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The Certification Program Evaluation for Students in Vocational Schools Using The CSE UCLA Model

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Abstract: This research aims to get an overview of the evaluation results and various obstacles faced in the implementation of machining competency test certification in Vocational High Schools (VHS). The evaluation method of this program is a qualitative research approach that uses the analysis of Techniques for Sequence Preference with Ideal Solution Similarity (TOPSIS). This study uses the CSE-UCLA model in designing program evaluation, which consists of five evaluation components: system assessment, program planning, program implementation, program improvement, and certification. Data collection involved subjects who were researched by filling out questionnaires, including school principals, vice principals for curriculum, deputy principals for industrial relations, deputy principals for facilities and infrastructure, heads of machining programs, workshop heads, machining productive teachers, and competency certification institutions/professional certification institutions in schools. Participants involved in collecting information used survey forms in five Vocational High Schools (VHS) in the Province of the Special Capital Region of Jakarta. In this study, five subjects of State Vocational High Schools were selected The study resulted that the machining competency test certification program has a good level of effectiveness, with certain components assessed as sufficient. Considering the dimension of the system assessment program, the value program planning category needs to be maintained or improved. In the context of program implementation, program improvement, and program certification, efforts are needed to improve the criteria for the better. Therefore, the findings of this study can be considered for the improvement of sustainable certification programs.

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Introduction

The development of knowledge and technology cannot be separated from the development of education (Vaganova et al., 2020). The educational process seeks to cultivate individuals into better workers and people overall by enhancing their conduct, knowledge, and motivation. (Stofkova & Sukalova, 2020). Education is an intermediary between the development of knowledge and skills and their application through the curriculum (Yadav et al., 2018). One of them is vocational education, where the learning process is based on the demands of workers in special fields (Fullerton & Leckie, 1999). Vocational training is at the forefront of human resource development in the industry (Ling et al., 2023). To find competent workers, it is necessary to focus on improving vocational education (Li & Pilz, 2023). Plus, in Industry 4.0, digitalization of automation is a key component of the manufacturing process, and AI-enabled robots can do anything. (Rofiq et al., 2019a). This is done by humans and the creation of new jobs in line with the progress of industrial

digitalization (Billett, 2000). This demonstrates that vocational training needs to adapt to the industry's shifting professional demands. (Mahmudah & Santosa, 2021).

Vocational education is based on a practice-based curriculum tailored to industries and skills (Muja et al., 2019). In addition, in some developing countries, particularly Indonesia, there are gaps in practical skills and knowledge among VET students (Abdurrahman et al., 2022). The system and pattern of implementing vocational high schools in Indonesia have not changed from a supply model to a demand model (Antonietti et al., 2022). In addition, vocational school education programs are not flexible to changing job needs (Mason et al., 2018). According to Central Statistics Agency (BPS) data on Indonesia's unemployment rate by educational attainment in 2022, graduates of vocational education programs rank second and account for the biggest share of the country's unemployed, at 24%. (Badan Pusat Statistik, 2020). Programs in the field of vocational education need to ensure the quality of vocational education priorities, competency test standards, and certification for students (Makinde and Bamiro 2023).

Vocational education competency test certification is part of the curriculum to improve students' abilities (Burke et al., 2014). In essence, competency tests are held to measure students' abilities in a certain field well (Nurtanto et al., 2020). This is important because a high level of expertise in one of the industry's investment strategies is included in the desired talent qualification (Finegold & Soskice, 1988). According to the Manpower Law of the Republic of Indonesia, a person's employability is determined by aspects of knowledge and skills in managing work (Republic of Indonesia Employment Law Number 13 of 2003, n.d.). In addition, the Office of Technology Assessment (OTA) classifies them into four types of competencies: The first type is academic ability represented by reading, writing, and math skills. The other three types are different types of special skills and consist of special skills that are considered based on job-specific skills (Parkinson & Mackay, 2016a). Specific strategies to ensure VHS graduates can enter the job market. need to improve vocational focusing on skills, applied knowledge, especially in the field of machinery (Majetic & Pellegrino, 2018). Applied knowledge-based competencies, students are expected to be able to use diagrams to interpret and represent physical objects and develop various complex technical ideas (Parkinson & Mackay, 2016b). Therefore, the implementation of competency certification tests requires the development of innovative engagement planning and assessment criteria that are carried out on an ongoing basis (Rodriguez et al., 2020a, 2020b).

Currently, competency certification tests only look at completing work without paying attention to the knowledge aspect of completing the job (Kuntoro et al., 2019b). Competency assessment is the process of evaluating a person's abilities or inabilities in certain technical or non-technical processes by providing evidence that those abilities or qualifications exist. (Pardjono, et al., Budiyono 2015). CSE-UCLA evaluation model, used as the main purpose of the problem-solving program of the Applied Knowledge Machining Competency Test program in Vocational High Schools, this model was introduced by Alkin (1969) system assessment, program design, program implementation, program improvement, and program certification are the five dimensions into which it was chosen and categorized. (Priyanto et al., 2024). The Program Improvement Evaluation component is used to view an overview of the program's functions and the Program Certification Evaluation component is used to view an overview of the program's usefulness and value. Evaluation research on the competency test certification program was conducted using the CSE-UCLA model. This research aims to get an overview of the evaluation results and various obstacles faced in the implementation of machining competency test certification in Vocational High Schools (VHS).

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Research Method

This program evaluation research employs a qualitative approach using the CSE-UCLA evaluation model. The study focuses on five State Vocational High Schools in Jakarta's Special Capital Region Province, selected through purposive sampling due to their comparable policy implementation and infrastructure. Respondents include the principal, vice principals (for curriculum, industrial relations, and infrastructure), the head of the machining program, the head of the workshop, and machining teachers. Data collection utilized a questionnaire with 54 questions designed to gather comprehensive information. The qualitative numerical data from the questionnaires were analyzed using the TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method. The research methodology emphasizes understanding data collection procedures through interviews and surveys. Techniques such as clustering, optimal matching, and multidimensional scaling were used to organize and summarize data, ensuring adaptive surveys address outliers and enhance data quality. The questionnaire was created using the weighting of the criteria of the Likert scale model for the following answer choices:

Classification	Score
5	Perfect Fit
4	Appropriate
3	Less Suitable
2	Not Suitable
1	Very inappropriate

Furthermore, questionnaire data obtained using the Technique For Others Reference by Similarity to Ideal Solution (TOPSIS) technique was used to assess qualitative study. (Mehrparvar et al., 2012). The stages are as follows:

1) Matrix of normalized decision criteria (rij), so that a normalized decision matrix is obtained
   Equation:
   $$rij = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \qquad (1)$$
   In this context, rij refers to a matrix element that has been normalized from Object to i based on criterion j.
2) Define a normalized decision matrix
   Weighted value.
3) Figuring out a matrix's positive and negative ideal solutions. An ideal solution that is positive (A) and one that is negative (A) based on the normalized weight rating can be determined, to identify the ideal solution, it is necessary to first determine whether the analyzed attribute is an advantage or a cost.
   $A^+ = (y_1^+, y_2^+, \ldots\ldots y_n^+)$
   $A^- = (y_1^-, y_2^-, \ldots\ldots\ldots\ldots y_n^-)$ (2)
   Here,
   $$y_1^+ = \begin{cases} maks_i\ y_{ij} & is\ an\ advantage\ attribute \\ min_i\ y_{ij} & if\ j\ is\ cost\ attribute \end{cases}$$
   $$y_1^- = \begin{cases} min_i\ y_{ij} & is\ an\ advantage\ attribute \\ maks_i\ y_{ij} & if\ j\ is\ a\ cost\ attribute \end{cases}$$
4) Utilizing a matrix of positive ideal and negative ideal solutions, determine the range between the values of each choice.
   $$D_i^+ = \sqrt{\sum_{j=1}^{n} \left(y_i^+ - y_{ij}\right)^2} \qquad (3)$$

$$D_i^- = \sqrt{\sum_{j=1}^{n}(y_{ij} - y_i^-)^2} \quad (4)$$

5) Calculate the value determination of each option alternative.

$$V_i = \frac{D_i^-}{D_i^- - D_i^+} \quad (5)$$

The effectiveness value of each aspect evaluated is classified based on validity according to Guilford (Uyasa & Kurniawan, 2018). Listed in Table 2.

Table 2. Classification of Effectiveness Using Guilford Validity

Range of effectiveness	Category
0,80 – 1,00	Excellent
0,60 – 0,79	Good
0,40 - 0,59	Enough
0,20 – 0,39	Less
0,0 – 0,190	Very Less

The dimensions and components of the questions applied in this study are:

1) System assessment, which includes the following information: a. Competency test urgency; b. advantages of administering competency tests; and c. assistance for competency test management staff d) Assisting all teachers at the Educational Laboratory Institution and in schools with the setup of tools, supplies, and testing tools for the Expertise Competency Test.
2) The Planning Program consists of the following: a) organizing the management of the competency test; b) organizing the program and human resources; c) organizing activities to get students ready to use workshop services; and d) organizing the setup of facilities to support the competency test organizers.
3) The following materials are included in the Implementation Program: a) Socialization of unique competency test workshop characteristics b) Collaboration with certifying bodies c) Socialization of measurement tools needed for seminars on competency tests.
4) Included in the improvement program are the following materials: a) strengthening comprehension of the idea of applied knowledge on tasks/jobshet on the worksheet as the foundation for procedural work considerations; and b) enhancing infrastructure and facilities for competency test certification workshops. c) Enhancing ongoing training initiatives in areas of machining expertise and procedures to benefit human resources.
5) Content for the Certification Program includes: a) Quality of Competency Test in accordance with the machining mechanic expertise program package standards. b) The expertise package's compliance with the machining mechanic expertise program package standard.

Results and Discussion

1) System Assessment

Institutional policies and the condition of the learning environment are two examples of elements that must be maintained and improved in order to increase and sustain the effectiveness of the implementation of Competency Test Certification in the VHS Machining Mechanical Program. These issues are related to the effectiveness level in the System Assessment dimension data. The equation shows the results of the first stage's calculation. (1). To get normalized outcomes from the data gathering process, the acquired data is normalized. The R_{ij}. matrix contains the normalized value based on the computation results. Entering the normalized data into the equation is the second step. (2). The third step illustrates how to use equations to determine the values of the positive ideal

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solution y_j^+ and the negative ideal solution y_j^-. (3) and (4), The values of D_i^+ and D_i^- are then determined by applying Equations (5) and (6). The next step is to determine the value of V_n preference so that it can be ranked based on its value once D_i^+ and D_i^- values have been determined.

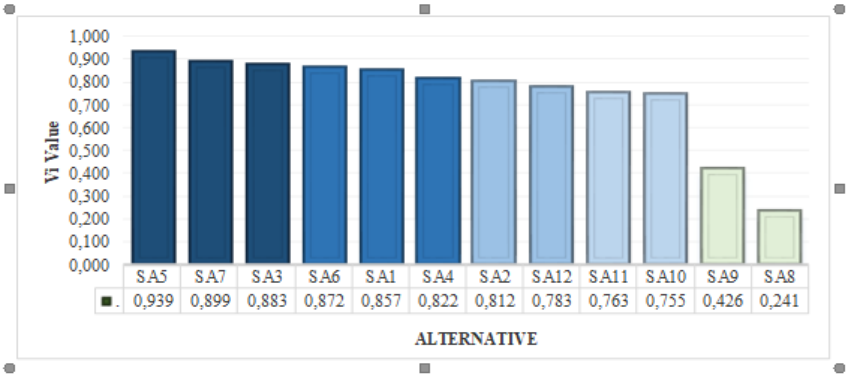

Figure 1. The preference values calculated for each alternative in the Assessment System dimension highlight components requiring improvement to enhance the effectiveness of Competency Test Certification implementation (Figure 1). The lowest preference values were observed in the SA12, SA11, and SA10 components, indicating areas needing immediate attention. Similarly, SA9 and SA8 components scored below the standard, requiring upgrades to meet the desired standard of conformity. Overall, the Average Assessment System program scored in the "Good" category. However, improvements are needed in areas related to infrastructure support for participants and the implementation team from the Business and Industry World. According to Fullerton and Leckie (1999), vocational education development must align with professional demands. Mahmudah and Santosa (2021) further emphasize the importance of adapting vocational education to meet evolving industry requirements. An integrated conceptual framework is essential for regulating and categorizing assessments to ensure they address current needs effectively (Priyanto et al., 2024).

2) Planning Program

A total of 12 alternative questions were used to assess the planning program dimension's effectiveness in 5 VHS. On the basis of Eq. (1), the first stage computation is performed. According to the computation's findings, the normalized value is part of the R_{ij} matrix. The data must be entered into the equation in the second step. (2). The third step illustrates how to use equations to determine the values of the positive ideal solution y_j^+ and the negative ideal solution y_j^-. (3) and (4), The values of D_i^+ and D_i^- are then determined by applying Equations (5) and (6). The next step is to determine the value of V_n preference so that it can be ranked based on its value once D_i^+ and D_i^- values have been determined.

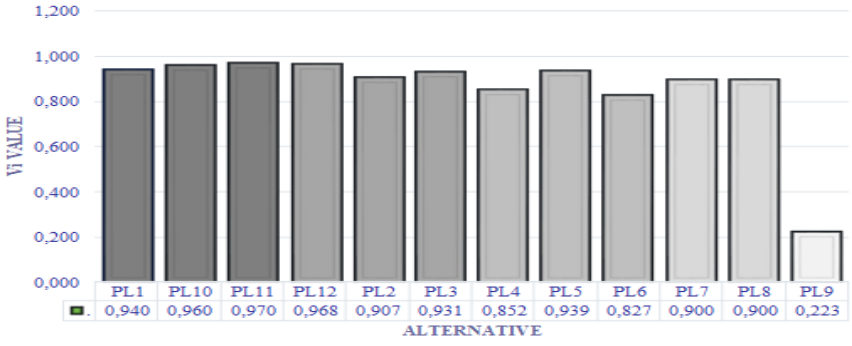

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Figure 2. Assess the preferences of each alternative dimension of the planning program. The component with the lowest V value needs to be modified in order to improve the effectiveness of the Machining Mechanics Program Competency Test Certification in VHS, according to the findings of the preference value calculation for each alternative dimension of the Planning Program. The planning program's dimensions average value is d. For the PL4 and PL6 question components, alternative grades are outstanding; however, they should be raised to a standard grade. Furthermore, the determinant value standard is not a very good substitute for the category standard value in the PL9 question component. As a result, the category standard needs to be improved to the minimum conformance category standard in the future. Developing education and training to comprehend theoretical applied knowledge and its connection to the implementation of work practices in workshops falls under the Very Low value category. Therefore, Kuntoro stated that organizational assessment planning and engagement standards must be implemented on an ongoing basis to ensure that programs are met. In addition, Arnita stated that planning activities need to design in their approach to purpose-based programming (Arnita & Chrisna, 2022). Planning offers an opportunity to examine the planned program criteria of future efforts and priorities in the program sector on an institutional structure (Rodriguez et al., 2020a, 2020b). Planning includes such as educators, the tasks of practitioners in the organization of institutions, facilities and infrastructure, and financing need to receive the main attention (Nurtanto et al., 2020).

3) Implementation Program

A component that needs to be enhanced in order to increase the effectiveness of the implementation of Competency Test Certification in the Machining Mechanics Program in 5 VHS based on 9 alternative questions is the Implementation Program dimension's effectiveness. Matrix R_{ij} contains the normalized value based on the computation results. Entering the normalized data into the equation's matrix R_{ij} is the second step. (2). Equations (3) and (4) are used to determine the values of the positive ideal solution (y_j^+) and the negative ideal solution (y_j^-), and Equations (5) and (6) are used to determine the values of D_i^+ and D_i^-. In order to sort it by value, the preferred value (V_n) is determined once the values (D_i^+) and (D_i^-) have been located.

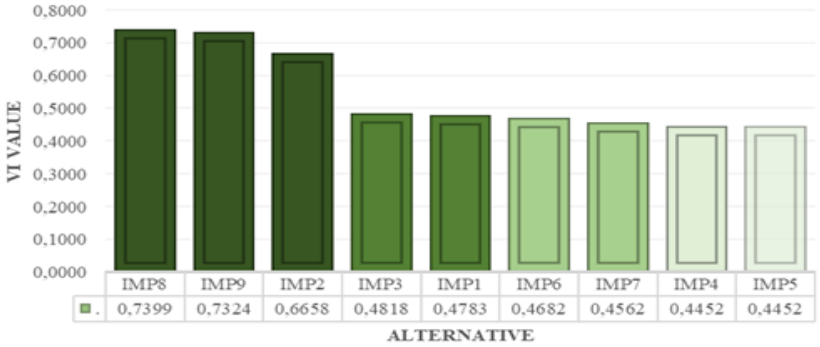

Figure 3 highlights the preference values for each alternative dimension of Program Implementation in the VHS Machining Mechanics Program. Components with the lowest V values require improvement to enhance the effectiveness of Competency Test Certification. The IMP8 and IMP9 components, currently in the Good category, should be upgraded to Excellent. The IMP2 component, rated Sufficient, needs to be improved to Good for future programs. Components such as IMP3, IMP1, IMP6, IMP7, and IMP4, categorized as Less, require significant upgrades to reach Sufficient or Good. The overall average score for this program dimension is Sufficient, underscoring the need for

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improvements across all aspects of program implementation. Suharno et al. (2020) stated that the primary goal of competency test certification is to enhance links and matches between education and industry, while a secondary goal is to improve knowledge and skills quality. Competency-based certifications enable graduates to utilize their certificates effectively in the future. Similarly, Aryani et al. (2021) emphasized that science plays a pivotal role in advancing technology, tools, and products that simplify human work and life. Ling et al. (2023) further stressed the importance of applied knowledge in practical, work-oriented learning programs.

4) Improvement Program

The issue to be identified in the Improvement Program dimension data is what elements for the Vocational Machining Mechanical Program need to be addressed in order to increase the efficacy of the implementation of Competency Test Certification. Five VHS are assessed in this instance using nine different questions. On the basis of Eq. (1), the first stage computation is performed. According to the computation's findings, the normalized value is part of matrix R_{ij}. The normalized data must be incorporated into the equation in the second step. (2). The third step is to use Equation to find the values of the positive ideal solution y_j^+ and the negative ideal solution y_j^- (3) and Equation (4), after which Equations (5) and (6) are used to determine the values of D_i^+ and D_i^-. In order to sort it by value, the preferred value (V_n) is determined once the values (D_i^+) and (D_i^-) have been located.

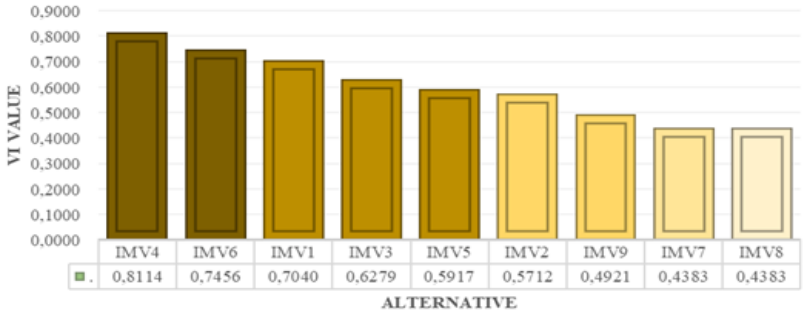

Figure 4 shows the preference values for each of the enhancement dimension alternatives. The component that receives the lowest V value, as determined by the preference value calculation, is the one that needs to be addressed in order to improve the efficacy of the Competency Test Certification implementation in the Vocational High School Machining Mechanics Program. outcomes of the IMV4, IMV6, and IMV1 question components' alternate ranking of the Good value category. In subsequent projects, the IMV3, IMV5, and IMV2 question components' Sufficient value category has to be changed to a Good or Very Good value category. The IMV9, IMV7, and IMV8 inquiry components' category of Less values. As a result, the inquiry component's value category of Enough or Good must be raised. The improvement program received an average score in the Sufficient category for all question components. Every element of the improvement program needs to be enhanced. According to Elakas, the supervisor of training in the productive sector and the use of external assessors to evaluate students for real job competency assessments (Elakas et al., 2023). Furthermore, according to Yildiz, the industry must be taken into account in order to satisfy the demands of raising the knowledge and abilities of potential employees in the sector (Yildiz & Yildirim, 2023). Accordingly, Dirim said that although the processes for competency test certification have been put into place, the quality, theory, and practice still require improvement in order to align with the curriculum and satisfy industry partners' demands (Dirim et al., 2023). To address the needs of enhancing the

knowledge and abilities of potential employees in the sector, associations and industries must be taken into consideration (Abdurrahman et al., 2022).

5) Certification Program

The issue to be identified in the Certification dimension data is what elements require improvement in order to increase the efficacy of the Competency Test Certification implementation in the VHS Machining Mechanics Program. Five vocational high schools are assessed in this instance using six different questions. The first stage calculation is carried out based on Eq. (1). The normalised ones are entered into matrix R_{ij} according to the computation findings. Entering the normalized data R_{ij} using Equation is the second step (2). The third stage is to determine the value of the positive ideal solution y_j^+ and the negative ideal solution y_j^-- using Equation (3) and Equation (4), followed by calculating the values of D_i^+ and D_i^-using Equation (5) and Equation (6). Once the values (D_i^+) and (D_i^-) are found, this is done to find the preference value (V_n) so that it can be sorted by value.

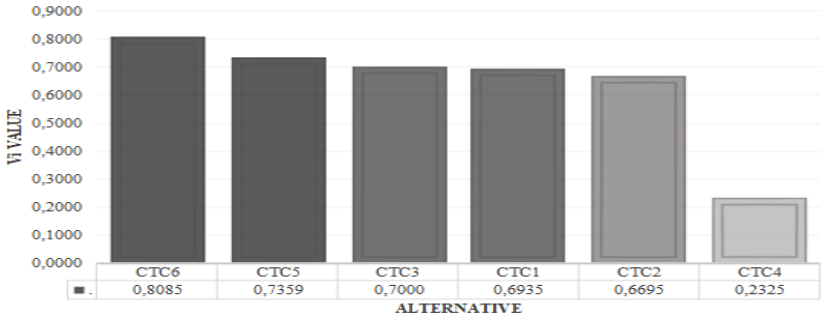

Figure 5 presents the preference values for each certification dimension alternative in the VHS Machining Mechanics Program. The components with the lowest V values highlight areas requiring improvement to enhance the effectiveness of Competency Test Certification (CTC). The Good category was achieved in the CTC6, CTC5, and CTC3 components, which should be maintained and upgraded to Very Good in the future. The CTC1 component received a Sufficient rating, while CTC2 needs to be improved to the Good category for better program implementation. The Poor category in the CTC4 component requires significant improvement to at least Sufficient or Good in preparation for future applications. Overall, the certification program scored an Average Sufficient rating, emphasizing the need for comprehensive upgrades across all components. Huang et al. (2023) highlighted deficiencies in infrastructure, equipment, and materials as significant challenges in certification procedures. The psychomotor performance of test participants also lagged due to inadequate theoretical understanding of the certification material. Knippa and colleagues stressed the importance of tracing graduate performance to evaluate the program's impact and developing a competency certification model that incorporates industry and professional association requirements to meet workforce demands (Pardjono et al., Budiyono, 2015).

This, related to the certification of the competency test, Zhu stated that machining knowledge is widely used in all areas of everyone's life, especially in the field of transportation (Zhu et al. 2020). In addition, XU & WANG stated that the average number of companies currently developing new machines to meet human needs is estimated at 68,000 from 2012 to 2031 (XU & WANG, 2021). Wang & Chen stated that the increase in competence has an effect on the performance of machine tools in terms of higher reliability, longer service life, higher fuel efficiency value, more powerful, cleaner and quieter operating systems, and more advanced materials. It requires a more complex

mechanical structure (Wang & Chen, 2023). In addition, the inside of each machine element is manufactured with precision, including free-form surfaces and thin-walled surfaces made of hard-to-cut materials that require dimensional accuracy and high surface quality (Imad et al. 2022). Therefore, the machinery industry needs human resources who are able to keep up with technological developments (CHIBA et al. 2023).

Conclusion

This result research concluded that the machining competency test certification program has a good level of effectiveness, with certain components assessed as sufficient. Considering the dimension of the system assessment program, the value program planning category needs to be maintained or improved. In the context of program implementation, program improvement, and program certification, efforts are needed to improve the criteria for the better.

Recommendation

It is important for the competency test management team to establish the right policies to improve output performance, outcomes, and impact. Information for productive subject teachers about the evaluation of performance competency test programs based on applied scientific knowledge in the application of competency tests. The evaluation research of the machining competency test certification program in vocational high schools, in the application of the CSE-UCLA evaluation model combination, needs to be continued on a larger sample of vocational high schools. Monitoring the performance of competency test certification graduates for five Vocational High Schools using a questionnaire containing 15 question items that were affordable to 39 respondents. The results of the p values of competency test certification graduates are 0.062 > 0.05. (insignificant).

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