

## COLLABORATION ON RESEARCH METHODOLOGY TRAINING THROUGH VISITING MALAYSIAN PROFESSORS FOR LECTURERS IN INDONESIA

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### Abstract:

Improving the quality of research and development in the manufacturing industry is the main focus in the community service entitled "Collaborative Research Methodology Training Through Visiting Professor Malaysia for Lecturers in Indonesia". The initiation of this collaboration was carried out by the Politeknik Indonusa Surakarta, Pancasakti University Tegal, and STT Warga as a response to concerns about the quality of research by lecturers and students in Indonesia. Through research carried out by lecturers and students, whether in final assignments, theses, theses or dissertations, it is hoped that there will be increased academic activity and a deeper understanding of current developments in the manufacturing industry.

In order to achieve this goal, this program involves visiting professors from Malaysia to provide research methodology training to lecturers in Indonesia. Through this collaboration, it is hoped that synergy will be created between the visiting professor's experience and knowledge and the local Indonesian context. It is hoped that this training will be able to improve the quality of research carried out by lecturers, so that it can make a positive contribution to the development of the manufacturing industry in Indonesia. Thus, this collaboration is a strategic step in improving academic quality and research contribution to the development of the manufacturing industry in Indonesia.

**Keywords:** collaboration, training, research and methodology, lecturers, students

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In order to achieve this goal, this program involves visiting professors from Malaysia to provide research methodology training to lecturers in Indonesia. Through this collaboration, it is expected to create synergy between the experience and knowledge of the visiting professor and the local Indonesian context. This training is expected to improve the quality of research conducted by lecturers, so that it can make a positive contribution to the development of the manufacturing industry in Indonesia. Thus, this collaboration is a strategic step in improving academic quality and research contribution to the development of the manufacturing industry in Indonesia.

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## Introduction

The mission of higher education is to carry out education, research and community service (Tri Dharma higher education). Tri Dharma activities are carried out in a balanced manner by the higher education academic community, especially lecturers, which are adapted to suit the demands, developments and needs of industry and society. Lecturers as implementers of the Tri Dharma of Higher Education are expected to adapt and further develop academic culture so that their productivity and contribution to society is high. This is stated in the Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers, Chapter I Article 1 and Article 60 as well as the Regulation of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 20 of 2017 which explains that lecturers are professional educators and scientists with the task of The main aim is to transform, develop and disseminate science, technology and art through education, research and community service. The duties and authorities of lecturers are also explained in article 60 point a (Oviyanti et al., 2018) that in carrying out professional duties, lecturers are obliged to carry out education, research and community service.

The performance of lecturers in carrying out the tri dharma influences the quality of higher education and also has a direct impact on the development of lecturers' academic careers. Lecturers have the right to increase their functional positions or receive professional certification allowances with the obligation to carry out their higher education tridharma regularly according to predetermined standards (Jajuk Herawati, 2019). However, the fact that is observed in partners is that some lecturers are more active in teaching and community service. Published research activities are considered minimal and only to meet minimum standards of obligation. Even though research and publications have a very high portion of assessment in functional position assessments.

Research Prasetyo et al., (2024) Basically it is a scientific way to obtain data with certain purposes and uses which are based on scientific characteristics, namely rational, empirical and systematic. Research is a rational activity because it is carried out in a reasonable way so that it is within reach of human reasoning. Empirical means that the process carried out can be observed by the human senses, so that researchers can observe and know the methods used. Systematic means that the process used in the research uses certain logical steps. Meanwhile, scientific publications (Waluyo et al., 2022) as a medium for disseminating knowledge, findings and research results published in scientific journals, conferences or other academically recognized learning sources. Scientific publications can take the form of journal articles where research is described systematically starting from introduction, methods, results and conclusions.

In fact, the low level of interest in researching and publishing occurs in universities, both public and private, although various efforts have been made by the government through the Ministry of Education, Culture, Research, Technology and Regional Kopertis as well as the universities themselves by carrying out workshops/training and providing funding incentives, but these efforts do not seem to have had maximum impact. Lecturers' low research interest can be

caused by the lecturers themselves internally. For example, individual competence, achievement motivation, and commitment to the institution. External factors such as infrastructure, incentives, working atmosphere, level of competition to obtain funding and quality publication platforms.

Seeing the obstacles faced by lecturers in carrying out research performance, four universities then collaborated to hold research methods training for lecturers by bringing in professors from UNIKL Malaysia Mastech as resource persons. The universities that joined are Jakarta State Polytechnic, Politeknik Indonusa Surakarta, STT Warga, and Pancasakti University Tegal. Through research methodology training, the target is for lecturers to be skilled in planning the research process. In planning research activities, methods are a part that needs special attention. Therefore, lecturers need to be given refresher regarding strategies for preparing methods in conducting research.

## Method

The method of implementing activities is in the form of training. Training is carried out using presentations using Ms. Power point. The practice carried out is the application of research methodology that is adapted to needs in the field.

The stages of implementing this activity start from: 1. Observation of activity targets; 2. Distributing questionnaires to lecturers (Pre-training); 3. Coordination with resource persons; 4. Carrying out training with lectures and discussions, and 5. Providing post-training questionnaires to determine the increase in knowledge and understanding regarding the application of research methods; 7. Discussion/question and answer related to the material and training provided.

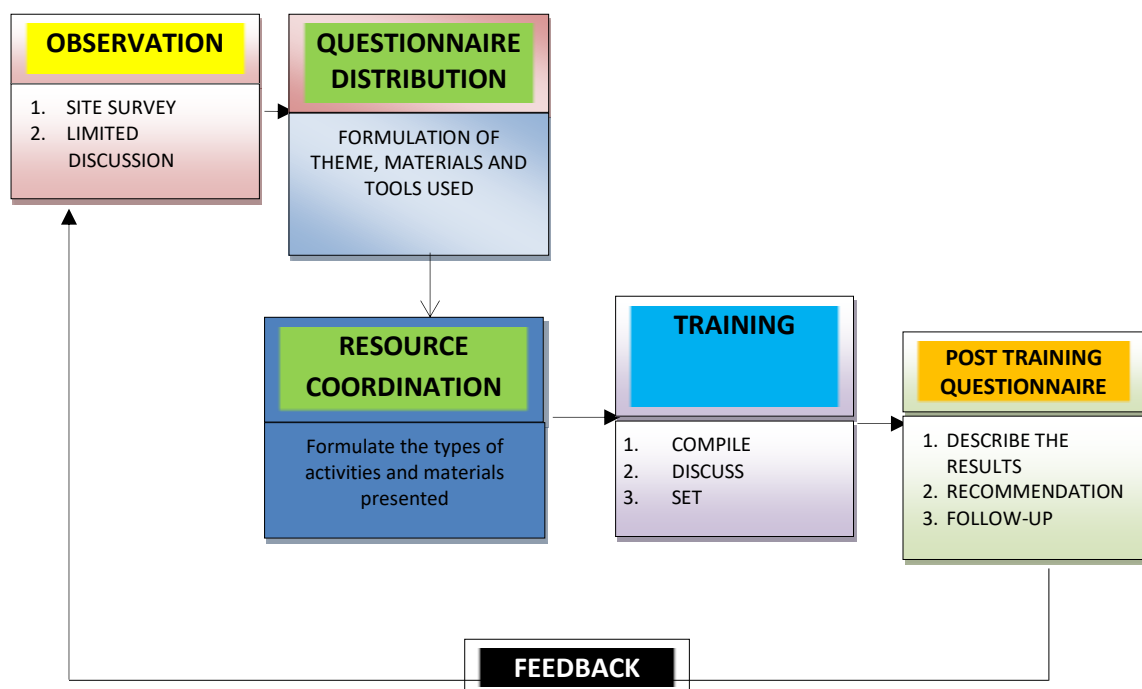


Figure 1. Problem Solving Framework

## Results and Discussion

Community service collaboration was initiated by the Politeknik Indonusa Surakarta, Pancasakti Tegal University and Citizen Technology College. This service collaboration was the beginning of concerns about the quality of research by lecturers and students regarding current developments in the manufacturing world. Research carried out by lecturers or students (final project, thesis, thesis or dissertation) aims to encourage academic activities and knowledge of developments in the industrial world to be of higher quality. Each academic community competes according to their respective competencies with a minimum of knowing (to 2 know) but also being able to understand (do being). A person must not only have expertise (skill) but must be ethical (moral) to be able to compete in the modern world. Animals and other living creatures are able to use tools to sustain life, but do not understand the meaning of life, namely being ethical and cultured. In the process, manufacturing research is needed as a foundation for technology, just as research is needed to enrich culture where technology plays a role in human welfare (Prof. Dr. Okid Parama Astirin, 2020). Therefore, the development of manufacturing itself can bring technology, there needs to be continuous and in-depth study so that science does not remain in books in libraries, there needs to be research to explore potentials that can improve human life. Likewise, so that research does not stay on campus and so that it is useful, it must be carried out downstream.

The series of activities will be carried out for 1 week starting from March 10 - 16 2024. On March 10, the committee picked up the speaker's arrival from Jakarta and then went to Pancasakti Tegal University on March 11 2024. On March 13 2024, the organizing committee together with the resource person went to Solo, specifically the Politeknik Indonusa Surakarta. On the 14th, speakers spoke at Citizen's Technology High School.

This activity started with the presentation of material delivered by the first resource person, namely Wachid Yahya, M.Pd. The topic presented was "Recent Development of Additive Manufacturing Technology" where Additive Manufacturing technology is currently experiencing very rapid development, especially Trends in Material and Process Innovation, for example New Materials: Advances in materials science have introduced high performance polymers such as PEEK, PEKK, and Ultem, as well as better metal alloys. These materials enhance 3D printing capabilities, enabling the production of components that can withstand extreme conditions and have better compatibility with AM processes. Next is Metal Additive Manufacturing: Techniques such as laser powder bed fusion and computational metallurgy solve long-standing materials challenges, making it possible to produce components with high temperature resistance and superior material properties.

1. After the break, the presentation of the material continued with Special AM Applications in the Industrial world: Aerospace and Defense:

The aerospace sector continues to be a significant driver of AM innovation. Additive manufacturing helps to rapidly increase production capacity and create complex components that are difficult to produce with traditional methods.

2. Medical Devices: The medical industry leverages AM for personalized medical solutions, including implants and prosthetics. The ability to customize devices for individual patients and produce prototypes quickly accelerates the development and availability of new medical technologies (3D Systems).

**Job Growth** The industry is growing rapidly, with a marked increase in job creation. This growth reflects the increasing demand for AM skills across multiple sectors, contributing to the overall economic impact. These advances not only increase the capabilities of additive manufacturing but also expand its applications across a wide range of industries, making it a critical technology for the future of manufacturing.

In the second session, the material was delivered by Prof. Dr. Wan Mansor Wan Muhamad who is Head of Mechanical Engineering, Malaysian France Institute, Universiti Kuala Lumpur Malaysia. He delivered material about "Essentials of Research Methodology". Research methodology is an important aspect in conducting a systematic and scientific investigation. Research methodology involves the principles, procedures, and techniques used to collect, analyze, and interpret data. Important things in research methodology are:

1. Research design

Definition: A framework or blueprint for conducting research. A research design details the procedures necessary to obtain the information needed to construct or solve a research problem.

2. Type:

Exploration: Exploring a new, little-known area.

Descriptive: To describe the characteristics of a population or phenomenon.

Experimental: To determine cause-and-effect relationships by manipulating variables.

3. Research Questions and Hypotheses

Research Questions: The specific questions the research seeks to answer.

4. Hypothesis: A testable prediction derived from the theories that the research seeks to test.

5. Method of collecting data

Qualitative Methods: Non-numerical data (interviews, focus groups, observations).

Quantitative Methods: Numerical data (surveys, experiments, secondary data analysis).

Mixed Methods: A combination of qualitative and quantitative approaches.

6. Data analysis

Qualitative Analysis: Thematic analysis, content analysis, narrative analysis.

Quantitative Analysis: Statistical techniques such as descriptive statistics, inferential statistics (regression, ANOVA).

7. Validity and Reliability

Validity: The extent to which research measures what it is intended to measure.

Internal Validity: The extent to which research results can be related to the independent variables.

External Validity: The extent to which findings can be generalized to other settings.

8. Data Interpretation and Reporting

Interpretation: Making sense of data, understanding patterns, and drawing conclusions.

Reporting: Presenting findings clearly and accurately, often in a structured format such as a

research paper or report.

9. Limitations and Future Research

Limitations: Recognize the constraints and potential weaknesses of the research.

Future Research: Suggest areas for further investigation based on findings.

10. Applications and Implications

Practical Implications: How the findings can be applied in real-world settings.

Theoretical Implications: How the findings contribute to existing knowledge and theory.

By understanding and applying these essentials, researchers can conduct rigorous and impactful research that contributes valuable insights to their field.



Figure 2. FGD activities at Pancasakti University



Figure 3. FGD activities at STT Warga



Figure 4. FGD activities at Politeknik Indonusa Surakarta

## Conclusion

The community service collaboration initiated by the Politeknik Indonusa Surakarta, Pancasakti University, and STT Warga is a step inspired by concerns about the quality of research and development in the manufacturing industry. In this collaboration, resource persons from UNIKL, students and lecturers took an active role. The main aim of this collaboration is to improve the quality of research from both lecturers and students in responding to the challenges of the current development of the manufacturing world. Through synergy between higher education institutions, it is hoped that there will be strengthening in the understanding, application and development of technology and innovation in the manufacturing sector which can have a positive impact on society at large.

Through collaborative community service activities, research is also able to trigger more productive and high quality research so that it can be downstreamed into the industrial world. The role of universities as academics will have a positive impact on the industrial world.

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