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Design of Capacity Development Program in Digital Mindset for Vocational Lecturers in Ministry of Transportation

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ABSTRACT

The Ministry of Transportation holds 22 civil service schools divided into land, sea, air, and railway dimensions and has a role in producing reliable, professional, qualified transportation apparatus, with link and match in the labor market. Digital transformation not only forces government bureaucracy to change with the pattern of technology utilization, but also in learning method. Lecturers' digital skills play a role in aligning education patterns with the millennial generation and adapting with global standards. The results of the digital mindset competency mapping of Lecturers in the Ministry of Transportation found that 13% of Lecturers were still in the low competency category, 11% in the high category, and 73% in the intermediate category. Gap analysis was carried out using the TNA instrument method and recommendations for filling the competency gap through curriculum design and syllabus for Digital Mindset for Lecturer training. The program will have a strong focus on digitalization of teaching materials, artificial intelligence in the academic world, and Implementation of Technology in Scientific Work, Research, and Publication. The design of capacity development program including the supporting training program, micro-learning, and other competency development program based on Regulation of the State Administration Agency of the Republic of Indonesia Number 10/2018.
Keywords: Capacity Development, Digital Mindset, TNA, Lecturer Competency

INTRODUCTION

In 2024, the Minister of Transportation (MoT), Budi Karya Sumadi, delivered a mandate to all Lecturers in the Ministry of Transportation regarding the achievement and improvement of competencies in 3 (three) learning outcomes, digital mindset, lecturers as role models, and lecturers as a coach. This study focuses on the priority of learning outcomes, namely the digital mindset for lecturers where the current digitalization aspect cannot be separated from how, methods, and processes of the teaching and learning process in higher education. Current learning methods use more animation and learning videos to support teaching materials (Liu et al., 2019). Also, the demographics of students who are in the millennial generation are also a generation of fast learners who can access knowledge and lots of information with digital technology (Audrin et al., 2022). Lecturers need to be in line with the needs and demands of learning in the digital era. In addition, issues related to the use of AI, plagiarism, and the trend of students who tend to be lazier to read because they are facilitated by copy-paste technology make Lecturers need to understand better the more appropriate and more effective educational strategies.

In the era of the headway of education, the role of Lecturers as educators and teachers is increasingly important (Wong et al., 2019). Lecturers are not only required to master the material being taught but must also be able to use innovative and effective teaching methods (Nilson, 2016). In addition, with the advancement of information and communication technology, lecturers are expected to be able to utilize various digital platforms in the learning process. To meet these demands, ongoing training is very important so that lecturers can improve their competence and professionalism. One approach that can be used in this analysis is by conducting competency mapping of Lecturers in the Ministry of Transportation, so that the

competency gap of the job holder that requires training can be identified. The competency gap between the competencies possessed by lecturer job holders and the competencies that should be possessed is a competency need that needs to be improved through training and becomes the basis for formulating training programs including curriculum and syllabus.

Digital Lecturer with the expectation of improving lecturer capabilities in the technology adaptation by integrating digital technology into the learning process to create an interactive and engaging learning experience for students/cadets (Valverde-Berrocoso et al., 2021). Due to some of the civil schools in MoT using online learning platforms, Learning Management Systems (LMS), so that the Lecturers need to be able to collaborate with applications to support teaching activities. Digital mindset should encourage creativity and innovation in materials, develop teaching materials that can be accessed online and are multimedia-based (video, infographics, interactive modules) to improve students/cadets' understanding and interest in learning. Facing with milenial generation who is well known as digital generation requires data and analytics mastery as a lecturer should understand the use of analytical data to evaluate and improve learning effectiveness, such as monitoring student/cadet development through attendance, participation, and learning outcome data.

METHOD

This study used a quantitative analysis method by distributing questionnaires to respondents. The questionnaire used was designed like training needs analysis (TNA) where the statements given are competencies expected to be possessed by lecturers. The questionnaire is divided into 3 variables: digital literacy, data management, innovation and adaptability. The respondents were lecturers in 22 vocational schools in MoT. According to the HR personnel information system (SIK) total of lecturers in MoT recorded was 576 lecturers. This number does not fully accommodate lecturers at vocational schools in MoT because of the large number of "dosen terbang", guest lecturers, instructors and non-lecturing personnel. Data collection was conducted in August - October 2024 and 516 data were obtained. To determine the validity and reliability of the questionnaire, Cronbach's Alpha and Pearson values were used. Pugu (Pugu et al., 2024) stated that for Alpha values> 0.6 and Pearson <0.05, the instrument met the validity and reliability requirements. Validity and reliability test result shows that all variables used in TNA instrument generate accepted value. The respondents filled out the questionnaire using a Likert scale of 1 – 4 with a value of 4 = very capable, 3 = capable, 2 = not able, and 1 = very not able.

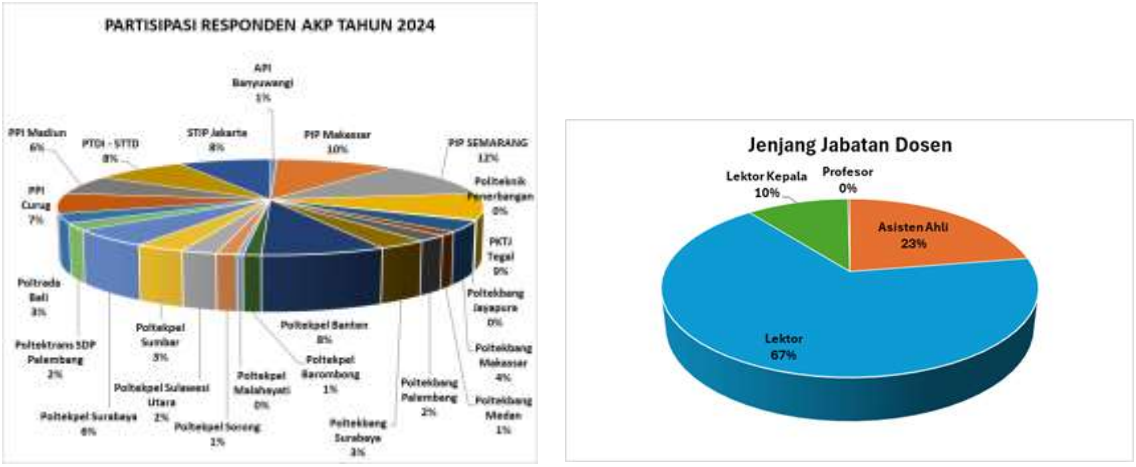
To facilitate the analysis from the questions, the values obtained are categorized into 3 groups based on the average of the respondents' answers following the standard deviation formula. The categorization calculation formula is as follows; Low competency: $x < (\mu-\sigma)$, Medium competency: $(\mu-\sigma) \leq x \leq (\mu+\sigma)$, and High competency: $x > (\mu+\sigma)$ where x is the competency value, μ is the average value of the respondents' answers to all question items in the questionnaire, and σ is the standard deviation of the respondents' answers to all question items. If the scale used in the instrument becomes the criteria for lecturers' competency achievement, then it can be assumed that lecturers' competency achievement is at a score of 1, meaning that they have achieved 25% of the competency needs for the position (job competency match). A score of 2 is a competency achievement of 50%, a score of 3 is considered to have achieved 75% of competency, and a score of 4 is a 100% competency achievement.

RESULT and DICUSSION

In the implementation of the 2024 TNA, the data of Lecturers based on the data recapitulation in the Ministry of Transportation's SIK supported by data confirmation from the HR personnel of each Civil Services School, a total of 576 prospective respondents were obtained. From the data collection and data cleaning process carried out, the total data obtained and further analyzed amounted to 516 respondents. This number has met the scientific principles for

further analysis. The demographics of respondents show the mapping of employees in the group of Lecturers at the MoT, where above 50% of male employees are in the age group > 45 years. This shows the existence of the millennial generation and generation Z which tends to be lower which allows for results related to digital skills which are generally more possessed by the millennial generation and generation Z. Furthermore, a demographic mapping was carried out on the length of service at MoT and the level of Lecturer positions. The length of service mapped in the instrument is not specific to the length of service in a particular position/position, it means that in the length of service written by the respondent, the respondent may have had other work experience, have held other structural/executive/functional positions, or through a transfer process in his/her current Lecturer position. Mapping of Lecturers in the MoT is dominated by Lecturers in III/c (Penata) to III/d (Penata Level I). Meanwhile, from the work period, most lecturers in MoT have served for more than 15 years. The trend of lecturers in the MoT is that some of whom have been involved in the technical, operational, and structural fields then devote their knowledge, competence, expertise, and experience as educators (Lecturers) in civil service schools in the MoT. This is important because civil service schools in the MoT are vocational schools that produce graduates who are ready to work, technically skilled in the field, and link and match in the industries, so that lecturers in civil service schools also need to have experience in the field and technical skills that support theoretical knowledge.

Field experience helps lecturers to better understand the procedures, tools, technologies, and standards that apply in the industry. This allows lecturers to teach the material in a way that is relevant and in accordance with the needs of the labor market. Lecturers with practical experience can relate theory to real situations faced in the field. Thus, it is expected to help vocational students/cadets to see how theory is applied and adapted in everyday work. With field experience, lecturers can tell real scenarios and challenges that are often faced in the world of work and help build soft skills of students/cadets such as problem solving, communication, and teamwork.



(a) (b)

Picture 1. (a) Percentage of Lecturers Participation, and (b) Percentage of Lecturer Job Level

Analysis of the results of the data collection was carried out quantitatively through statistical methods. To facilitate the analysis of Digital Mindset competency the values obtained were categorized into 3 groups based on the average of the respondents' answers following the standard deviation formula. The categorization calculation formula is as follows;

• Low category: $x < (\mu-\sigma)$

• Intermediate category: $(\mu-\sigma) \leq x \leq (\mu+\sigma)$, and

• High category: $x > (\mu+\sigma)$ where x is the category value, μ is the average value of the

respondents' answers to all question items on the questionnaire, and σ is the standard deviation of the respondents' answers to all question items.

Table 1. Digital Mindset Competency

Variable	Average Score	Category
Digital Literacy	2.98	Intermediate
Data Management	3.03	Intermediate
Innovation and Adaptability	3.	Intermediate

Digital Mindset is needed in adapting to educational technology. The development of technology presents many tools and platforms that can improve the quality of learning, such as Learning Management Systems (LMS), video conference applications, and interactive learning devices. Lecturers who have a digital mindset are able to adopt and utilize this technology optimally in teaching. Development of data-based learning through a digital mindset, the lecturers are better prepared to use data to understand the learning needs of students/cadets. The use of big data, for example, can help in identifying learning patterns, evaluating the effectiveness of learning, and adjusting teaching methods to better suit the needs of students/cadets. From Table 1 shown the result that the average Lecturers in MoT was in intermediate level. Digital mindset competency allows Lecturers to create flexible learning experiences, for example through online or hybrid learning in civil service schools. This makes it easier for students/cadets to study according to more flexible time and place, so that it can increase the accessibility of education. From the average score of respondents in each variable in the Digital Mindset for Lecturers, it is obtained that the competency of Lecturer competency in the MoT is good, however, the lowest score is the ability in digital literacy. Digital literacy used as a reference for State Civil Apparatus (ASN) is the 4 pillars of digital literacy of the Ministry of Communication and Digital of the Republic of Indonesia; digital skill, digital culture, digital ethic, and digital safety. The average value of digital literacy skills of 2.98 is one of the focuses of competency development of lecturers in MoT. This result can also be associated with the demographics of lecturers in MoT who are employees aged >45 years by 46%. The generation at that age is included in generation X. Lecturers from generation X (generally born between 1965 and 1980) often face several obstacles related to the digitalization of learning. The results indicates that some lecturers still have limitations in digital skills such as using applications for online classes, creating interactive content, or using social media as a teaching tool. Many lecturers in generation X grew up with more manual, traditional teaching methods, have a more stable and structural mindset. Generation X usually teaches cadets from generations Y (Millennials) and Z who are more digital-savvy and accustomed to technology. This condition creates a gap in communication and learning styles, where cadets expect more interactive and technology-based methods, while lecturers may still tend to use traditional approaches.

The challenges in managing Lecturer data in the academic field are quite complex and require special attention due to the variety of academic data that must be managed and the need to maintain the integrity and security of information. Data integration generally comes from various systems, such as SIAKAD (Academic Information System) data, performance/e-performance, research, teaching, and certification. Integrating data from various sources so that it is stored in one centralized system is often a major challenge, especially if the systems are not compatible with each other. Changes in the system from institutions, supervisory institutions (Dikti), and the MoT still cause several groups of Lecturers need to pursue an understanding of these things. Improving understanding related to the system can be done through webinar activities, technical guidance, socialization, and practice. Based on the TNA results, the achievement of innovation and adaptability capabilities is good. The competency gap in the ability to innovate is the creation of creative learning. This gap

occurs as a continuation of the competency gap of Lecturers in their digitalization capabilities as previously discussed. Meanwhile, related to adaptability in teaching, the competency gap occurs in the ability to use new technology, such as padlet, jamboard, mentimeter, kahoot, google based applications. From the qualitative data that supports the main source of the results is the change of the curriculum for higher education is also an obstacle for Lecturers because civil service schools are required to follow the curriculum set by the government. Often, Lecturers do not really get in-depth or socialization regarding the latest Higher Education curriculum, so Training of Facilitators or Training of Trainers is needed for Lecturers to adjust to the latest curriculum.

(a)

(b)

(c)

Picture 2. (a) Digital Literacy Score, (b) Data Management Score, and (c) Inovation and Adaptability Score

Furthermore, we analyzed each value for instrument statement which lead to detail the gap competencies. These questions can be the basis for compiling and focusing on designing the curriculum and syllabus for Digital Mindset for Lecturer training where the training program aimed at Lecturers in the MoT can fill the competency gap or competency that still needs to be improved. The design of the training program that emphasizes 3 (three) competencies, namely; digital literacy, data management, and innovation and adaptability can be formulated into the following training program syllabus:

Table 2. Digital Mindset Training Design for Lecturer

No	Training Subject	Material	Sub Material
Basic Materials			
1.	Competency Development Program/ Overview.		
2.	Building Learning Commitment.		
3.	Lecture: Digital Mindset for Lecturer	Digital Mindset	• Lecturer in society 4.0 • 4 Pilars of Digital Literacy

			• Transformation of learning styles in the information technology era
Core Materials			
1.	Digitalization of Learning Materials	1. Digital tools 2. Making Digital Learning Materials 3. Interactive Learning	1. Digital Tools, sub-topics: • Types of digital learning tools • Collaboration of Google-based digital tools • Social media as a learning tool 2. Making Digital Learning Materials, sub-topics: • Making broadcast materials/recorded audio teaching materials • Making broadcast materials/audiovisual teaching materials 3. Interactive Learning, sub-topics: • Interactive Quiz • Survey and Polling
2.	Articial Intelligence in Education	1. Basic Concepts of AI 2. Use of AI in Education 3. AI for Adaptive Learning 4. AI for Evaluation and Assessment 5. Ethics and Policy of AI Use	1. Basic Concepts of AI, sub-topics: • Basic Concepts of Artificial Intelligence • Importance of Artificial Intelligence • AI Language 2. Use of AI in Education, sub-topics: • AI components: machine learning, deep learning, NLP, and Computer Vision • AI Trends in Higher Education • AI Case Studies in Higher Education • Challenges and Opportunities for AI Implementation in Higher Education 3. AI for Adaptive Learning, sub-topics:

			• AI-based adaptive learning technology (examples: EdTech platforms and chatbots as learning assistants) • Designing AI-based content for personalized learning experiences 4. AI for Evaluation and Assessment, sub-topics: • Automatic analysis of essay answers using NLP • Automatic grading system for quizzes and exams 5. Ethic and Policy for AI Use, sub-topics: • Data privacy in the use of AI in education • Algorithmic bias • Institutional policies for fair and responsible implementation of AI
3.	Implementation of Technology in Scientific Work, Research, and Publication	1. AI in Scientific Research and Data Visualization 2. Research Data Analysis with AI 3. Plagiarism Checking and Plagiarism Prevention Strategies 6. Optimizing Scientific Publications	1. AI in Scientific Research and Data Visualization, sub-topics: • Utilizing AI for literature exploration: Google Scholar, ResearchRabbit, and Semantic Scholar. • Writing tools: Grammarly, Quillbot, and ChatGPT. • Strategies for constructing data-based scientific arguments.

			2. Research Data Analysis with AI, sub-topics: • AI-based data analysis software (Orange, RapidMiner, SPSS with AI tools). • Statistical analysis techniques with Python and R for scientific research. • Practice: Making predictions on research data with machine learning. 3. Plagiarism Checking and Prevention Strategy, sub-topics: • Reference management with Mendeley and Zotero • Detecting plagiarism with tools such as Turnitin and iThenticate. • Discussion: The role of researchers in ensuring authenticity and validity of data 4. Optimizing Scientific Publications, sub-topics: • Selecting the right journal with the help of technology (Elsevier Journal Finder, Springer Nature Journal Suggester) • Automated review of manuscripts to improve publication eligibility • Techniques to increase the chances of being accepted in

			reputable journals (Q1/Q2). • Understanding international journal publication standards and guidelines
Supporting Materials			
1.	Data Management	Academic Data Management for Lecturers	• Digital Data Management System • Managing Teaching Data • Managing Research and Publication Data
Evaluation			
1.	Learning Project: Preparation of Digital Display Materials and Interactive Learning (quizzes, pre-post tests, or surveys)		

CONCLUSIONS

Bottom-up TNA in training planning and other competency development programs carried out through a series of competency gap needs analyses for positions and/or employees to produce training implementation that is in accordance with the competency gap filling needs of Transportation Apparatus. For Lecturers in MoT the needs of gap competency filling mostly about the use of AI. However, overall, the research results show that lecturers at the Ministry of Transportation already have good digital literacy skills. Other competency development patterns for Lecturers within the Ministry of Transportation include IT seminars/technical guidance/workshops and Digitalization of Broadcast Materials, formation of professional associations, formation of a Community of Practice (CoP) for Lecturers at the Ministry of Transportation. Competency development activities through training, seminars, technical guidance, and other competency development programs require support from the relevant leaders and management as well as cooperation and collaboration with internal and external stakeholders, such as the Bureau of Human Resources and Organization (Biro SDMO), the Center for Development of Transportation Functional Positions (Pusbin JF Transportasi), the Ministry of Education, Culture, Research, and Technology, the Ministry of Communication and Digital of the Republic of Indonesia, and other Ministries/Institutions.

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