



บทความวิจัย

การพัฒนาและประเมินหลักสูตรฝึกอบรมครูเทคนิคอาชีพศึกษาของไทยตามแนวทางการศึกษาและการฝึกอบรมด้านเทคนิคและการอาชีพศึกษาของเยอรมัน: เส้นทางสู่การแข่งขันระดับโลก

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บทคัดย่อ

เทคโนโลยีช่วยส่งเสริมให้เกิดการเรียนรู้ด้วยตนเองและการเรียนรู้ในรูปแบบต่าง ๆ เกิดขึ้นได้ อาชีวศึกษามีส่วนช่วยส่งเสริมกลุ่มแรงงานเฉพาะทางผ่านทางการศึกษาต่าง ๆ ความสามารถในการแข่งขันในระดับสากลจำเป็นต้องมีการพัฒนาสมรรถนะของครูเทคนิคอาชีพศึกษา งานวิจัยนี้มีวัตถุประสงค์เพื่อจัดทำและประเมินหลักสูตรการฝึกอบรมครูเทคนิคอาชีพศึกษาตามเทคนิคการศึกษาของเยอรมัน เพื่อเสริมสร้างสมรรถนะการเรียนการสอนระดับชาติสำหรับการแข่งขันระดับนานาชาติ การศึกษานี้เป็นการพัฒนาและทดสอบโปรแกรมการฝึกสอนโดยผู้เชี่ยวชาญตามสมรรถนะสำหรับครูเทคนิคอาชีพศึกษา กระบวนการศึกษาครอบคลุมถึงการระบุความต้องการและเป้าหมาย การออกแบบและจัดโครงสร้างหลักสูตร การฝึกอบรม การพัฒนาหลักสูตร การวางแผนการฝึกอบรม และการวิเคราะห์ผลลัพธ์ ประสพการณ์ในอุตสาหกรรมและความเชี่ยวชาญเฉพาะด้าน การติดตามเทคโนโลยีเป็นสิ่งสำคัญสำหรับครูด้านเทคนิค ในงานวิจัยนี้ผู้เชี่ยวชาญ 5 ท่าน ได้ประเมินเนื้อหา ข้อสอบ และวัตถุประสงค์เชิงพฤติกรรมของหลักสูตรโดยใช้ IOC ซึ่งได้พบว่าหลักสูตรมีความสอดคล้องกันในส่วนการประเมินประสิทธิผลการฝึกอบรม ผู้เข้าร่วมที่เป็นผู้บริหารและครูเทคนิคอาชีพศึกษาจำนวน 16 ท่าน ได้ทำแบบทดสอบก่อนและหลัง โดยพบว่าคะแนนการทดสอบวัดความรู้ เพิ่มจาก 29.38 เป็น 87.50 โดยผลการวิเคราะห์ t-test พบว่ามีค่า p-value เท่ากับ 0.00 ซึ่งยืนยันว่าการฝึกอบรมทำให้ความรู้เพิ่มขึ้นอย่างมีนัยสำคัญ การวิจัยการเรียนรู้แบบผสมผสานในอนาคตต้องกำหนดวัตถุประสงค์การเรียนรู้ กำหนดสัดส่วนที่เหมาะสมของการเรียนการสอนแบบออนไลน์และแบบเผชิญหน้า และกำหนดความสำคัญของการใช้ระบบการจัดการเรียนรู้ จัดให้มีกิจกรรมการเรียนรู้ที่หลากหลาย และให้ทรัพยากรมากมายแก่นักเรียน ครูและนักเรียนได้รับการสนับสนุนให้แสดงความคิดเห็นและสะท้อนการเรียนรู้ของพวกเขา มีการหารือเกี่ยวกับการประเมินนักเรียนที่มีความหมายและสาขาการเรียนรู้เพื่อปรับปรุงหลักสูตรในอนาคต

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Developing and Evaluating Thai Technical Teacher Training Courses Based on German Technical Vocational Education and Training: A Path towards Global Competitiveness

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Abstract

Technology supports self-directed learning and offers an array of technology-enhanced learning methods. Technical-vocational education and training (TVET) are vital in enhancing skill development opportunities of specialized workforce. Competency development of TVET teachers plays a crucial role in enhancing their global competitiveness. The objective of this study is to develop and assess German-based technical and vocational teacher training courses in order to enhance teacher competencies in effective teaching. Improving TVET teachers' professional competencies is important for them to become better-prepared for global competitiveness. This study involves the development and testing of a competency-based coaching program for TVET teachers. The study process encompasses identifying needs and goals, designing, and structuring the training course, developing the curriculum, planning training sessions, and analyzing results. Industry experience, subject-specific expertise, and the ability to keep up with technological progress are essential for TVET teachers. In the research, five experts evaluated the course content, tests, and behavioral objectives using IOC which reported congruence of curriculum evaluation. To assess the effectiveness of the training program, sixteen school administrators and TVET teacher participants completed the pretest prior to engaging in the training program, then they completed the posttest of knowledge acquisition after training. As results, the posttest scores sharply increased from 29.38 to 87.50, ($p < 0.001$), confirming that teachers' knowledge can be enhanced significantly through intervention. Regarding the implications for future studies on blended learning that combines classroom and online education, it is especially important to clearly define learning objectives, to determine the appropriate proportion of online and face-to-face instruction, to indicate the importance of learning management systems, to provide a variety of learning activities, and to teach students to use multiple resources that could help them learn better. In addition, students should be encouraged to express their opinions and reflect on their own learning. Likewise, teachers should critically reflect on their pedagogical experiences for further development. Last but not least, a meaningful assessment of student learning alongside the curriculum assessment must be brought into account for the development of a future-ready curriculum.

Keywords: Training Course, Vocational Education, German Technical Education

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1. Introduction

Technology has caused rapid social and educational changes. Self-learning in national education lets students discover their potential by utilizing information and activities that match their interests and aptitudes. Flexible learning styles will enable self-improvement and social adaptability for most people in the future. The Vocational Education and Training directly promotes niche labor groupings and specialists. Knowledge transfer, training, cultural heritage, academic advancement, and knowledge accumulation in an appropriate learning environment will enhance individuals and society. Academic institutions are the primary educational centers responsible for establishing educational standards and requirements for the quality of education, the desired characteristics of academic institutions to be used as a benchmark for promoting and controlling academic quality assurance and teaching evaluation, and a system to continuously develop technical teachers and staff to keep up with technological advances. Today, vocational education trains people to create jobs, which boosts the economy and society. Most Thai schools still prioritize content and theoretical memorization. Many academic professionals agree that the current teaching technique hinders students' creativity and prevents them from solving complex challenges [1]. The new method should emphasize skills, life skills, and working capacity, especially critical thinking and problem-solving. This new strategy can prepare students to face future challenges. The Office of Vocational Education Commission (OVEC) emphasizes technical teacher competency development [2].

Teachers must acquire information, skills,

values, convictions, and habits in fundamental vocational training [3],[4]. Teaching, training, discussion, narratives, and project-based research increasingly drive rapid industrial technical advancement. Since many crucial methodological skills are acquired by teachers over their careers or are infrequently used, technical teacher training must be improved.

In Thailand, teachers have a lot of work to do with the content of the subject and unfortunately little time to find out about new innovations and teaching techniques and the resulting consequences for their teaching. Their current job is to teach the lesson in a short amount of time with a large number of students in the classroom. This problem becomes very critical in practical training.

Germany's dual vocational education and training is known for its hands-on experience, extensive partnerships with local businesses, rigorous standards and certification, and graduates' job market success. Germany's technical education programs prepare apprentices for high-paying technical employment with theoretical and practical instruction. The rigorous certification process assures apprentices have the skills to succeed in their professions, while close industry engagement ensures programs are relevant to labor market needs. German technical university graduates are sought after due to their knowledge and readiness for the workforce [5].

The introduction to practical pedagogy prepares technical teachers to plan, execute, and reflect on professional directions. It helps technical teachers understand psychomotor learning and gives them a variety of instructional strategies for teaching knowledge and



understanding to accommodate this shift in learning content and organization. The school's mission requires the development of pedagogical approaches and instructional activities that enhance student maturity and personal fortitude.

German vocational training also focuses on school's regulation and organizational structure, multilingual students, intercultural education strategies, student's psychomotor-cognitive learning and instruction, education morality and goals of students.

Consequently, the objective of this study is to develop and evaluate technical teacher training courses using learning field structural design and arrangement in vocational education institutions based on German technical education. The assessment of training outcomes is established through the utilization of pretest and posttest data with a confidence level of 95%. The contribution of this research is to improve national teaching and learning competencies for global competitiveness.

2. Research Methodology

This study was carried out with the intention of designing and assessing a competency-based training course on expert coaching for technical teachers.

Research and development were the means through which this objective was fulfilled. The research methodology consists of 4 main steps, which are:

2.1 Identify the Needs and Goals of Technical Teacher Development Program

Researcher invited nine experts with diverse backgrounds in knowledge and experience, including

university professors, a technical teacher, an official from the vocational education commission, and representatives from the private sector. The in-depth interview can be concluded as follows:

Technical teachers must prioritize self-determination, experience, self-activity, and lifelong learning. Teachers should be able to trace complicated structures to fundamental principles, obtain overviews of fundamental technical possibilities, and establish a new information assimilation and processing economy in the face of a profusion of data. Participants' learning resistances and experiences with practical-pedagogical introduction approaches will be addressed in the "learning how to learn" feature. Technical teachers create short progression diagram-based trials, and the working group leader must inform and advise themselves on participant learning progress [6].

The German-Thai Dual Excellence Education (GTDEE) initiative is one of the main ways the German-Thai Chamber of Commerce helps German and Thai companies enter new markets and build business relationships [7]. A quality management instrument is needed to sustain vocational education and training, teaching and learning. High-quality vocational education requires teachers with the right knowledge, skills and habits. Technical teachers have to design and assign tasks that require technical, personal, social, and methodological competence.

Teaching quality is influenced by several key factors such as credibility, a learning-friendly atmosphere, language proficiency, feedback culture, and the reflective thinking among students etc. It is essential to recognize that a teacher's role extends beyond the transfer of knowledge. Creating an



environment that fosters lifelong learning necessitates the incorporation of high-quality teaching methods, project-based assignments, the cultivation of independence, and the cultivation of teamwork skills. In order to effectively implement student-centered and project-based learning approaches, Teachers must possess a deep understanding of pedagogy, didactics, and methodology. A well-designed blend of traditional and online learning methods, known as blended learning, can efficiently and effectively cater to the diverse needs of today's students.

Blended learning offers a powerful and effective means of delivering high-quality education by harnessing its inherent flexibility, personalized learning experiences, multimedia resources, collaborative opportunities, and cost-effectiveness. To enhance the overall quality of education, it is crucial for school leadership to adopt a flexible and adaptable approach.

In Thailand, technical teachers are required to possess a teaching license, a vocational education degree, and relevant work experience, ensuring their competence in the field. Technical teachers must employ multiple methods and adopt a holistic approach to provide exemplary professional education. Recognizing the importance of vocational education, Thai government is also actively working towards improving teacher training programs with the aim of enhancing the overall quality of vocational education in the country. [2], [8], [9].

2.2 Design and Development of the Training Course

2.2.1 Curriculum development

In the first stage, E. Tech was selected as

the overall needs design, where the German-Thai Chamber of Commerce (GTCC) and Eastern College of Technology (E. Tech) jointly developed the mechatronics technician program. This program has led to the implementation of project-based teaching and learning at the vocational education level in the electronic and mechatronic field. Before the program began, a workshop was organized by the German-Thai Dual Excellence Education (GTDEE) to familiarize teachers with the levels of teaching required and how to achieve its aims. The workshop was attended by teachers from E. Tech and Don Bosco Technological College from various fields, including the electric power department, industrial technician department, and electronics and mechatronics department. The German operational framework for the teaching and learning curricula for ETECH and Don Bosco's mechatronics was established, and experts from the Thailand Professional Qualification Institute, Thai-German Institute, and the Faculty of Technical Education, King Mongkut's University of Technology North Bangkok joined the workshop to generate and form the learning process for the project-based model with the teachers from both institutions.

The workshops focused on developing a training concept, reviewing, and developing the curriculum, training approaches, field expert observations, providing project-based learning textbooks, using English during project presentations, and the level of competence required of a mechatronics student same as in Germany.

2.2.2 Planning the training sessions

Planning a training session involved defining learning goals, selecting activities and modes of



instruction, creating a timetable, practicing presenting, and making revisions.

The Index of Item Objective Congruence (IOC) was employed to evaluate the alignment between the behavioral objectives, the topic, and the training course. This critical assessment involved the participation of five experts in this phase.

2.2.3 Training material development

It is essential to create effective training materials to conduct a successful training session. These procedures include determining learning goals, considering the audience, choosing content, organizing information, developing visual aids, using clear language, reviewing and editing, formatting materials, and soliciting input from coworkers or test participants. The alignment between content, test, and behavioral objectives was also assessed by IOC.

2.2.4 Delivering the training session

The mechatronics training at the Eastern College of Technology (E. Tech) has led to the partial implementation of the learning field structure in the curriculum, allowing teachers to gain a broader, holistic view of all training content and create a more inclusive and collaborative educational community.

The curriculum's learning field structure was inspired by E. Tech's mechatronics training. Sixteen school administrators and technical teachers were invited to attend the intensive training course "Implementing the learning field structure in the curriculum" to learn about its benefits and guiding principles, how to implement it in classrooms and workshops, and how to integrate it with existing curricula. This program prepares school administrators and technical teachers to implement

the learning field structure into the curriculum. The training course covers competency areas, learning field organization, learning circumstances, and competence-oriented lesson planning. It also examines how school administration creates teaching teams and designs the organizational structure of the school in order to implement the learning field concept. To assist instruction, a manual, a 20 questions exam, PowerPoint presentations, meta cards, and course evaluation forms have been developed. The alignment and quality of the exam was also assessed by IOC.

The training consisted of three sections:

- 1) Conceptual knowledge of learning field concept,
- 2) Expert coaching and development plan, and
- 3) Evaluation, feedback and support.

2.3 Evaluating the Effectiveness of the Training

Evaluating the effectiveness of training entails determining whether the program achieved its intended goals and objectives. Basic evaluation methods include evaluations, surveys, and observations. To ensure ongoing effectiveness, evaluative processes should be ongoing.

The pre-test and post-test data also underwent analysis employing a one-tailed T-Test with a confidence level of 95%.

2.4 Continuous Improvement

The continuous development training is the routine evaluation and enhancement of a training program's effectiveness. This requires identifying areas for improvement and modifying the program to better suit the needs of the learners and the organization. Continuous training enhancement may



involve a variety of activities, including: collecting learner feedback can help determine which training components are effective and which need improvement. This feedback can be used to modify the training's content, delivery, and evaluation methods.

Measuring the extent to which learners can apply what they have learned can help identify training deficiencies and inform program modifications to enhance learning outcomes.

By incorporating new technologies such as e-learning platforms, gamification, and virtual reality, training programs can be improved. By regularly evaluating and incorporating new technologies, training programs can continue to be pertinent and engaging for learners.

The training material should be frequently reviewed and updated to ensure its accuracy, applicability, and currency. This may involve updating information, incorporating new research or best practices, and adding new examples or case studies.

By perpetually evaluating and enhancing training programs, organizations can ensure that they provide their employees with the necessary knowledge and skills to effectively carry out their duties while also fostering their ongoing professional development and growth.

3. Results

3.1 Result of Identify the Needs and Goals of Technical Teacher Development Program

Thailand's vocational education depends on technical teachers' skills. The government has taken steps to improve technical teacher education and incentives. The vocational education in Thailand can

be improved by examining and evaluating technical teacher qualifications.

Technical teachers must have the technical and practical abilities to teach vocational courses. Teachers also should have industry experience and subject-specific knowledge. Thus, vocational schools must ensure their teachers have the practical skills. The knowledge of industry developments and advancements is also crucial. Teachers must keep up with technology advances since vocational education is strongly related to industry. Industry training and workshops must be provided to teachers. Thus, instructional skills and technical knowledge should be assessed together.

The effective pedagogy uses group work, hands-on exercises, and interactive sessions. Thus, effective vocational education requires instructional abilities. Technical teachers should also be evaluated on their adaptation to student demands. Vocational education attracts various intellectual and cultural students. Thus, teachers must change their methods to fit varied student demands.

3.2 Results of the Design and Development of the Training Course

3.2.1 Result of the curriculum development

By presenting the concept of the learning field more thoroughly, teachers should be able to adapt the training content to actual industrial problems. This can help to increase student engagement and motivation, enhance learning outcomes, and better prepare students for real-world success.

The 18-hour training course consists of 6 main topics with several sub topics as shown in Figure 1. In this research, five experts were sent a 20 questions

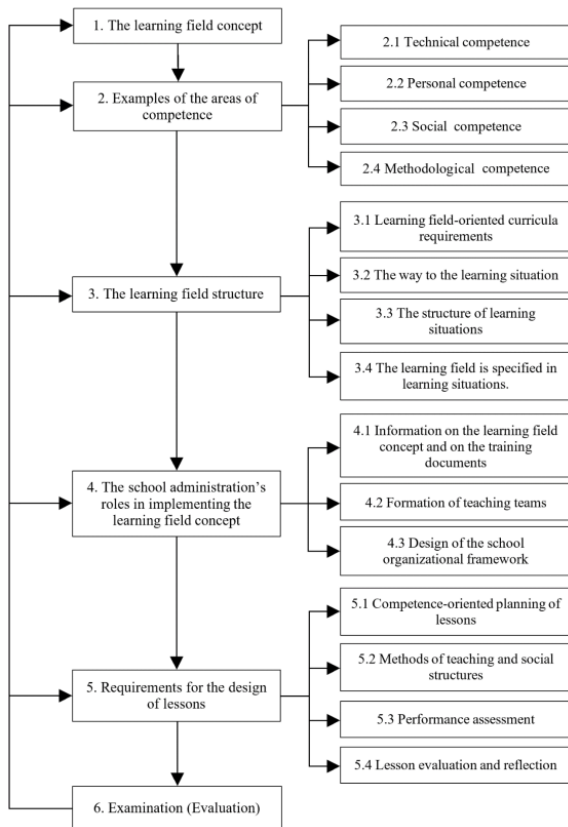


Figure 1 Model of the Training Course

survey regarding the suitability of a training course. According to the results of the evaluation of the training course's suitability, the mean score was between 4.40 and 4.60 on a scale of 5.0, with a standard deviation of 0.55, indicating that the structure of the training course was consistent with the objective of the study.

3.2.2 Result of Planning the Training Sessions

The training curriculum consists of 5 sessions which are 1) The learning field concept, 2) Examples of the areas of competence, 3) Learning field structure, 4) The school administration's roles in implementing the learning field concept, and 5) Requirements for the design of lessons.

Using IOC, five experts assess the congruence between the behavioral objectives, topic, and training course. The results indicate values between 0.60 and 0.80, validating the congruence.

3.2.3 Result of Training material development

Five IOC experts assess the alignment between content, test, and behavioral objectives. The range of 0.60 to 0.80 displayed by the result confirms congruence. The expert team suggests adding additional information to the implementation guide for the learning field structure. This document contains a learning field implementation example of apprenticeship education for mechatronics technicians in a five-year Dual Vocational Education and Training (DVET) program, an excerpt of the profession's thirteen learning fields, the framework curriculum, and the finest German praxis example, the training plan framework. In the classroom, students develop valuable skills. Authentic application should be incorporated into learning environments that are engaging, relevant, and meaningful. Learning consists of planning, determining, executing, controlling, and evaluating. It should be safe and conducive to learning. The objectives and learning environment are determined by the teacher. The objectives for learning describe the expected outcomes of a specific experience. Prior learning and the experiences of the learners define the learning field. In the Thai curriculum, the concept of the learning field should include personnel and educational resources. The program should include fundamental skills, mechatronics-specific practical skills, hands-on training, and an apprenticeship at a workplace specializing in mechatronics. In Appendix C [10], the Federal Institute for Vocational Training (BIBB) -

Germany mechatronics curriculum specifies thirteen learning fields. German mechatronics technicians must possess electrical, mechanical, control, and communication skills. Curriculum frameworks consist of the educational mission of the vocational school, didactic principles of lesson design, preliminary remarks on the job-related learning area, and descriptions of all course learning fields.

3.2.4 Result of Delivering the Training Session

The training course "The Implementation of the Learning Field Structure in the Curriculum" consists of five main topics with subtopics. These topics include the learning field concept, areas of competence, learning field structure, why learning field-oriented curricula requirements, the school administration's roles in implementing the learning field concept, information on the learning field concept and training documents, formation of teaching teams, design of the school organizational framework, requirements for the design of lessons, competency-oriented planning of lessons, methods of teaching and social structures, performance assessment, and lesson evaluation and reflection.

The training course developed a handbook and 20 questions exam with multiple correct answers in paper form and Google Forms for online use. The 20 questions exam is based on the "all or nothing principle," meaning that the task is only rated as correct if all correct answers are ticked. Questions with multiple correct answers offer several advantages over those with only one correct answer, such as more flexibility in testing, deeper learning and critical thinking, and reducing the impact of guessing on test scores. The most important details are the exam evaluation sheets for pretest and Post-test

which contains basic descriptions of all topics related to the exam questions.

3.3. Results of the Evaluation of the Effectiveness of the Training

There was a total of sixteen participants who attended the training. Before the actual instruction was administered, each of them worked on pretest examination. Following the completion of the course, participants were given a Post-test to complete. The 20 questions exam was to determine the current level of knowledge. Due to the subject-based education in Thailand, the participants had limited exposure to the learning field concept, as disclosed in a subsequent discussion. Therefore, interdisciplinarity is rarely utilized in the classroom.

The training improved the average score from 29.38 to 87.50 with a p -value of 0.00 (less than 0.05), as shown in Table 1. This demonstrates that the training had a significant impact on the participant's knowledge development.

Table 1 t-Test: Paired Two Sample for Means.

	Pretest	Post-test
Mean	29.375	87.5
Variance	209.5833333	60
Observations	16	16
Pearson Correlation	0.014862599	
Hypothesized Mean Difference	0	
df	15	
t Stat	-14.24880	
P(T <= t) one-tail	0.00000	
t Critical one-tail	1.75305	
P(T <= t) two-tail	0.00000	
t Critical two-tail	2.13145	

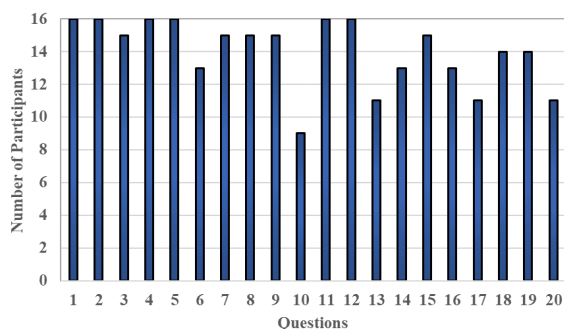


Figure 2 Number of participants who answered each question correctly. (Post-test)

3.4. Results of Continuous Improvement

The researcher analyzed two data sources to optimize future training.

3.4.1 The examination data

Since each of the sixteen participants has completed the 20 post-test questions, it has been determined that each participant's knowledge has increased substantially. It has been discovered that the majority of participants can answer some queries correctly, indicating that the training is able to provide participants with extremely explicit knowledge. However, it has been discovered that fewer participants can correctly answer certain questions, as illustrated in Figure 2. The figure demonstrates that only nine, eleven, eleven, and eleven of sixteen participants can correctly answer queries 10, 13, 17, and 20, respectively. This appears to necessitate further discussion.

After training, a post-test was conducted to evaluate the level of knowledge among participants, and feedback was given immediately. However, some participants misunderstood certain questions, causing confusion. Continuous evaluation of work processes is necessary to ensure successful

implementation of the learning field concept, which can be achieved through interim reflection, support from school management, an exchange of experiences between teachers, and the formulation of common goals.

3.4.2 Training Evaluation

Participants also evaluated the training in terms of level of effort, contribution to learning, skill and responsiveness of the coach, course content and facilities.

Table 2 Training evaluation results.

Item	Mean	S.D.
Learning objectives were clear.	4.625	0.619
Course content was organized and well planned.	4.500	0.730
Course workload was appropriate.	4.563	0.629
Course organized to allow all Teachers to participate fully.	4.625	0.719

According to Table 2, the training course was effective and well-received by most participants with various levels of skill and knowledge. The course achieved its goal of improving participants' skills and knowledge, and the presentation, teacher, grading, learning objectives, content, workload, opportunities for participation, training room setup, air conditioning, and breaks were all effective in creating a conducive and comfortable learning environment.

4. Discussions and Conclusions

The rapid advancement of technology has expedited societal and educational transformations, facilitating personal growth through autonomous acquisition of knowledge and adaptable approaches



to learning. Academic institutions establish and uphold criteria while fostering specialized labor groups through vocational education and training (VET). The development of technical teacher competency is essential for achieving international competitiveness. The objective of this study was to develop and evaluate technical teacher training courses that draw upon the principles and practices of German technical education.

The research methodology encompasses the process of identifying needs and objectives, designing and constructing the training course, formulating the curriculum, organizing the training sessions, and evaluating the outcomes.

Technology has accelerated social and educational changes, enabling self-improvement through self-learning and flexible learning styles. Academic institutions set standards and promote specialty labor groups through VET. International competitiveness requires technical teacher competency development. This objective of this research was to develop and evaluate technical teacher training courses based on German technical education.

The research methodology involves identifying needs and goals, designing and developing the training course, developing the curriculum, planning the training sessions, and assessing the results.

A better understanding of the learning field concept helps teachers tailor training to real-world industrial problems. This method may boost student motivation, learning outcomes, and real-world success. The 18-hour training course covers six main topics with multiple subtopics. This study surveyed five experts with 20 questions to evaluate a training course.

The training course's appropriateness assessment yielded an average rating of 4.40 to 4.60 on a 5.0 scale, with a standard deviation of 0.55. These results indicate that the training course design meets the research objective.

A total of sixteen individuals participated in the training program. Each participant engaged in the completion of pretest and Post-test assessments. The training program resulted in a significant increase in the mean score, with the average score rising from 29.38 to 87.50. This improvement was statistically significant, as indicated by a P-value of 0.00. This finding indicates that the training program had a substantial influence on the participants' acquisition of knowledge.

Prior to designing a blended learning program, it is essential to identify lucid learning outcomes, determine the optimal blend of online and face to face instruction, utilize a Learning Management System (LMS) to facilitate content management, progress monitoring, and learning outcome evaluation, employ a diverse range of learning activities, engage in collaborative and interactive activities with peers and teachers, and provide students with access to a variety of learning resources. These recommendations will help enhance future research in these fields; 1) conduct a thorough evaluation of blended learning initiative's efficacy to determine its success in achieving its educational goals, 2) improve subsequent iterations of the curriculum, it is necessary to collect student and teacher feedback.

The training evaluation results indicated that the participants expressed satisfaction with the training course. All scores obtained surpass the threshold of 4.500, indicating a level of performance that can



be classified as excellent.

Several recommendations exist for implementing the learning field concept when implementing a learning field in the curriculum: clearly define the learning goals, select appropriate learning activities, provide adequate resources, and ensure that the learning field is aligned with the course's overall objectives.

The most important details are that teachers should encourage reflection and feedback, assess student learning in a meaningful and appropriate way, and implement learning fields in the curriculum to promote student learning and engagement. These suggestions will aid students in acquiring a deeper understanding of the topic and applying their knowledge effectively.

References

- [1] J. N. Warnock and M. J. Mohammadi-Aragh, "Case study: use of problem-based learning to develop students' technical and professional skills," *European Journal of Engineering Education*, vol. 41, no. 2, pp. 142–153, 2016.
- [2] N. Prachyanun, C. Pinanta, and S. Thapanee, "The project-based learning management process for vocational and technical education," *Higher Education Studies*, vol. 11, no. 2, pp. 20–29, 2021.
- [3] G. halasz and A. Michel, "Key Competences in Europe: interpretation, policy formulation and implementation," *European Journal of Education*, vol. 46, no. 3, pp. 289–306, 2011.
- [4] K. Hauge and P. Wan, "Teachers' collective professional development in school: A review study," *Cogent Education*, vol. 6, no. 1, pp. 1–20, 2019.
- [5] P. Blumenthal and U. Grothus, "Developing global competence in engineering students: U.S. and German Approaches," *The Online Journal for Global Engineering Education*, vol. 3, no. 2, pp. 1–12, 2008.
- [6] T. Rucker, "Teaching and the claim of bildung: The view from general didactics," *Studies in Philosophy and Education*, vol. 39, pp. 51–69, 2019.
- [7] German-Thai Chamber of Commerce (2021, March). GTCC Annual Report 2020. [Online]. Available: https://issuu.com/germanthaichamber/docs/gtcc_annual_report_2020
- [8] S. Theerasak and K. Buratin, "Comparing employability skills of technical and vocational education students of Thailand and Malaysia: A case study of international industrial work-integrated learning," *Journal of Technical Education and Training*, vol. 11 no. 3, pp. 94–109, 2019.
- [9] P. Meesuk, B. Sramoon and A. Wongrugsu, "Classroom action research-based instruction: The sustainable teacher professional development strategy," *Journal of Teacher Education for Sustainability*, vol. 22, no. 1, pp. 98–110, 2020
- [10] D. Präsident. (2011, July 29). Ordinance on Vocational Education and Training in the Occupation of Mechatronics Fitter. [Online]. Available: https://www.govet.international/dokumente/pdf/5_govet_mechatroniker_ausbildungsrahmenplan_en.pdf