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THE EFFECTIVENESS OF PROBLEM-BASED HYBRID LEARNING MODELS IN ACHIEVING STUDENT DIGITAL LITERACY

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Abstract: Digital literacy has become a very important issue in this era. This study aims to analyze the effectiveness of the Problem-Based Hybrid Learning (PBHL) Model on students' digital literacy. This research used a literature review following the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines. Article searches were conducted in research journal databases from Elsevier, PubMed, Science Direct, Web of Science, National Index, and Google Scholar. The results of this study, based on a review of 45 articles, found that the use of PBHL in the learning process in schools and universities has a positive effect such as improving performance, understanding, critical thinking skills, digital literacy skills, and cognitive abilities in learning by applying the PBHL learning method both in schools and universities.

Keywords: PBHL Model; Digital Literacy; Literature Review

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INTRODUCTION

In the 21st century, digitalization has been integrated into every aspect of life and has become a part of today's living's fast and convenient necessities. Technology is one of the prerequisites in the educational context of the 21st century. Through the meaningful and directed use of media and technology, as well as the crucial role of technology in education, meaning is provided for every individual. The development of technology has a very significant impact on the information exchange process, including digital literacy.

The development of the digital world can give rise to two opposing sides regarding the advancement of digital literacy. Literacy has become a part of human life and development. Digital literacy is an important aspect needed to participate in the modern world. Being digitally literate means processing information, understanding messages, and effectively communicating with others in various forms. Its forms in information are

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creating, collaborating, chatting, and working according to ethical rules, as well as understanding when and how technology should be used effectively to achieve desired goals. Moreover, awareness and critical thinking regarding the various positive and negative impacts that may arise from using technology in everyday life are crucial (Amsal, 2019). Eshet (2002) states that digital literacy is not only the ability to effectively use various digital sources but also a specific way of thinking. Digital literacy is also defined as the ability to read and understand information in hypertext or multimedia formats (Bawden, 2008). Digital literacy encompasses not only the ability to use digital sources but also the ability to effectively process information obtained from various multimedia sources.

In the context of learning, digital literacy enables anyone who masters it to acquire knowledge, attitudes, and skills through learning activities that are better, faster, easier, and more enjoyable. Various studies in the context of learning have shown that to effectively utilize information and communication technology (ICT), learners need more than just literacy skills; they also require other supporting competencies, namely digital literacy.

Gilster (1997), in his book titled "Digital Literacy," explains that digital literacy is the ability of an individual to comprehend information from a wide range of sources on computer devices both offline and online. Digital literacy involves an individual's conscious ability and attitude in using digital tools and facilities to identify, access, manage, integrate, evaluate, analyze, and synthesize digital sources, and to build new knowledge, express, and communicate with others in digital media (Martin, 2005).

Digital literacy encompasses several elements such as critical thinking skills, creativity, building and evaluating information, as well as using digital media effectively, and can be developed through students' digital writing (Al-Qallaf & Al-Mutairi, 2016). Digital literacy for learning is more than just knowing how to operate technology but also involves information management, appropriate critical thinking skills, and proper online behavior (Tang & Chaw, 2016).

Students need technology and information skills to help investigate and solve problems in learning. Proficiency in digital literacy is crucial for learners to effectively utilize information technology in their learning process. Digital literacy can provide the foundational management skills of the digital environment needed for students to succeed in information literacy and their fields of study (Cordell, 2013). However, the level of digital literacy among educated students in learning is still relatively low (Rahayu & Mayasari, 2018). In this context, the skills to understand and utilize various information from digital sources are also referred to as digital literacy (Bulger, Mayer, & Metzger, 2014), which is important for enhancing education. Digital literacy has a positive effect on students' skills for learning success.

In response to this, one alternative model that is considered capable of training students is the Problem-Based Hybrid Learning (PBHL) model. Based on hybrid learning, learning is essentially a social process that will be disrupted if all modules that take place online are far from human interaction (Donnelly, 2006). Driscoll (2002) shows that blended/hybrid learning can mean different things to different people. The PBHL model is a learning model that combines face-to-face Problem-Based Learning (PBL) and online learning. In the PBHL model, students are presented with a structured problem, and then they work in groups to formulate the problem. Teachers facilitate students in learning,

organize learning tasks, mediate in formulating problems, and formulate hypotheses. Students work in groups to solve previously formulated problems. Traditional teaching strategies emphasize the broad coverage of content areas through lectures, providing example problems, and practicing problems (Slavin, R.E., 2009). Students conduct research, collect data, analyze inductively and deductively, and draw conclusions, seeking information through printed books available on the internet, discussing, engaging in question-answer activities, and presenting their work results through a series of carefully planned activities in the PBHL model to train students' digital literacy.

According to Jaleniauskiene (2016), the PBHL approach requires that every student must actively participate in their own learning and be responsible for identifying their learning needs and achieving desired outcomes. This model represents a transition from traditional learning to PBL (Malik & Malik, 2018). Furthermore, the PBHL model can also enhance students' learning outcomes, such as long-term knowledge acquisition, problem-solving skills, and generic competencies (Carrió et al., 2016). PBHLlearning is a highly effective model used in the learning process at the middle school, high school, and university levels.

Research on the Problem-Based Hybrid Learning (P-BHL) Model has been conducted by Sujamen, R. (2018), demonstrating that in physics learning using the PBHLmodel effectively improves students' critical thinking skills at SMAN 1 Singaraja. Furthermore, based the research results by Montafej, J., et al. (2022), it is indicated that the PBHL model can increase Productive Skills and Critical Thinking in English subjects among undergraduate students in Iran. Amin, S., et al. (2020) researched P-BHL, indicating that the model used in geography subjects can enhance students' spatial thinking abilities. In other words, PBHL can also develop critical and analytical thinking skills about everyday life environments. Additionally, research conducted by Thamrin, et al. (2022), states that the implementation of teaching materials in PBHL learning provides many opportunities to learn concepts and case exercises related to learning outcomes evaluation. Furthermore, research conducted by Budiawanti, S., et al. (2021), states that the use of e-modules in the physics learning process can improve students' critical thinking abilities at SMA Negeri 2 Sragen.

Based on the above research results, it is supported that PBHL is very effective in the learning process to enhance students' learning activities in understanding facts, concepts, principles, and procedures. Based on the above description, this research aims to investigate how the PBHL approach can be used to create a learning environment that not only facilitates the improvement of students' digital literacy skills but also enhances their critical thinking and problem-solving skills. Related to this, the research questions can be formulated as follows: 1) How effective is Problem-Based Hybrid Learning in improving students' digital literacy in the learning process?; 2) What is the relationship between Problem-Based Hybrid Learning and digital literacy in the learning process?.

METHOD

The design of this study is qualitative research using the Systematic Literature Review technique to identify, evaluate, and interpret relevant research findings related to the research questions regarding Problem-Based Hybrid Learning. This study can be categorized as a literature review with comprehensive searching. The research was

conducted following Dyba and Dingsoyr's (2008) five stages: (1) Review protocol; (2) Identification of inclusion and exclusion criteria; (3) Searching for relevant studies; (4) Critical appraisal; (5) Data extraction; and (6) Synthesis. The assessment does not include a quality appraisal, the synthesis is narrative, and the analysis is thematic (Grant & Booth, 2009).

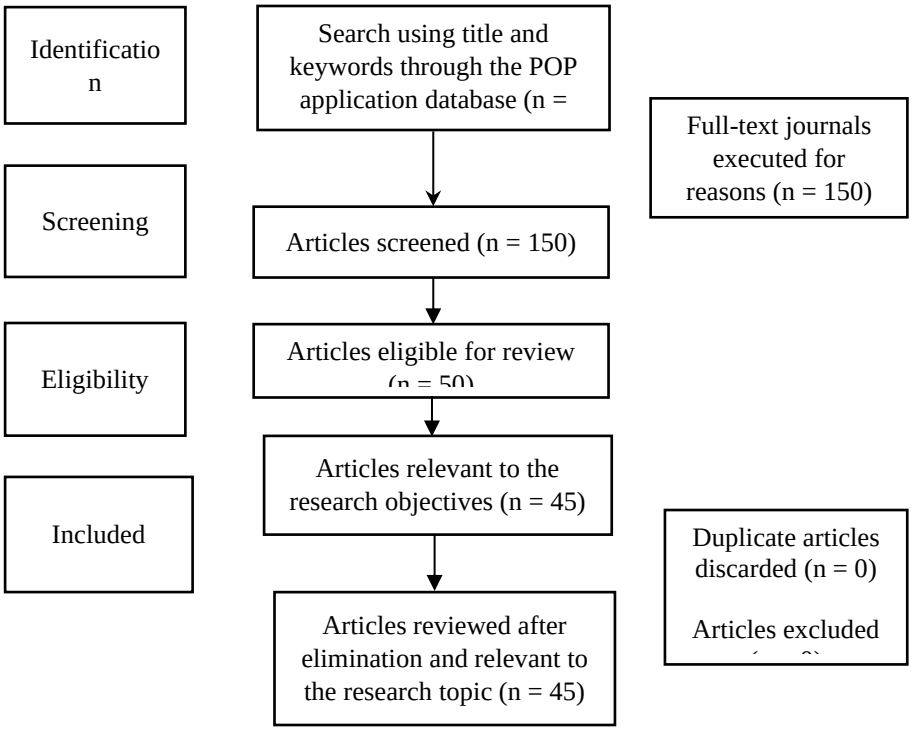

Figure 1. Research Design

This study followed the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) for literature review, which provided an overview of the process starting from the initial literature search (150 articles), screening, critical appraisal, and articles generated in qualitative and quantitative analysis. The total number of obtained articles was 50, published from 2018 to 2023. The article collection strategy in this study used POP, which was a form of research or literature data collection where the research objects were taken from various scientific journals. The population analyzed in the scientific paper was Problem-Based Hybrid Learning in enhancing digital literacy.

Protocol Review

The protocol review was conducted to achieve the following objectives: (1) to maximize the coverage of literature, (2) to identify and include related works that can be classified as studies (experimental, survey, case study, or similar), and (3) to collect and synthesize meaningful data from sources related to the specified research questions. This protocol establishes the research questions, search strategy, inclusion and exclusion criteria, quality criteria, data extraction, and synthesis methods.

Search Strategy and Study Selection

Electronic databases used to search for articles included POP applications such as Google Scholar, PubMed, Elsevier, National Index, Science Direct, and Web of Science. The analysis structure used in this research is consistent with studies conducted on other topics or titles. A total of 150 articles, published from 2018 to 2023, were obtained. Using reference management software (Mendeley), records, titles, and abstracts were screened, and each full-text article was reviewed based on inclusion criteria.

Identification of Inclusion and Exclusion Criteria

The identification of inclusion and exclusion criteria was optimized to identify as many relevant articles as possible. These criteria served as a template used by several researchers, with one criterion specifically referring to blended learning. More complex inclusion and exclusion processes were carried out at the critical appraisal stage. The inclusion criteria for searching relevant studies were articles and books, excluding reports, letters, or abstracts. Exclusion criteria included articles and books that were not accessible through university services or memberships. Specifically, to provide high-quality papers, this study was limited to articles published in journals and categorized based on inclusion and exclusion criteria. The inclusion criteria for this literature review were articles on Problem-Based Hybrid Learning models, hybrid learning in school and higher education, published between 2018 and 2023. The exclusion criteria were abstracts only and articles not published in scientific journals. Journals that had one or more items from each inclusion criterion were considered. After screening based on inclusion criteria, a total of 150 articles were identified. Following the title and abstract screening, 50 articles were excluded. The remaining 100 articles were considered and assessed in full text. Of these, 55 papers did not meet the inclusion criteria, resulting in a total of 45 eligible research articles included in the systematic review, published between 2018 and 2023. Using reference management software (Mendeley), records, titles, and abstracts were organized and screened, and each full-text article on Problem-Based Hybrid Learning in schools and higher education, published from 2018 to 2023, was reviewed.

Search for Relevant Studies

The search for relevant studies was conducted in two steps: (1) digital research databases were searched for relevant studies, and (2) references within the identified studies were examined for additional studies. The keywords used in this article search were “Hybrid Learning,” “Problem-Based Hybrid Learning,” and “Digital Literacy.” The following research databases were searched sequentially: Google Scholar and Scopus. The search was conducted for articles written in English and Indonesian (Bahasa Indonesia) and published in proceedings or journals. Scopus was chosen for its ranking as an academic research database, its extensive coverage of studies relevant to our review, and based on previous experience. Google Scholar was selected for its broad reach. At this stage, the titles and abstracts of articles were checked. If an article met the inclusion and exclusion criteria, the PDF and site data were downloaded, and citation and keyword data were added to a spreadsheet. A total of 45 high-quality articles were accepted at this stage. Most of the articles rejected at this stage were not accessible through university services or memberships and were project descriptions or abstracts.

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Critical Appraisal

The critical appraisal focused on relevance (only articles classified as experimental, case studies, surveys, or similar, with a focus on blended learning). The appropriate research approach was described, including the research context, number of subjects, scope, design, methods, implementation, and credibility (conclusions based on sound analysis and reasoning).

Data Extraction

At this stage, data were extracted from the 45 accepted articles by reading each article in detail. The data entered into the spreadsheet included: the type of article, number of research subjects (N), brief description of the study, description of the results, theme of the article, and research context.

Synthesis

For the synthesis stage, all articles and books in the review were classified according to the type of research and based on two variables, as presented in Table 1.

Table 1. Variables Used in Data Synthesis

Variable	Description
Problem-Based Hybrid Learning Model	A blended learning model combining online and offline (face-to-face) learning based on problems. The problems presented are real-world, complex, and ill-structured problems.
Digital Literacy	Digital literacy refers to an individual's ability to understand information from a wide range of sources on a computer device, both offline and online (Gilster, P. 1997).

The three variables represent the three research objectives. For each article, all variables relevant to the study were examined, and the related text was added to the results and research description in the spreadsheet. Then, all this information was collected and categorized. The results of all accepted studies were summarized according to the three research questions and reported

RESULT AND DISCUSSION

In this section, the general results of the literature review are organized based on three research questions. Based on 150 articles searched using Scopus and Google Scholar, 45 articles were comprehensively reviewed (Table 2). 100 articles could not be reviewed and analyzed because they were inaccessible through research websites.

Table 2. Summary of Synthesized Articles Accepted from 2018-2023

No.	Authors and Year	Title	Object	Country
1	Wawta Techataweewan and Ujsara Prasertsin. 2018	Development of digital literacy indicators for Thai undergraduate students using mixed-method research	Digital Literacy	Thailand

No.	Authors and Year	Title	Object	Country
2	Mohan Singh SAUD. 2021	Digital literacy competencies among English teachers of Nepal: are they Ready for online instruction?	Digital literacy	Nepal
3	Riki Perdana, Riwa Yani, Jumadi Jumadi, Dadan Rosana. 2019	Assessing Students' Digital Literacy Skill in Senior High School Yogyakarta	Digital Literacy	Indonesia
4	Dony Darma Sagita, Asnib, Fatma Nofriza, Fitniwilis, Feli Cianda Adrin burhendi, Rizki Dwi Siswanto. 2019	Students' Digital Literacy Skill to Solve Learning Problems	Digital Literacy	Indonesia
5	Langgeng Budianto, Alam Aji Putera, Siti Nurul Azkiyah. 2022	Digital Literacy of ESP Learners: Voices of Medical Teachers, Learners and Authorities	Digital Literacy	Indonesia
6	Ming Li and Zhonggen Yu. 2022	Teachers' Satisfaction, Role, and Digital Literacy during the COVID-19 Pandemic	Digital Literacy	China
7	Hussien Mohamad Alakrash and Norizan Abdul Razak. 2021	Technology-Based Language Learning: Investigation of Digital Technology and Digital Literacy	Digital Literacy	Malaysia
8	Yunisca Nurmalisa, Sunyono Sunyono, Dwi Yulianti, and Risma Margaretha Sinaga. 2023	An Integrative Review: Application of Digital Learning Media to Developing Learning Styles Preference	Digital Literacy	Indonesia
9	Lorenzo Cherubini. 2020	A Unique Hybrid Problem-Based Learning Model: Prospective Teacher Education and Development	PBHL	Canada
10	Yullys Helsa, Turmudi, and Dadang Juandi. 2023	Hybrid Learning for Conceptual Understanding Skills in Mathematics: A Meta-Analysis	HL	Indonesia
11	Eman Fathi Baresh, Suraini Mohd Ali, Ramiaida Darmi. 2021	Using Hybrid Problem-based Learning (HPBL) Approach to Enhance Libyan EFL Students Engagement with English Language	PBHL	Malaysia
12	Titie Panyajamorn, Suthathip Suanmali, YOUJI Kohda.2020	Using MOOC and gamification Hybrid learning models in rural Public schools in Thailand	HL	Thailand

No.	Authors and Year	Title	Object	Country
13	Benjamin Gleason, Christine Greenhow. 2018	Hybrid Learning in Higher Education: The Potential of Teaching and Learning with Robot-Mediated Communication	HL	Michigan
14	Yuliani and Sujinah. 2022	Efektivitas Model Problem Based Learning dengan Mode Hybrid pada Pembelajaran Menulis Teks Editorial Siswa Kelas XII	PBHL	Indonesia
15	Trisni Andayani, Harun Sitompul & Julaga Situmorang. 2020	Pengembangan Model Pembelajaran Hybrid Learning Dengan Pendekatan Problem Based Learning Pada Matakuliah Pengantar Sosiologi	PBHL	Indonesia
16	Singgih Prihadi, Sajidan, Siswandari, Sugiyanto. 2022	The challenges of application of the hybrid learning model In geography learning during the COVID-19 pandemic	HL	Indonesia
17	Munir Tubagus, Syarifuddin, Lukman Syafie, Koderi, Ramdan Satra, Huzain Azis. 2023	The Effectiveness Test of the Hybrid Learning Model Based on the Learning Management System Using Statistical Analysis	HL	Indonesia
18	Heny Hendrayati and Budhi Pamungkas. 2018	Implementasi Model Hybrid Learning pada Proses Pembelajaran Mata Kuliah Statistika II prodi Manajemen FPEB UPI	HL	Indonesia
19	Junias Robert Gultom, Dadan Sundara, Medy Desma Fatwara. 2022	Pembelajaran hybrid learning model sebagai strategi Optimalisasi sistem pembelajaran di era pandemi covid-19 Pada perguruan tinggi di jakarta	HL	Indonesia
20	Hernawan Sulistyanto, Harun Joko Prayitno, Sutama, Sabar Narimo, Anam Sutopo. 2023	The Effectiveness of Hybrid Learning-Based Adaptive Media to Empower Student's Critical Thinking Skills: Is It Really for VARK Learning Style?	HL	Indonesia
21	Verina Ainur Izzami Hariyanto, Yuri Lolita. 2023	The effect of using flipped learning strategy in Improving students' speaking skill in hybrid Learning	HL	Indonesia
22	Ensa Johnson Refilwe Morwane	Adult Learners' Perspectives on Their Engagement in a	HL	Pretoria

No.	Authors and Year	Title	Object	Country
	Shakila Dada Gaby Pretorius Marena Lotriet. 2018	Hybrid Learning Postgraduate Programme		
23	Sahira Aaraj, Fareeha Farooqi, Nadia Saeed, Sabeen Khan. 2022	Impact of COVID Pandemic and Hybrid teaching on Final year MBBS students' End of clerkship Exam performance	HL	Pakistan
24	Wasis Wuyung Wisnu Brata, Rahma Yanti Padang, Cicik Suriani, Eko Prasetya, Nanda Pratiwi. 2022	Student's Digital Literacy Based on Students' Interest in Digital Technology, Internet Costs, Gender, and Learning Outcomes	DL	Indonesia
25	Astutri Puji Rahayu, Dian Hidayati, Susilowati, Fillah Babul Fathatul Jannah. 2022	Pembelajaran interaktif melalui hybrid learning dengan metode demonstrasi	HL	Indonesia
26	Singgih Prihadi, Sajidan, Siswandari, and Sugiyanto. 2023	The Effectiveness of SIHyL (Spatial Inquiry Hybrid Learning) Model in Improving Students' Spatial Citizenship in Geographic Learning	HL	Indonesia
27	Maria Spante, Sylvana Sofkova Hashemi, Mona Lundin & Anne Algers. 2018	Digital competence and digital literacy in higher education research: Systematic review of concept Use.	DL	Sweden
28	Gaung Perwira Yustika, Sri Iswati. 2020	Digital Literacy in Formal Online Education: A Short Review	DL	Indonesia
29	Rila Setyaningsih, Abdullah,Edy Prihantoro, Hustinawaty. 2019	Model penguatan literasi digital Melalui pemanfaatan e-learning	DL	Indonesia
30	Didin Saripudin, Wildan Insan Fauzi, Eki Nugraha. 2021	The Development of Interactive E-Book of Local History for Senior High School in Improving Local Wisdom and Digital Literacy.	DL	Indonesia
31	Yunisca Nurmalisa, Sunyono Sunyono, Dwi Yulianti, and Risma Margaretha Sinaga. 2023	An Integrative Review: Application of Digital Learning Media to Developing Learning Styles Preference	DL	Indonesia

No.	Authors and Year	Title	Object	Country
32	Eman Fathi Baresh*, Suraini Mohd Ali, Ramiaida Darmi. 2020	Using Hybrid Problem-based Learning (HPBL) Approach to Enhance Libyan EFL Students' Engagement with English Language	HPBL	Malaysia
33	R Sujanem et al. 2018	The Effectiveness of problem-based hybrid learning model in physics teaching to enhance critical thinking of the students of SMAN	PBHL	Indonesia
34	K R S Sivapriya, Balaji Arumugam. 2021	Hybrid problem based learning: An innovative teaching learning method-Reflective experience	HL	India
35	Sonia S. Kharay, Anu Sharma, Priya Bansal. 2018	Evaluation of hybrid problem-based learning in large classrooms: a qualitative and quantitative analysis	PBHL	India
36	Sendy Mohamad Anugrah, Toho Cholik Mutohir, Suroto. 2022	Manfaat dan Tantangan Penggunaan Hybrid Learning Dalam Pendidikan Jasmani: Literature Review	HL	Indonesia
37	Chun-Xiao Liu et al., 2020	Comparing hybrid problem-based and lecture learning (PBL + LBL) with LBL pedagogy on clinical curriculum learning for medical students in China: a meta-analysis of randomized controlled trials	HPBL	China
38	Jamal Montafej et al., 2022	The Effectiveness of Hybrid and Pure Problem-Based Learning in the Productive Skills and Critical Thinking of Iranian Undergraduate Students through MALL Application.	HPBL	Iran
39	S. Amin et al., 2022	Improving environmental sensitivity through problem-based hybrid learning (PBHL): an experimental study	PBHL	Indonesia
40	Saiful Amin. 2020	The Effect of Problem-Based Hybrid Learning (PBHL) Models on Spatial Thinking Ability and Geography Learning Outcomes	PBHL	Indonesia
41	Fitri Rahmawati, Sarwanto Sarwanto, Sri Budiawanti. 2021	Needs analysis of physics e-module based on hybrid-PBL model on	PBHL	Indonesia

No.	Authors and Year	Title	Object	Country
		critical thinking skills improvement		
42	Rodrigo Jiménez-Saiz, and Domenico Rosace. 2019	Is hybrid-PBL advancing teaching in biomedicine? A systematic review	PBHL	Canada
43	Mohamed Ali Mohamed Kassem. 2018	Improving EFL Students' Speaking Proficiency and Motivation: A Hybrid Problem-based Learning Approach	PBHL	India
44	Thamrin1, Saidun Hutasuhut1, Reza Aditia1, Fauziyah Riyan Putri. 2022	The Effectiveness of the Hybrid Learning Materials with the Application of Problem-Based Learning Model (Hybryd-PBL) to Improve Learning Outcomes during the COVID-19 Pandemic.	PBHL	Indonesia
45	Amatulloh Mufida et al., 2022	Pengaruh Problem Based Learning dan Pendekatan CTL Berbasis ESD Terhadap Kemampuan Berpikir Kritis Dalam Pembelajaran Hybrid di Era New Normal.	PBHL	Indonesia

The article's presentation can be seen in Figure 2, which addresses two research questions. The percentage of hybrid learning is 33%, the percentage of Problem-Based Hybrid Learning is 36%, and digital literacy accounts for 36%. There is an increase in the percentage of hybrid learning, Problem-Based Hybrid Learning, and digital literacy for research published from 2018 to 2023, as shown in Figure 3. Literature review articles in 2020 reached a high percentage. Some articles published in 2020 are indicative of the impact of Covid-19. Thus, both literature reviews show an increasing implementation percentage.

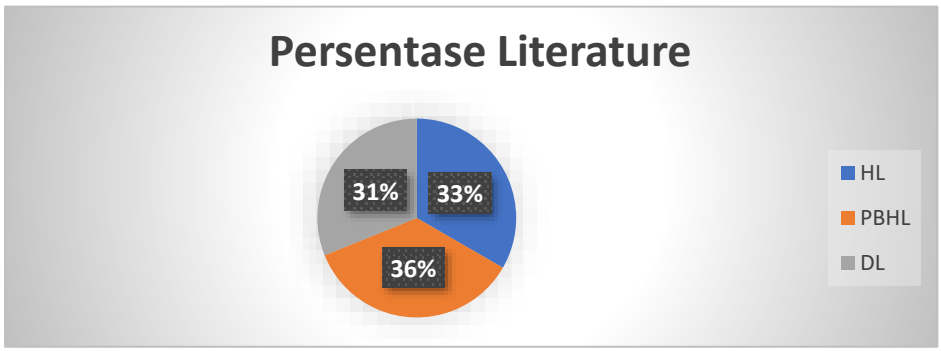

Figure 2: Percentage of Description Articles on Hybrid Learning, Problem-Based Hybrid Learning, and Digital Literacy

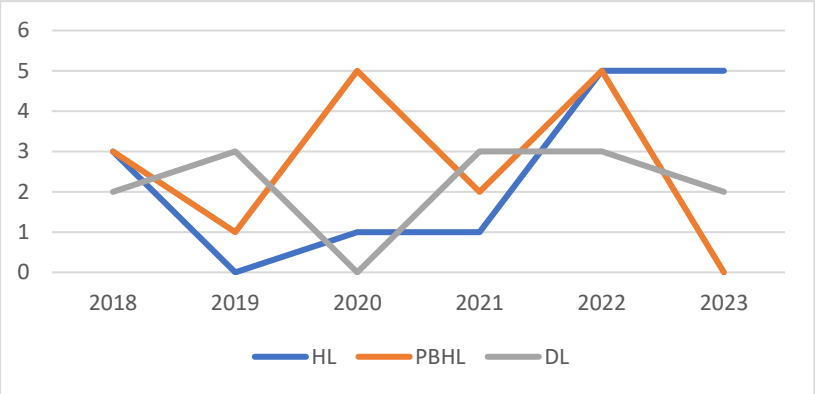

Figure 3: Number of Articles Using Hybrid Learning, Problem-Based Hybrid Learning, and Digital Literacy

The educational concept proposed by Ki Hadjar Dewantara bears similarities to the concept of constructivism in education. Both emphasize learning focusing on students' ability to construct their thinking. Educators merely act as facilitators who assist students in constructing concepts in constructivism. In other words, their learning approach is student-centered. There is no single theory, but most constructivisms share two main ideas: learners are active in constructing their knowledge, and social interaction is crucial for knowledge construction.

The Effectiveness of Problem-Based Hybrid Learning in Digital Literacy Learning Process

Problem Based Hybrid Learning is a term used to combine conventional face-to-face learning models with internet-based learning models commonly known as e-learning, which contain real-life complex and structured problems. Generally, there are three different definitions for Problem-Based Hybrid Learning: (1) the combination of media and tools used in e-learning environments; (2) the combination of several pedagogical approaches; and (3) the combination of traditional face-to-face learning with online problem-based approaches. Problem-Based Hybrid Learning is the process of integrating various learning methods that combine virtual and physical resources. The utilization of online learning resources, especially web/blog-based ones, without abandoning face-to-face activities (Graham, 2006). Driscoll and Carliner (2005) define Problem-Based Hybrid Learning as integrating or combining learning programs in different formats to achieve common goals. Problem-Based Hybrid Learning is a combination of various learning strategies. Thus, Problem-Based Hybrid Learning is a learning method that combines two or more methods and strategies to achieve learning goals. Before the emergence of Problem-Based Hybrid Learning, learning components were limited.

However, when Problem-Based Hybrid Learning is present, the learning components no longer have limitations, allowing learning goals to be achieved freely by the learning conditions (Graham, 2006; Hung & Chou, 2015; Thai et al., 2020; Youde, 2020). Online learning and problem-based face-to-face learning are components of

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Problem-Based Hybrid Learning. Thus, Problem-Based Hybrid Learning must utilize problem-based technology, intranets, and the web to access learning materials and facilitate learning interactions. The use of technology in teaching and learning activities can provide benefits to enhance student learning motivation, illustrate materials, and aid the investigation process. Integrating technology meaningfully into learning requires effort.

Boelens et al. (2017) stated that content is the most important part of developing the Problem-Based Hybrid Learning model as it serves as a reference and impacts the learning process. The content must be well-structured and engaging. Regarding the effectiveness of Problem-Based Hybrid Learning, Kudryashova et al. (2016) explained that the Problem-Based Hybrid Learning model applied in the learning process can help students acquire knowledge and skills effectively. The presentation of concepts in the Problem-Based Hybrid Learning model must be comprehensive and accompanied by relevant examples to be easily understood by students. The Problem-Based Hybrid Learning model effectively facilitates geography learning in the 21st century. Chalkiadaki (2018) stated that in the 21st century, dynamic individuals are needed to respond to all social changes.

The ongoing digital innovation ideally supports educational development, especially in the field of education, to provide educators with the means to package and present data or information to students (Dwiqi et al., 2020; Aisyah et al., 2021). The ongoing digital era, especially in the field of education, greatly affects human life, and many young people have already been affected by advancements like today, both in the general environment and in the virtual world, so it should not be visible to the naked eye (Widiara, 2018; Nugraha, 2020). Digital techniques emphasize the need to instill advanced innovations in data acquisition, education, and evaluation. Problem-Based Hybrid Learning will succeed if students participate in face-to-face and online learning. The combination of offline and online learning enables students to easily achieve maximum performance results. Problem-Based Hybrid Learning will fail under certain circumstances, namely 1) when students do not respect the technical learning rules that have been designed; 2) in cases of internet network constraints that hinder the Problem-Based Hybrid Learning technique from being executed properly; and 3) unclear learning instructions that make it difficult for students to understand.

The application of Problem-Based Hybrid Learning poses challenges for instructors in designing and managing synchronous and asynchronous online classes. Users of the Problem-Based Hybrid Learning model must have computer or notebook skills connected to the internet. Problem-Based Hybrid Learning facilitates both synchronous and asynchronous learning for students. Regarding the use of the Problem-Based Hybrid Learning model, technological advancements greatly affect the way of learning and teaching. Instructors' ability to maximize new technology by combining appropriate pedagogical approaches will significantly affect the effectiveness of the learning process. The implementation of the Problem-Based Hybrid Learning model is a compensation for the lack of traditional face-to-face learning, thus combining distance learning and face-to-face instruction directly through technology media. Problem-Based Hybrid Learning has several dimensions, including 1) delivering learning messages in different modes, face-to-face, and distance learning; 2) using mixed web-based technology; 3) the ability to be conducted synchronously and asynchronously; 4) practical

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and classroom-based learning; 5) multidisciplinary inclusion in learning materials; 6) using different pedagogical approaches; 7) facilitating different goals, and 8) instructor-directed or student-autonomous learning. In the implementation of the Problem-Based Hybrid Learning model, four challenges must be understood by all students, namely combining flexibility, fostering interaction, facilitating the learning process, and cultivating an effective learning climate.

Problem-based hybrid Learning also presents challenges for learners regarding online learning components that depend on institutional perspectives, posing regulatory challenges in learning technology. In terms of regulatory challenges regarding learning technology, Problem-Based Hybrid Learning has five models for its implementation: 1) full implementation of hybrid learning using the internet; 2) alternating face-to-face and online Problem-Based Hybrid Learning; 3) implementation involving more online learning, with face-to-face learning done directly during presentations, discussions, or practicums; 4) implementation where face-to-face learning is more frequent than online learning; and 5) simple implementation where learners only need to access online learning materials outside of school hours, while most learning is done face-to-face in class. In the involvement of the main learning structures and concepts, the Problem-Based Hybrid Learning model plays an important role for students to develop ideas through face-to-face interaction and small group discussions online, which are then presented. The applied Problem-Based Hybrid Learning model is capable of building digital literacy, confidence, and student abilities while strengthening relationships between learning themes or topics. From the above quotation, it can be concluded that Problem-Based Hybrid Learning is a learning model that uses two methods, offline and online, with the percentage of online and face-to-face attendance adjusted to the conditions and needs, with both assessments accumulated.

The Relationship between Problem-Based Hybrid Learning and Digital Literacy

The achievement of digital literacy competencies in hybrid classes can be accomplished by collaborating affective attitudes of cooperation, responsibility, and independence. Collaboration is a 21st-century learning trend that shifts from teacher-centered to collaborative learning (Ciampa & Gallagher, 2021). A collaborative learning environment challenges students to express themselves more and defend their positions, enabling them to generate their ideas based on reflection (Zubaidah, 2017). Digital literacy competencies in Problem-Based Hybrid Learning will then be seen in the cognitive domain. The cognitive domain emphasizes intellectual aspects, such as knowledge, understanding, and critical thinking skills (solving complex problems). In measuring digital literacy competencies in the cognitive domain in Problem-Based Hybrid Learning classes, the theme of advancing society's well-being is chosen because it aligns with 21st-century learning, which should emphasize interdisciplinary learning themes.

Problem-Based Hybrid Learning in the cognitive domain through digital literacy. Students' cognitive understanding is reflected in three phases that hone students' critical thinking skills, namely through information searching, information acquisition, and knowledge synthesis. The Problem-Based Hybrid Learning model is one of the innovative learning methods because it can construct and develop advanced thinking and provide opportunities for students to represent and abstract concepts they understand in learning

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and provide opportunities to prove concepts they have understood and help them to add and improve if there are errors during the learning process (Aristika et al., 2021). The quality of Problem-Based Hybrid learning is achieved through interaction among students, discussions, and exchanging opinions or ideas about certain problems, thus training communication skills that include oral and written communication. Oral communication, for example, includes discussion and explanation. Whereas written communication, for example, expressing ideas through drawings, graphs, tables, diagrams, or in the students' language (Sanchez-Muñoz et al., 2020).

Digital literacy skills in this domain are related to skills or abilities to act after someone gains certain learning experiences. Dakhi et al., (2020) state that the results of psychomotor learning are a continuation of the achievement of cognitive learning outcomes (understanding something) and affective learning outcomes (tendency to behave/act). The implementation of digital literacy skills assessment in the psychomotor domain in learning activities in Problem-Based Hybrid Learning classes is by observing students' skills in using learning-support applications. The application of digital literacy in learning makes students very active; active learning is very suitable for implementation in the education world that can help students gain new experiences and understanding that impact students' cognitive abilities.

The Problem-Based Hybrid Learning model serves as an alternative learning approach that can enhance students' digital literacy skills and cognitive abilities. With this model, students become accustomed to using ICT-based learning, thereby becoming digitally literate. In the learning process, students are provided with teaching materials such as video materials, modules, and PowerPoint presentations. Engaging teaching materials prevents students from feeling bored during the learning process. This aligns with Setiono's (2021) research, which found that students mostly prefer teaching materials in the form of videos; video presentations become a challenging and captivating learning method.

CONCLUSION

The concept of problem-based hybrid learning represents a form of technology application that leads to the development and advancement of problem-based education. Digital literacy is the ability of an individual to comprehend information from various extensive sources on computer devices both offline and online. Digital literacy entails an individual's conscious ability and attitude in utilizing digital tools and facilities that can be employed in identifying, accessing, managing, integrating, evaluating, analyzing, and synthesizing digital sources, thereby enabling the construction of new knowledge, expression, and communication with others in digital media. Education progresses with the development and changes of time, and problem-based hybrid learning serves as the educational world's response to the changing times.

Problem-based hybrid learning is more about developing learning methods to keep up with technological and environmental advancements. The research in this article still needs to review the literature on the extent to which the success of problem-based hybrid learning serves as the basis for students' digital literacy achievements. The research in this article is expected to broaden the insights of other researchers to explore various

concepts grounded in constructivism as the fundamental concept to understand new concepts that follow the development of time.

REFERENCES

Aristika, A., Darhim, Juandi, D., & Kusnandi. (2021). The effectiveness of hybrid learning in improving of teacher-student relationship in terms of learning motivation. Emerging Science Journal, 5(4), 443–456.

Ciampa, K., & Gallagher, T. (2021). The development and validation of the Teachers' SelfEfficacy Beliefs for Literacy Instruction in the 21st Century (TBLI21c) scale: a pilot study. Journal of Research in Reading, 44(3), 654–674.

Dakhi, O., Jama, J., Irfan, D., Padang, U. N., & Barat, S. (2020). Blended Learning: A 21st Century Learning Model At College. International Journal Of Multi Science, 1(7), 50–65.

Hubbard, R. (2013). The Really Useful eLearning Instruction Manual: Your toolkit for putting elearning into practice. John Wiley & Sons Ltd.

Hidayatullah, F., & Anwar, K. (2020). Hybrid Learning dalam Pembelajaran Pendidikan Jasmani Sekolah Dasar dan Menengah maupun Pendidikan Olahraga Perguruan Tinggi. Prosiding SENOPATI (Seminar Olahraga Pendidikan Dalam Teknologi Dan Inovasi), Seri Webinar Olahraga (Training From Home), Imunitas Tubuh, Dan Pandemik Covid-19, 1(1), 1–7.

Hediansah, D., & Surjono, H. D. (2020). Hybrid Learning Development to Improve Teacher Learning Management. JKTP: Jurnal Kajian Teknologi Pendidikan, 3(1), 1–9.

Meydanlioglu, A., & Arikan, F. (2014). Effect of Hybrid Learning in Higher Education. International Journal of Information and Communication Engineering, 8(5), 1292–1295.

Setiono. (2021). Analisis Respon Mahasiswa dalam Pembelajaran Online Berbasis Aktifitas di Perguruan Tinggi. Jurnal Pendidikan, 9(2), 15–23.

Sutisna, E., & Vonti, L. H. (2020). Innovation Development Strategy for Hybrid Learning based English Teaching and Learning. English Review: Journal of English Education, 9(1), 103–114.

Sanchez-Muñoz, R., Carrió, M., Rodríguez, G., Pérez, N., & Moyano, E. (2020). A hybrid strategy to develop real-life competences combining flipped classroom, jigsaw method and project-based learning. Journal of Biological Education, 00(00), 1–12.

Zubaidah, S. (2017). Keterampilan abad ke-21: keterampilan yang diajarkan melalui pembelajaran. ResearchGate