkhasawneh & Alqahtani, 2019).

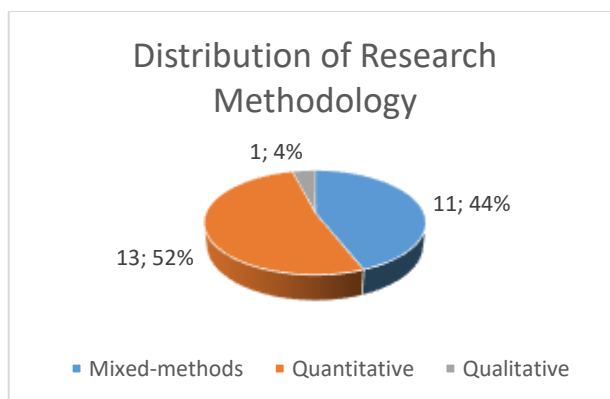


Figure 2. Distribution of Research Methods.

The participants in the reviewed studies were school students (87%) and college students (9%), followed by course students (4%), and experts (0.01%). Most of the studies applied self-regulated learning strategies to students of school level ($n=105584$). Chen et al. (2021), for instance, used secondary data from PISA so they had the highest number of participants since the authors involved 3693 schools across six East Asian countries and nine Western countries (Chen et al., 2021). Participants from higher education levels consisted of students from the English language department ($n=388$) and non-English departments ($n=10129$) which were from management, math, and other study programs. Seven experts were involved in the studies; 4 experts were involved in a research done by Álvarez et al. (2018) to give judgments on the usability of the tool to support self-regulated learning (Pérez-Álvarez et al., 2018). Other 3 experts participated in research done by Lluch Molins and Cano Garcia (2023) to evaluate Personalized Learning Design (Lluch Molins & Cano Garcia, 2023).

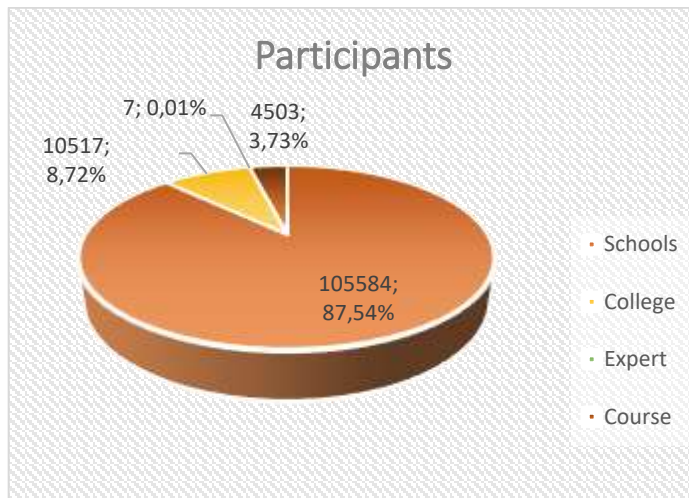


Figure 3. Distribution of Participants

In the articles reviewed, the studies were mostly conducted in countries in Asia (n=20) and some other studies were done in Europe (n=3) and America (n=4). Figure 4. The total number of countries 27, was due to research that was conducted in more than one country as represented in research by Chen et al. (2021) which took data from PISA which covers East Asian regions and Western countries.



Figure 4. Distribution of Research Area.

The Benefit of Using Digital Learning Media Using Self-Regulated Learning Approach

Several studies have developed technology-based digital learning models to develop the competence of students. Self-recorded videos received positive responses from students because they could assess their

own performance to their best performance. Students have the freedom to determine topics, practice pronunciation, and vocab with the app leading to readiness which results in better performance. The self-regulated (SRL) method has good potential to improve students' speaking skills (Menggo et al., 2022). Students who apply self-regulated learning can speak well when they understand and can regulate what they do when completing speaking tasks (Al-Hawamleh et al., 2022). Various informal learning places based on the articles reviewed have increased in recent years, and the design of digital media is increasingly complex, for example in 3D animations. In the last 3 years, digital media devices have mostly been used in portable form (Degner et al., 2022). Improving self-regulatory skills is in the hands of students, but to build them, the role of educators is needed (Kang, 2022). Self-efficacy and self-regulation influence each other. Interaction features in the VR app and challenges in a game-based design make it easier for students to understand and improve their motivation (Chen & Hsu, 2020). The SRL training program improves academic performance, SRL strategies, and student motivation (Theobald, 2021).

Self-regulated learners can speak successfully when they understand and can regulate what they do by doing a speaking task. The use of the portfolio does not appear to have adequately supported the students in this process. Strategic planning, for its part, seems to benefit from the tools of the portfolio (Al-Hawamleh et al., 2022). Another research by Alotumi (2021) found that students used a range of motivational self-regulation strategies to enhance their EFL speaking skills. It also indicated that there is no significant relationship between students' SRMIS-EFL and their academic level. However, it evinced that students' gender had a significant effect, in favor of female students, on their SRMIS-EFL (Alotumi, 2021). Using a self-regulated learning method with the implementation of smartphone assistance has a positive impact on student speaking ability. This enhanced effect is demonstrated by the adjusted mean score on the post-test = 82.32. In this research, English instructors are supposed to apply this method by considering students' characteristics, cognitive capacities, learning styles, learner autonomy, and the steps of how to implement this method in the instruction process (Menggo et al., 2022).

Trend of Studies Focusing on the Use of Digital Learning Media by Using Self-Regulated Learning Approaches?

Based on the articles reviewed, it was assumed that the trend of studies focusing on digital learning media use was investigating the effectiveness of digital platforms which were developed to enhance certain learning outcomes i.e. English proficiency (Apridayani, 2022), speaking ability (Al-Hawamleh et al., 2022; Alotumi, 2021; Kang, 2022; Menggo et al., 2022; Mohammadzadeh et al., 2018; Zhang & Wilson, 2023), self-regulatory skills (Hendikawati et al., 2019; Miyoshi et al., 2021; Pérez-Álvarez et al., 2018), and digital reading literacy (Chen et al., 2021). The digital learning tools that were mostly utilized such as the Learning Management System (LMS). 10 studies applied LMS as a digital tool with an SRL approach to improving the students' learning outcomes. Miyoshi et al. (2021), for instance, developed a new "e-Portfolio system" for developing a system that fosters self-regulated learners which can represent students' learning outcomes (Miyoshi et al., 2021). Another study which was done by Almoeather (2020) investigated the effectiveness of Blackboard as a Learning Management System and Edmodo as a Social Learning Network. The result showed that both LMS and Edmodo were able to enhance students' beliefs, aspirations, abilities, and achievements.

Participants who were involved in the articles reviewed were mostly students at the high school level, followed by participants from higher education. Another trend found in this systematic review was that studies concerned with the use of digital learning media with a self-regulated learning approach were mostly conducted by researchers from Asian countries. Most of the studies were aimed at enhancing students' learning outcomes.

CONCLUSION

The use of digital learning media by using a self-regulated learning approach can have positive impacts on learning outcomes. The self-regulated learning approach accommodated the students of health vocational education outside the classroom activity. Mostly digital learning media were developed in the context of various areas such as mathematics or SRL itself. Some previous studies found that digital learning media like Blackboard, Edmodo, LMS, or Android apps were

developed in the context of general English, but not for specific purposes.

In future research, researchers are recommended to conduct studies related to digital learning media in the form of LMS or web-based learning media in the area of English for Academic Purposes speaking skills by using a self-regulated learning approach for students of vocational health education. In conducting further research, English lecturers are encouraged to apply this media by considering students' characteristics, cognitive capacities, learning styles, learner autonomy, and the steps of how to apply this method in the instruction process.

REFERENCES

- Aditya, D. S. (2021). Embarking digital learning due to COVID-19: Are teachers ready? *Journal of Technology and Science Education*, 11(1), 104-. <https://doi.org/10.3926/jotse.1109>
- Al-Hawamleh, M. S., Alazemi, A. F., & Al-Jamal, D. A. H. (2022). Digital portfolio and self-regulation in speaking tasks. *Asian-Pacific Journal of Second and Foreign Language Education*, 7(1), Article 14. <https://doi.org/10.1186/s40862-022-00141-w>
- Alkhasawneh, S., & Alqahtani, M. A. M. (2019). Fostering Students' Self-Regulated Learning through Using a Learning Management System to Enhance Academic Outcomes at the University of Bisha. *TEM Journal*, 8(2), 662-669.
- Almoeather, R. (2020). Effectiveness of Blackboard and Edmodo in Self-Regulated Learning and Educational Satisfaction. *Turkish Online Journal of Distance Education*, 21(2), 126–140. <https://doi.org/10.17718/tojde.728140>
- Alotumi, M. (2021). EFL college junior and senior students' self-regulated motivation for improving English speaking: A survey study. *Heliyon*, 7(4), e06664. <https://doi.org/10.1016/j.heliyon.2021.e06664>
- Amiti, F. (2020). Synchronous and asynchronous e-learning. *European Journal of Open Education and E-Learning Studies*, 5(2). <https://doi.org/10.46827/ejoe.v5i2.3313>
- Andreani, W., & Ying, Y. (2019). "PowPow" interactive game in supporting English vocabulary learning for elementary students.

- Procedia Computer Science*, 157, 473–478.
<https://doi.org/10.1016/j.procs.2019.09.005>
- Apridayani, A. (2022). Exploring Thai EFL Students' Self-Regulated Learning (SRL) Strategies and English Proficiency. *MEXTESOL Journal*, 46(1).
- Chen, C.-H., & Su, C.-Y. (2019). Using the BookRoll E-Book System to Promote Self-Regulated Learning Efficacy and Academic Achievement for University Students. *Educational Technology & Society*, 22(4), 33-46.
- Chen, J., Lin, C.-H., & Chen, G. (2021). A cross-cultural perspective on the relationships among social media use, self-regulated learning and adolescents' digital reading literacy. *Computers & Education*, 175, 104322. <https://doi.org/10.1016/j.compedu.2021.104322>
- Chen, Y.-L., & Hsu, C.-C. (2020). Self-regulated mobile game-based English learning in a virtual reality environment. *Computers & Education*, 154, 103910. <https://doi.org/10.1016/j.compedu.2020.103910>
- Degner, M., Moser, S., & Lewalter, D. (2022). Digital media in institutional informal learning places: A systematic literature review. *Computers and Education Open*, 3, 100068. <https://doi.org/10.1016/j.caeo.2021.100068>
- Goh, C. C. M., & Burns, A. (2012). *Teaching Speaking: A Holistic Approach*. Cambridge University Press.
- Greene, J. A. (2018). *Self-regulation in education*. Routledge.
- Hendikawati, P., Zahid, M. Z., & Arifudin, R. (2019). Android-Based Computer Assisted Instruction Development as a Learning Resource for Supporting Self-Regulated Learning. *International Journal of Instruction*, 12(3), 389–404. <https://doi.org/10.29333/iji.2019.12324a>
- Kang, N. (2022). Promoting EFL Learners' Self-regulated Learning using a Self-recorded Video-Speaking Task in an Online ESP Course. *The Journal of Asia TEFL*, 19(4), 1141–1162. <https://doi.org/10.18823/asiatefl.2022.19.4.1.1141>
- Kusuma, J. W., Hamidah, Mahuda, I., Sukandar, R. S., Santoso, E., & Jatisunda, M. G. (2021). Project-based learning with LMS Moodle to promote mathematical problem solving and self-regulated learning. *Journal of Physics: Conference Series*, 1764(1), 012135. <https://doi.org/10.1088/1742-6596/1764/1/012135>
- Landa, E., Zhu, C., & Sesabo, J. (2021). Readiness for integration of innovative teaching and learning technologies: An analysis of

A systematic review of self-regulated learning approach through digital learning media in enhancing students' EFL speaking competences (D. Rochmawati, J. Nurkamto, M. Nizam, D. Rochsantiningsih & Sunardi)

- meso-micro variables in Tanzanian higher education. *International Journal of Educational Research Open*, 2, 100098. <https://doi.org/10.1016/j.ijedro.2021.100098>
- Li, K. (2019). MOOC learners' demographics, self-regulated learning strategy, perceived learning and satisfaction: A structural equation modeling approach. *Computers & Education*, 132, 16–30. <https://doi.org/10.1016/j.compedu.2019.01.003>
- Lim, C. L., Jalil, H. A., Ma'rof, A. M., & Saad, W. Z. (2020). Differences in Self-Regulated Learning (SRL) and Online Learning Satisfaction Across Academic Disciplines: A Study of a Private University in Malaysia. *International Journal of Learning and Teaching*, 6(2), 62–67. <https://doi.org/10.18178/ijlt.6.2.62-67>
- Llema, C. F., & Vilela-Malabanan, C. M. (2019). Design and Development of MLERWS: A User-Centered Mobile Application for English Reading and Writing Skills. *Procedia Computer Science*, 161, 1002–1010. <https://doi.org/10.1016/j.procs.2019.11.210>
- Lluch Molins, L., & Cano Garcia, E. (2023). How to Embed SRL in Online Learning Settings? Design through Learning Analytics and Personalized Learning Design in Moodle. *Journal of New Approaches in Educational Research*, 12(1), 120. <https://doi.org/10.7821/naer.2023.1.1127>
- Menggo, S., Darong, H. C., & Semana, I. L. (2022). Self-Regulated Learning Method Through Smartphone Assistance in Promoting Speaking Ability. *Journal of Language Teaching and Research*, 13(4), 772–780. <https://doi.org/10.17507/jltr.1304.10>
- Mishra, P., & Warr, M. (2021). Contextualizing TPACK within systems and cultures of practice. *Computers in Human Behavior*, 117, 106673. <https://doi.org/10.1016/j.chb.2020.106673>
- Miyoshi, M., Ueki, M., Ohno, K., & Ohmori, M. (2021). Creating an LMS ePortfolio Building System That Enhances the Quality of College Life from One That Supports Self-Regulated Learning. *Yonago Acta Medica*, 64(4), 324–329. <https://doi.org/10.33160/yam.2021.11.001>
- Mohammadzadeh, A., Sarkhosh, M., & Asst. Prof., Urmia University, Iran, faizalr@usm.my. (2018). The Effects of Self-Regulatory Learning through Computer-Assisted Intelligent Tutoring System on the Improvement of EFL Learner' Speaking Ability.

- International Journal of Instruction*, 11(2), 167–184.
<https://doi.org/10.12973/iji.2018.11212a>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2010). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *International Journal of Surgery*, 8(5), 336–341. <https://doi.org/10.1016/j.ijsu.2010.02.007>
- Nasrullah, A. N., Mahuda, I., Putri Mubarika, M., Meilisa, R., & Fajari, L. E. W. (2022). Android-Based Mathematics Learning Media Assisted by Smart Apps Creator on Self-Regulated Learning Title. *International Journal of Asian Education*, 3(3), 160–165. <https://doi.org/10.46966/ijae.v3i3.292>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 71. <https://doi.org/10.1136/bmj.n71>
- Pérez-Álvarez, R., Maldonado-Mahauad, J., & Pérez-Sanagustín, M. (2018). Design of a tool to support self-regulated learning strategies in MOOCs. *Journal of Universal Computer Science*, 24(8), 1090-110.
- Pinilla, S., Cantisani, A., Klöppel, S., Strik, W., Nissen, C., & Huwendiek, S. (2021). Curriculum Development with the Implementation of an Open-Source Learning Management System for Training Early Clinical Students: An Educational Design Research Study. *Advances in Medical Education and Practice*, 12, 53–61. <https://doi.org/10.2147/AMEP.S284974>
- Saadati, Z., Zeki, C. P., & Vatankhah Barenji, R. (2021). On the development of blockchain-based learning management system as a metacognitive tool to support self-regulation learning in online higher education. *Interactive Learning Environments*, 31(5), 3148–3171. <https://doi.org/10.1080/10494820.2021.1920429>
- Salehian Kia, F., Hatala, M., Baker, R. S., & Teasley, S. D. (2021). Measuring Students' Self-Regulatory Phases in LMS with Behavior and Real-Time Self Report. In *Proceedings of LAK21: 11th International Learning Analytics and Knowledge Conference* (pp. 259–268). Association of Computing Machinery. <https://doi.org/10.1145/3448139.3448164>

- Susantini, E., Puspitawati, R. P., Raharjo, & Suaidah, H. L. (2021). E-book of metacognitive learning strategies: Design and implementation to activate student's self-regulation. *Research and Practice in Technology Enhanced Learning*, 16(1), Article 13. <https://doi.org/10.1186/s41039-021-00161-z>
- Theobald, M. (2021). Self-regulated learning training programs enhance university students' academic performance, self-regulated learning strategies, and motivation: A meta-analysis. *Contemporary Educational Psychology*, 66, 101976. <https://doi.org/10.1016/j.cedpsych.2021.101976>
- Viberg, O., Kukulska-Hulme, A., & Peeters, W. (2023). Affective Support for Self-Regulation in Mobile-Assisted Language Learning. *International Journal of Mobile and Blended Learning*, 15(2), 1–15. <https://doi.org/10.4018/IJMBL.318226>
- Wang, C.-Y., & Lin, J. J. H. (2023). Utilizing artificial intelligence to support analyzing self-regulated learning: A preliminary mixed-methods evaluation from a human-centered perspective. *Computers in Human Behavior*, 144, 107721. <https://doi.org/10.1016/j.chb.2023.107721>
- Wang, X., Chen, J., & Zhang, T. (2021). Facilitating English Grammar Learning by a Personalized Mobile-Assisted System with a Self-Regulated Learning Mechanism. *Frontiers in Psychology*, 12, 624430. <https://doi.org/10.3389/fpsyg.2021.624430>
- Yang, G., & Bae, J. (2022). The Effect of Mobile Application Types on Learner's Vocabulary Ability and Affective Domain. *The Journal of Asia TEFL*, 19(4), 1219–1233. <https://doi.org/10.18823/asiatefl.2022.19.4.5.1219>
- Yulianeta, Yaacob, A., & Lubis, A. H. (2022). The Development of Web-Based Teaching Materials Integrated with Indonesian Folklore for Indonesian Language for Foreign Speakers Student. *International Journal of Language Education*, 6(1), 46-62.
- Zhang, W., & Wilson, A. (2023). From self-regulated learning to computer-delivered integrated speaking testing: Does monitoring always monitor? *Frontiers in Psychology*, 14, 1028754. <https://doi.org/10.3389/fpsyg.2023.1028754>
- Zimmerman, B. J., & Schunk, D. H. (1989). *Self-Regulated Learning and Academic Achievement Theory, Research, and Practice*. Springer Verlag.