# IMPROVING TEACHERS PERFORMANCE AND SKILLS THROUGH TRAINING ON THE UTILIZATION OF LARGE LANGUAGE MODEL TECHNOLOGY

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**Abstract**. Mastery of technological competence within the TPACK (Technological Pedagogical Content Knowledge) framework is crucial for educators to succeed in increasingly digital learning environments. This article explores the development and implementation of training on using large language models (LLM) for educators, focusing on their ability to integrate this technology into the learning process. While LLMs are controversial, they offer significant potential to support learning, such as content creation, self-directed learning, and student evaluation. However, the effectiveness of using LLMs heavily depends on the clarity of instructions given by the user, often posing a major challenge. This study employs a simplified Action Learning model comprising three stages: design, implementation, and evaluation. During the design phase, a needs analysis

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revealed participants' low confidence and understanding of AI technology. The training implementation involved registration, material presentation, and hands-on practice with supervision. Evaluation covered three levels of Kirkpatrick's model: reaction, learning, and knowledge transfer. The evaluation results indicated a significant increase in participants' confidence in using AI, though concerns about the impact of AI on students' critical and creative thinking skills remain. The conclusion suggests that the training effectively enhances participants' understanding and skills in utilizing LLMs. It recommends further research involving a broader range of participants and the use of LMS technology for tracking learning outcomes. The training underscores the importance of improving TPACK competence amid disruptive technological advancements...

*Keywords: Artificial Intelligence, TPACK, Professional Development, Education.*

**Abstrak** Penguasaan kompetensi teknologi dalam kerangka TPACK (Technological Pedagogical Content Knowledge) menjadi kunci bagi pendidik untuk sukses dalam lingkungan pembelajaran yang semakin digital. Artikel ini mengeksplorasi pengembangan dan pelaksanaan pelatihan penggunaan model bahasa besar (Large Language Model/LLM) bagi pendidik, dengan fokus pada kemampuan mengintegrasikan teknologi ini dalam proses pembelajaran. LLM, meskipun kontroversial, menawarkan potensi besar dalam mendukung pembelajaran, seperti pembuatan konten, pembelajaran mandiri, dan evaluasi siswa. Namun, efektivitas penggunaan LLM sangat bergantung pada kejelasan instruksi yang diberikan oleh pengguna, yang sering kali menjadi tantangan utama. Penelitian ini menggunakan model Action Learning yang disederhanakan menjadi tiga tahapan: perancangan, implementasi, dan evaluasi. Pada tahap perancangan, dilakukan analisis kebutuhan peserta yang menunjukkan rendahnya kepercayaan diri dan pemahaman mereka terhadap teknologi AI. Implementasi pelatihan melibatkan pendaftaran, presentasi materi, dan praktik langsung dengan pengawasan. Evaluasi melibatkan tiga tingkat dari model Kirkpatrick: reaksi, pembelajaran, dan transfer pengetahuan. Hasil evaluasi menunjukkan peningkatan signifikan dalam kepercayaan diri peserta terhadap penggunaan AI, meskipun masih ada keraguan mengenai dampak AI terhadap keterampilan berpikir kritis dan kreatif siswa. Kesimpulan menunjukkan bahwa pelatihan ini efektif dalam meningkatkan pemahaman dan keterampilan peserta dalam memanfaatkan LLM, dengan saran untuk penelitian lanjutan

mencakup peserta yang lebih luas dan penggunaan teknologi LMS untuk pelacakan capaian pembelajaran. Pelatihan ini menegaskan pentingnya peningkatan kompetensi TPACK di tengah perkembangan teknologi yang disruptif.

**Kata Kunci**: Kecerdasan Buatan, TPACK, Pengembangan Profesi, Pendidikan

## INTRODUCTION

Technological Competence in the TPACK framework includes learners' skills in utilizing technology, integrating technology in learning content to assist in the learning process (Brantley-Dias & Ertmer, 2013). From this basic framework, the demand to have skills in technology management becomes a learner's achievement to be successful in the learning environment. The ability to utilize technology is not only helpful in the learning environment but can also be transferred to administrative matters. With the ability to utilize and manage technology around learners, it is expected that teaching performance and skills will also improve (Rosenberg & Koehler, 2015). The risks that occur if a learner is not able to utilize technology properly in accordance with the times are learning becomes uninteresting, learning content becomes obsolete, unable to create a collaborative atmosphere remotely to the inability in the digital teaching process. (Hidayati et al., 2018; Setyosari et al., 2020).

Various technologies have emerged to assist learners in managing classes, learning environments, administrative tasks. One example of the most widely used technology in the last five years is Google Classroom, Quiziz, Google Meet, Zoom. These technologies help in managing the class, interacting with learners, and testing students' learning achievements. Meanwhile, the technology that has been gaining popularity among the general public in the last two years (2022 - 2024) is artificial intelligence with the Large Language Model (LLM). LLM is a type of artificial intelligence that is able to generate information based on user requests through a collection of previously taught knowledge. The use of LLM in education has generated a lot of controversy from various parties. (Chang et al., 2024). However, this technology has very promising capabilities and potentials, especially in assisting learners, such as producing learning content, assisting learners' self-learning, learning testing assistants. (Chang et al., 2024, p. 202; Jeon & Lee, 2023; Kasneci et al., 2023).

However, using LLM technology is not easy to do effectively and efficiently. LLM is only able to generate information according to user requests through messages or instructions delivered in the form of narrative text. If the instructions or messages are not specific enough, LLM may produce irrelevant information or even contain errors. This risk becomes one of the challenges for learners who want to utilize LLM in supporting their performance and learning process. A learner must be able to evaluate and curate all content and information produced by LLM. (Mukhlis, 2024; Wibowo et al., 2023). Nevertheless, there have been many LLM utilizations carried out to support the learning process. Starting from developing graphic design learning content, creating daily exam questions, foreign language learning, translating foreign language teaching materials to assisting in the validation process of learner answers. (Maharani et al., 2024; Mukhlis, 2024; Pontjowulan, 2023; Ramadhan et al., 2023; Suharmawan, 2023; Wibowo et al., 2023).

Therefore, there is a need for a platform that can facilitate learners who have doubts and lack of skills in operating LLM so that it can be used in the classroom and learning environment. One of the most common and widely used solutions is through education and training. There have been many types of training organized to fulfil teachers' competencies and skills in operating high technology, such as video alignment, online learning, multimedia and programming. (Eliza et al., 2019; Fitria et al., 2019; Myori et al., 2019; Soepriyanto et al., 2018, 2021). Training formats have also evolved in terms of time, location and methods used. There are short (one week) to long (24 weeks) training programs. Some training is conducted through face-to-face meetings and has evolved into virtual meetings.

From this explanation, the purpose of this research is to develop and implement training that aims to improve teacher competence. The competence targeted in the training to be developed is competence in operating Large Language Models (LLMs) for the needs of the learning process. To simplify and narrow down the scope of the material taught at the training, the results of a brief needs survey, prospective participants are interested in learning and being trained in developing exam questions on a learning topic.

**METHODS**

To develop this training design, the model popularized by (McArdle, 2011) i.e. Action Learning Model. The model consists of six components, including business justification, analysis, design, development, implementation and evaluation. To simplify the six components of the model, it is summarized into three main stages, namely design, implementation and evaluation.

The design stage consists of actions that focus on the needs of the trainees, the outcomes of the training, and the design of the training implementation. This stage is a combination of business justification, analysis and training design components. The outputs produced at the design stage are the training curriculum, implementation blueprint, training resource persons and evaluation techniques for trainees' achievements.

The second stage is the implementation of the design that has been approved by the training developers. This stage includes preparing the program, managing the participants, organizing the presentation of materials and managing the learning sessions of the trainees. Concrete actions taken in this stage are checking the training teleconference link, checking access to materials from the participants' perspective, checking the readiness of evaluation instruments. To ensure the comfort and safety of the participants, a special officer was assigned to assist the participants in case of technical difficulties. To provide an interactive experience for the participants, resource people were given guidelines to ask small questions and not bring an overly formal atmosphere to the training process.

The third stage is the evaluation of the training. This activity is used to measure the experience and learning outcomes of the trainees. The evaluation process is carried out through filling out a satisfaction questionnaire, a questionnaire on perceptions of artificial intelligence and a final assignment in the form of practical use of artificial intelligence.

The targeted training participants are learners who are actively teaching, students in the educational environment both teaching and non-teaching. The training activities were carried out for one full week with one day of material provision, and five days of practical assistance and training assignments.

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## RESULTS AND DISCUSSION

### First Stage

In the first stage, a needs survey was conducted among potential candidates who would become trainees. The result is the lack of ability of the learners in utilizing artificial intelligence technology in the classroom, there is still a sense of distrust towards the emerging artificial intelligence technology. This response is also quite understandable because intelligence is still controversial in its uncontrolled utilization in the educational environment. (Chang et al., 2024).

Through this response, several topics were developed to be delivered in the training including (1) 21st Century Learning Paradigm Shift, which discusses how teaching and learning will better utilize all available technology as needed. The second topic is (2) the utilization of artificial intelligence to develop test materials and learning content. Through these two materials, the expected outcomes of this training include (1) the participants have confidence in using AI in the learning environment, (2) the participants are able to operate AI for learning needs appropriately, (3) the participants have discipline in utilizing AI for learning needs. The selection of this topic has been widely presented because it is fairly basic and in accordance with the daily tasks of a learner in the learning environment. (Liling & Aklani, 2023; Maulana et al., 2023; Pontjowulan, 2023)

### Second Stage

In the second stage, the implementation process includes the registration of participants, registration, presentation of materials, practical assistance, and presentation of participants. The entire sequence of activities must be pursued by the participants to achieve the outcomes that have been made. Therefore, all activities and sessions were made in a concise and brief form to be easily taken by the trainees.

During the registration process, 29 training participants were obtained, consisting of various occupations. The majority of participants are educational students who are prospective learning facilitators. The rest are teachers from various positions such as principals, researchers, educators and subject teachers which can be seen in Table 1. The participants were mostly from Malang city.

**Tabel 1 Occupational Distribution of Trainees**

| Job | Counts | % of Total | Cumulative % |
|---|---|---|---|
| Student | 6 | 21.4 % | 21.4 % |
| Teachers | 9 | 32.1 % | 53.6 % |
| Staff | 6 | 21.4 % | 75.0 % |
| Principal | 1 | 3.6 % | 78.6 % |
| Preservice Teachers | 6 | 21.4 % | 100.0 % |

All activities were conducted through virtual meetings. The resource persons made independent presentations that were moderated by the organizers so that the training would run in an orderly and safe manner. All activities were conducted online through the zoom platform. Zoom was chosen as the platform due to its simplicity and practicality in online learning. In addition, online training can reduce the costs incurred by participants and does not burden the financial burden of the organizers.

Both materials are presented by resource people who have competence in the appropriate field. The resource person with the learning paradigm material is a researcher in the field of learning technology with a master's degree in Learning Technology. Meanwhile, the resource person with the presentation on artificial intelligence practice is a lecturer in informatics with a master's degree in Learning Technology. To ease the burden on the resource persons, the evaluation instruments and assignments were developed by the organizers who were assisted by the two resource persons. With the collaboration between the organizers and the resource people, the training process was efficient and orderly.

At the end of the material presentation, the organizers provided assignments and a mentoring system to the participants. The assignment was collected five days after the material presentation was given. The assignments are in the form of worksheets containing practical exercises that must be completed as a form of learning outcomes for the participants.

**Stage Three**

In the evaluation process, the model (Kirkpatrick & Kirkpatrick, 2012). was used. In the evaluation stage, the organizers evaluate only the first three levels rather than all

levels of the model. Therefore, the questionnaires and instruments used will only cover learner reactions, learning outcomes and actual knowledge transfer/application.

At the first level of the evaluation model, it is measured how participants respond to the training, their satisfaction, the competence of the resource persons and the services provided by the organizers. At this level of evaluation, it is possible to draw conclusions and criticize the training process and revise it for future activities.

**Tabel 2 Participant Satisfaction Survey**

| Aspects | Mean | Median | Mode | Sum | Min | Max |
|---|---|---|---|---|---|---|
| Easy access to Zoom meetings | 0,2527778 | 06.50 | 07.00 | 79 | 1 | 7 |
| Ease of finding material & Zoom Meeting links | 0,2576389 | 06.00 | 07.00 | 80 | 3 | 7 |
| Training Activity Flow | 0,2729167 | 06.00 | 07.00 | 83 | 4 | 7 |
| Training Activity Management | 0,2527778 | 06.00 | 06.00 | 79 | 4 | 7 |
| Accuracy of Material with Needs | 0,2729167 | 06.00 | 07.00 | 83 | 4 | 7 |
| Structure and Content of Training Materials | 0,2576389 | 06.00 | 06.00 | 80 | 1 | 7 |
| Examples of cases given in the training | 0,2680556 | 06.00 | 06.00 | 82 | 3 | 7 |
| Depth and Novelty of Training Materials | 06.07 | 06.00 | 07.00 | 85 | 3 | 7 |
| Readiness of the resource person in presenting the material | 06.07 | 06.00 | 07.00 | 85 | 4 | 7 |
| Ability of resource persons in providing training | 0,2576389 | 06.00 | 06.00 | 80 | 1 | 7 |
| Ability to answer questions and responses from participants | 05.57 | 05.50 | 07.00 | 78 | 3 | 7 |
| Clarity of material delivery by the resource person | 06.21 | 06.00 | 07.00 | 87 | 5 | 7 |
| Oral and written communication skills of the resource person | 06.29 | 06.50 | 07.00 | 88 | 5 | 7 |
| The resource person's ability to create an active, comfortable and safe environment in training | 05.57 | 06.00 | 07.00 | 78 | 1 | 7 |
| Clarity of voice, vocals and intonation of the resource person | 05.57 | 06.00 | 07.00 | 78 | 2 | 7 |
| Training method | 06.00 | 06.00 | 07.00 | 84 | 4 | 7 |
| Suitability of assignments and assessments with the material taught | 06.14 | 06.00 | 07.00 | 86 | 4 | 7 |
| Techniques for evaluating trainees' abilities | 0,2631944 | 06.00 | 06.00 | 81 | 2 | 7 |
| Reputation of the training organizer | 0,2729167 | 06.00 | 07.00 | 83 | 3 | 7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Communication between organizers and trainees | 06.07 | 06.50 | 07.00 | 85 | 3 | 7 |
| Hospitality of organizers to trainees | 05.57 | 06.00 | 07.00 | 78 | 2 | 7 |
| Clear and directed curriculum and syllabus | 05.43 | 05.50 | 05.00 | 76 | 1 | 7 |
| In general, would you recommend this training to a friend? | 0,3409722 | 08.00 | 10.00 | 108 | 1 | 10 |

Looking at Table 2 of the Participant Satisfaction Survey, the majority of participants gave a positive response to the training implementation process. In terms of the curriculum and structure of the materials, participants gave excellent ratings, characterized by median scores that were close to the maximum rating. However, on the technical readiness of the application and material links, a handful of participants gave negative responses. They gave a uniform reason, namely that they could not find the material links and zoom easily. After checking the system logs, the participants who gave these responses were participants who entered the participant grub late, while the material links and links were sent before the participants joined the participant grub. This is an evaluation that links and materials must be informed to participants both cumulatively and personally.

In terms of resource person assessment, participants also gave a very positive assessment of the competence and ability of the resource person. This was shown in several indicators of resource persons, including verbal ability, material preparation, techniques for answering questions, vocal intonation and time management. All these indicators received a positive assessment from the training participants. This is shown by the median value which is close to the maximum value of the assessment.

At the second level, the participants' learning outcomes were measured. At this level, the results of the participants' perceptions based on a questionnaire assessing confidence and management of AI were measured. See Table 3, the results obtained by the participants tend to vary and there are still participants who do not know the concept of artificial intelligence in general. Not only that, but there are also still many responses that AI is a threat to the learning environment, this is shown in the statement 'AI can threaten ....', which is shown in the maximum value there are answers that lean towards positive. This is quite reasonable, because it could be that in the participant's environment, the use of artificial intelligence is still not managed how to use it both in function and

good faith in the learning process. This was also mentioned in several evaluations of AI and other generative technologies. (Kasneci et al., 2023; Liling & Aklani, 2023; Mukhlis, 2024).
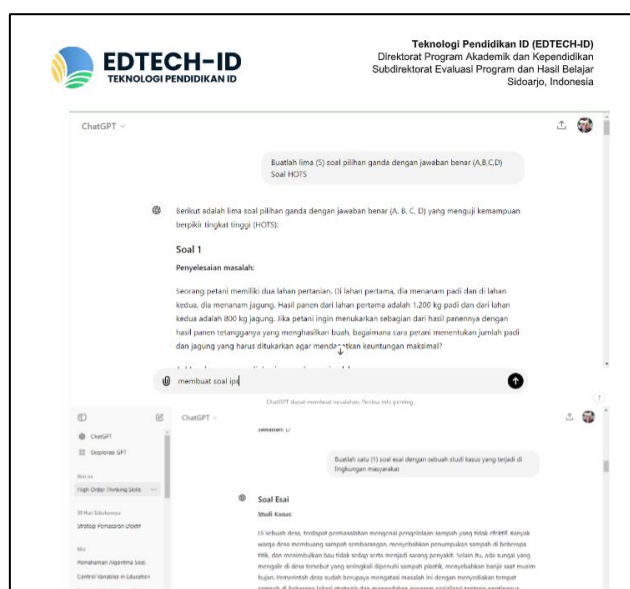
**Tabel 3 Self-confidence Assessment Results**

| Aspects | Mean | Median | Mode | Sum | Min | Max |
|---|---|---|---|---|---|---|
| I know what Artificial Intelligence (AI) is | 0,239583 | 0,25 | 0,25 | 120 | 2 | 7 |
| I use AI for personal needs | 0,239583 | 0,25 | 0,25 | 120 | 3 | 7 |
| I am interested in integrating AI in the learning process | 0,259028 | 0,25 | 0,25 | 126 | 3 | 7 |
| In my opinion, AI is able to replace the role of teachers in guiding students' learning process in the classroom | 0,163194 | 0,125 | 0,125 | 78 | 1 | 7 |
| I think AI can help students to learn independently without teacher supervision. | 0,176389 | 0,166667 | 0,166667 | 91 | 2 | 7 |
| The results of the materials provided by AI can be used for the learning process | 0,220833 | 0,208333 | 0,208333 | 114 | 2 | 7 |
| AI can threaten students' critical thinking skills | 0,224306 | 0,208333 | 0,208333 | 115 | 3 | 7 |
| AI can threaten students' creative thinking skills | 0,204861 | 0,201389 | 0,166667 | 100 | 1 | 7 |
| AI can help students to find out-of-the-box ideas | 0,246528 | 0,25 | 0,25 | 122 | 4 | 7 |
| AI can make learning media obsolete and not up to date | 0,169444 | 0,125 | 0,083333 | 80 | 1 | 7 |
| I am confident that I am able to utilize AI in teaching | 0,249306 | 0,25 | 0,25 | 123 | 3 | 7 |
| I feel able to control the use of AI in the classroom | 0,211806 | 0,243056 | 0,25 | 111 | 1 | 7 |
| I find it helpful with AI to create exam questions/daily assignments | 0,249306 | 0,25 | 0,25 | 123 | 2 | 7 |
| I find it helpful for AI to create learning materials | 0,249306 | 0,25 | 0,25 | 123 | 4 | 7 |
| I find it helpful for AI to assess student learning outcomes | 0,249306 | 0,25 | 0,25 | 123 | 2 | 7 |

| | 0,24 6528 | 0,25 | 0,25 | 12 2 | 3 | 7 |
|---|---|---|---|---|---|---|
| I find it helpful for AI to develop lesson plans | | | | | | |

The third level of evaluation is knowledge transfer. At this level, the evaluation measures the application of the knowledge that has been taught to the participants. At this level of evaluation, assignments are used as an instrument to measure the participants' learning achievement. As an illustration, the assignment instructed the participants to develop a multiple-choice question and answer with at least five options for seven questions. In addition to multiple choice, participants were asked to develop an essay question with Bloom's taxonomy level C4. All questions must be developed with the help of AI or created entirely by AI in accordance with the instruction guidelines provided during the training. Figure 1 shows a snapshot of the trainees' worksheets.

The majority of the participants used one of the artificial intelligence platforms, Google Gemini and OpenAI ChatGPT, both of which are most widely used by the general public and there is no cost involved in utilizing them. From the aspect of the instructions given to the participants, most of them were still rigid and only changed the object words, there was no deep improvisation of the prompts used. However, this is a very good achievement because the goal of introducing artificial intelligence and utilizing AI has been achieved with the minimum result.



**Gambar 1 Participant Practicum Process**

## CONCLUSIONS

**Conclusions**

Training activities to improve learners' performance and skills through the utilization of artificial intelligence technology have been conducted. The training was developed using the Action Learning model. All activities ran smoothly and orderly both in the administrative and learning scope.

In the process of evaluating the achievements of the training, the participants gave a positive assessment of the organizer's services, resource persons and the materials taught. In the second level, there are still participants who still do not fully trust artificial intelligence in the learning environment, but the majority have recognized the potential in artificial intelligence. At the third level, all participants had completed the assignments and practiced using AI. However, skills in modifying AI instructions were not fully developed.

This training provided insight that the skills within the scope of teachers' TPACK will be very broad with the development of disruptive technologies such as artificial intelligence. With the training in AI technology management, it is hoped that the learners' ability to utilize technology can be improved and master its application wisely, effectively and on target.

**Advice**

For future research, it is expected to attract a wider range of participants, massive and consisting of various educational backgrounds. Utilize LMS technology to track learning outcomes. Using evaluation techniques up to level four.

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