An Authentic Project-Based Learning Approach for Workplace E-Learning: Creating, Joining and Reproducing Self-Project in Informal Learning Setting

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ABSTRACT

Adults engaging in workplace e-learning are increasing. Authentic project-based learning (APBL) is a valuable approach to help students engage in dealing with real-world problems. There is no doubt that APBL is a highly effective approach for learners, but the implementation of it faces some challenges such as setting up the APBL problem, preparing a curriculum flexible enough for APBL and providing assistance to teams, including monitoring. This research proposed a significant APBL approach in informal learning setting for learners to engage in APBL activities directly related to real work and life, as well as to overcome some challenges of APBL implementation. They can engage in APBL activities by three modes: creating self-projects, joining the projects that others created, or reproducing the projects that others conducted. We investigated the APBL activities of students of distance education faculty, Kim Chaek University of Technology for 16 months from September, 2023. 104 learners took part in APBL by 1st mode, 428 by 2nd mode and 96 by 3rd mode, and their academic performance were improved, while some challenges of APBL implementation were overcome.

Keywords: Distance education, Cooperative/collaborative learning, Adult learning, Informal learning, Project-based learning

INTRODUCTION

General public interest in e-learning has been increasing. With rapid change in working environments in keeping up with the development of science and technology, a constant need to retrain and train people in new products, technologies and services arises, and people who are graduates or non-graduates are also learning second or third major in e-learning environments. Distance education is an educational context that the teacher and student are separated by space and time. E-learning is widely used for workforce developing and employee training, and it offers the benefits of time/place-free availability, on demand training, delivery-efficiency, cost-effectiveness, and self-management of learning. Learners in workplace e-learning have different workplace environments, work characteristics, as well as technical abilities and work experiences, but there are many cases working in the same professions or similar work setting. They have favorable opportunities that they can rapidly apply acquired knowledge to practice as well as deal with the real-world problems that they can't imagine or experience in the classroom. They all desire to rapidly acquire enough knowledge and technology that is relevant to their work and contribute to solving the real-world problems. To bring about positive changes in job performance and workplace behaviors and to drive business success is the purpose of work-integrated learning. To this end, it is necessary to adopt significant learning approaches combining learning with practicing and associated with solving real-world problems.

Project-based learning(PBL) that was originated in the early twentieth century is a student-centered learning approach in which a learning focus is shifted from "teacher telling" to "learning by doing". Researchers argued "This approach gives students the opportunity for detailed investigations on worthy topics and enables them to learn from the experiences and apply gained knowledge, skills and attitudes to real cases in their lives." Most project work has covered several steps such as topic selecting, planning, research, presentation and evaluation. The PBL has been accompanied by the cooperative learning and teachers in PBL activities have played the role as the facilitator and guide. Researchers have noted that PBL is very effective to develop the critical thinking, academic achievements, cooperativity, problem-solving ability, scientific attitude, and self-efficacy of the students. Especially, researches for implementing the PBL of which topics are real-world problems such as the recycling of waste plastics or the production of biodiesel have indicated the effectiveness of PBL as effective learning approach for improving the problem-solving ability and increasing the motivation of students in engineering education. Furthermore, authentic project-based learning (APBL) for preparing the learners to solve real-world problems has been conducted as a type of PBL. Researchers states "Authentic project-based learning (APBL) is a highly effective way for instructors to help students learn disciplinary skills, modes of thinking, and collaborative study and practices by creating solutions to real-world problems for real users and clients."

Many researches have mentioned a number of benefits of PBL to students: to help them in learning through practices; to improve their problem-solving abilities; to motivate them to engage in learning with interest; to support them in improving their communication skills and their effective cooperation; and to apply with different learning levels and styles.

To increase learning effect, some researchers have combined the PBL with other learning approaches, technology or tools. The PBL combined with flipped learning and augmented reality improved students' project performance, learning motivation, as well as critical thinking tendency. And integrated project-based learning modes Plagiarism Checker and Telegram Messenger have a good effect on student learning outcomes.

On the other hand, researchers have suggested the conflicts and challenges encountered in PBL implementation. Especially, they have indicated four greatest challenges: (a) "setting up the APBL problem", (b) "preparing a curriculum flexible enough for APBL", (c) "providing assistance to teams, including monitoring", (d) "managing several stakeholders, including co-instructors, clients, and students"

This research aims to help learners to engage in APBL activities of which topics are the authentic problems that they encountered in the workplace activities and lives, and allows them to overcome some challenges of APBL implementation that researchers have indicated. Since no instructor could design and suggest the projects that are suitable for workplace learners who have different workplace environments and work characteristics, the APBL could be a good opportunity for them by incorporating real-world highly-ill-structured problems, real clients and real users. This research proposes to the learners take part in the APBL activities in informal learning environment. Previous researches have suggested several definitions of informal learning and have argued that informal learning can contribute to providing diverse learners with appropriate learning opportunities and to motivating them to learn science outside of and within schools. In this research we adopt the term of informal learning focusing on "not developed to be part of an ongoing school curriculum" and "voluntary as opposed to mandatory participation".

We propose a significant APBL approach to help learners in the workplaces engage in APBL activities in informal learning setting by three modes: creating self-projects, joining the projects that others created, or reproducing the projects that others have conducted.

We investigate the progress of the APBL activities of students of Distance Education Faculty, Kim Chaek University of technology for 16 months, from September, 2023 to December, 2024 and address the following research questions.

1. Does the proposed APBL approach overcome the challenge in setting up the APBL problem?
2. Does the proposed APBL approach overcome the challenge in preparing a curriculum flexible enough for APBL?
3. Does the proposed APBL approach overcome the challenge in providing assistance to teams, including

monitoring?

An Authentic Project-Based Learning Approach For Workplace E-Learning

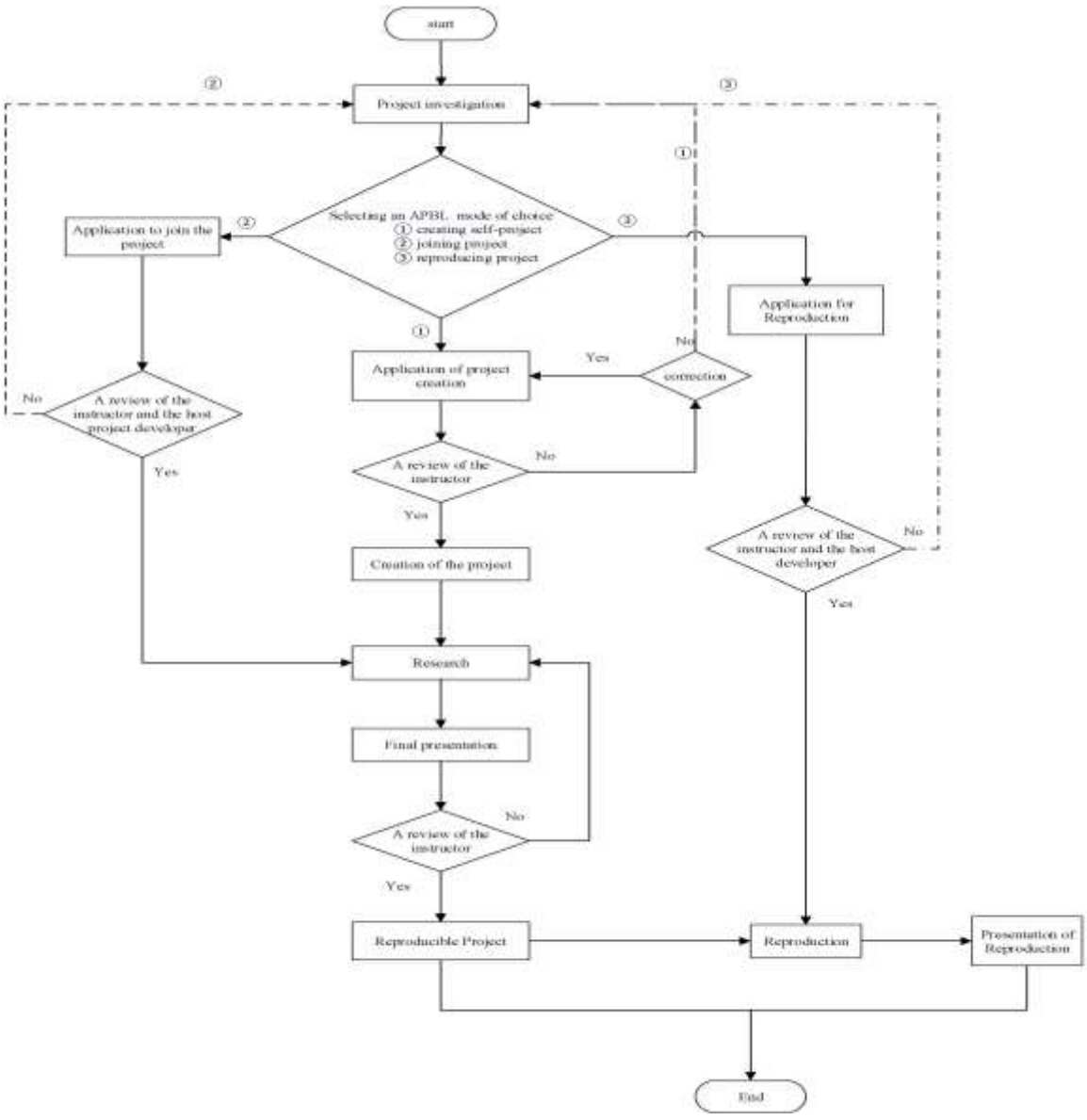
Distance Education Faculty, Kim Chaek University of Technology provides the learners who have full-time jobs with online engineering courses.

This research deals with the APBL homepage for informal learning, newly created in the portal site "Ri Sang 4.0", which was developed by Distance Education Faculty, Kim Chaek University of Technology for delivering distance education to learners with full-time jobs.

Although there are several definitions on informal learning, this research is based on the definition: "Informal learning refers to activities that occur outside the school setting, are not developed primarily for school use, are not developed to be part of an ongoing school curriculum, and are characterized by voluntary as opposed to mandatory participation as part of a credited school experience."

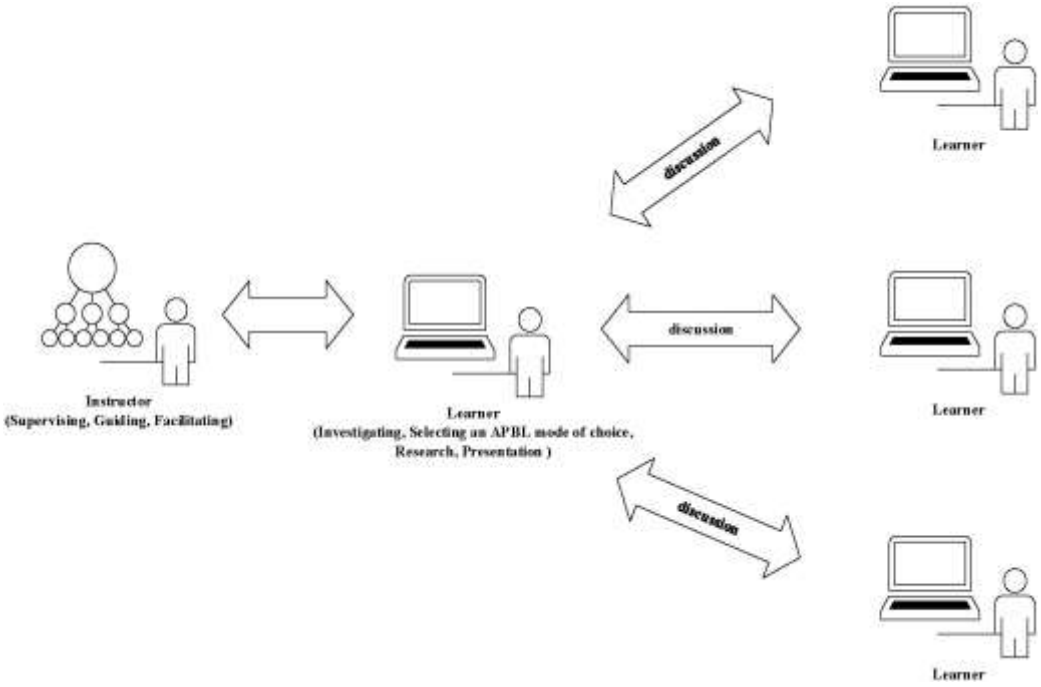
The learner conducts an investigation of other projects based on the idea of the project he or she is trying to implement. If an investigation confirms that there is an already implemented project that the learner wants to implement, he or she will be able to reproduce the project, and if the project is currently being implemented by another learner, he or she will be able to join and implement the project, either of the above two cases or the new project will be initiated and implemented (Fig.1).

Fig.1. A Flowchart of a learner's activity in APBL



The whole process of planning and implementing the project is accompanied by a constant discussion with other learners and also with the supervision, assistance and guidance of the instructor (Fig.2).

Fig.2. A diagram of APBL activity



Learner's activity in APBL

This APBL homepage consists of "Ongoing projects" and "Reproducible projects" webpages.

Ongoing Projects

The "Ongoing Projects" webpage enables learners to conduct APBL activities by creating their own projects or joining the existing projects, based on their investigations of the ongoing projects (Fig.3).

Fig.3. "Ongoing Projects" webpage in learner mode.

Reproducible Projects

The "Reproducible Projects" webpage enables the APBL activities by reproducing the projects which has been implemented by the learners at workplace. As mentioned before, the finally presented projects are automatically registered at the "Reproducible Projects" webpage. Learners can conduct APBL activities by reproducing and discussing on the projects, registered at the "Reproducible Projects" webpage.

Instructor's activity in APBL

Instructor's role in APBL should be firmly defined to be guide or facilitator who will assist learners to come up with the question for organizing and proceeding with activity as well as with the result. He/she provides the guidance on the context rather than content for the proper PBL structuring. As for ongoing projects, the instructor provides supervision on every step of projects from creation to final presentation by learners, and sends them feedback by message and call in order to facilitate and provide guidance on the project activities. All the presentations except discussion, submitted by the learners in each step of project progress, will be available on the webpage under approval by instructor. The instructor sends feedback to the rejected presentation with reason.

Meanwhile, as for reproducible projects, the instructor also supervises, leads and facilitates the reproduction process of the learners, and evaluates the project implementation and reproduction progress by messages or calls.

The instructor gets in touch with the contact of the relevant enterprise and organization by e-mail address or telephone number, inserted in the "Final Presentation" and "Presentation of Reproduction" parts, and checks how successfully project has been implemented. All the presentations except discussion, submitted by the learners in each step of project reproduction will be available on the webpage under approval by instructor. The instructor sends feedback to the rejected presentation with reason.

RESULTS AND DISCUSSION

Table 1 Statistics on participants in APBL activities

	Persons	Percentage		Persons	Percentage
Sex					
Male	419	66.72	Working history		
Female	209	33.28	0-3 Years	51	8.12
			4-6 Years	213	33.91
Age			7-9 Years	111	17.68
1 7-25	91	14.48	10-12 Years	121	19.27
2 6-35	385	61.31	Above 13 Years	132	21.02
3 6-45	111	17.68			
4 6-55	31	4.94	Project experience		
Above 56	10	1.59	Yes	285	45.38
			No	343	54.62
Educational background					
Middle School	537	85.51			
College	71	11.31			
University	20	3.18			

This research introduced no deadline to APBL activities, but deals with the learners who took part in the APBL activities in informal setting from September, 2023 to December, 2024 and completed the project. Participants are the learners who registered at the Distance Education Faculty, Kim Chaek University of Technology and have full time job. APBL participation is not mandatory, but optional, and not limited to the major course (Table 1). Table 2 and Table 3 illustrates a comparison of the average scores of APBL participants with the

scores of non-participants as for major subjects, where all the basic-subjects scores or academic performance of participants and non-participants are almost same in the lower grades. The results of Table 3 shows that the scores of participants are significantly higher than the ones of non-participants.

Table 2 Average scores of the basic-subjects

	t	Degrees of freedom	Average	95% Confidence Interval	
				Lower	Upper
Participants	43.798	49	7.44800	7.1063	7.7897
Non-participants	54.057	49	7.37000	7.0960	7.6440

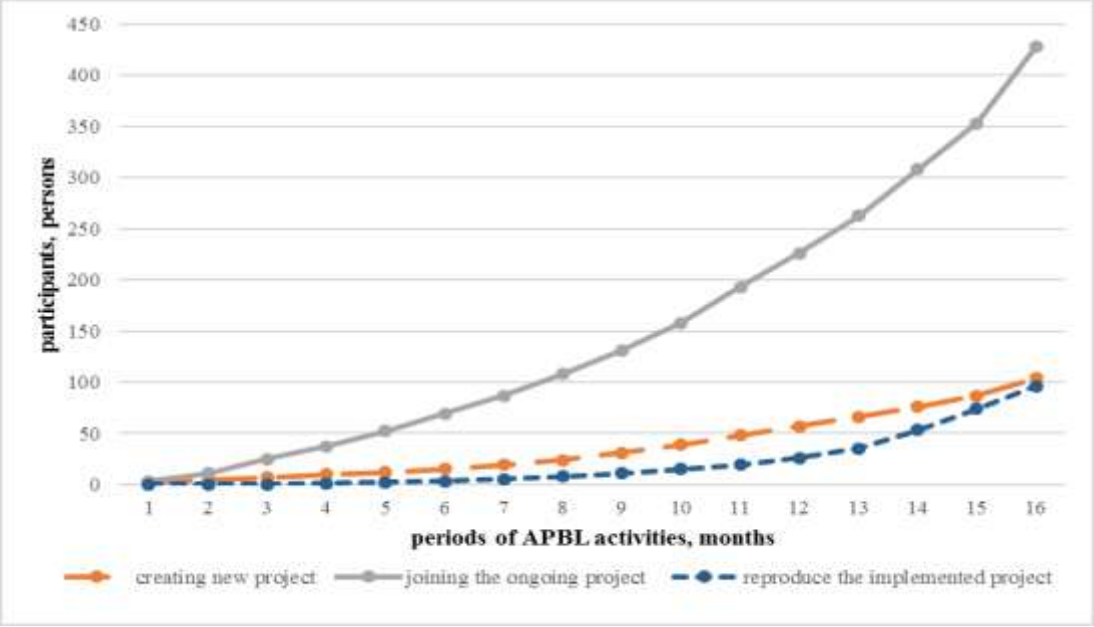
Table 3 Average scores of the major subjects

	t	Degrees of freedom	Average	95% Confidence Interval	
				Lower	Upper
Participants	126.237	49	8.41600	8.2820	8.5500
Non-participants	66.794	49	7.63600	7.4063	7.8657

Overcoming the challenge of setting the project subject

It is most difficult to correspond the study requirement of the learners, who will work on the project, to the project client requirement. This research overcame such challenges by learning method, proposed by this research, which lets the learners be client.

Fig. 4. Tendency of participating in 3 modes for 16 months.



Scoping was at learner's discretion. The learners created 104 projects that 428 other learners joined, while 42 projects (175 joined) of them were completed to be reproducible, and there was an increase in participants (Fig. 4). In addition, 175 applications were rejected, as they only asked for solutions to solve the real-world problems without proposing study question and subject. Although rejection rate was high at the initial period after the homepage was created when the learners did not meet the requirement of the instructor which requires proper project formatting, it was getting very low when many projects were created and used as models. While 96 learners participated in 29 of 49 reproducible projects, 21 projects were reproduced by 45 learners. This

research does not consider the project difficulty level.

Overcoming the challenge of preparing the fully flexible course for APBL

This research overcomes the challenge of reorganizing the course by enabling APBL activities in informal learning setting.

Currently, implementation and reproduction period of the completed project is between 2 and 57 weeks, while that period of the non-complete project is unpredictable. Also, graduates as well as undergraduate attend the APBL, and 9 graduates completed 3 projects and reproduced 2 project.

Overcoming the challenge of assistance to the group including supervision

This research overcomes to some extent the challenge in the instructor's mission to supervise and assist the project groups by making available at the homepage the whole process of the project implementation and reproduction so that all the learners or any general portal site subscribers can browse and provide necessary evaluation and assistance through discussion.

During supervision and assistance to the projects of the learners, there were 2149 offline discussions (not included online discussion by chatting tool during the PBL).

CONCLUSION

This research proposed the method for the workplace learners to attend the APBL activities on the real-world problems of their direct connection by 3 modes: creating the new project, joining the ongoing project and reproduce the implemented project. In the first mode, the learners have opportunities to design and implement the project with the subject of real-world problems that they face. In the second mode, they have opportunities to select the suitable projects among the created projects and implement them by collaborative study and research. In the third mode, they have opportunities to reproduce the already implemented projects according to the concrete real-world situation which they face. This research has significance as follows:

First, that enables learners to attend the APBL activities as well as of bringing several benefits through survey on learners' APBL activities.

Second, that selects the projects to be applied to formal learning.

Third, that makes it possible to find the solution to reflect the APBL activities in the course materials and course roadmap for cross-connecting and restructuring.

The learning method indicated by this research brought about the result that the challenges arising from the APBL practice like setting the project and preparing the flexible course were overcome and there was some progress in overcoming the challenge of assistance to the group including supervision. There is continuous increase in the number of learners who attend the APBL activities in informal learning setting. The learning method suggested by this research is not applicable to the learners whose jobs are not relevant to their major courses, in other words, this approach is most effective when the learner's job, major course, and project subject are matched.

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Data Availability The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

DECLARATIONS

Conflict of interest Authors declare that they have no conflict of interest.

REFERENCES

1. Andrew M, Blaine. (2019). Interaction and presence in the virtual classroom: An analysis of the perceptions of students and teachers in online and blended Advanced Placement courses. Computers & Education, 132, 31–43. https://doi.org/10.1016/j.compedu.2019.01.004
2. Bekerman, Z. (2006). Informal learning: conceptual distinctions and preliminary findings. Learning in Places: The Informal Education Reader (pp. 203–229). Peter Lang.
3. Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. Educational Psychologist, 26(3&4), 369–398.
4. Chang, L.C., & Lee, G.C. (2010). A team-teaching model for practicing project-based learning in high school: Collaboration between computer and subject teachers. Computers & Education, 55, 961-969. https://doi.org/10.1016/j.compedu.2010.04.007
5. Chang. S. C., & Hwang. G. J. (2018). Impacts of an augmented reality-based flipped learning guiding approach on students' scientific project performance and perceptions. Computers & Education, 125, 226-239.
6. Crane, V. (1994). Informal science learning: what the research says about television, science museums and community-based projects. Science Press.
7. Davies, C.E., Brown, N., Brown, C., & Davies, R. (2015). Project learning opportunities with biodiesel. Proceedings of the Asia Pacific Confederation of Chemical Engineering Congress 2015, Australia, Article p.433.
8. Du, X. M., & Han, J. (2016). A Literature Review on the Definition and Process of Project-Based Learning and Other Relative Studies. Creative Education, 7, 1079-1083.
9. Dym, C. L., Agogino, A. M., Eris, O., Frey, D. D., & Leifer, L. J. (2005). Engineering design thinking, teaching, and learning. Journal of Engineering Education, 94(1), 103–120.
10. Frank, M., & Barzilai, A. (2004). Integrating alternative assessment in a project-based learning course for pre-service science and technology teachers. Assessment & Evaluation in Higher Education, 29(1), 41–61.
11. Harun, H. M. (2002). Integrating e-Learning into the workplace. Internet and Higher Education, 4, 301–310.
12. Henry, P. (2001). E-learning technology, content and services. Education +Training, 43, 249–255.
13. Hofstein, A., & Rosenfeld, S. (1996). Bridging the gap between formal and informal science learning. Studies in Science Education, 28(1), 87–112.
14. Kilpatrick, W. H. (1918). The project method. Teachers College Record, 19(4), 319–335.
15. Klett, F. (2010). The design of a sustainable competency-based human resource management: a holistic approach. Knowledge Management & E-Learning: An International Journal, 2(3), 278–292.
16. Kurzel, F., & Rath, M. (2007). Project Based Learning and Learning Environments. Issues in Informing Science and Information Technology, 4,503-510.
17. Ladewski, B. G., Krajcik, J. S., & Harvey, C. L. (1994). A middle grade science teacher's emerging understanding of project-based instruction. The Elementary School Journal, 94(5), 498-515.
18. Lewis, D. G. R., Gerber, E. M., Carlson, S. E.& Easterday, M. W. (2019). Opportunities for educational innovations in authentic project-based learning: understanding instructor perceived challenges to design for adoption. Education Tech Research Dev (2019) 67, 953–982. https://doi.org/10.1007/s11423-019-09673-4
19. Liu, M., & Hsiao, Y. (2002). Middle school students as multimedia designers: A project-based learning approach. Journal of Interactive Learning Research, 13 (4), 311 - 337.
20. Morgan, T. (2019). Enabling Meaningful Reflection Within Project-Based-Learning in Engineering Design Education. Design Education Today (Chapter 2).
21. Oscar, A.V., Xabier, N. C., Oscar, B. A., Maria, L. S. D. A. L., & Maria, T. S. D. A. B. (2010). Evaluation of computer tools for idea generation and team formation in project-based learning.

Computers & Education 56, 700–711 https://doi.org/10.1016/j.compedu.2010.10.012

22. Papandreou, A. (1994). An application of the projects approach to EFL. English Teaching Forum, 32(3), 41–42.
23. Park, J. H., & Wentling, T. (2007). Factors associated with transfer of training in workplace e-learning. Journal of Workplace Learning, 19(5), 311–329.
24. Pratama. H., & Prastyaningrum. I. (2019). Effectiveness of the use of Integrated Project Based Learning model, Telegram messenger, and plagiarism checker on learning outcomes. Journal of Physics: Conference Series, 1171, 1-10. https://doi.org/10.1088/1742-6596/1171/1/012033
25. Prince, M. J., & Felder, R. M. (2006). Inductive teaching and learning methods: Definitions, comparisons, and research bases. Journal of Engineering Education, 95(2), 123–138. https ://doi.org/10.1002/j.2168-9830.2006.tb008 84.x.
26. Rajan, K. P., Gopanna, A., & Thomas, S. P. (2019). A Project Based Learning (PBL) Approach Involving PET Recycling in Chemical Engineering Education.Recycling,4(10), 1-16.
27. Salas, E., Kosarzycki, M. P., Burke, C. S., Fiore, S. M., & Stone, D. L. (2002). Emerging themes in distance learning research and practice: some food for thought. International Journal of Management Reviews, 4(2), 135–153.
28. Suastra, I W., & Ristiati, N P. (2019). Developing Critical Thinking, Scientific Attitude, and Self-efficacy in Students through Project Based Learning and Authentic Assessment in Science Teaching at Junior High School. Journal of Physics: Conference Series, 1233,012087, 1-9. https://doi.org/ 10.1088/1742-6596/1233/1/012087
29. Sumarni, W. (2015). The Strength and weaknesses of the Implementation of Project-Based Lerning: A Review. International Journal of Science and Research, 4, 3, 2015.
30. Utku, K. (2010). A web based system for project-based learning activities in “web design and programming” course. Procedia Social and Behavioral Sciences, 2, 1174–1184. https://doi.org/10.1016/ j.sbspro.2010.03.168.
31. Welsh, E. T., Wanberg, C. R., Brown, E. G., & Simmering, M. J. (2003). E-learning: emerging uses, empirical results and future directions. International Journal of Training and Development, 7, 245–258.