GPT Chat Integration in Project Based Learning in Learning: A Systematic Literature Review

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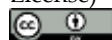
Abstract: The evolution of technology in education has opened new doors for innovative teaching methods. One such breakthrough tool is ChatGPT, a learning model developed by Open AI. Open AI has huge potential, not only to increase efficiency but also to improve pedagogy for more engaging learning experiences. The purpose of this research is to test the integration of GPT Chat in Project Based-Learning in Learning. This research uses a systematic literature review method using Preferred Reporting Items for Systematic Reviews (PRISMA). The results of this research explain that in the Industrial Revolution Era 4.0, educational institutions must prepare new literacy and orientation in the field of education, the new literacy itself is in the form of data, technology, and human resource literacy. Project-based learning is a learning model that emphasizes student activity in solving various problems through a series of activities starting with gathering information, planning a project, and producing a particular product packaged in the form of project work. The stages of project-based learning are Determining basic questions, developing a project plan, Developing a schedule, Monitoring, Test results, and Evaluation of experience. ChatGPT is a research tool or "thought partner", and is said to be useful for a variety of teaching purposes. The application of the PjBL model has the potential to improve student learning outcomes and motivation in Indonesia. Therefore, the integration of GPT chat with Project Based-learning in learning needs to receive further attention so that it can make a more significant contribution to improving the quality of learning and student motivation in Indonesia.

Keywords: Education 4; GPT Chat; PjBL

Introduction

New opportunities for the collection, dissemination, and use of information may emerge as a result of the Industrial Revolution 4.0. The term "Industry 4.0" has become increasingly widespread and increasingly well known recently. The first mention of this concept was made in a German government report included in the high-tech 2020 strategic plan and published in November 2011. Recent years have seen an increase in the importance of the phrase "Industry 4.0".

Recent technical advances and discoveries have had a significant impact on the global industrial environment (Niresh et al., 2021; Harahap & Rafika, 2020; Tatipala et al., 2021; Laskurain-Iturbe et al., 2021). This is related to globalization and advances in information technology, which have substantially increased the capacity of knowledge to move faster and further, creating more opportunities for its emergence (Rodriguez, 2020). The function of highly qualified and competent teachers is the key to the higher education system. Apart from the influence of globalization and technological advances on

learning. Therefore, in this industry 4.0 era of the 21st century, an education department that trains its students to be able to teach effectively and educate future generations in borderless information technology not only meets the needs of the industry but also ensures the best possible student experience (Lestariningsih, 2020; Nababan et al., 2020).

Learning is the process of student interaction with educators and learning resources in a learning environment. Learning is assistance provided by educators so that the process of acquiring knowledge and knowledge, mastering skills and habits, as well as forming attitudes and beliefs in students can occur (Chan et al., 2019). In other words, learning is a process to help students learn well. Learning is a core activity in the educational process because, through this learning activity, it is hoped that educational goals can be achieved in the form of changes in behavior in students, and it is also the hope of all parties that each student achieves learning outcomes that are as good as possible by the learning objectives.

The learning process is a manifestation of the interaction of subjects (students) with objects consisting of objects and events, processes, and products (Code, 2020). Students learning difficulties with the material, lack of focus and concentration of students, and several disorders can cause students not to concentrate on learning, including students not having self-motivation, a learning environment that is not conducive, students' health conditions that are not supportive, and students feeling bored, mismatch in students' understanding of concepts. Comprehension is a person's ability to understand and be able to explain an object that is understood. Each student's conceptual understanding of the material is not always the same, this is influenced by habits and experiences that develop before and while students study at school. As an educator, this is a challenge that must be answered. Teachers must be able to attract interest, arouse curiosity, and enable students to receive knowledge.

Teachers must be able to understand participants. Of course, this can be done by presenting interesting, fun, and challenging learning. What is meant here is challenging students to solve problems. In this digital era, technology plays an increasingly important role in the world of education. One promising innovation is the use of Chat GPT (Generative Pre-trained Transformer) as a learning assistant in the classroom and using the problem-based learning model, the problem-based learning (PjBL) model is suitable for application in learning.

PjBL is a problem-solving learning model where students are required to be able to solve problems cooperatively (Syahlan et al., 2023). Of course, problems must be presented as problems in everyday life, so that students are interested in knowing the solutions. Integrating GPT Chat as a learning assistant in the classroom carries significant transformational potential. From providing personal assistance to students to increasing engagement and interaction between students and teachers, utilizing. GPT Chat can enrich the learning experience. However, it is important to remember that the teacher's role remains important in the learning process. GPT Chat is just a tool that can help improve the efficiency and quality of learning. Thus, classroom transformation through the integration of Chat GPT as a learning assistant can be a step towards more adaptive and innovative learning.

Previous research by Syahlan et al. (2023), explained that project-based learning (PjBL) is a learning strategy that can develop students' scientific skills in 21st century-based learning, a learning method that can be applied at all levels of education, in this learning method the educator acts as a facilitator. Project-based learning aims to find solutions to problems, apart from that, students also learn the concept of how to solve problems and develop critical thinking skills. Based on previous research by (Susanti et al., 2022) Increasing Student Learning Motivation through the Use of Interactive Digital Books Based on Project Based Learning (PjBL), and Research (Barlian et al., 2022), Boosting Student Learning Motivation Through Project-Based Learning with Attention, Relevance, Confidence, and Satisfaction Motivational Design Process. There appears to be no research on GPT Chat Integration in Project-Based Learning in Learning: A Systematic Literature Review. The purpose of this research is to review several published studies that examine the Integration of GPT Chat in Project-Based Learning in Learning: A Systematic Literature Review.

Method

We conducted this study as a systematic review following PRISMA guidelines (Page et al., 2021). The PRISMA guidelines provide several things to consider in preparing a systematic review. In this study, we will mainly focus on several main items: Learning in the era of education 4.0, project-based learning in the 21st century, ChatGPT in Learning, and Integration of Chat GPT with project-based learning in learning. This helps form the basis of our assessment. Initially, we collected the latest studies on the role of GPT Chat in writing scientific articles, based on some selected keywords. Then, we apply eligibility criteria to the collection. We selected only literature published in 2017 or later to provide an overview of current trends. Apart from that,

we limited the type of literature to only literature in the form of journals and proceedings.

Result and Discussion

Preferred Reporting Items for Systematic Reviews (PRISMA) was the reporting technique used in this study. The research was conducted methodically during the required research phases. The information provided is comprehensive and unbiased and aims to combine relevant research results. The steps of a systematic literature review include developing research questions, literature searches, screening and selecting relevant articles, screening and selecting the best research results, analysis, synthesis of qualitative results, and preparation of research reports. Writing the background and objectives of the research, collecting research questions, searching the literature, selecting articles, extracting articles, assessing the quality of basic studies, and summarizing the material are steps in the systematic literature review research process.

The complete article was published in an international journal in 2017-2023, indexed in a database, and has the theme GPT Chat Integration in Project-Based Learning in Learning: A Systematic Literature Review.

In this era of education 4.0, all campuses and high schools in Indonesia must be able to support and prepare students who are ready to work. The following are several trends in education 4.0 that you need to know and follow to encourage students' readiness to face the Industry 4.0 era.
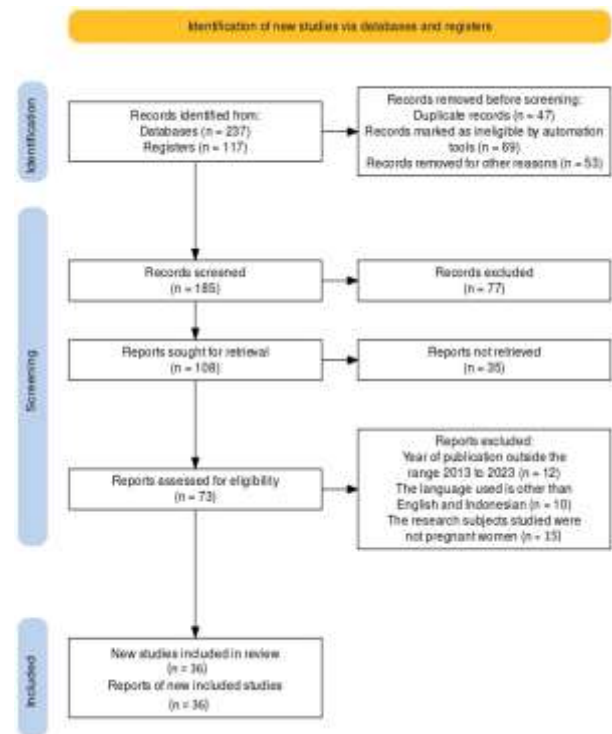

Figure 1. Flow of the literature search process based on PRISMA guidelines

Table 1. Learning in the education 4.0 ora

Source	Learning in the education 4.0 era
(Coman et al., 2020); (Muktiarni et al., 2019); (Narh-Kert et al., 2022)	Various times and places
(Walkington & Bernacki, 2020); (Çetin & Karsantık, 2022); (Radjuni, 2022)	Personalized learning
(Singh et al., 2021); (Gudyanga, 2023); (Bonfield et al., 2020); (Vilalta-Perdomo et al., 2022); (Goh & Abdul-Wahab, 2020); (Ngereja et al., 2020)	Freedom of choice

There are several trends in education 4.0 that you need to know about and follow developments to encourage students' readiness to face learning with trends in the Industry 4.0 era. namely: Various times and places, namely students do not always have to study in class and sit for lessons from morning to evening. They can study in different places by utilizing e-Learning. Learning systems such as the Learning Management System (LMS) will encourage all students to take lessons more easily from anywhere armed with gadgets and laptops; Personalized learning means students can adapt and learn using an LMS which also needs to be personalized based on student abilities. This indicates that all students have the same opportunity to work on tasks that are considered difficult independently to achieve more equitable learning outcomes. Students who experience these difficulties will get additional study time by maximizing LMS and e-learning.

This is to strengthen and increase opportunities for students to have the same learning abilities; Freedom of choice is carried out in each subject taught to all subjects with the same goal, and the path taken by each student will be different. This is why personalization of learning needs to be done to ensure that all students are free to choose their way of learning. For example, students can choose device A for studying outside the home and device B when at home. All of this is the freedom to choose learning methods that can be adjusted to your wishes; Project-based learning This is very important for

educational institutions to encourage students' readiness to follow industry 4.0 trends.

Institutions need to have more contacts to deploy students to projects that students can participate in directly. Different from internships, this educational method focuses more on direct practice in the field with partners so that every material provided on campus is put into practice on the project and the student's level of success in receiving each material is assessed. Education 4.0 or Education 4.0 is a general term for educational theorists to describe various ways to integrate cyber technology into learning. These social changes in the education sector follow the direction of increasingly

rapid technological developments to keep pace with the Industrial Revolution 4.0 that the world has undertaken.

While the education system in Indonesia must be ready for children to master technology, it is not yet evenly prepared. Teachers and students have to adapt to learning methods that are carried out remotely and online in almost all schools and universities. Teachers are encouraged to be more creative and innovative in developing learning methods. The problem is, that this freedom is sometimes a burden for those who are not familiar with high technology. Therefore, all parties must embrace the era of Education 4.0.

Table 2. Project Based-learning di abad 21

Source	Project Based-learning in the 21st Century (Stages in project-based learning in the 21st Century)
(Dwivedi et al., 2023)	Determination of fundamental questions
(Aldridge & Bianchet, 2022); (Göloğlu Demir, 2020); (Almazroui, 2023)	Develop project planning
(Yuliansyah & Ayu, 2021)	Arrange a schedule
(Fajarika Nuninsari et al., 2020); (Markula & Aksela, 2022)	Monitoring
(Hopster-den Otter et al., 2017); (Waluyo & Nuraini, 2021); (Yulkifli et al., 2022)	Test result
(Novitasari & Mediatati, 2021); (Karyawati & Ashadi, 2018); (Safaruddin et al., 2020); (Kusumawati, 2021)	Experience Evaluation

Project-based learning is a strategy to change traditional classes that focus on contextual learning through complex activities. The Buck Institute for Education states that project-based learning is a systematic teaching method that involves students in learning knowledge and skills through a structured process, and real and thorough experiences designed to produce products. Project-based learning is a learning model that actively involves students in designing learning objectives to produce real products or projects. Student-created projects encourage a variety of abilities, not only technical knowledge and problems, but also practical skills such as dealing with incomplete or inaccurate information, setting one's own goals, and group collaboration.

Project-based learning also emphasizes complex tasks based on challenging questions or problems, involves students in design activities, solving problems, making decisions, or carrying out investigations provides opportunities for students to work independently for long periods, and culminates in in producing a product. Project learning is also authentic learning because it involves real projects and provides a productive learning experience. There are several stages in project-based learning which will be explained through the mapping figure 2. The explanation of the steps is as follows:
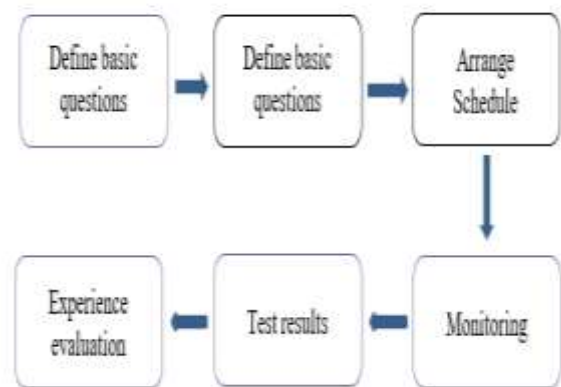
Figure 2. Stages in project-based learning

Determination of fundamental questions

The first stage begins with essential questions, namely questions that can arouse students' interest in the topic being studied and in turn influence the project assignments that must be completed. To help students think critically, this question will approach real-world problems with existing realities. Teachers try to make the subjects discussed relevant to students.

Develop project planning

The second step involves planning, which is done jointly by the teacher and students. As a result, students will feel proud of the assignments they will complete.

Plan components include selecting activities, game rules, and items that can help answer important problems by combining various topics that have been discussed, as well as selecting tools and resources that can be used in the process of completing the project.

Arrange a schedule

Making a schedule carried out jointly by teachers and students is the third stage. The teacher and students create a timeline for completing the project as one of the activities in this step: The project completion date is set by the teacher and students; The teacher instructs the class to develop a new strategy; Instructors often lead classes; The teacher asks that students justify their decisions.

Monitoring

Teachers should monitor the progress of students' project work. The teacher carries out this monitoring by helping and directing students through each step of doing the assignment. To simplify the monitoring process, a Rubik was developed which can record all

important activities. In other words, the teacher functions as a monitor of student activities.

Test result

Teachers complete an evaluation process to determine how much learning has been achieved, whether learning activities were successful or not, and provide feedback on the level of understanding to develop future learning strategies.

Experience Evaluation

Event assessment is the final step of the activity. Reflecting on the ultimate learning process are teachers and students. Project activities and outcomes are the subject of this reflection. Students will be invited to discuss and share their feelings and experiences during this reflection process, which can be done individually or in groups. The instructor and students will discuss ways to improve performance so that the project-based learning process ends with fresh information that resolves the issues raised in the first stage.

Table 3. ChatGPT in Learning

Source	ChatGPT in Learning (ChatGPT Strategy in Learning)
(Meron & Tekmen Araci, 2023)	Treat ChatGPT as a learning partner
(Van Wyk et al., 2023)	Use ChatGPT to increase confidence
(Oktaria et al., 2023); (Iswahyudi et al., 2023); (Halaweh, 2023)	Request ChatGPT to provide supportive feedback

We believe that teachers can use ChatGPT to increase their students' learning motivation and truly prevent cheating. Here are three strategies for doing so:

Treat ChatGPT as a learning partner

Treating ChatGPT as a learning partner can help teachers shift the focus among their students from competition and assessment to collaboration and mastery. For example, a science teacher might assign students to work with ChatGPT to design a hydroponic vegetable garden. In this scenario, students can engage with ChatGPT to discuss vegetable growing requirements, brainstorm design ideas for a hydroponic system, and analyze the pros and cons of the design. These activities are designed to encourage content mastery because they focus on the learning process, not just the final grade.

Use ChatGPT to increase confidence

When students feel confident that they can successfully do the assignments given to them, they are less likely to cheat. An important way to increase students' self-confidence is to give them opportunities to experience success. ChatGPT can facilitate that experience by offering individualized support to

students and breaking down complex problems into smaller challenges or tasks. For example, suppose students are asked to try to design a hypothetical vehicle that can use gasoline more efficiently than traditional cars.

Students who are struggling with the project - and may be prone to cheating - can use ChatGPT to break down larger problems into smaller tasks. ChatGPT can advise them to first develop an overall concept for the vehicle before determining the size and weight of the vehicle and deciding what type of fuel to use. Teachers can also ask students to compare the steps suggested by ChatGPT with the steps recommended by other sources.

Request ChatGPT to provide supportive feedback

ChatGPT can be directed to provide feedback using positive, empathetic, and encouraging language. For example, if a student solves a math problem incorrectly, instead of simply telling the student "You are wrong and the correct answer is…", ChatGPT can start a conversation with the student. Here is a real response generated by ChatGPT: "Your answer is not correct, but it is very normal to encounter the occasional error or misconception along the way. Don't be discouraged by

these minor setbacks; you are on the right track! I'm here to support you and answer any questions you may have. This will help students feel supported and understood, as well as receive feedback for improvement. Teachers can easily show students how to direct ChatGPT to provide that feedback. We believe that when teachers use ChatGPT and other AI chatbots wisely - and also encourage students to use these tools responsibly in their schoolwork - students have an incentive to learn more and cheat less. Apart from that, apart from the problem of plagiarism which is the biggest issue in using ChatGPT currently, ChatGPT can help a lot with research activities in the future.

ChatGPT will continue to develop and its weaknesses will continue to be refined. For example, currently, ChatGPT is not yet capable of in-text referencing, however, OpenAI has designed a WebGPT prototype, and other experiments have also been carried out to link chatbots to reference citation tools. Tools like ChatGPT will soon become a natural part of the writing process, just as calculators and computers have become part of mathematics and science, statistical and econometric software in data processing and testing, or AI like Grammarly in improving writing spelling and grammar.

Table 4. Integration of GPT Chat with Project Based-learning in learning

Source	Integration of GPT Chat with Project Based-learning in learning (GPT Chat with Project Based-learning in learning)
(Widarbowo et al., 2023)	Helping Students with Personalized Learning
(Cotton et al., 2023)	Answering Student Questions Instantly
(Abbas et al., 2022)	Increasing Student Engagement
(Baskara, 2023)	Supporting Teachers in Managing Classes
(Tlili et al., 2023)	More Interactive Learning

The evolution of technology in education has opened new doors for innovative teaching methods. One such breakthrough tool is ChatGPT, a large language model developed by OpenAI. This has great potential not only to improve efficiency but also to improve pedagogy for a more engaging learning experience. Explore how ChatGPT can empower teachers to foster creativity, critical thinking, student-centered learning, and project-based learning (PBL) activities. Also consider the ethical use of ChatGPT, emphasizing its role in facilitating deeper learning rather than replacing critical thinking or simply increasing efficiency. By integrating Chat GPT with Project Learning in Biology learning, you can:

Helping Students with Personalized Learning

So that each student will receive personal support in the learning process. Students can ask questions to GPT Chat, which will provide relevant responses and help students understand the course material better. This will allow for a more adaptive and individualized learning experience.

Answering Student Questions Instantly

One of the main benefits of using GPT Chat as a learning assistant is its ability to answer student questions instantly. Students don't have to wait their turn to get answers from the teacher, instead, they can quickly ask for help from GPT Chat to clarify difficult concepts or get additional explanations. This will help improve learning efficiency in the classroom.

Increasing Student Engagement

With GPT Chat as a learning assistant, student involvement in the learning process can increase. Students can interact with GPT Chat through questions, discussions, or even learning games. This will provide a more interactive and fun experience for students, so they are more motivated to learn.

Supporting Teachers in Managing Classes

Utilizing GPT Chat as a learning assistant can also help teachers manage the class more effectively. GPT Chat can help answer student questions, provide additional reading material, or provide advice regarding assignments. With this learning assistant, teachers can focus on accompanying and guiding students individually, thereby improving the quality of teacher-student interactions.

More Interactive Learning

In classrooms that integrate Chat GPT as a learning assistant, learning will become more interactive. Students can participate in conversations with GPT Chat, solve problems together, and collaborate on group assignments. This will help develop students' communication and collaboration skills, as well as create an inclusive learning environment. Teachers' teaching methods in teaching biology that are not good will affect student learning. For example, teachers teach only using the lecture method, which causes students to get bored, sleepy, and passive and only take notes on the material explained by the teacher. Processive teachers dare to try new methods, which can help improve teaching and

learning activities and increase students' motivation to learn.

Conclusion

The use of ChatGPT with Project Learning in learning has begun to be widely used, this is because it can improve the quality of teaching, save time because learning can be done anytime and anywhere, create interactive and interesting learning, and make it possible to make innovative breakthroughs in learning. Various uses of ChatGPT with Project Learning in learning, including in the world of education, make learning more fun, easier, and more meaningful. For this reason, it would be appropriate if the integration of ChatGPT with Project Learning in Biology learning could be used as an innovative alternative learning media.

Author Contribution
Conceptualization, I. P., R. A., S., E. M., N. W. P.; methodology, I.P; validation, R. A. and. S; formal analysis, E. M.; investigation, N. W. P., and I. P.; resources, R. A. and S; data curation, E. M.: writing—original draft preparation., N. W. P.; I. P. and R. A.; writing—review and editing, S..: visualization, E. M and N. W. P. All authors have read and approved the published version of the manuscript.

Conflicts of Interest
The authors declare no conflict of interest.

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