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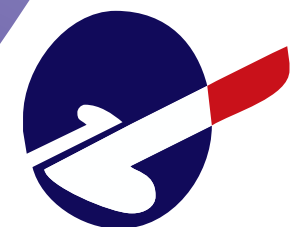*Suyitno, Dwi Jatmoko, Aci Primartadi, Zahidah Ab-Latif*

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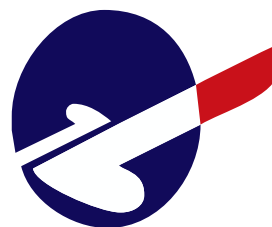
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Successful implementation of teaching factory in machining expertise in vocational high schools

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ABSTRACT

This research aims to (1) evaluate the application of the teaching factory (Tefa) in the field of machining expertise in Vocational High Schools (VHSs) and (2) identify the obstacles to the implementation of Tefa. The research uses the CIPP (Content, Input, Process, and Product) evaluation method. This research was carried out in four vocational schools on the competence of machining expertise with the criteria of having implemented Tefa for more than five years and as a pioneer in implementing Tefa. The four schools are Vocational High School (VHS) Mikael Surakarta, State Vocational High School (SVHS) 1 Magelang, SMK Warga Surakarta, and SMK Karya Teknika Colomadu Karanganyar. The research respondents are principals, vice principals, heads of competency skills, and managers of Tefa. The data collection was through interviews, observation, and document scrutiny. The instruments used are an interview guide, observation sheet, and document analysis guide. The qualitative data analysis used qualitative data processing software. The results are as follows. (1) The application of Tefa in VHSs based on the evaluation is the context component 98%, the input component 89.25%, the process component 87%, and the product component 82.5 %. The percentage of evaluating the implementation of Tefa as a whole for the CIPP component is 89.2%, or very good; and (2) The obstacles faced in implementing Tefa in vocational high schools include rules for product sales, rules for working hours for public teachers, setting practicum schedules, working hours that were not flexible, rapid technological changes, understanding of block schedules, and lack of human resource competence. The results of this study imply that schools that implement Tefa are expected to be well-managed because it impacts the progress of VHS processes and products.

INTRODUCTION

One of the ways that the government has taken to improve the competitiveness of the Indonesian workforce is to improve the quality of vocational high schools (VHSs) and vocational higher education. VHS is a formal education that educates students to be ready to work at the operator level in the industry. It meets the qualification level in the Indonesian National Qualifications Framework (KKNI article 2). VHS is included in the operator position group, namely group level 1

to level 3 (President of the Republic of Indonesia, 2012). Vocational education is one of the secondary education systems which prepares students especially can work better in one particular field of work (Bakar, 2018). The development of vocational education is expected to be a way to improve the quality of human resources who can compete in the job market in Indonesia and abroad. This quality improvement is accompanied by collaboration with industry so that prospective workers are trained according to industry needs and are ready to work in their fields.

According to Prosser's theory, effective vocational education should pay attention to the working environment and learning facilities that are as similar as possible to those in the industry (Rojewski, 2002). Students must be interested in the field of work, competence, or work taught at school to be motivated to follow the learning process. The government supports improving the quality of vocational high schools (VHS) in Indonesia with the VHS revitalization policy, as stated in Presidential Instruction No. 9 of 2016 (President of the Republic of Indonesia, 2016).

The success of vocational revitalization is expected to improve prospective workers' quality, reducing the problem of unemployment of productive age. One of the revitalization steps set by the Directorate of Vocational Development is the implementation of the teaching factory (Tefa). Tefa is one of the steps in revitalizing VHS with the hope of (1) increasing the competence of teachers and students, (2) encouraging the creation of a quality culture, (3) creating an industrial culture, (4) creating a vehicle for creativity and innovation for students and teachers, and (5) creating entrepreneurship development facilities, internships and training places for graduates who have not worked in the industry.

Tefa was introduced in VHSs in 2000 under the name of a production unit. Tefa learning is a learning concept in production/service-based vocational schools that refers to the standards and procedures applicable in the industry and is carried out in an atmosphere like what happens in the industry (Khurniawan, 2016). Stavropoulos et al. (2018) also states that the Tefa paradigm creates an authentic environment for engineering students to develop skills and competencies through their direct involvement in the challenges faced by the industry. Based on this, the learning strategy in vocational schools is directed at forming student work competencies, for example, the application of problem-based learning, product-based learning, project-based learning, and industrial internships. The collaboration between learning at school and the application of products in the company is also a model for teaching Tefa in vocational schools (Djuhartono et al., 2021).

Several kinds of Tefa have been developed and investigated for their success. Chryssolouris et al. (2016) designed the Tefa learning with five stages, namely: presenting the problems faced by the industry, identifying the specifications for making product designs based on input from the industry, then making the initial design as a pilot project, analyzing in detail the product design, and presenting the solution to the problem faced collaboratively with industry. Maarof et al. (2019) states that a learning factory represents a simulation of a real factory environment where students can gain hands-on learning experience by conducting various projects. In line with this, Winarno and Sari (2019) argues that Tefa can improve students' skills in production.

Several researchers have seen that Tefa brings several advantages. Scheid (2018) reported that (1) new teaching-learning arrangements have to be developed according to the required specifications of the curriculum, (2) the learning situations should also be adaptable to the different types of learning factories, and also provide guidance to schools without a dedicated learning factory, and (3) the learning environment is not too complex and therefore discouraged the learners but at the same time foster the required competencies. Putra et al. (2018) reported that school and industry cooperation on machining engineering vocational competence could be done by making products in schools.

Product is discussed between the school and industry depending on the facilities owned by the school. Perdana (2019) reported that Tefa was effective in increasing student motivation to take part in learning activities and had a positive impact on improving the quality of student evaluation results. Tefa, with existing production units, can produce products/services worthy of sale to increase school income, which can help school operational costs and be used as a medium for school promotion to the community. The implementation of Tefa also has drawbacks, namely: limitations in accepting large or mass orders, weaknesses in business capital, and weaknesses in terms of timeliness (Handayani et al., 2018).

The ideal conditions for implementing Tefa include the following aspects: (1) learning, (2) human resources, (3) facilities, (4) practical activities, (5) cooperation networks, (6) products and services, (7) transparency, and (8) legal (Kasman, 2017). The ideal Tefa condition can be seen from the teaching materials that aim to achieve specific competencies and are multipurpose or marketable. For schools whose competency programs do not produce products/services, it can be directed to simulations of real work situations in the workplace. In addition, the assessment system is based on Tefa, and the learning system uses a block and continuous schedule.

Learning activities, especially learning practices, apply industrial culture, reflected in quality standards, work time standards, and occupational safety and health standards. Some research results also show that applying Tefa can improve vocational students' work readiness (Dewi & Sudira, 2018; Khoiron, 2016; Zutiasari et al., 2021), so applying this Tefa learning model needs to be continuously developed. Yunanto (2017) writes that the implementation of Tefa in schools needs to be improved in management, workshops/laboratory, learning patterns, marketing promotion, products, human resources, and industrial relations.

Different research results were presented by Handayani et al. (2018), who reported that the implementation of Tefa in schools was going well when viewed from human resources, partnerships with the industrial world, infrastructure, and products. Cooperation between schools and industry must be closely woven, especially in developing information and communication technology to support establishing a Tefa network between schools and industry (Mavrikios et al., 2019).

Based on several research reports, the implementation of Tefa in each vocational school will have different results and characteristics. Not all schools have succeeded in implementing Tefa, and several obstacles are faced. Thus, a thorough evaluation of the implementation of Tefa in schools from context, input, process, and output is essential to get an idea for improving the implementation of Tefa in schools.

RESEARCH METHOD

The research method used is the CIPP evaluation research method. The evaluation was carried out on the implementation of Tefa in VHSs, which included the evaluation of context, input, process, and product (CIPP). The evaluated components and aspects can be seen in Table 1.

Table 1. Components and Aspects Evaluated

Component of evaluation	Aspects evaluated
Context	Background, understanding, purpose
Input	Curriculum and teaching, management, infrastructure, human resources
Process	Implementation of learning and production, monitoring of implementation and products, collaboration with industry
Product	Achievement of goals, product quality, graduate employment, competency certificate for students

This research was carried out in four vocational high schools (VHS) and state vocational high schools (SVHS) on the competence of machining expertise with the criteria of having implemented Tefa for more than five years and as a pioneer in implementing Tefa. The schools are: SMK Mikael Surakarta, SMKN 1 Magelang, SMK Warga Surakarta, and SMK Karya Teknika Colomadu Karanganyar. These schools were chosen because they pioneered Tefa in VHS (see Table 2). The Tefa products produced by the VHSs are 3d printer machines, CNC milling machine simulators, manual lathes (assembling), CNC milling machines (assembling), machine tool components, waste processing machines, and products ordered from national companies. Research respondents from each vocational school are the principal and the Tefa manager in each school. Complete respondents for each school can be seen in Table 2.

The data collection was through interviews, observation, and document analysis. The research instruments used were: interview guides, observation sheets, and document checklists. Interview guides were used to obtain data on Tefa management from school principals, vice principals, heads of competency skills, heads of production units, Tefa coordinators, and teachers.

Observation sheets were used to obtain data on the process of applying Tefa. Document analysis is used to obtain data regarding the implementation of Tefa. The instrument's validity was measured with content validity and expert judgment involving three experts. The data analysis technique used is qualitative data analysis, including data reduction, data presentation, and conclusion drawing. Data processing also uses qualitative data processing software QSR Nvivo 11 and spreadsheet software for data visualization.

Table 2. Data on VHSs Research Subjects, Implementation of Tefa, and Respondents

No.	VHS Name	Implementation of Tefa	Respondent
1	SMK Mikael Surakarta	Pioneer school implementing the Tefa learning model	Principal, head of the skill competency, head of the production unit, vice principal of public relations, productive subject teacher.
2	SMKN 1 Magelang	Implemented Tefa since 2014 with assistance from GiZ SED TVET or SMK Pilot Project Tefa	Principal, deputy principal for curriculum, head of skills competence, manager of the school job market, teacher of productive subjects, and tefa coordinator.
3	SMK Warga Surakarta	Vocational schools assisted by the Tefa Pilot Project Vocational School	Principal, deputy principal for curriculum, head of competency of expertise, vice principal for public relations, head of production unit, and teacher of productive subjects.
4	SMK Karya Teknika Colomadu Karanganyar	Independently implement Tefa (a pioneer in implementing Tefa in private schools)	Principal, head of expertise competence, coordinator of production units, and teacher of productive subjects.

FINDINGS AND DISCUSSION

Findings

Context Evaluation

Context evaluation includes background, understanding, and objectives of Tefa implementation. The implementation background of each school is different. There are two main background factors, namely, internal school factors and external school factors. Internal factors are more towards the needs of schools for improving the quality of vocational education and as a way to save expenses and increase school income. Based on data analysis conducted at SMK Mikael, SMK Warga Surakarta, and SMK Karya Teknika Karanganyar, there are four backgrounds for implementing Tefa: meeting demands from the government, improving graduate achievement, becoming a superior school, and having limited income. SMKN 1 Magelang has three implementation backgrounds: meeting government demands, improving graduate achievement, and becoming a superior school.

Based on the evaluation of Tefa's understanding, it can be concluded that every school already has the correct and the same understanding. Tefa is understood not only as a production unit or only producing products but also as a learning process that produces products. The product is used as a learning tool following the existing essential competencies. Based on this research, the purpose of implementing Tefa is closely related to the implementation background. Based on data analysis conducted by SMK Mikael Surakarta, SMK Warga Surakarta, and SMK Karya Teknika Karanganyar, there are four objectives of implementing Tefa: increasing student competence, maintaining teacher competence, impacting school finances, and increasing collaboration with industry. Meanwhile, SMKN 1 Magelang has three goals: increasing student competence, maintaining teacher competence, and increasing collaboration with the industry.

Figure 1. Bar Chart of Achievement Context Aspects of SMK Mikael Surakarta (A), SMK Magelang (B), SMK Warga Surakarta (C), and SMK Karya Teknika Karanganyar (D)

Quantitative analysis of the above data is processed and made in the form of a percentage found the results of the achievement of the context aspect. This achievement was obtained 100% by SMK Mikael Surakarta, 92% by SMK N 1 Magelang, 100% by SMK Warga Surakarta, and 100% by SMK Karya Teknika Karanganyar (Figure 1). From the four schools, SMKN 1 Magelang, in context analysis, especially for the background and purpose of implementing Tefa, was different from the other three VHSs, namely in the background of limited funds, so to implement Tefa, it also did not target income. SMKN 1 Magelang is a public school whose operational costs have been met by the Government Regulation No. 48 of 2008 concerning education funding. Based on the results of this analysis, all VHSs from the context aspect have achieved 98% and can be categorized as very good.

Input Evaluation

Input evaluation includes the evaluation of three aspects, namely: curriculum and learning, infrastructure, and human resources. The percentage comparison for each component in each school is shown in Figure 2. Based on this data, it can be illustrated that the achievement of the fulfillment of facilities and infrastructure has the lowest score among the other two aspects. Indicators of curriculum and learning aspects are (1) schedule planning, (2) job sheet planning (job sheet work drawings, job sheet value formats, job sheet process sequences, product-based job sheets used internally by schools, product-based job sheets which are orders from industry, job orders project work), (3) determination of competency standards, (4) the team involved, and (5) planning the implementation of the curriculum.
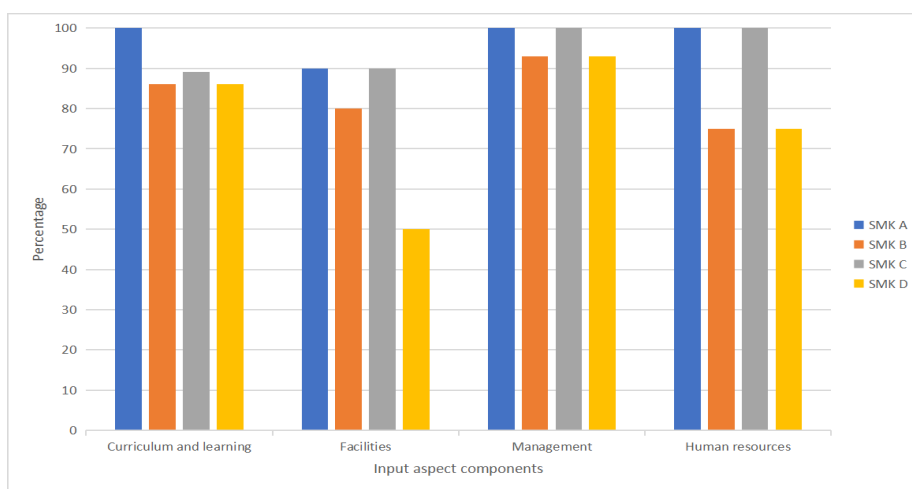
Figure 2. Bar Chart of the Percentage of Achievement Evaluation of Input Aspects from SMK Mikael Surakarta (A), SMK Magelang (B), SMK Warga Surakarta (C), and SMK Karya Teknika Karanganyar (D)

The evaluation achievements of the input aspects are a combination of evaluation of the components of curriculum planning and teaching, management of Tefa, infrastructure, and human resources. The percentage of each VHS is SMK Mikael Surakarta 98%, SMKN 1 Magelang 86%, SMK Warga Surakarta 92%, and SMK Karya Engineering Karanganyar 81%. Based on these results, the achievement of input evaluation is outstanding, with the average score of all schools at 89.25%. The components of facilities and human resources could be improved. In terms of the aspects of infrastructure facilities, in all schools, there are shortcomings because the facilities owned are practical facilities that already exist. Most of them are old tools and machines that need to add new facilities.

Process Evaluation

Process evaluation includes evaluating the implementation of the learning process, monitoring, and industrial cooperation. The data and comparison of the achievement of each VHS can be seen in Figure 3.
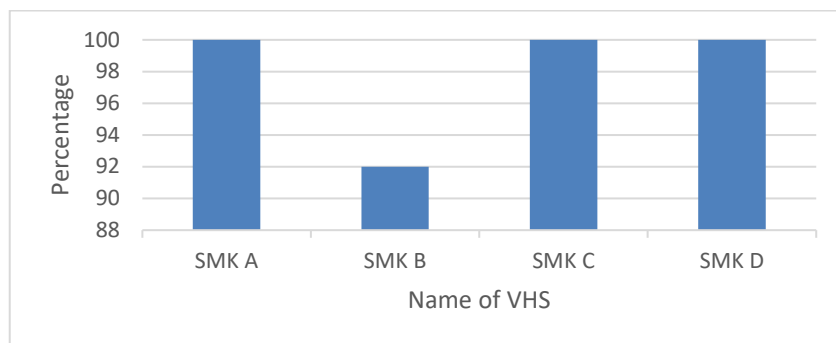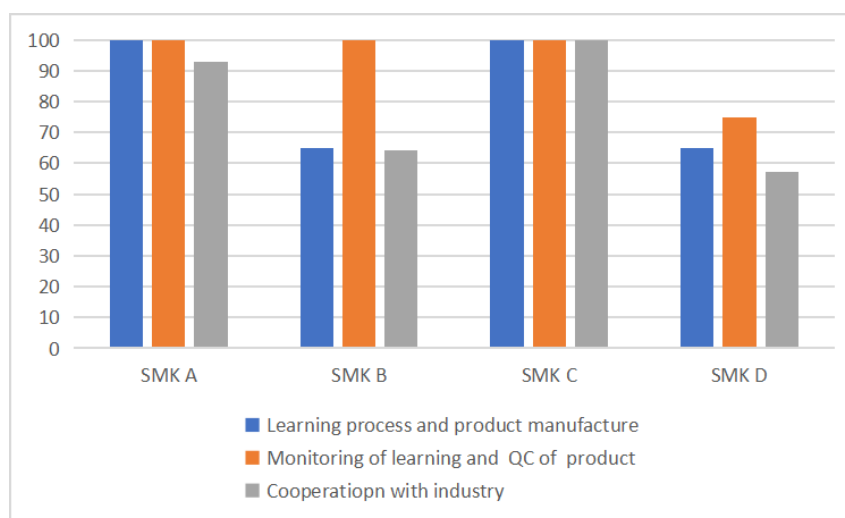

Figure 3. Bar Chart of the Percentage of Achievement Evaluation of Process Aspects of SMK Mikael Surakarta (A), SMKN Magelang (B), SMK Warga Surakarta (C), and SMK Karya Teknika Karanganyar (D)

Figure 3 shows that the achievement of each component for each school is different from each other. The learning implementation component still needs to be fully achieved, while industrial cooperation has the lowest score. The achievements of each of these sub-components were then calculated for the process aspects of each school. Figure 3 shows that the percentage of achievement of the process aspect in applying Tefa above is 75%. The lowest achievement is at SMKN 1 Magelang, 77%.

The evaluation results for the process aspects of each school are as follows: at SMK Mikael Surakarta, 98% of aspects that need to be improved are the components of cooperation with industry, especially in the sub-component of cooperation between schools and industry. The score of SMKN 1 Magelang is 77%. The aspects that need to be improved are components of implementing learning and product manufacturing, especially in sub-components of block schedules, implementation of job sheets, implementation of industrial culture, and components of cooperation with industry in the sub-component of the type of cooperation with industry.

At SMK Warga Surakarta, 94% of the aspects that need to be improved are the components of the implementation of learning, especially in the sub-components of implementation of block schedules, implementation of job sheets, and implementation of industrial culture. The percentage of SMK Karya Teknika Karanganyar is 79%. The aspects that need improvement are learning aspects, including job sheet implementation, industrial culture, and cooperation with industry. Based on the data, the implementation of product manufacturing and product quality control at all VHSs is good.

In other words, mechanical engineering vocational schools can make or produce products or goods. The average process component achievement is 87% which can be grouped into a very good category.

Product Evaluation

Product evaluation is carried out for goal achievement, product quality, graduate employment, and student graduation indicators in the competency test. Based on the evaluation data of the components in the product aspect, it can be concluded that the achievement of the product aspect is as shown in Figure 4.
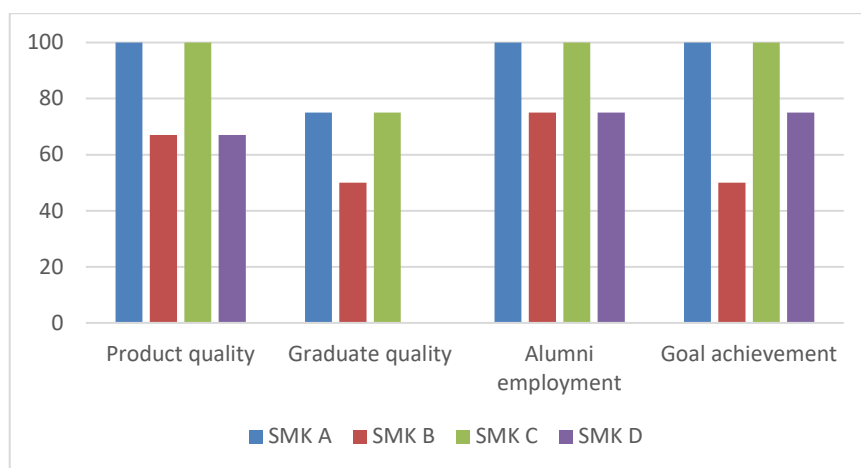
Figure 4. Bar Graph of Product Aspect Evaluation Achievements of SMK Mikael Surakarta (A), SMKN Magelang (B), SMK Warga Surakarta (C), and SMK Karya Teknika Karanganyar (D)

Based on these data, the product aspects that have yet to be maximized are in SMKN 1 Magelang and SMK Karya Teknika Karanganyar. These two VHSs must improve the quality of students and product quality. The product quality, in this case, the type of product made, should be increased to a machine product or component with high precision. The evaluation results on the production aspects of the two VHSs were excellent, reaching 100%, and the other two were not good because they only reached 65%.

Machines and tools produced by SMK Mikael Surakarta and SMK Warga Surakarta have standardized quality so that external parties have used them. Meanwhile, SMKN Magelang and SMK Karya Teknika produce more for internal purposes and orders where the sustainability of the production process still needs to be guaranteed. Based on the percentage score of the product aspect, an average score of 82% or an excellent level is obtained.

Discussion

The application of Tefa, which is a must for vocational schools, can improve the quality from the CIPP aspect. Improvement is from students and teachers as measured by increased competency and the products produced, and it can improve the learning climate and guarantee the quality of learning (Purnami et al., 2021). The application of Tefa can also increase student competency because they can be directly involved in the production process (Nurtanto et al., 2017; Stavropoulos et al., 2018).

Implementing teaching factories in vocational schools raises several challenges because the conditions and obstacles usually differ from those at the academic level (Scheid, 2018). Based on interviews with principals, vice principals, and heads of competency skills, the obstacles faced by each vocational school are different. At SMK Mikael Surakarta, from the implementation side, Tefa is running well with a few obstacles, namely schedule variations, especially the theoretical schedule that was adjusted to the block practice schedule. The implementation of block learning will cause the

implementation of theoretical learning, which is usually scheduled per week, to be disrupted by many block practice implementations.

At SMKN 1 Magelang, from the implementation side, Tefa is running with several obstacles, namely: (1) Inadequate or incompetent human resource competencies or lack of industrial experience; (2) Facilities that do not keep up with technological developments; and (3) Government regulations regarding income from product sales and teacher working hours that make public schools unable to be flexible in managing them. Income generation can be obtained through Tefa (Mentari et al., 2021), but regulations regarding state school finance still need to be flexible in managing non-tax state income outside education costs. The fulfillment of Tefa's demands with the teacher's mandatory workload caused the increase in competence to support Tefa not to go smoothly because most of the teacher's time is spent on teaching. Obstacles to the existence of a model of cooperation with industry and the existence of government regulations are also experienced by Tefa managers in other schools (Pradipta et al., 2021; Yoto & Marsono, 2020).

At SMK Warga Surakarta, from the point of view of the implementation of Tefa, Tefa is going well; the obstacle faced was the arrangement of work orders, especially during school holidays. SMK Karya Teknika Karanganyar's implementation of Tefa generally went well, at a simple level and just starting. Some of the obstacles faced are: (1) facilities where almost 75% of the equipment used is old machines, (2) competent human resources meet only the standards for teachers who do not meet, and (3) limited funding for a phased development plan with revenue and efficiency of Tefa. The results of this study follow what is stated by Sudiyono (2020) that the application of Tefa faces obstacles in management, the learning process, namely scheduling, and a need for more facilities.

Based on the discussion of the evaluation results that have been described, the results of the evaluation of the application of Tefa in vocational schools from the context, input, process, and product aspects can be seen in Figure 5. The summary results of the achievements of these aspects for the four vocational high schools are: (1) component context of all SMK has been achieved 98% and can be categorized as very good, (2) the input component is very good with an average percentage of 89.25%, (3) the achievement of the process component is 87% which can be grouped in a very good category, and (4) the achievement of product components 82.5% can be classified as very good. Based on these four data, the overall evaluation result of the implementation of Tefa is 89.2%, which is in the excellent category.
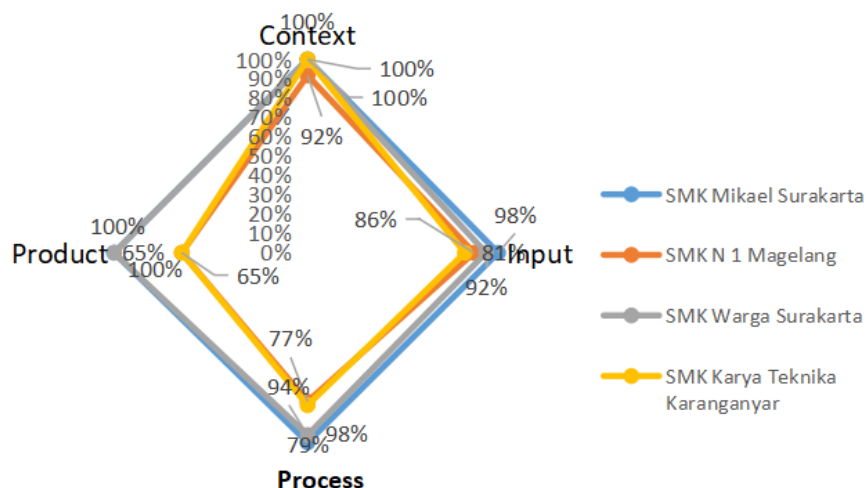
Figure 5. The Results of the CIPP Evaluation of the Application of Tefa at the Mechanical Engineering Vocational School

The obstacles to implementing Tefa found in the four VHSs include (1) Government regulations and rules, especially for public schools related to product sales; (2) Government regulations and rules relating to working hours of public school teachers, related to setting practice schedules and inflexible working hours; (3) Rapid technological changes, especially to meet product

demands from customers; (4) Different understanding of block schedules among educators, especially among adaptive, normative, and productive teaching teachers; and (5) Lack of competent human resources in terms of industry experience and teacher competency standards.

CONCLUSION

Based on the results of research on the evaluation of the implementation of the Tefa program in VHSs, conclusions can be drawn. The application of Tefa in mechanical engineering vocational schools for context components is 98%. The input components are 89.25%, process components are 87%, and product components are 82.5%. The result of the evaluation of the Tefa application, on average, for all CIPP components is 89.2% or in the excellent category. Obstacles faced in implementing Tefa in vocational schools include government regulations, especially for public schools relating to product sales, government regulations relating to working hours for public teachers, setting practice schedules and inflexible working hours, rapid technological changes, a different understanding of the block schedule among educators, and the lack of human resource competence in terms of industry experience and teacher competency standards. The results of this study imply that schools will maintain the existence of Tefa in order to support efforts to improve student competence, improve teacher competence, increase income generating, and improve the quality of graduates. In addition, vocational schools' working climate can approach the industry's working climate.

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Development of media animated video to improve learning outcomes of Sunda siger bridal makeup

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ABSTRACT

The teaching and learning process for cosmetology education students needs to be developed to provide meaningful experiences in the learning process both in theory and practice, as well as being able to provide solutions to the problems found to improve learning outcomes and creativity, one of which is in the Sunda siger bridal makeup learning material. The development model refers to Research and development (R&D) and the Borg & Gall model. The development research results show that video-based learning media exists in the Indonesian bridal makeup course, especially in the Sunda Siger bridal makeup learning material, with an average feasibility level based on the expert judgment of 80.15% declared feasible. A small and wide class trial is carried out with the same score of 80,4% declared eligible. The feasibility results obtained from experts and trials analyzed for data, the acquisition of the control class scores with the results of the pretest 64% and posttest 75.67%, in the experimental class, the value of the pretest was 71.57%, and the posttest was 88.33%, from the results of the use value. This video media is suitable for learning about Sunda siger bridal makeup. The results of the media being accepted or rejected can be seen from the value of the t-test where the learning video media obtained tcount 24.54 and t-table 2,086, with the acquisition of t-count greater than t-table then H1 accepted video media in the development of video media in learning Sunda siger bridal makeup.

INTRODUCTION

Technological advances are growing, one of which is the use of media technology such as computers and smartphones with software and hardware to assist the learning process using digital-based technology systems (Farista & Ali, 2018). The development of technology using learning media, such as animation, video, design, and analysis, has been widely used as a tool in the delivery of materials, messages, information, or references used by teachers (Khoerunnisa & Aqwal, 2020). What is meant by media is: "Information-carrying technology that can be used for teaching learning media, then stands for reacher," where media is a technology that can be useful in providing information that can be disseminated to find the knowledge that has not been conveyed orally (Rasyid et al., 2016).

The use of media in the learning process is more efficient and effective and helps to absorb the subject matter deeper and completely the subject matter. The media is a determinant of student learning success. The media can stimulate students' thoughts, concerns, feelings, and abilities or skills so that they encourage learning activities that can improve student learning outcomes (R. M.

Sari et al., 2017). Each type of media has characteristics and capabilities for presenting messages and information. Media also needs to be considered with the characteristics of different abilities in their use. Video media has become a significant concern in recent years, with the perception of "video easy to understand" (S. L. Sari et al., 2017).

The criteria for a good learning media are: (1) clear and neat, (2) clean and attractive, (3) Suitable for the target, (4) Relevant to the topic presented, (5) Following the learning objectives, (6) Practical, flexible and resistant, (7) Good quality, and (8) The size is following the learning environment. With the criteria of the video, the "video" media ranks 3rd in the teaching process, scoring 74% in 2017-2018 (Patel et al., 2020). Animated videos can enrich students because they gain experience and competence (Yusuf et al., 2017). Instructional media animation video tutorials must be designed to overcome the problems in schools so that learning becomes more effective (Kusuma et al., 2015). Using video learning media, teachers deliver lessons to students more efficiently for the subject matter (Tasmalina & Prabowo, 2018).

Video media presents audio and visuals with good learning messages that contain concepts, principles, procedures, and theories to help understand teaching (Pratama et al., 2017). The use of video in the teaching and learning process is feasible for several reasons, namely: (1) more efficient use of time, (2) more active learning opportunities, (3) videos can help in the learning process when not in class, (4) all aspects of the material are met in the video, and (5) reduce the burden on teachers in conducting lecture models (Kurniawan et al., 2018). This can be proven by several studies or articles that have been done previously. This research produces computer-based interactive multimedia learning application products (John-Leader et al., 2008).

Learning about Indonesia's bridal makeup requires a medium to increase knowledge in the learning process, whereas learning about Indonesia's bridal makeup requires theory and practice. Sunda siger bridal makeup is a type of bridal makeup originating from West Java which was formerly known as the Priangan residency area. In ancient times, Sunda siger makeup was only used at wedding receptions among royalty and nobility (Desiana & Dienaputra, 2019). One of the characteristics of the bride is the siger crown, which is a kind of headdress as a symbol of sacred honorable status. The process of Sunda siger bridal makeup has several stages and stages that could be clearer. In this case, the Sunda siger bridal makeup learning process needs to be repeated to increase practice knowledge (Pangesti & Sabardila, 2020).

From the results of the explanation of the background above, it can be concluded that it is necessary to research the development of animated video media on Sunda siger bridal makeup learning materials to improve student learning outcomes of the Cosmetology Education Study Program, Faculty of Engineering, Universitas Negeri Medan.

RESEARCH METHOD

This research was conducted at the Universitas Negeri Medan on even-semester cosmetology education students in 2021/2022 by applying the research and development (R&D) system. Sugiyono (2017) explains that research and development is a method used to produce specific products and test their effectiveness of these products. This research Borg and Gall (1983) model in the use of video learning media, such as for compatibility in using this method in the learning process (Agustini & Ngarti, 2020). The Borg and Gall (1983) research and development model consists of ten implementation steps, including (1) research and data collection (research and information collection), (2) planning, (3) product draft development (develop a preliminary form of product), (4) field trial, (5) initial product improvement, (6) field trial, (7) improve the product of field test results, (8) field implementation test, (9) final product refinement, and (10) dissemination and implementation (Hamdani, 2017).

Implementation is done by product testing, data collection, and data analysis. Experts validate media products by validating media quality, materials, learning, and product trials. This is done to obtain appropriate media to develop the teaching and learning process. The control and experimental classes then analyzed the results of the media through the pretest and posttest processes to obtain a feasibility value with categories of strongly agree, agree, and disagree, at the percentage

level of 60% - 100%, as for the t-value of the assessment test to see whether the significance of the use of media (H0) rejected or accepted (H1) significance level t-table 0.05.

FINDINGS AND DISCUSSION

Validator Rating

Validator assessment saw the results of questionnaires given to media experts, material experts, and learning experts to get advice and input on the video media development process. The results obtained are shown in Table 1 and Figure 1. The value obtained from the validator with an average of 80.15% taken is from the results of the media expert validator 77.60%, material expert 80.65%, and learning expert 82.20%, from the assessment, results obtained from learning media can be used in the Sunda siger bridal makeup learning process, and can continue to be for the trial process for small classes and large classes.

Table 1. Expert Validator Assessment

No.	Validator	Score%
1	Media Expert	77.60%
2	Material Expert	80.65%
3	Learning Expert	82.20%
	Amount	240.45%
	Average	80.15%
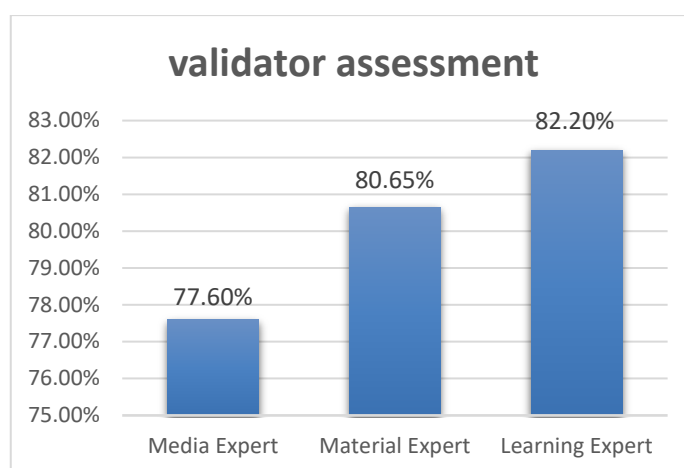
Figure 1. Validator Assessment

Trials

The results of media validation were then tested on a small group of 5 students, and a large group of 15 students, the implementation of this product trial was to see the use of media on students, in which the results of the effectiveness of the media would be used for data collection.

Table 2. Small Group Trial

No.	Theory	Score %
1	Video simplicity	82%
2	Video clarity	78%
3	Video understanding	80%
4	Educational videos	82%
5	Appeal of using video	85%
	Amount	407%
	Average	81.40%
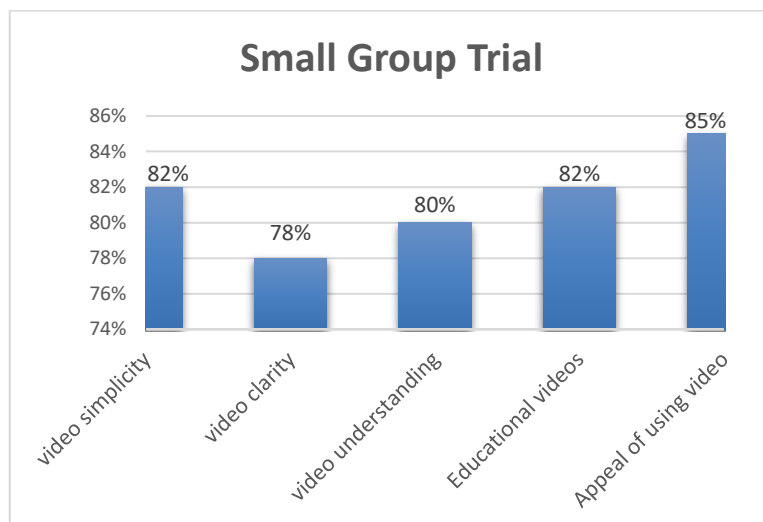
Figure 2. Small Group Trial

The score obtained from the small group test results where the assessment of video simplicity is 82%, video clarity 78%, video understanding 80%, education video 82%, and appeal of using video 85%, with an average number of 81.4%.

Table 3. Broad Group Trial

No.	Theory	Score %
1	Video simplicity	80%
2	Video clarity	78%
3	Video understanding	78%
4	Educational videos	80%
5	Appeal of using video	77%
	Amount	407%
	Average	81.40%
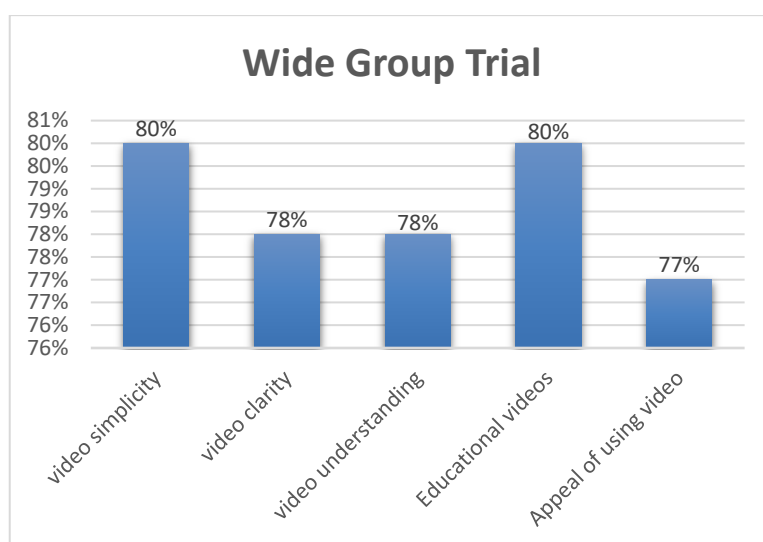
Figure 3. Board Group Trial

The broad group percentage scores with video simplicity at 80%, video clarity at 78%, video understanding at 78%, education video at 80%, and appeal of using video at 77, with an average of 81.4%. The results of the trial show the exact percentage assessment, which is 81.4%, that the

conclusions drawn from the product trial can already be used in the data analysis process on the use of video learning media, where the results of the media can be continued in the data analysis process.

Analysis Process

The data analysis used a sample of 21 students of the Universitas Negeri Medan Cosmetology Education Study Program for the 2021/2022 academic year through pretest and posttest in the control and experimental classes. Based on the results obtained in the control class with an average pretest value of 64% and an average posttest value of 75.67%, while the results of the experimental class pretest 71.57% and posttest 88.33%, from the pretest and posttest results, obtained show that the experimental class is better than the control class, with an assessment difference of 12.66%, this indicates that the use of video learning media in Sunda siger bridal makeup can improve student learning outcomes of cosmetology education students for the 2021/2022 academic year Faculty of Engineering, Universitas Negeri Medan. The results of the feasibility data analysis were then tested for significance using the t-test.

Table 4. Data Analysis Results

No.	Resonden	Pretes	Postes
1	Control class	64%	75.67%
2	Experiment class	71.57%	88.33%
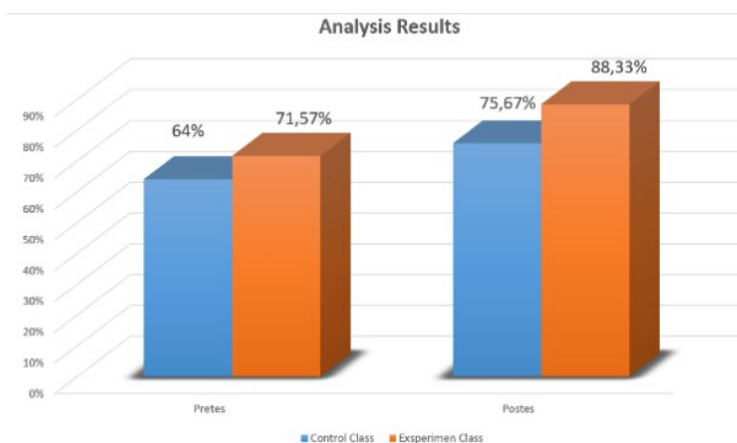
Figure 4. Data Analysis Results

T-test

The t-test was conducted to see the significance of the process of developing video learning media which was seen from the count and table tests with a level of 0.05. As for the assessment, if the t-count value was less than the t-table, then the H0 assessment was accepted, and H1 was rejected. Table 5 shows that the results t-count $\geq$ t-table equals $24,54 \geq 2,086$. From the results obtained, H1 is accepted. The development of Sunda siger bridal makeup learning video media can be used and is feasible in the teaching and learning process to improve student learning outcomes and creativity. Cosmetology education students, Faculty of Engineering, Universitas Negeri Medan, the academic year 2021/2022.

This is in line with the research results of Setyowati and Fida (2021), which state that the animated video tutorial is very feasible (90.73) to improve the development of students in all of the X grades at vocational high schools. The learning outcomes have increased from an average pre-test to post-test results and the acquisition of understanding with an N-Gain test of 0.52 in moderate criteria. The conclusion is obtained that the improvement of e-learning through the animate.

This research is used with the opinion of Nurharini and Yuyarti (2017), which states that animated video media for learning arts and crafts and media that attract students' attention to study hard.

Table 5. T-test Results

No.	Evaluation	Control	Experiment
1	average value	76.61	86.67
2	Standart Deviasi	1.08	1.62
3	Varians	23.73	52.53
4	Samples	21	21
5	Hige Score	82	100
6	Low Score	65	75
	t-count	24,54	
	t-table	2,086	

CONCLUSION

Based on the results of the research conducted, it can concluded that learning media video of the Sunda siger bridel makeup is feasible to use for the teaching and learning process, where the post-test score in the control class is 75.67% and the experimental class is 88.33% with a difference of 12.66% increase, while from the results of the t-test carried out there is acceptance in the use of learning media that tcounts $\geq$ ttable which is equal to $24,54 \geq 2,086$, with the result that Ho is rejected and H1 is accepted, in this case it is necessary to use other media to improve the quality of students and teachers in the teaching and learning process.

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Students' readiness in following online learning during the Covid-19 pandemic

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ABSTRACT

The Covid-19 pandemic has impacted various sectors, including the education sector. This study aimed to determine Polbangtan YoMa students' readiness to follow online learning during the Covid-19 pandemic. This research is survey research. The subjects of this study were 158 Polbangtan YoMa students. The instrument used for data collection was a questionnaire. Data were analyzed using descriptive statistics. This study results are: (1) the aspects of facilities and infrastructure get the percentage of 66%, meaning that Polbangtan YoMa students are ready to follow the learning from the aspect of facilities and infrastructure; (2) the technological literacy aspect gets the percentage of 65%; meaning the Polbangtan YoMa students are ready to follow the learning from the aspect of their technological literacy abilities; (3) the quality aspect of online interactions gets the percentage 35%; meaning that Polbangtan YoMa students are not ready to take part in learning from the aspect of online interaction quality capabilities; (4) aspects of the benefits of online learning get the average sroce percentage of 52%, meaning that Polbangtan YoMa students agree that online learning will be helpful; (5) aspects of assistance services get the percentage of 67%, meaning that Polbangtan YoMa students entirely agree that assistance services help in online learning; and (6) aspects of online learning prospects get the average score percentage of 57%, meaning that Polbangtan YoMa students somewhat agree that online learning provides online learning prospects, thus Polbangtan YoMa students are ready to do online learning with an average proportion of 57%. The online learning model used at Polbangtan YoMa is asynchronous learning using e-learning, WhatsApp, and Google Classrom.

INTRODUCTION

Coronavirus disease 2019 (Covid-19) is a contagious and deadly disease caused by the recently discovered coronavirus. This infectious disease was known as the 2019 novel Coronavirus (2019-nCoV). The World Health Organization (2020) renewed the name, becoming Coronavirus Disease 2019 (Covid-19) which was caused by the virus of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). This Covid-19 infection occurred through SARS-CoV-2 transmission from symptomatic humans to other humans through coughing or sneezing droplets (Jin

et al., 2020). The initial symptoms when Covid-19 allegedly infects a person struck by fever, cough, runny nose, sore throat, fatigue, headache, shortness of breath, and diarrhea (Chen et al., 2020; Guan et al., 2020; Huang et al., 2020; Wang et al., 2020).

This new virus and the disease it causes were unknown before the outbreak began in Wuhan, China, in December 2019 (World Health Organization, 2020b). The Worldometer (2022) site reported that until 27 May 2020, Covid-19 had become a pandemic affecting many countries. The number of positive infections was 5,804,679 cases, at which the mortality rate was 357,738, and the number of healing patients was 2,509,531. COVID-19 was identified and spread out into Indonesia starting on 2 March 2020. Gugus Tugas Percepatan Penanganan COVID-19 Republik Indonesia (2020) reported that until 16 August 2020, the positive infection rate was 23,851 cases, the recovery rate by 6,057 patients, and the mortality rate by 1,473 deceased. The disease with high risk and the high rate of Covid-19 cases in Indonesia impacted every sector of people's lives.

One of the sectors affected by the Covid-19 pandemic is education. At the time, the education sector in Indonesia still conducted offline or face-to-face learning. In addition, education staff had to undertake their work in the institutions. If the activities were still conducted amid the Covid-19 pandemic, it would create many other infection cases or clusters, eventually increasing the Covid-19 infection rates in Indonesia. Therefore, government, teachers, and students must try to prevent the disease.

Through the Ministry of Education and Culture, the government of the Republic of Indonesia instructed that education for students should be carried out in an online system. At the same time, academic staff and teachers worked from home in their respective houses to prevent Covid-19 infections (Minister of Education and Culture of the Republic of Indonesia, 2020). As a result, all schools, from kindergarten to higher education, must comply with the circular.

In order to follow up on the instruction, the Head of Sekolah Tinggi Penyuluhan Pertanian Magelang (2018) immediately issued a circular SE.1172/I.8/3/2020 regarding self-awareness, preparedness, and infection preventive action of the Covid-19 outbreak at Polbangtan YoMa Magelang Campus. Consequently, all academic communities at Polbangtan YoMa must comply with the instruction, including students. The instruction of sudden online learning that has yet to be socialized obliged the students to prepare in every aspect. Students' readiness becomes very urgent and essential, considering the purpose of education in Polbangtan YoMa is to make students skillful in applying applied science in agriculture and farming.

Therefore, there is a need to map out Polbangtan YoMa students' readiness to follow online learning during the Covid-19 pandemic. Many previous studies examined readiness in online learning; however, there has yet to be a study investigating vocational higher education, particularly in agriculture and farming.

RESEARCH METHOD

This study is survey research. The research subjects are Polbangtan YoMa students. The sample was established using the random sampling technique. The data collection instrument is a questionnaire using Google Forms spread through WhatsApp. The questionnaire consists of six aspects, i.e.: (1) facilities and infrastructure, (2) technological literation, (3) the quality of online interaction, (4) assistance service, (5) the advantage of online learning, (6) the prospect of online learning (Direktorat Jendral Perguruan Tinggi Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2020; Sadikin & Hamidah, 2020). The questionnaire and its aspects were firstly validated for its content validity through expert judgments (Sugiyono, 2017). The instrument reliability test applied is Alpha Cronbach assisted with SPSS Software. The instrument coefficient reliability of Alpha Cronbach is > 0.60 (Ghozali, 2011). The collected data are quantitative and qualitative. The qualitative data are used to support quantitative data displayed descriptively. The per aspect of quantitative data was determined using the technique of students' response percentage with the following Formula 1.

$$\text{Percentage of Aspect} = \frac{\text{Expected Score}}{\text{Expectation Score}} \text{ x } 100\% \tag{1}$$

The result per aspect and total aspect percentage was then compared with Table 1 to interpret the data qualitatively.

Table 1. Interpretation of Result Percentage

Interval Percentage	Interpretation Category
76% < x ≤ 100%	Strongly Agree /Highly Prepared
51% < x ≤ 76%	Agree/ Ready
26% < x ≤ 51%	Disagree/Unprepared
0% < x ≤ 26%	Strongly Disagree/ Extremely Unprepared

FINDINGS AND DISCUSSION

Two expert validated the questionnaire and provided suggestions for improvements. After the instruments were revised, the two experts deduced that the questionnaire was valid to be used for data collection. Meanwhile, the questionnaire was tested on 20 respondents and found that the Cronbach alpha was 0.732, so the questionnaire was reliable because it was > 0/60.

The questionnaire was worked out by 158 Polbangtan YoMa students who did different study programs. As many as 18.3 % of the students did livestock production technology study program, 19.1 % did animal feed technology study program, 31.4 % did animal health education program, 14.6 % did agricultural counseling study program, and 16.6 % did agribusiness horticulture study program. Of the total students, 46.6 % are male students and 43.4 % are female students.

The collected quantitative data were tabulated and searched for the mean of each aspect. The result percentage of each element is shown in Figure 1.
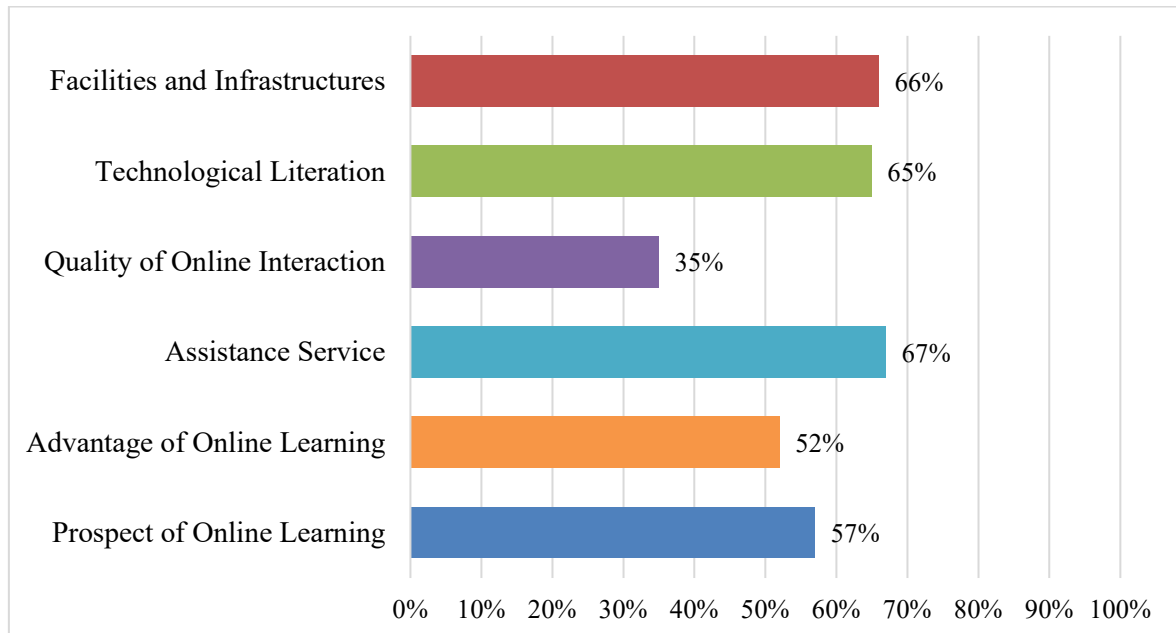
Figure 1. Chart of Polbangtan YoMa Students' Readiness Aspect Percentage

The percentage of facilities and infrastructures derives as much as 66%, meaning that Polbangtan YoMa students were ready to follow the learning system viewed from the facilities and infrastructure aspects. The percentage of technological literation aspect obtains as much as 65%, meaning that Polbangtan YoMa students are prepared to participate in the learning observed from the technology literation aspect they have. The percentage of the quality of the online interaction

aspect derives as much as 35%, meaning that Polbangtan YoMa is not ready to participate in the learning viewed from the skill of online interaction quality aspect. The percentage of the advantage online learning aspect gets as much as 52%, meaning that Polbangtan YoMa students agree that online learning is helpful for them.

The percentage of assistance service aspect obtains as much as 67%, indicating that Polbangtan YoMa students agree that assistance service helps them greatly during online learning. The percentage of the prospect of online learning derives as much as 57%, meaning that Polbangtan YoMa students agree that online learning provides a reasonable prospect of online learning. The average percentage of the sixth aspect is 57%, meaning that Polbangtan YoMa students are ready to participate in online learning.

Polbangtan YoMa Students' Readiness to Participate in the Online Learning

Online learning requires equipment and tools like a laptop, smartphone, and Internet connection. The students of Polbangtan YoMa must have the equipment and tools to work on their assignments. Nevertheless, online learning will spend more on Internet credit quota than offline or face-to-face learning. Thus, this is the main problem.

The Internet credit quota in the market is varied. Usually, they have packages starting from 1 GB to unlimited quota. Unfortunately, the Internet credit quota available in the market is costly. The price varies depending on how much Internet credit quota one wants to buy. Additionally, the price offered among service providers is also varied. Students must be selective in choosing the package conforming to their requirements and the provider's signal strength in their regions of the Polbangtan YoMa students. The Internet network is presented in Figure 2.
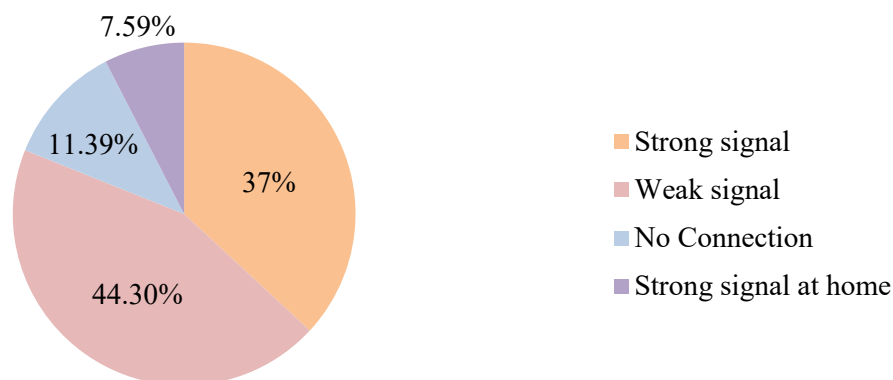
Figure 2. Diagram Response of Internet Network Signal Strength

The Covid-19 pandemic requires Polbangtan YoMa students to return to their respective regions' homes. Compared to students at Polbangtan YoMa Campus in the urban area, most students at home were found in low-signal or rural areas. They experience difficulty getting Internet connections due to bad signals in their villages or regions. Only 37% of the students can get uninterrupted internet access during online learning. This difficulty makes the students burdened with Internet access to move to other spots (certain areas) with a good signal when they follow online learning. Many students change their phone numbers with a different provider to get a good internet connection.

The Covid-19 pandemic requires Polbangtan YoMa students to return to their respective regions' homes. Compared to students at Polbangtan YoMa Campus in the urban area, most students at home were found in low-signal or rural areas. They experience difficulty getting Internet connections due to bad signals in their villages or regions. Only 37% of the students can get uninterrupted internet access during online learning. This difficulty makes the students burdened with Internet access to move to other spots (certain areas) with a good signal when they follow online

learning. Many students change their phone numbers with a different provider to get a good internet connection.
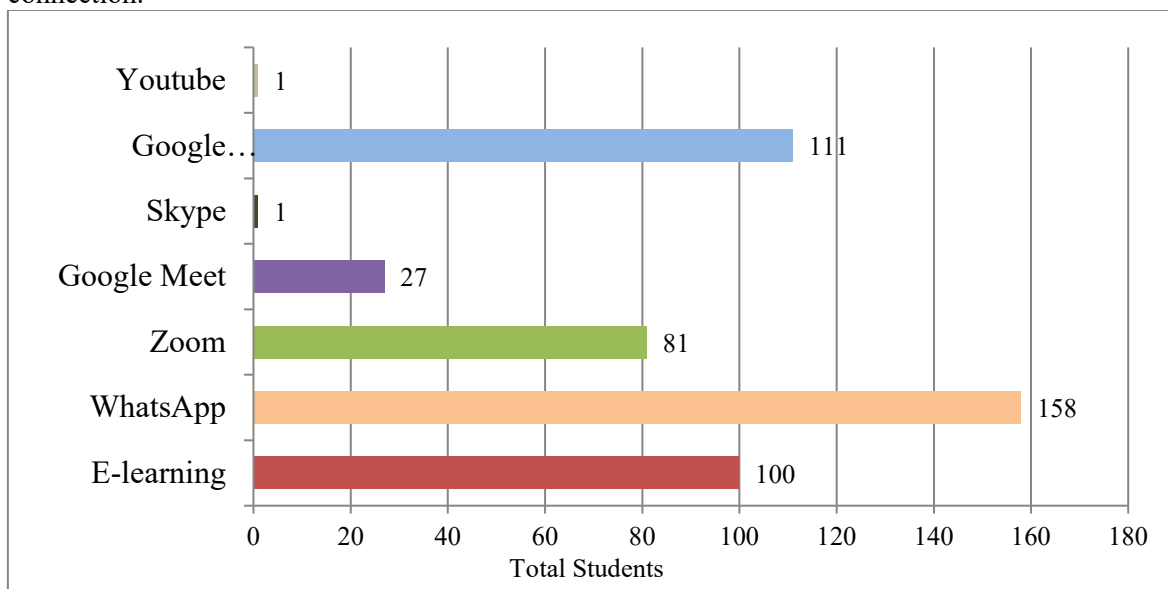
Figure 3. Charts of Online Learning and E-learning Applications Used by Polbangtan YoMa Students
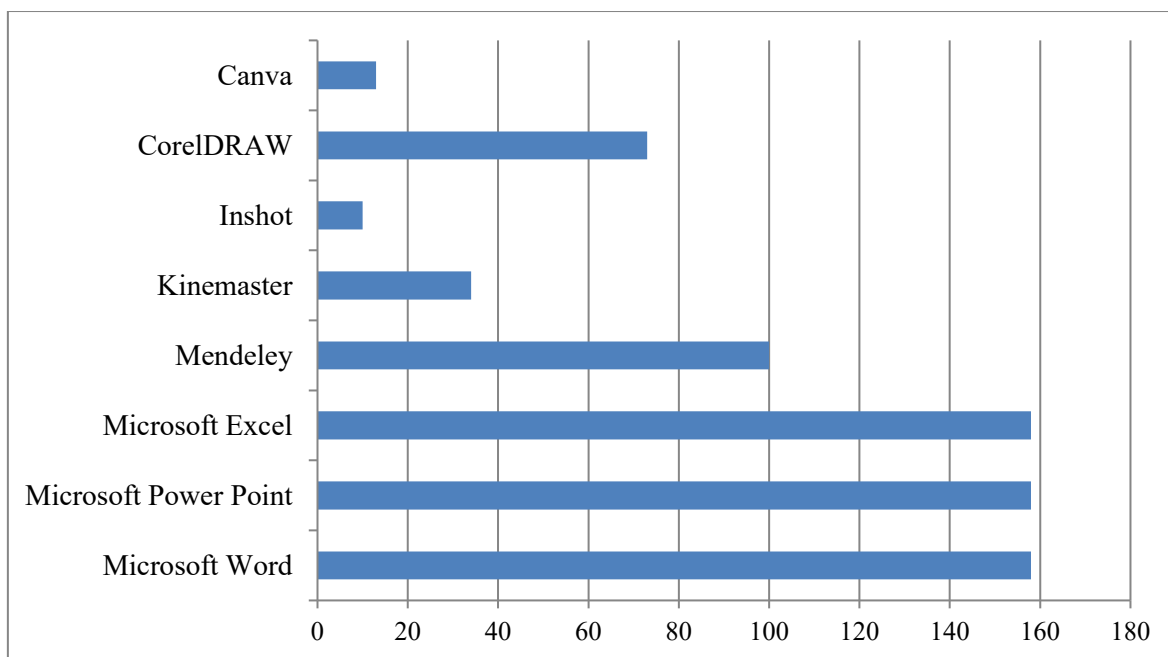
Figure 4. Chart of Applications Used by Polbangtan YoMa Students

In online learning, the students are usually assigned many tasks. The more they master the tools to work on their assignments, the better they can complete the job excellently. Of the various existing tools in the market, there are five tools that most students master, i.e., Microsoft Word, Microsoft PowerPoint, Microsoft Excel, SPSS, and Mendeley. Unfortunately, only a few students can master photo or video editing applications, such as CorelDraw, kinemaster, Photoshop, Canva, and Inshot.

Nonetheless, college task is usually not only in text but also in photo or video. Hence, students must adapt to mastering photo or video editing applications. For students with difficulty mastering such applications, 56.3% will learn using the Internet, 34.2% will ask their friends, and the rest, 10%, only responded as they were. It means that although students have not mastered

technological literation, they will be ready to master the skill or applications to work on their tasks during online learning with satisfying results.

Regarding assistance services, students feel relieved that the campus provided an Internet credit quota of as much as 150.000 IDR for two months of online learning. Additionally, because of the online learning from home, students' meals are still borne by Polbangtan YoMa, so the meal money can be saved to buy Internet credit quota if it runs out.

The aspect of advantage of online learning, students perceive it as applicable. However, the effectiveness in understanding the learning materials provided is lacking. The matter is that Polbagtan YoMa organizes vocational education, emphasizing practical classes rather than theoretical ones (Head of Sekolah Tinggi Penyuluhan Pertanian Magelang, 2018). If they have many theories but lack practical courses, they will experience problems while undertaking fieldwork practice.

In the next aspect, according to Politeknik Pembangunan Yogyakarta-Magelang students, the prospect of online learning can be managed well during the Covid-19 pandemic. It is because education during the Covid-19 pandemic prioritizes more students' and lecturers' safety, but it did not put aside education. This priority is mentioned in the Ministry of Education and Culture of the Republic of Indonesia (2020). This decision states that the principle of education policy during the Covid-19 pandemic, the health and safety of students, teachers, education staff, families, and the community, is a top priority in setting learning policies. Nevertheless, if online learning is conducted long-term, it will cause eye pain, and the Internet quota will run out quickly.

Online Learning Model at Polbangtan YoMa

Based on the survey, Polbangtan YoMa must select a suitable online learning model. The right online learning would make online lessons more effective and efficient. The asynchronous learning model is the right online model for education. This model can overcome the problems of unstable Internet connection and wasteful use of Internet quotas (Hadi, 2015; Perveen, 2016). In addition, the learning time has become more flexible, and the schedule is not fixed because students can participate in online learning at the scheduled time and anytime (Northey et al., 2015). Online learning applications like Google classroom or WhatsApp can be used for online presence lists and discussions related to the problems in online learning.

Meanwhile, teachers can use e-learning on this site: http://e-learning.polbangtanyoma.ac.id to distribute learning materials and exercise worksheets. However, this learning model has a shortcoming, i.e., there needs to be direct interaction between the lecturers and students, so they feel reluctant to study the learning materials and work on the tasks by the lecturers. Therefore, the lecturers should provide learning materials in the handout text and videos, images, and animations (Choe et al., 2019; Perveen, 2016). It is advisable that the worksheets not only in an essay but also in multiple choice questions and right or wrong choices in which the content is not only text but also images and animations (Martín-SanJosé et al., 2015).

CONCLUSION

Polbangtan YoMa students are ready to follow online learning during the Covid-19 pandemic. Nonetheless, it needs to make innovation in learning. The online learning model that should be used is the asynchronous learning model. The reason for selecting the asynchronous learning model is that it is accessible to students in Polbangtan YOMA, so it is better to use mixed Google Classroom, WhatsApp, and e-learning. Further research should study activities within the class by implementing an asynchronous online learning model both for theoretical and practical learning. Additionally, teachers should develop online learning, which can replace practical learning, such as making virtual laboratories.

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Soft skills profile of critical thinking ability for culinary arts students in online learning

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ARTICLE INFO

ABSTRACT

The ability to think critically has become a demand in the 21st century. This paper describes how culinary arts students' soft skills ownership profile after participating in online learning through the communication media application used. This study is survey research, processed by quantitative description. The research subjects were the culinary arts study program students with diploma 4 and bachelor's degrees, Department of Food and Clothing Engineering, Faculty of Engineering, Universitas Negeri Yogyakarta. The population of this study is all students who are part of ongoing online learning. Samples were taken at simple random. The data collection technique used a questionnaire via google form; the goal was affordability from the aspect of place and time. The study focuses on mastering soft skills in learning and innovation skills, especially critical thinking and problem-solving. The survey results show that Catering lecturers widely use online media, such as the Google Meet application, Google Classroom, and Be-Smart. More than half of the soft skills profiles displayed by culinary arts students show critical thinking behaviors (61%). The behavior of critical thinking soft skills that is quite prominent is the ability to think rationally, consider well to solve problems and be able to make creative solutions to tasks found during learning. Online learning implies that it is necessary to increase human resources, especially lecturers, in optimizing online media applications. Students need support in the form of triggers and the preparation of learning tools that can awaken critical thinking skills.

INTRODUCTION

Learning in the network (online) has long been known in education, although its previous use was minimal. The use of online learning was initially only for special classes that were remote, so teachers very rarely used it in their teaching activities. Moreover, online learning requires teachers ' information technology ability and relatively expensive facilities and infrastructure. Teaching materials that teachers will deliver must be designed in various forms and recommended in digital form so that they accommodate the independent or individual learning of students (Darmansyah, 2020). This is in line with the Internet connection, which is an essential requirement during the implementation of online learning. At the same time, not all regions in Indonesia can be reached with a good Internet connection. Expanding the Internet network is one solution, but we are also faced with the high cost of investing in Base Transceiver Stations (BTS) and the high price of repeaters that require special permits before use (Asiba, 2021).

The Coronavirus disease 2019 (Covid-19) is disturbing worldwide, especially in Indonesia; this is because Covid-19 has paralyzed various sectors such as the economy, tourism, trade, and investment. The Covid-19 pandemic since the end of 2019 has forced teachers and their various supporting components to carry out online learning because health factors are important factors that must be prioritized. The implementation of online learning, which was accelerated due to the coronavirus, certainly changed all habits in learning activities. The interaction that previously could be done freely is now starting to be limited (Bojović et al., 2020). Learning activities carried out face-to-face are now evolving through online learning. Online learning was chosen because it is considered the best solution so that the learning and teaching process during this pandemic can still run without endangering students and teachers/lecturers (Seli et al., 2021).

Online learning during the Covid-19 pandemic is not always detrimental but also has several advantages in its application. Some of the benefits of online learning are the flexibility of time and place so that the implementation of learning does not require students and teachers to gather in the same place. Differences in location, time, and distance are common to communicating and learning interactively with students, so online learning is a suitable alternative. Students can access learning media whenever and as much as they need to be understood (Aziz & McKenzie, 2020).

On the other hand, the demands of vocational graduates must be to the needs of the world of work. Activities in vocational groups must always be oriented towards strengthening competence so that vocational education graduates can show that they are competent according to their fields and levels. The Director-General of Vocational Education has determined that vocational education learning must equip students with various skills as personal development assets. In the strategic plan of the Ministry of Education and Culture Directorate General of Vocational Education (2020), it is stated that the skills that must be trained and mastered include life and career skills, skills in learning and innovation, and skills in utilizing information, media, and technology. This stipulation binds all vocational higher education institutions, including vocational education, attached to universities. Therefore, vocational education must create learning that allows graduates with high skills and knowledge (high skill & know-how).

Based on this, through this research, we want to see the profile of soft skills ownership on the critical thinking ability to cater to students after online learning is implemented for three semesters. This is very useful for improving learning activities toward 21st-century skills. Learning, in a broad sense, is an obligation, competency development, and a process not bound by place and time in which there are activities to get, understand, remember, and use information (Yokoyama & Miwa, 2020). Learning is knowledge acquired by systematic study, gaining knowledge of a subject or skill due to reflection, experience, or instruction (Bragg et al., 2021).

Rossman and Rallis (2012) further explain that learning emphasizes an active process in which students passively receive information and knowledge and actively apply various types received. So far, we are familiar with the most commonly known learning taxonomy, Bloom's Taxonomy. Bloom's Taxonomy provides assessment criteria for learning outcomes that can be classified into three domains: cognitive, affective, and psychomotor. The cognitive domain refers to intellectual abilities that include knowledge with six levels, from easy to difficult. The effective field relates to feelings, emotions, and behaviors. The psychomotor domain refers to skills (Baran & Jones, 2020).

Learning has gone through several stages ranging from conventional or face-to-face learning to learning with the help of communication and information technology, better known as online learning. Online learning utilizes information and communication technology (ICT) and continues to develop (Da Silva & Behar, 2020). Online learning has transformed the everyday student experience and created virtual campuses and classrooms. Technologies widely used in this era of online learning include tablets, smartphones, interactive whiteboards, social media platforms, professional broadcasting communication equipment, augmented and virtual reality, and various other learning software programs that contribute to this digital learning era.

A modern online-based learning system is also supported by learning formats in the form of text, audio, video, and interactive 3D materials. Flexibility is the main benefit of implementing online learning. Online learning can be done in the office, at home, and even in various places with an Internet connection. Comerchero (2006) explain that the application of online learning also

encourages students to be more responsible for the learning they take or participate in. When learning success is obtained, it will build self-knowledge and self-confidence in students.

According to Arkorful and Abaidoo (2015), online learning provides advantages in the form of flexibility in time and place; increasing access to knowledge and information; building interaction with more students and minimizing student fear; implementation, which tends to be cost-effective; and helps for overcoming staff, facility, and technical limitations. However, behind some of these advantages, there are disadvantages of online learning, including the lack of optimal interaction process, students' understanding and interpretation being less effective, lack of communication skills, a challenge to control fraud, plagiarism opportunities, the loss of the role of institutional socialization and learning facilitators, and that not all disciplines are compatible with online learning.

Soft skills are defined as non-technical skills that do not depend on abstract reasoning and are loaded with interpersonal and intrapersonal skills (Hurrell, 2016). Soft skills become an essential thing that students must own. One of the weaknesses of vocational education graduates is due to changes in quality that have been oriented only to hard skills and are not accompanied by the development of soft skills, which are very much needed by business and industrial sectors. Soft skills play a very important role in a person's success in life (Prihatiningsih, 2018). Soft skills are needed in the world of work, where this ability will be able to help individuals to apply the knowledge gained while in college in the world of work (Manara, 2014).

Mastery of soft skills will ensure that one does his or her job with high quality (Sharma & Sharma, 2010). Mastery of hard skills coupled with integrated soft skills enables students to adapt to organizational culture, take the initiative, and contribute to organizational success (Kinsella & Waite, 2021). Critical thinking and problem-solving skills are essential in learning in the 21st century. In critical thinking, Heard et al. (2020) explain that it takes the ability to recognize a problem and then find a way or solution that can be used to solve problems. In detail, critical thinking requires the ability to collect information, interpret data, assess existing evidence, evaluate, and then draw conclusions. Critical thinking skills are higher-order thinking skills in solving problems systematically. "Critical thinking is thinking that uses its mind to solve a problem by first understanding the problem, expressing an opinion or argument clearly, being able to detect it from various points of view and conclude the existing problems" (Fatmawati et al., 2014).

According to Sulaiman et al. in Changwong et al. (2018), preparing students to be able to think critically is one of the main goals of many professional universities. In addition, critical thinking skill is also one of the skills that are sought after by most employers. Critical thinking skill is the ability to reason, build concepts, and develop logical thinking. Students can synthesize, assess, and reflect on things such as ideas and assumptions with rational reasons (Hamidah, 2017). This ability is essential when students are involved in solving various problems. Students must be able to find the issues and formulate creative solutions to problems encountered (Dadakhon & Sabohat, 2022). In online learning, lecturers can create topics, or students discover the topics when interacting with assignments.

Critical thinking also includes three main elements: effectiveness, novelty, and self-direction. It is effective because it avoids general traps or views on one side only so that it ignores evidence and cannot present evidence to support a statement (Willingham, 2008). Keynes reinforces this statement in Zakiah and Lestari (2019), in which he states that the purpose of critical thinking is to maintain an objective position. Where will an argument weigh all sides and then analyze its weaknesses and strengths? Therefore, it is also necessary to actively look for all sides of an idea so that it can support a statement to be conveyed.

Students who develop critical thinking skills will benefit academically and succeed in the world of work. Through necessary thinking skills, students will broaden their perspective of various things and improve their ability to navigate essential decisions in the learning process and their careers (Murawski, 2012). Critical thinking is one of the high-level skills that is an indicator of the success of the learning objectives students must achieve. Critical thinking skills must be developed consistently in the learning process so that students can manage the learning process independently and improve their thinking skills (Thalib et al., 2017).

RESEARCH METHOD

This research is survey research, processed by quantitative description. The research subjects are Diploma 4 and undergraduate students of the Culinary Arts Program of the Department of Food and Fashion Engineering, Faculty of Engineering, Universitas Negeri Yogyakarta. This population determination is based on the fact that all students are part of online learning, which is currently enforced. The research sample was established using the simple random sampling technique. During online learning, students had a variety of theoretical and practical learning experiences. They completed structured tasks independently and in discussion groups, journal and book studies, presentations, questions and answers, culinary practices, and surveys.

The data collection used a questionnaire with Google Forms, by the conditions of the Covid-19 pandemic, and taken at a particular time only to be affordable in time and place. This research focuses on the mastery of soft skills in soft skills learning and innovation skills, especially critical thinking and problem-solving skills. The soft skills rubric for necessary thinking skills as a response instrument uses the following six categories, as seen in Table 1.

Table 1. Response Category

Response	Explanation
Not like me	Illustrating that the mastery of the described soft skills has not yet appeared
A little bit similar to me	Illustrating that the mastery of soft skills is not as described
A little closer to me	Illustrating that the mastery of soft skills is somewhat close to the description
Sometimes like me	Illustrating that the mastery of the described soft skills is still unstable or not yet stable
I do it almost often	Illustrating that the mastery of soft skills is close to the description, although it is not consistent
I always do	Illustrating that the mastery of the described soft skills has become part of daily behaviour

Soft skills profile data were analyzed quantitatively according to the strengths and weaknesses of soft skills resulting from online learning activities. Soft skills profile is strong if students can describe mastery in categories "I almost often do and always do." Besides, it is categorized as a weakness.

FINDINGS AND DISCUSSION

Online Media Used

Online activities that have been carried out so far have been conducted based on responses from various respondents. Based on the data in Table 2, the media most frequently used by lecturers is Google Meet (39.9%), followed by Google Classroom (26.22%) and Be-Smart (25.14%). Of course, the selection of online media is based on an agreement between lecturers and students on the use of this application with various disadvantages and advantages. Google Meet, distance, and time are acceptable. The capacity can reach 100 to 250 people, with multiple features that help interaction in learning.

Table 2. Online Media Used

No.	Online Media	F	%
1	Google Meet	73	39.9
2	Google Classroom	48	26.22
3	Be-Smart UNY	46	25.14
4	Zoom Meeting	7	3.82
5	WhatsApp	7	3.82
6	YouTube	2	1.1
	Total	183	100

Furthermore, Google Classroom is an online mixed-learning application. It aims to help lecturers and students organize classes and communicate with students without being tied to class schedules. The utilization of Google Classroom can be multiplatform through computers and mobile devices (Alim et al., 2019; Sabran & Sabara, 2018). Be-Smart is an interactive electronic learning media via the Internet intended for students and lecturers at Universitas Negeri Yogyakarta. The application was built to facilitate the relationship between lecturers and students in teaching and learning activities and to follow the development of learning technology. Be-smart was created using the Modular Object-Oriented Dynamic Learning Environment (MOODLE) (Abubakari et al., 2021), a world-famous software package to develop Internet electronic learning media (LPMT Fenomena, 2013).

Ownership Profile Soft Skills of Critical Thinking Ability

Critical thinking and problem-solving skills are important in learning in the 21st century (Carlgren, 2013). In detail, critical thinking skills require the ability to collect information, interpret data, assess existing evidence, and evaluate and then draw conclusions (Heard et al., 2020). Critical thinking is also thinking using the mind to solve problems by first understanding, presenting arguments, and detecting bias from various points of view so that conclusions can be drawn (Fatmawati et al., 2014; Mursidik et al., 2015). Soft skills ownership profile on critical thinking ability can be seen in Figure 1.
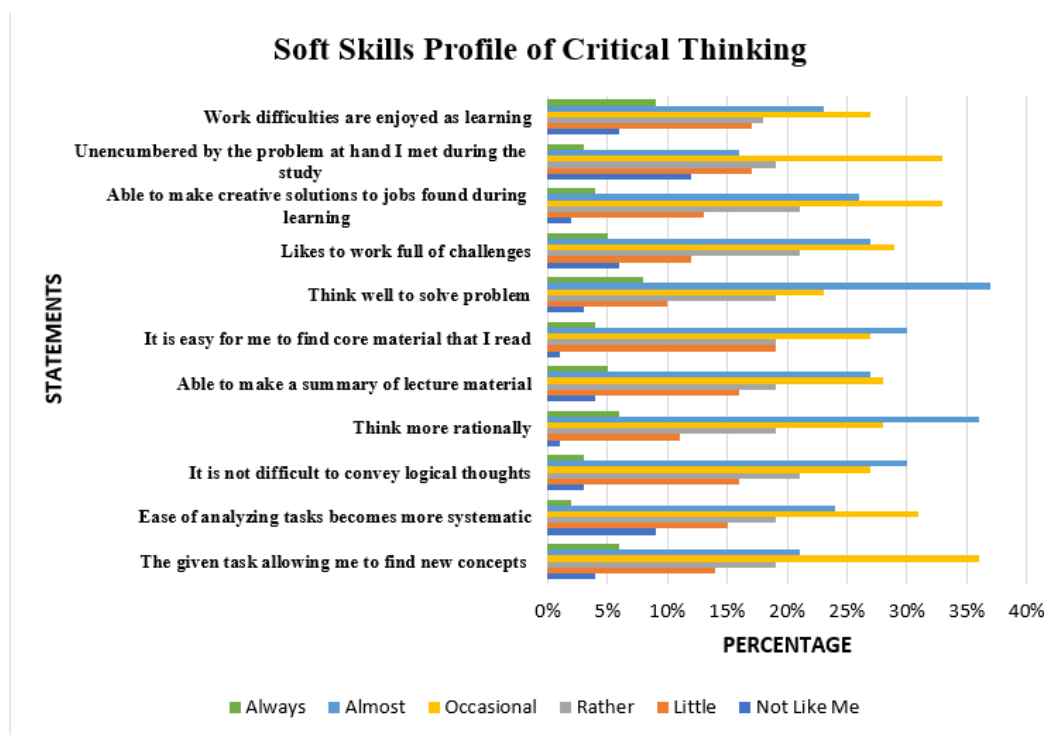
Figure 1. Soft Skills Profile of Critical Thinking

Based on Figure 1, in the "almost like me" category, the three highest percentages are "think well to solve problems" (37%), "think more rationally" (36%), "it is not difficult to convey logical thoughts" (30%), and "it is easy for me to find core material that I read" (30%). In the 'occasional like me' category, the three highest percentages in a row are statements with the given task "allowing me to find new concepts" (36%), able to make creative solutions to jobs found during learning (33%), and "unencumbered by the problem at hand," "I met during the study" (33%). Overall ownership of soft skills still shows "sometimes like me," with an average achievement of 29%, as as shown in Figure 2.

Average Soft Skills Aspect of Critical Thinking
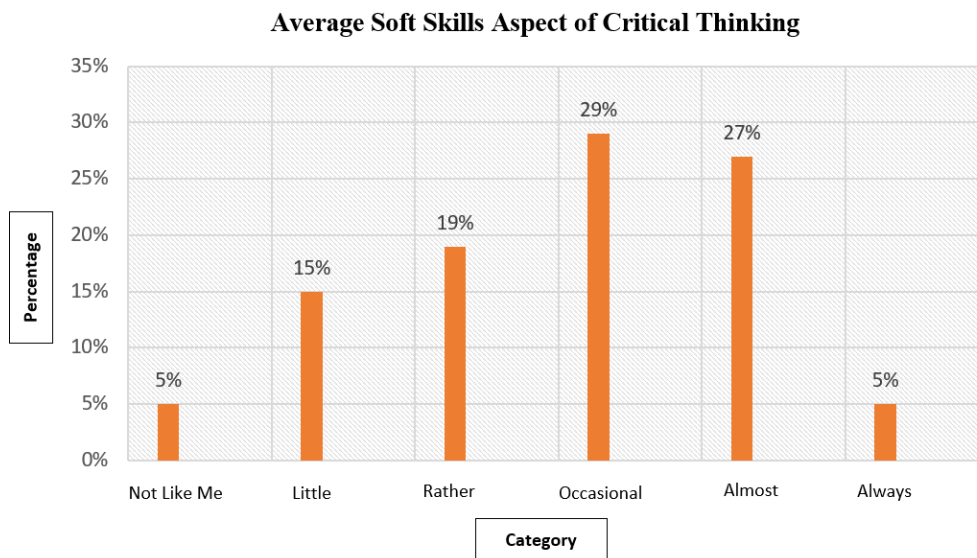
Figure 2. Average Soft Skills Aspect of Critical Thinking

Figure 1 shows that although students are trained to think critically, not all show their critical thinking skills. This situation indicates that online learning needs to support students in the form of triggers so that they can practice critical thinking. With this average, it shows that there are still 39% of students whose soft skills have yet to emerge in the essential aspect of thinking.

The distribution in Figure 2 shows aspects of soft skills, with the tendency of the data to the right being more significant than that to the left, where the curve to the right shows some elements of soft skills "sometimes," "almost," and "somewhat like me." When added up, it reaches 61%, while the soft skills aspect of critical thinking that leans to the left shows "a bit," "a little," and "not like me" is tiny, reaching 39%. Thus the description of the soft skills aspect of online learning in the part of critical thinking ability shows a tendency to the right, namely "sometimes," "almost," and "somewhat like me." Furthermore, an overview of the mastery of critical thinking skills on each item can be seen in the following Figure 3.

Average Soft Skills Aspect of Critical Thinking on Each Item
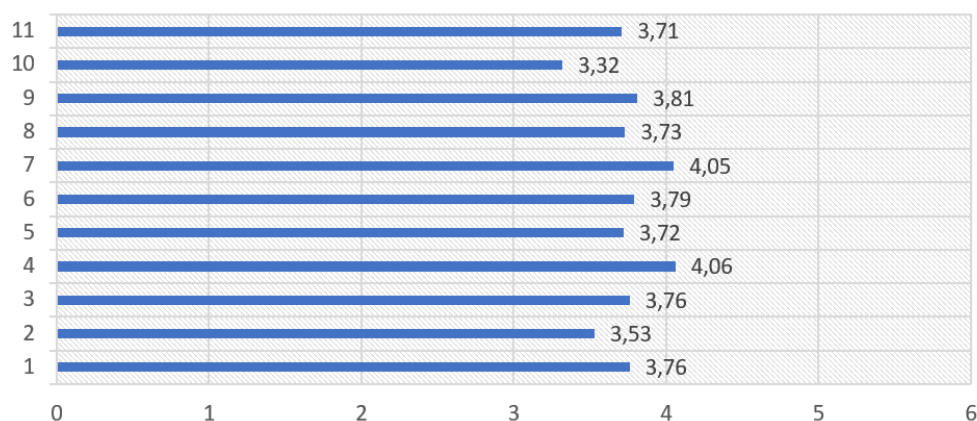
Figure 3. Average Soft Skills Aspect of Critical Thinking on Each Item

The profile of soft skills in critical thinking is seen from the average score of the highest rank on the item "can reason" or in statement number four (4.06), the second "can think well to solve problems" or statement number seven (4.05) and the third "can make creative solutions to tasks found

during learning" or statement number nine (3.81). The overall average value reached 3.75 in the "sometimes like me" and "almost like me" categories. Overall, the average achievement of the soft skill profile on critical thinking skills only reaches 61%.

CONCLUSION

Based on their background, theory, and data processing, culinary arts lecturers widely use online media: the Google Meet application, Google classroom, and Be-Smart. This media is used in teaching because it is considered effective in bridging the interaction of lecturers and students since it has features that support the teaching-learning process. The profile of soft skills displayed by Culinary Arts students has more than half (61%) showing critical thinking behaviors, while the distribution is in groups "like me" (29%), "almost like me" (27%), and "always like me" (5%). The behavior of critical thinking soft skills that is quite prominent is the ability to reason, think well to solve problems and make creative solutions to tasks found during learning. Based on the research results and existing conclusions, the absorption and use of technology and information in learning are diverse. Therefore, it is necessary to increase the ability of lecturers to optimize the features in this application program, for example, evaluation activities, assignment assignments, discussions, quizzes, and assessments. Online learning has been able to equip students with critical thinking. However, it is not optimal; this situation indicates that online learning needs support through triggers or the preparation of learning tools that can awaken critical thinking skills.

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The impact of online learning on students learning motivation

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ABSTRACT

The current Covid-19 pandemic forces the learning process to be carried out online or long distance to impact every factor that supports smooth learning, one of which is student learning motivation. Thus, this study aims to determine the impact of online learning on vocational school students' learning motivation. The method used in this study is a qualitative descriptive research method. The research approach used is a literature study by collecting data from the results of research that has been done previously that discusses the variables related to this research. The study indicates that several factors cause a decrease in student learning motivation, including the need for more learning facilities to support student learning activities, including electronic devices and inadequate Internet networks. Boredom is also another factor that reduces students' learning motivation. In addition, changing the method of delivering learning materials to giving individual assignments is a burden for students. The role of the teacher as a motivator and mentor for students in learning could be more optimal, which also causes a decrease in student learning motivation. Parents who are busy and need more time to pay attention to their children's learning conditions also reduce students' learning motivation.

INTRODUCTION

At the beginning of 2020, the world was shocked by the discovery of a deadly virus called Covid-19, originally considered a normal virus but turned out to be deadly and spread very quickly. Originally discovered in China, the virus spread quickly to infect the whole world (Amalia & Sa'adah, 2020). The country has implemented a large-scale social restriction policy and physical and social distancing so that the Covid-19 virus does not spread wider (Noviansyah & Mujiono, 2021). During large-scale social restrictions, people must maintain their health, maintain distance, wear masks, and always wash their hands with soap and hand sanitizer (Kristina et al., 2020). The spread of the Covid-19 virus affects every aspect of life, including a major impact on the world of education that is felt by various groups, including school principals, teachers, students, and parents (Wandira et al., 2021).

The covid-19 pandemic that is happening around the world at this time has also forced the government to issue policies in the field of education, namely online or distance learning to avoid the spread of Covid-19 in the school environment (Syafari & Montessori, 2021). This is evidenced by the issuance of the Circular Letter of the Minister of Education and Culture of the Republic of Indonesia (2020), which states the abolition of national exams and the implementation of learning

from home. Therefore, changes in education methods also occur, requiring all parties related to the world of education to prepare themselves for these changes.

Online learning is a new thing in Indonesian education, so students are required to adapt quickly (Ramanta & Widayanti, 2020). Online learning or learning from home is a way of learning carried out by students in their respective homes by covering elements of online, offline, project-based learning, blended learning, and home visits (Putri, 2021). Noviansyah and Mujiono (2021) also explains that online learning is a learning model that prioritizes connectivity, accessibility, flexibility, and the ability to generate various Internet interactions.

Online learning depends on information technology devices, Internet networks, and students' skills to operate them (Chang et al., 2021). Students can take part in learning through lectures and discussions using learning media, conferences, and video applications (Musu et al., 2021). This corresponds to Dewi and Sadjiarto (2021), who states that online learning is one of the learning techniques carried out remotely utilizing various kinds of information technology and is supported by the Internet network to reach a broad and large target group.

Online learning has advantages and disadvantages, where the advantages outweigh the disadvantages, but there must still be innovation and improvement to make its quality more effective (Lisman et al., 2021). Online learning is good learning to complement face-to-face learning because, currently, learning is required to use existing technology and not only face-to-face (Sukardi & Rahmat, 2019). Students need support from the government, schools, and parents to implement online learning (Samsinar et al., 2021).

For students, online learning provides the opportunity to learn independently and can be done anytime and anywhere. In contrast, online learning makes it easier for teachers to provide materials, assignments, and assessments through applications without face-to-face meetings (Ningsih & Erdisna, 2021). Online learning makes students more flexible and independent in learning the material, expands the range of learning, and it is more efficient (Lusiani, 2021). Thus, indirectly, the students' independence in learning will also be formed by itself.

Online learning raises various problems that must be faced by teachers and students, one of which is the need for maximum delivery of learning topics so that they are replaced with homework assignments (Adriani et al., 2021). Students feel that implementing online learning during the Covid-19 pandemic has been ineffective (Hamid et al., 2020). Other problems that arise are the lack of skills for students to access the Internet network and applications needed for learning, and it is not easy to manage study time (Handayani et al., 2020).

Another problem arising from online learning is the need for more adequate technical facilities and resources and the lack of linguistic skills (Noori, 2021). Online learning cannot improve knowledge and competence in the long term because there needs to be social interaction between teachers and students which results in the teacher being unfocused in academic activities, so student learning outcomes are low (Farell et al., 2021). Online learning also often makes students bored and not eager to learn because online learning is less interesting than learning in class (Yunitasari & Hanifah, 2020).

Learning motivation has a positive relationship with learning outcomes, so high and low learning outcomes are influenced by high and low learning motivation (Muhammad, 2017). The same thing is explained by Saputra et al. (2018), who explain that providing a strong learning motivation will significantly affect learning. For vocational students, learning motivation has a positive effect on the productive competence of students because if learning motivation increases, the productive competence of students will also increase (Ramli, 2013). However, with online learning, student learning motivation has decreased. Nurfaisal (2021) argues that lacking social relationships reduces learning motivation because students are more motivated if they can communicate directly. The instability of the Internet network also affects the decline in student learning motivation.

This study aims to determine the effect of online learning on the aspects that support the implementation of good learning, especially aspects of student learning motivation. This research is expected to help related parties, especially the government in the field of education, to make good learning formulations to facilitate students' development of their knowledge and skills. This research is also expected to be a material consideration for related parties in developing education in a more modern direction.

RESEARCH METHOD

The research method used in this study is a qualitative descriptive analysis method. According to Sukardi (2003), the descriptive method is one of the research methods applied to describe facts and character objects systematically. The data used in this study is secondary data derived from the results of research that has been done previously, journals, articles, official websites, books, or notes that discuss matters or variables related to this research. In addition to secondary data, this study was also compiled using the author's idea as a form of concluding the data that had been obtained previously.

The approach used in this research is a literature review, a series of activities carried out to collect library data, read and take notes, and manage research materials (Rahayu, 2018). Whereas, according to Sari and Asmendri (2020), literature review research is research that is carried out to collect data and information through various sources in the library and from the Internet related to the problems being studied and carried out systematically to collect, process, and conclude data using certain methods to get answers to the problems raised. This research has reviewed 34 journals that discuss literature review research methods, online learning, student learning motivation, and the impact arising from online learning on student learning motivation. The journals studied are journals of the latest research carried out during the Covid-19 period so that discussions about online learning make sense and are important.

FINDINGS AND DISCUSSION

Based on the findings in the field and the literature study that has been carried out, it was obtained that education is affected by the Covid-19 pandemic. Providing education is disrupted and less than optimal due to various policies issued by the government and related parties. The government has issued a policy regarding physical distancing by maintaining a distance between people and opening crowds to break the chain of spreading the Covid-19 virus in the community. This is also related to the research findings by Siahaan (2020), which state that the government has also issued a policy regarding working from home and online learning to anticipate the transmission of the Covid-19 virus in the work and school environment.

According to several high school teachers, online learning forced them to learn about information technology from the beginning, which hindered the teaching and learning process. They also added that online learning also made students less interested in learning because of the various limitations faced, both technical and non-technical. Different geographical conditions make not all places have a good Internet network, so the quality of online education in cities and villages significantly differs.

This also follows what was reported by Mastura and Santaria (2020) in their research, which revealed that the pandemic forced students to study from home with parental guidance, even though they lacked preparation in its implementation. Student learning motivation decreases because of the boredom they experience because they usually follow learning in class with their friends and then suddenly learn at home independently. Inadequate online learning facilities also reduce student motivation because students are faced with theoretical learning, which makes students slow in understanding learning materials. For teachers, online learning provides difficulties, especially for teachers who need to be proficient in technology, affecting the quality of learning and student learning outcomes. Teachers sometimes feel bored teaching from home because teachers usually teach at school and interact with other teachers.

Boredom is another problem of online learning. Students and teachers have a particular point of boredom in carrying out online learning. This was also expressed by several high school students in Yogyakarta who stated that online learning made it difficult to understand learning materials. Even though they live in the city, not all have adequate Internet access, so each student's mastery of the material differs.

In relation to this problem, Siahaan (2020) also explains that boredom is a factor that reduces student learning motivation. They feel bored because they stare at their cell phones or laptops for several hours. Technical problems such as power outages and Internet network disruptions make it difficult for them to access learning. Tasks that accumulate and an obligation to help parents at home are also complaints of students so that they often make excuses to ask for time to retreat in completing rest tasks to improve their immune system and concretization. The burden on parents becomes heavier because, in addition to having to think about costs for daily life, including buying Internet packages so that their children can continue to study online, parents also have to accompany their children to study every day.

The findings in the field illustrate that children's learning motivation decreases during online learning due to environmental conditions that do not support the learning process. The role of parents could be more optimal in guiding and motivating students to learn. This follows a survey conducted by Suciati and Syafiq (2021), which reported that in Greater Jakarta, Bandung, Medan, and Surabaya, parents were fine with facilitating their children in terms of providing adequate electronic devices and Internet packages. However, parents need help accompanying their children while studying at home because of the difficulty in dividing their time with work responsibilities. Parents also need to gain more knowledge of the process of mentoring children's learning. This causes the role of parents in online learning to be carried out by their children not optimal because parents inevitably have to be a worker and a teacher at the same time.

Other findings from the impact caused by online learning are several complaints related to accommodation costs to support online learning. Explanations given by several parents, many of whom experienced an economic downturn due to the pandemic that occurred, especially if they have to set aside money to buy electronic devices for online learning. Puthree et al. (2021) also explain that inadequate facilities and infrastructure will affect students' learning motivation. Parents complain about the high cost of purchasing Internet quotas, considering the economy of each family is an obstacle to online learning.

According to several high school teachers' explanations, online learning makes teachers' work easier because it can be done from anywhere. However, the perceived obstacle is that not all teachers understand information technology. The method of delivering information usually done through the presentation focuses on giving independent assignments because it is simpler. On the other hand, judging from some students' opinions, giving independent assignments too often makes it easier for them because they have to play with gadgets every day. Not all students have adequate gadgets, so students' learning motivation decreases. This is in line with what Suttrisno (2021) reported in his research, which showed that student learning motivation decreased because it was caused by too short independent task processing time and inadequate electronic facilities. This also impacts the spirit of learning that goes up and down when doing online learning.

Based on the results of the exposure of several teachers and high school students, it can be illustrated that they are not ready to participate in online learning due to several factors, including environmental, social, economic, and several other factors. Their learning motivation has decreased due to technical factors, such as the presence of gadgets and Internet networks, and non-technical factors, such as support and guidance from the people around them. With online learning, students and teachers must spend more time outside of school, which often clashes with undesirable circumstances.

Research conducted by Cahyani et al. (2020) also shows that learning motivation is important for students in learning because it will provide enthusiasm and determine the quality of the work given. According to the results of her research, the level of learning motivation of female students is higher than that of male students, but all of them have decreased due to online learning held. If the online learning environment is not conducive, it can reduce students' interest and motivation to learn. Teachers cannot provide direct assistance, so they cannot take actions such as appreciation that can increase learning motivation. In addition, students need help finding a time conducive to independent study at home. Family social conditions that are not conducive can also make it difficult for students to focus on learning, so collaboration between students and parents is needed so that learning becomes more focused.

Kusumaningrini and Sudibjo (2021) explain that the level of motivation to learn during the Covid-19 pandemic is influenced by several factors. Parents play a role in increasing student learning motivation because parents become substitutes for the teachers' duties at home, so students are always expected to get guidance and support facilities. Teacher creativity also affects student learning motivation because teachers try to provide interesting and innovative learning so students feel energized. Interest in learning becomes the next factor that affects students' learning motivation because they will try to find knowledge about something they are interested in and are more involved with each activity of interest.

If traced according to the opinion of several students and teachers met in several places, they preferred face-to-face learning to online learning. This is also in line with a survey conducted by Haryadi and Rosina (2020) on 26 high school students, which reported that more students needed to be more enthusiastic about online learning (61%) than enthusiastic students (39%). As many as 96% of students choose and enjoy face-to-face learning. The level of enthusiasm and how to enjoy learning can affect student learning motivation, so the data shows that student learning motivation decreases due to online learning. Another thing that reduces student learning motivation is network constraints and inadequate electronic devices.

CONCLUSION

Overall, online learning greatly affects students' learning motivation, even teachers' teaching motivation. Students learning motivation decreases due to various factors, including the unavailability of online learning tools, unsupportive environmental conditions for learning, unsupportive family economic conditions, and other non-technical conditions that affect the online learning process. Some findings in the field show that students are more inclined to choose face-to-face rather than online learning. This happens because, with face-to-face learning, students are energized, and understanding learning materials is also maximal. On the other hand, teachers also choose to teach face-to-face because they do not have to be involved in information technology. Online learning is also not ready to be implemented because not all areas have adequate Internet network access, so there is an imbalance when implementing online learning. It is expected that related parties can design other better learning models suitable to be applied in areas where technological development is not evenly distributed.

This research is limited to the time of the Covid-19 pandemic. This research took several sources as observation material to collect some of the necessary data with the research coverage area, which is limited only to Yogyakarta. In the future, various studies will be conducted to develop an educational model following the times. Further research may dig deeper into the problems of online learning so that one day even though there is no pandemic, online learning can be implemented perfectly to simplify the education system. The development of the scope of research variables can also be carried out so that it is not only a problem of student motivation but can also lead to improving the quality of student learning outcomes with online learning. Until now, such research has been very interesting to study. Until now, the shortcomings in this study are still interesting for further research to complement each other's research data.

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TPACK-based blended learning as an implementation of progressivism education: A systematic literature review

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ABSTRACT

Blended learning research has been developed recently. Still, research has yet to examine the rationale for emerging trends and issues regarding TPACK and Blended learning in terms of educational philosophy. This article focuses on analyzing blended learning based on TPACK (Technological Pedagogical Content Knowledge) from the perspective of the philosophy of progressivism. The educational philosophy of progressivism requires making progress consistently and applying it comprehensively, constructively, and innovatively. In progressivism philosophy, every human being also needs a change to be invariably developed and get improvement. The research method used is qualitative. This research uses library research to explore relevant concepts using various writings on blended learning and TPACK and then analyzed using the progressivism theory. This article explores the results of a literature review on blended learning, TPACK, and progressivism philosophy. A few books and articles published from 2006 to 2021 were searched using Harzing's Publish and Perish through Scopus, Google Books, and Google Scholar databases. The systematic review followed the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses) guidelines. The literature review includes 44 articles and books on blended learning, TPACK, and progressivism philosophy. In this context, a conclusion can be drawn where TPACK-based blended learning is an innovation in education following the needs and developments of the times, which is the implementation of the philosophy of progressivism. TPACK-based blended learning results from the philosophy of progressivism, which considers education to be moving in the direction of the times. The philosophy of progressivism requires a fundamental change in the implementation of education towards a better, quality, and real benefit for students.

INTRODUCTION

The pursuit of education always lives in a dynamic world, along with advances in information technology and demographic changes. If the world of education does not align with the development of the era, education will become obsolete and out of tune with progress in the second millennium. The impact of this development causes the tendency to learn, especially in future

learning, which has changed the traditional learning approach towards future learning (Mulyani & Syah, 2014; Prayogi & Estetika, 2020).

Blended learning is recommended as future learning that people can learn anywhere, whether in the classroom, in the library, at home, or on the road; at any time, not according to the schedule can be morning, afternoon, or evening. Blended learning is an innovation in responding to the challenges of the times when human mobility is increasingly dense and the birth of new technologies. This learning model can be applied to anyone, especially those with high mobility who find it challenging to continue to meet face-to-face with educators or lecturers. Another reason is to learn together for those who feel they need additional material. They are less satisfied with conventional learning in the classroom because, with blended learning, they can quickly get new and even more up-to-date materials from various sources and even experts from all over the world (Asarta & Schmidt, 2020; Bernard et al., 2014; Hung & Chou, 2015; Zhang, 2020). Students like blended learning because it provides unlimited learning opportunities (Kandakatla et al., 2020).

Blended learning can be applied if the teacher has competency in technological pedagogic. The teacher needs to have mastery of teaching material and pedagogical knowledge on technological pedagogic, called TPACK, simultaneously (Rahmadi, 2019). Hence, in implementing blended learning, teachers must be supported by technological efforts and new types of knowledge, namely TPACK (Technological Pedagogic and Content Knowledge). The demands of 21st-century learning are integrating technology as a learning medium to develop a learning skill, so teachers must have technical skills to improve learning outcomes.

At this time, teachers are expected to be able to integrate the knowledge of content, pedagogy, and technology known as TPACK (Harris & Hofer, 2011; Rosenberg & Koehler, 2015; Schmid et al., 2020). Teachers are expected to be skilled teachers who teach effectively, master content, and utilize technology in learning. TPACK can be used as a framework for designing teacher education curricula that align with the era and demands of 21st-century learning (Rahmadi, 2019). TPACK is a development of the framework introduced by Shulman, namely PCK (Pedagogical Content Knowledge) (Shulman, 1987). This knowledge must be mastered by present and future teachers who will teach in a learning environment with various technological instruments.

Students who are the current younger generation, also known as Generation Z or Net Generation, have different characteristics from the previous generation. If the world of education does not try to map the distinctive profile of these learners and design appropriate learning patterns, a gap will form between the two. Generation Z has been very pampered with the various facilities offered. This has a rationale for undergoing a pattern so that learning follows the times (Rezky et al., 2019). As regards the rationale, it follows the flow of progressivism. Progressivism argues that knowledge that is correct in the present may not be correct in the future. Education must prioritize children instead of focusing on teachers or content areas (Mutmainnah, 2020; Nasution, 2012).

Progressivism directs students to continue to advance and develop in order to develop their potential of students. Progressivism demands always moving forward (progress) to act constructively, reformative, actively, innovatively, and dynamically. The flow of progressivism recognizes and tries to develop the principle of progressivism in the reality of life so that humans can survive life's challenges (Dewey, 1916). This flow is also referred to as instrumentalism and experimentalism. It is instrumentalism because it assumes that humans have the ability of intelligence as a tool to live and develop their personalities. At the same time, it is called experimentalism because it practices the principle of experimentation to test the truth of a theory. They then called environmentalism because the environment influences individual personality development.

Based on this explanation, the author wants to explain how TPACK-based blended learning is studied from the perspective of progressivism. The study begins by explaining the critical role of TPACK-based blended ;earning in the learning process and the relationship between TPACK-based blended learning and progressivism. Based on the researchers' knowledge while reviewing the literature, TPACK-based blended learning results from progressivism rationale to obtain the concept of TPACK-based blended learning as an implementation of progressivism education. Regarding this, the research formula can be seen as follows: (1) How is the concept of TPACK-based blended learning if reviewed based on the progressivism concept?; (2) How is the role of TPACK-based

blended learning in the teaching and learning processes?; and (3) What is the relationship between TPACK, blended learning, and the progressivism concept?

RESEARCH METHOD

In this article, the research used library research. Library research aims to explore data and information from various sources from books and journals. This research can be classified as a literature review with a comprehensive search. The study was conducted according to Dybå and Dingsøyr (2008), which consisted of five stages: (1) Review protocol; (2) Identification of inclusion and exclusion criteria; (3) Search for relevant studies; (4) Critical assessment; (5) Data extraction; and (6) Synthesis. The assessment does not include quality assessment, the synthesis is narrative, and the analysis is thematic (Grant & Booth, 2009). Figure 1 shows the PRISMA flow diagram for the literature review that gives an overview of the process going from the initial search of the literature (156 articles and books), screening, critical appraisal, and the resulting articles in the qualitative and quantitative analysis.
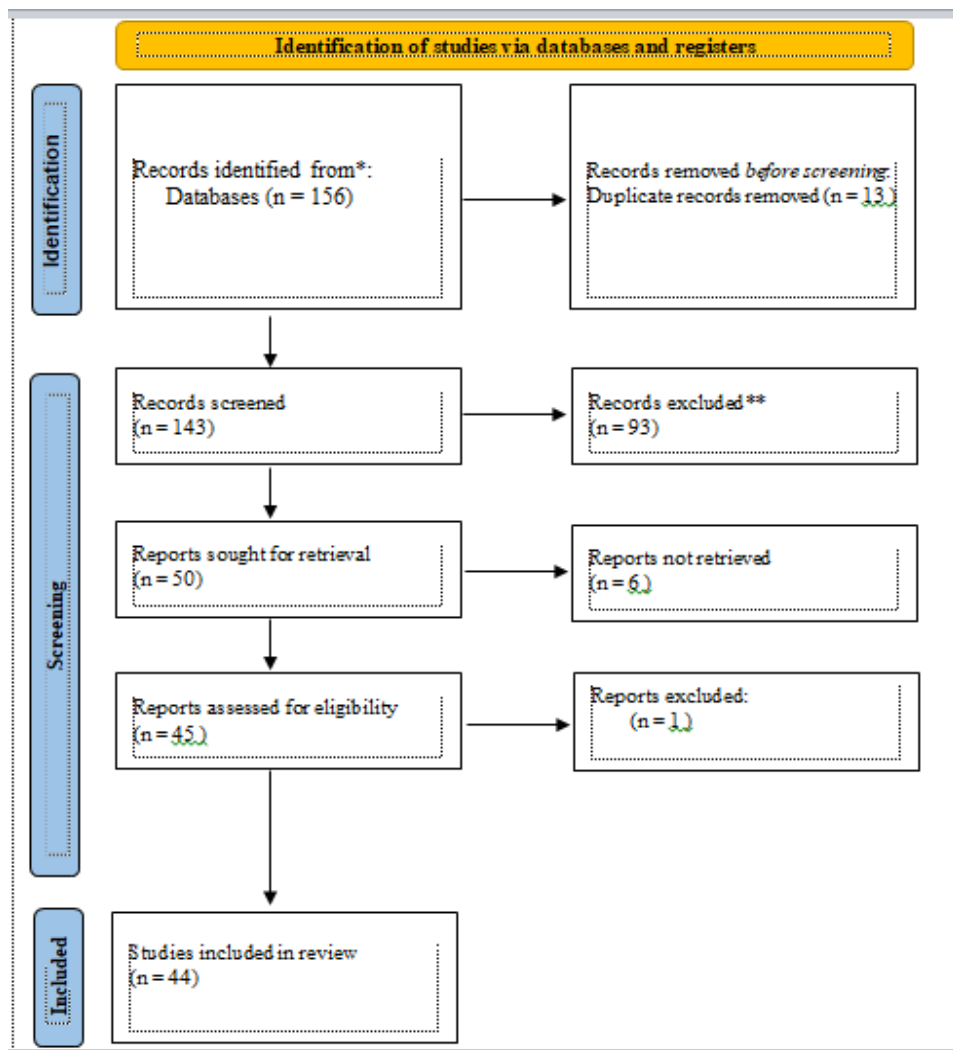
Figure 1. PRISMA Flowchart for this Research

Protocol Review

The review protocol was implemented to achieve the following objectives: (1) to maximize literature coverage, (2) to identify and include related work that could be classified as a study

(experimental, survey, case study, or similar), and (3) to collect and synthesize meaningful data from sources related to the specified research question. This protocol establishes research questions, search strategies, inclusion, exclusion, quality criteria, data extraction, and synthesis methods.

Identification of Inclusion and Exclusion Criteria

The identification of inclusion and exclusion criteria was optimized to identify as many relevant articles as possible. Inclusion and exclusion criteria are template criteria used by several researchers. However, one criterion refers specifically to blended learning. More complicated inclusions and exclusions should be made at the critical assessment step. The inclusion criteria for searching for relevant studies are articles n books, not reports, letters, or abstracts. The exclusion criteria are articles and books that cannot be accessed through university or membership services.

Search for Relevant Study

The search for relevant studies was carried out in two steps: (1) digital research databases were searched for relevant studies, and (2) references within the found studies were checked for additional studies. The keyword in this article search was "blended learning," "TPACK," and "progressivism." The following research databases were searched sequentially: Google Scholar and Scopus. Searches were conducted for articles written in English and Indonesian language (Bahasa Indonesia) and published in proceedings or journals. Scopus was chosen because of its ranking as an academic research database, good study coverage relevant to our review, and based on previous experience. Google Scholar was chosen because of its high coverage. At this stage, the title and abstract of the article are checked. If the article meets the inclusion and exclusion criteria, the pdf and site data are downloaded, and the citation and keyword data are added to the spreadsheet. A total of 44 quality articles were accepted at this stage. Most articles rejected at this stage are not accessible through university or membership services and are project descriptions or abstracts.

Critical Assessment

The critical assessment focuses on relevance (only articles classified as experimental, survey case studies, or similar with a focus on blended learning). Appropriate research approaches are described, including research context, number of subjects, scope, design, methods, execution), and credibility (conclusion based on good analysis and reasoning).

Data Extraction

During this stage, data were taken from 44 articles received by reading all articles in detail. The following data were entered into the spreadsheet: Type of article, number of research subjects (N), a brief description of the study, description of results, article theme, and research context.

Synthesis

For the synthesis step, all articles and books in the review were classified according to the type of research and by three variables, as presented in Table 1.

Table 1. Variables Used in Data Synthesis

Variables	Description
Blended learning	The learning involved is to combine instructional modalities or delivery media and combine online and face-to-face instruction (Graham, 2006).
TPACK	As framework for technology integration, as well as a body of knowledge of what teacher need to know to teach with technology (Angeli & Valanides, 2005; Herring et al., 2016).
Progressivism	Progressivism is a modern educational philosophy that requires the change of educational implementation progressively (Fadlillah, 2017).

The three variables represent the three questions on the research objectives. For each article, all variables that match the study are checked, and the related text is added to the results and study descriptions in the spreadsheet. Then all this information is collected and categorized. The results of all accepted studies were summarized according to the three research questions and reported.

FINDINGS AND DISCUSSION

In this section, the general result of the literature review is arranged based on the three research questions. Based on 156 articles searched by using Scopus and Google Scholar, it was obtained that 44 articles were reviewed comprehensively (Table 2, Table 3, and Table 4). 112 articles cannot be reviewed and analyzed because it was inaccessible through the University website for the researcher.

Tabel 2. Summary of Synthesis of Accepted Articles in 2021-2022

No.	Author and Years	Titles	Object	Countries
1	Ayasrah (2022)	Attitudes of teachers and outstanding students towards blended learning in light of the Covid-19 pandemic in Jordan	Blended learning	Jordan
2	Lu and Wang (2022)	The effects of different interventions on self-regulated learning of pre-service teachers in a blended academic course.	TPACK	Chinese
3	Batac et al. (2021)	Qualitative content analysis of teachers' perceptions and experiences in using blended learning during the COVID-19 pandemic	Blended learning	Philippines
4	Abroto et al. (2021)	Pengaruh metode blended learning dalam meningkatkan motivasi dan hasil belajar siswa sekolah dasar (*The effect of blended learning to increase elementary school students' motivation and learning outcomes*)	Blended learning	Indonesia
5	Lachner et al. (2021)	Fostering pre-service teachers' technological pedagogical content knowledge (TPACK): A quasi-experimental field study.	TPACK	Jerman
6	Schmid et al. (2021)	Self-reported technological pedagogical content knowledge (TPACK) of pre-service teachers in relation to digital technology use in lesson plans.	TPACK	Switzerland
7	Wang et al. (2021)	Blended learning for Chinese university EFL learners: learning environment and learner perceptions.	Blended learning	Chinese
8	Peng and Fu (2021)	The effect of Chinese EFL students' learning motivation on learning outcomes within a blended learning environment	Blended learning	Chinese
9	Ouatiq et al. (2022)	The preferences and expectation of moroccan teachers from learning analytics dashboards in a blended learning environment: Empirical study.	Blended learning	Morocco
10	Saragih et al. (2021)	Filsafat pendidikan (*educational philosophy*)	Progresivisme	Indonesia
11	Lapitan et al. (2021)	Education for chemical engineers an effective blended online teaching and learning strategy during the COVID-19 pandemic.	Blended learning	Philippines
12	Taghizadeh and Hajhosseini (2021)	Investigating a blended learning environment: contribution of attitude, interaction, and quality of teaching to satisfaction of graduate students of TEFL	Blended learning	Iran

Table 3. Summary of Synthesis of Accepted Articles in 2018-2020

No.	Author and Years	Titles	Object	Countries
1	Cahapay and Anoba (2020)	The readiness of teachers on blended learning transition for post COVID-19 period: An assessment using parallel mixed method	Blended learning	Philippines
2	Asarta and Schmidt (2020)	The effects of online and blended experience on outcomes in a blended learning environment.	Blended learning	USA
3	Bykova et al. (2021)	Blended learning in the context of digitalization.	Blended learning	Ukraina
4	Gera (2020)	Analisis pembelajaran e-learning dalam perspektif aliran filsafat pendidikan progresivisme (*analysis of progressivism educational philosophy-based e-learning*)	Progresivisme	Indonesia
5	Kacetl and Semradova (2020)	Reflection on blended learning and e-learning - case study.	Blended learning	Czech Republic
6	Kandakatla et al. (2020)	Student perspectives on the learning resources in an Active, Blended and Collaborative (ABC) pedagogical environment.	Blended learning	USA
7	Faiz and Kurniawaty (2020)	Konsep merdeka belajar pendidikan indonesia dalam perspektif filsafat progresivisme (*the concept of indonesia independent of learning program in progressivism educational philosophy*)	Progresivisme	Indonesia
8	Mustaghfiroh (2020)	Konsep "merdeka belajar" perspektif aliran progresivisme John Dewey (*the concept of John Dewey's genre-based 'Indonesia independent of learning program*)	Progresivisme	Indonesia
9	Schmid et al. (2020)	Developing a short assessment instrument for Technological Pedagogical Content Knowledge (TPACK.xs) and comparing the factor structure of an integrative and a transformative model	TPACK	Switzerland
10	Thai et al. (2020)	Face-to-face, blended, flipped, or online learning environment? Impact on learning performance and student cognitions	Blended learning	Vietnam
11	Widiani (2020)	Progresivisme peningkatan mutu pendidikan terhadap siswa (analisis sejarah periode pendidikan di indonesia) (*progressivism of education quality development for students (analysis of education in Indonesia history)*)	Progresivisme	Indonesia
12	Youde (2020)	I don't need peer support: Effective tutoring in blended learning environments for part-time, adult learners	Blended learning	UK
13	Zhang (2020)	Exploring blended learning experiences through the community of inquiry framework.	Blended learning	Chinese
14	Mishra (2019)	Considering contextual knowledge: The TPACK diagram gets an upgrade	TPACK	USA
15	Rahmadi (2019)	Technological Pedagogical Content Knowledge (TPACK): kerangka pengetahuan guru abad 21 (*Technological Pedagogical Content Knowledge (TPACK): A framework of the 21st teachers' knowledge*)	TPACK	Indonesia
16	Shu and Gu (2018)	Determining the differences between online and face-to-face student–group interactions in a blended learning course	Blended learning	Chinese
17	W. Wang et al. (2018)	Preservice teachers' TPACK Development: A review of literature	TPACK	USA

Table 4. Summary of Synthesis of Accepted Articles in 2005-2017

No.	Author and Years	Titles	Object	Countries
1	Derbel (2017)	Blended learning: Concept, emerging practices and future prospects.	Blended learning	Tunisia
2	Fadlillah (2017)	Aliran progresivisme dalam pendidikan di Indonesia (*progressivism for education in Indonesia*)	Progresivisme	Indonesia
3	Swallow and Olofson (2017)	Contextual understandings in the TPACK framework.	TPACK	USA
4	Herring et al. (2016)	Handbook of Technological Pedagogical Content Knowledge (TPACK) for educators: Second edition	TPACK	USA
5	Warami (2016)	Bahasa dalam gerbang filsafat pendidikan: Perspektif ontologi bahasa dan budaya (*Language in Philosophy of Education: Ontology Perspective of Language and Culture*)	Progresivisme	Indonesia
6	Yunus (2016)	Telaah aliran pendidikan progresivisme dan esensialisme dalam perspektif filsafat pendidikan. (*Study of the educational flow of progressivism and essentialism in the perspective of educational philosophy*)	Progresivisme	Indonesia
7	Hung and Chou (2015)	Students' perceptions of instructors' roles in blended and online learning environments : A comparative study	Blended learning	Taiwan
8	Rosenberg and Koehler (2015)	Context and technological pedagogical content knowledge (TPACK): A systematic review	TPACK	USA
9	Bernard et al. (2014)	A meta-analysis of blended learning and technology use in higher education: From the general to the applied	Blended learning	USA
10	Nanuru (2013)	Progresivisme pendidikan dan relevansinya di Indonesia (*Education Progressivism and Its Relevance*)	Progresivisme	Indonesia
11	Nasution (2012)	Pendidikan dalam persfektif progresivisme dan perrenialisme (*Education in Progressivism and Perennialism Perspective*)	Progresivisme	Indonesia
12	Harris and Hofer (2011)	Technological pedagogical content knowledge (TPACK) in action: A descriptive study of secondary teachers' curriculum-based, technology-related lnstructional planning	TPACK	USA
13	Koehler et al. (2013)	What is Technological Pedagogical Content Knowledge (TPACK)?	TPACK	USA
14	Graham (2006)	Blended learning systems	Blended learning	USA
15	Angeli and Valanides (2005)	Preservice elementary teachers as information and communication technology designers: An instructional systems design model based on an expanded view of pedagogical content knowledge	TPACK	Cyprus

The presentation of articles can be shown in Figure 2, which is reviewed to answer three-question research. The percentage of blended learning is 48%, the dominant percentage, the percentage of TPACK is 29%, and the percentage of progressivism is 23%. There is an increasing percentage of blended learning, progressivism, and TPACK for the research published from 2005 to 2022 in Figure 3. It is seen that the literature review articles in 2020 achieved a high percentage. A few articles published in 2020 are indicated by Covid-19. Thus, these three literature reviews have an increased percentage of implementation.
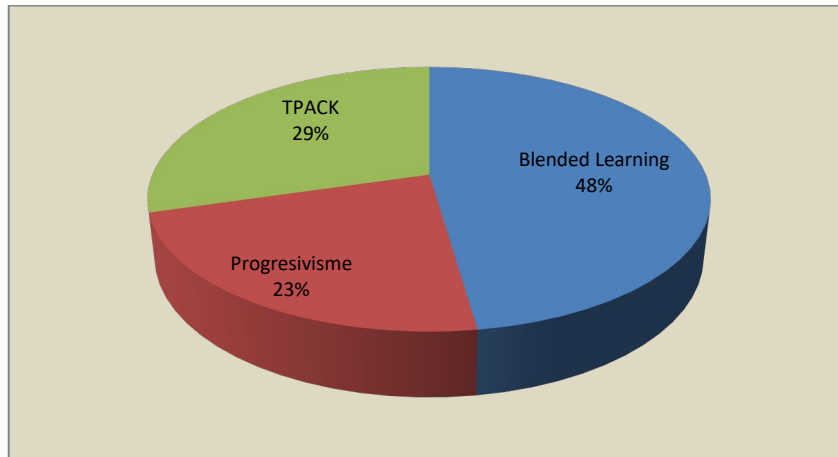
Figure 2. Percentage of Article Description between TPACK, Blended Learning, and Progressivism
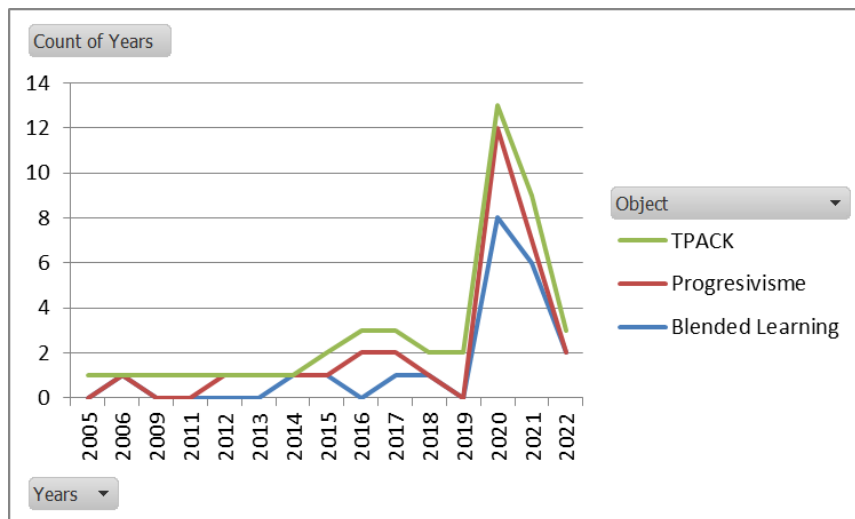
Figure 3. Number of Articles Using TPACK, Blended Learning, and Progressivism

Indonesian Education Concept

The concept of education expressed by Ki Hadjar Dewantara has similarities to the concepts of constructivism and progressivism in education. Both have a common thread: learning focuses on students' ability to build their thinking. An educator is only a facilitator who helps students build the constructivism concept. In other words, the learning approach is student-centered (student-centered learning). There is no single theory, but most constructivism has the same two main ideas: Learners are active in constructing their knowledge, and social interaction is essential for constructing knowledge.

The progressive flow recognizes and tries to develop the principle of progressivism in the reality of life so that humans can face life's challenges according to the times' conditions and challenges. Thus, teachers must be able to become facilitators according to the times, one of which is by implementing TPACK-based mixed learning.

TPACK-Based Blended Learning in the Learning Process

Blended learning is a term for mixing conventional learning models, usually face-to-face, with internet-based learning models commonly known as e-learning. Generally, there are three different definitions for blended learning: (1) the combination of media and tools employed in an e-learning environment; (2) a combination of several pedagogical approaches; and (3) a combination

of traditional face-to-face learning with a web-based online approach. Blended learning is a process of unifying various learning methods that combine virtual and physical resources. The use of online learning resources, especially those based on web/blogs, without leaving face-to-face activities (Graham, 2006). Driscoll and Carliner (2005) define blended learning as integrating or combining learning programs in different formats to achieve common goals. Blended learning is a combination and various strategies for learning. So blended learning is a learning method that combines two or more methods and strategies to achieve the learning objectives. Before the advent of blended learning, the learning component had limits.

Nevertheless, when blended learning already exists, the learning component has no more limitations so that learning objectives can be achieved with the freedom of ways adapted to learning conditions (Graham, 2006; Hung & Chou, 2015; Thai et al., 2020; Youde, 2020). Online learning and face-to-face learning are components of blended learning. So, blended learning must use the Internet, intranet, and web-based technologies to access learning materials and enable learning interactions. Using technology in teaching and learning activities can provide benefits for increasing student learning motivation, illustrating material, and assisting the investigation process. Integrating technology meaningfully into learning takes work.

In order to be able to choose the right technology, the teacher must master the material to be taught so that he can analyze the character of the material. Teachers must also consider teaching strategies that follow the technology, including pedagogic knowledge. So, it can be concluded that to integrate technology well, teachers must master the knowledge of material content, pedagogics, and technology (Harris & Hofer, 2011; Rosenberg & Koehler, 2015). The three bits of knowledge interact and intersect to form a TPACK (Figure 4).
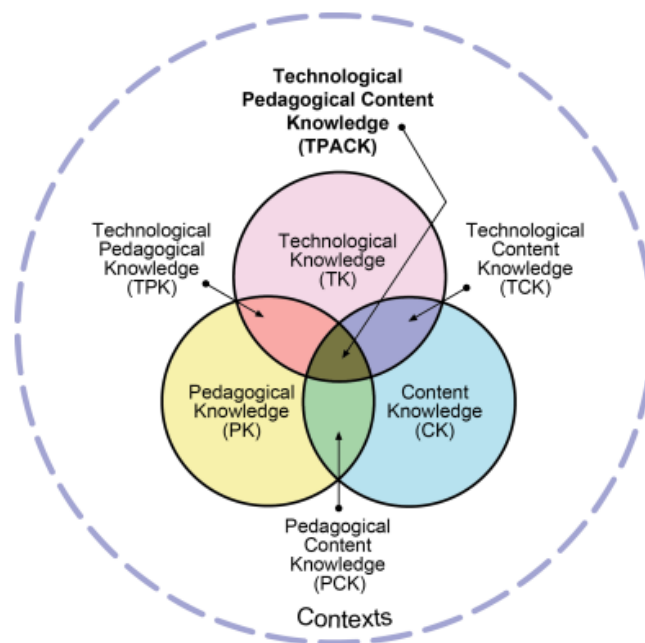
Figure 4. Technological Pedagogical Content Knowledge (TPACK) Framework (Koehler et al., 2013)

In teaching and learning activities, teachers must also be able to convey material well because learning is a process of developing new knowledge, skills, and behaviors in a person due to his interaction with various information and the environment. Therefore, the teacher must be able to convey the information he knows correctly and on target, namely the correct material content, through practical pedagogical activities. Based on Shulman's idea of PCK, Koehler et al., (2013) have added technology to PCK and described TPACK as the relationship between technology, pedagogy, and content.

Therefore, teachers should be able to integrate technology into their teaching. Educators can be said to be professionals who not only master the material and concepts but must master how to teach so that learning materials can be conveyed to students properly. The material (content) and teaching methods (pedagogical) are interconnected and cannot be separated. The importance of continuity between material and pedagogical then emerges a new understanding that combines a knowledge of material and technology to students, namely Technological Pedagogical and Content Knowledge (TPACK).

The essential components of TPACK are Content Knowledge (CK), Pedagogical Knowledge (PK), Technological Knowledge (TK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), Technological Pedagogical and Content Knowledge (TPACK) (Rosenberg & Koehler, 2015; Swallow & Olofson, 2017). Teachers are important in utilizing technology and integrating technology into the teaching and learning process (Schmid et al., 2021; W. Wang et al., 2018). Regarding implementation, positive relations between self-reported TPACK and self-reported frequency, type, or quality of classroom technology use are acquired based on several studies implemented by Chuang et al. (2015), Habibi et al. (2020), and Li et al. (2019). In addition, TPACK development is essential to apply for pre-service teachers in order to prepare students for a digitalized future (Lachner et al., 2021).

Technology also helps increase student engagement and activity inside and outside the classroom. Face-to-face learning is one of the components of blended learning. With face-to-face learning, students can further deepen what has been learned through online learning, or vice versa, to deepen further the material taught through face-to-face. Independent learning is one of the components of blended learning because there is an independent learning process in which students can learn independently through online learning (Shu & Gu, 2018; Thai et al., 2020).

The Relationship of TPACK-Based Blended Learning with Progressivism Philosophy

Progressivism is linguistically derived from the word progressive, which means to move forward. The simple meaning of progressivism is the movement of change towards improvement. Regarding educational philosophy, progressivism is a philosophical school that requires progress to bring about change (Faiz & Kurniawaty, 2020; Mustaghfiroh, 2020; Nanuru, 2013; Nasution, 2012). In line with this opinion, Warami (2016) added that the philosophy of progressivism education is a philosophy that refers to respecting individuals and science and accepting change following the times, both technology and the environment.

Progressivism requires educational goals that are reconstructive or provide a continuous experience so that students can do something following the demands of the environment. Progressivism can be an educational movement that prioritizes implementing education in child-centered schools as a reaction to teacher-centered education. In connection with the various understandings described above, it can be concluded that progressivism is a philosophical school that always wants students to progress in changing times and the environment, which is getting faster so that students can adapt and even master these changes (Gera, 2020; Widiani, 2020).

Progressivism-based development is required to appear the professional values and skills prepared for 21st-century learning. In the increasingly complex global era, teachers must prepare themselves to become a professional teachers. As an educator, teachers must adapt to the situation to qualify their competencies for students (Faiz & Kurniawaty, 2020).

The concept of blended learning based on TPACK implements the progressive philosophy of progress. Progressivism considers TPACK-based blended learning as one of the products of this philosophy. This is related to the philosophy of progressivism, which considers education advanced according to developments and changing times. At the same time, TPACK-based blended learning responds to the world of education in the changing times. TPACK-based blended learning is more about developing learning methods to keep up with technological advances and the environment. Progressivism includes the development and changes in all fields of education, material, curriculum, and goals to keep up with changing times and the environment.

The history of the emergence of TPACK-based blended learning and progressivism philosophy. Blended learning generally appears as a renewal or a variation of conventional learning methods deemed too limited to face-to-face meetings and limited by time (Bykova et al., 2021; Derbel, 2017; Kacetl & Semradova, 2020). The concept of blended learning is a form of implementing the flow of progressivism philosophy. In addition, the TPACK-based blended learning concept combines learning strategies between material (content) and teaching methods (pedagogical) which are interconnected and inseparable.

The importance of continuity between material and pedagogical emerges in a new understanding of combining material knowledge and technology for students. Students (Koehler et al., 2013; Mishra, 2019; Rahmadi, 2019; Swallow & Olofson, 2017). Along with the development of the era, teaching methods with conventional models were deemed unable to answer the challenges of changing times, so innovations and educational changes were carried out to keep pace with the current rapid advances in technology, information, and communication so that the blended concept in TPACK-based learning was born.

Likewise, the flow of progressivism appears against dissatisfaction with the implementation of education, which is very traditional, tends to be authoritarian, and students are only used as objects of learning. Usually, this flow of progressivism is associated with a liberal & cultural worldview which means flexible (not rigid, not resistant to change, not bound by a particular doctrine), curios (wanting to know, wanting to investigate), tolerant, and open-minded or open. Progressivism was born as a reaction to its competitors, namely the philosophy of essentialism, which believes in rejecting renewal and is more inclined to conventional classical education, which emphasizes culture as a basic element of education, including the teacher as the center (Barnadib, 1990; Saragih et al., 2021). So blended learning and progressivism are both born to make changes that follow the times in the field of education, which was initially considered classic, did not develop, and tended not to suit the needs of the times.

The concept of blended learning is based on TPACK and progressivism philosophy from a curriculum point of view. Learning that uses blended learning combines media in learning or combines a pedagogical approach and traditional face-to-face learning with a web-based online approach (Graham, 2006). Based on the explanation of the principle of blended learning, blended learning is flexible and can be included in all curricula. A curriculum based on the philosophy of progressivism emphasizes a flexible and open curriculum that can be changed, shaped, and developed according to the times and science and technology. Curriculum development in progressivism must be based on student's needs, interests, and initiatives, not frozen, and can be revised so that what is suitable is an experience-centered curriculum (practice) (Barnadib, 1990; Yunus, 2016).

Blended learning based on TPACK and the philosophy of progressivism is based on the point of view of educators. Blended learning is student-centered, so teachers must create creative and fun learning that spurs students' focus on learning. In TPACK-based blended learning, educators are required to have several competencies so that learning goes well, namely the ability to make learning designs, mastery of technology, and mastery of learning materials following the field of material to be taught (Ayasrah, 2022; Lu & Wang, 2022; Ouatiq et al., 2022). In addition, teachers are required to develop learning skills so that they have skills in the field of technology to improve learning outcomes and facilitate the process and the availability of learning tools such as lesson plans (Yusuf, 2015).

According to the philosophical view of progressivism, the teacher is an advisor, which means that the teacher can become an advisor when students experience a dead end in solving the problems they face because the teacher is a person who understands the character of the student. Teachers, as mentors, have a lot of knowledge and experience in the field of education. As a director, the teacher must know the student's potential and be able to direct the student's potential. The progressivist teacher is not an authoritarian person who can do anything but an authority holder who can do anything (authoritarian) to his students. Progressivism argues that teachers must know the direction of children's development because the environment in which children live is always a process of interaction and is always in a changing situation (Fadlillah, 2017; Nanuru, 2013).

Based on the student's point of view, blended learning is based on TPACK and progressivism philosophy. Blended learning TPACK focuses on students who are required to be independent of

time and responsible for implementing predetermined learning in person or online. Students feel happy to learn because the teacher conveys the material with the help of technology so that it looks more attractive and easy to understand. TPACK-based blended learning gives students the freedom to choose and utilize learning materials. The philosophy of progressivism education places students in a central position in learning, as previously explained, and progressivism adheres to the principle of child-centered education. Progressivism tries to direct students to be active, not passive, so that classroom activities focus on problem-solving practices and the school atmosphere is directed at cooperative and democratic situations (Mudyaharjo, 2001; Saragih et al., 2021).

More specifically, the learning process is more emphasized on creativity, activity, naturalistic learning, and experience so that progressivism in its context places more emphasis on students and their interests than on the subject itself. Progressivism lays the foundations of independence and freedom for students. Students are given the freedom, both physically and in their way of thinking, to develop hidden talents and abilities (Latif, 2020). In this regard, progressivism is always associated with the liberal road to culture. Namely, liberals are flexible (flexible and not rigid), tolerant, and open, often wanting to know and investigate for the sake of developing experience (Mustaghfiroh, 2020).

Based on the explanation described above, progressivism and blended learning views toward educators and students have similarities. This aligns with the philosophy of progressivism, which states that education changes according to the times. TPACK-based blended learning provides flexibility for teachers and students in face-to-face or online learning, a combination of media or pedagogical approaches.

According to John Dewey's philosophy of progressivism, from the explanation above, there is a relationship between the concept of "blended learning based on TPACK" and the concept of education. TPACK-based blended learning is an implementation of the philosophy of progressivism emphasizing the existence of maximum exploration of the learning process that continues to develop according to the times. Education is also responsible for fostering students to be brave, independent, and self-employed through blended learning, where teachers must master TPACK as the basis of learning.

CONCLUSION

The concept of blended learning based on TPACK is a form of implementing the philosophy of progressivism that leads to development and progress in education. Progressivism includes the development and change of all fields of education, material, curriculum, and goals following the changing times and the environment. The philosophy of progressivism, which considers education to be advanced according to the developments and changes of the times and blended learning based on TPACK, is a form of response to the world of education in responding to the changing times. TPACK-based blended learning is more about developing learning methods to keep up with technological advances and the environment. The research in this article still needs to review the literature on how far successful TPACK and blended learning are as the basis of the progressivism concept. The research in this article is required to make the other researchers open-minded to examine various concepts that are based on progressivism as the basic concept to find out new concepts following the current development.

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Evaluation of industrial work practice program in Vocational High School 1 Rejotangan

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ARTICLE INFO	ABSTRACT
	This study aims to evaluate implementing the Industrial Work Practice (Prakerin) program at the Vocational High School (VHS) of 1 Rejotangan. This type of research is evaluative with a descriptive qualitative method using the CIPP model. The population of this study was 15 students involved, five work of world instructors, 21 teacher councils, and the headmaster of VHS of 1 Rejotangan. Data collection techniques use interviews and observations. Interviews are conducted openly and behind closed doors. The interview was conducted with the headmaster of VHS of 1 Rejotangan. The observations made by the researchers aimed to capture data on pre-employment activities, sincerity, and cooperation of participants and instructors during the activity. The results of this study are (1) synchronization of the joint curriculum to the world of work at the evaluation stage of the context of the VKS of 1 Rejotangan industrial practice program. At this stage, (1) the signing of an MOU between the world of work schools, a student readiness plan (competency mapping), and a placement plan (world of work Placement Mapping); (2) input evaluation obtained information that a cooperative organization was formed. The cooperative organization between schools and the business world and industry in the industrial practice program has two aspects: departmentalization and division of labor. The division of labor comprises principals and teachers from the business/industrial world. Meanwhile, departmentalization consists of mapping students. Place students in existing competencies and an appropriate world of work; (3) process evaluation, a collaboration between schools and the world of work for student development, is flexible and consistent with each school's policies; (4) product evaluation. The internship program has many benefits for schools and the world of work.

INTRODUCTION

Education is the key to development that enables developing countries in global competition (Kotabe & Kothari, 2016). Another function of realizing education is as a solid foundation for building a prosperous, developing, and independent society (Husbands & Pearce, 2012). However, trying to improve education in Indonesia will encounter obstacles. Some of these obstacles are (1) the low level of facilities, infrastructure, and teacher quality; (2) low educational needs and efficiency (Hargreaves, 2019). Furthermore, education has an essential role in improving the quality of human resources (HR). Creating quality human resources will not escape the institutions that protect them

(Hanafi, 2020). So that with education, human resources owned by a nation can compete in the era of globalization

Meanwhile, the main challenge in education needs to be followed up. The Curriculum Center of the Research and Development Agency of the Ministry of National Education has identified six main issues in the national education system, namely: (1) the deterioration of students' character and morals; (2) unequal learning opportunities; (3) the internal efficiency of the education system is still low. (4) institutional status; (5) management of education that is outside of national development; (6) unprofessional human resources. Vocational Secondary Education prioritizes the preparation of students to enter the workforce and develop professional attitudes.

Sukardi (2011) argues that the success of vocational education is how high the level of absorption of graduates in the world of work is. If an educational institution can produce graduates who meet the requirements in the world of work, then the learning process directs students to have the skills needed. To achieve this goal, VHS makes various efforts to improve the quality of education natural Vocational High School is one of the schools whose learning materials change relatively quickly according to the demands of the job market.

Based on the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, the aims of Vocational High Schools (VHS) are (1) to prepare students for the transition to higher levels and expand their foundation education; (2) to improve students' abilities as community members to maintain relationships with society, culture, and the natural environment; (3) improve students' development abilities With the advancement of science, technology, and art; (4) Prepare for work and develop a professional attitude. All VHS graduates must have the skills and willingness to work so that VHS graduates can be avowed in the business/industry world.

Ardiani and Ridwan (2020) explain that vocational high school graduates able to enter the business world need to be in a Dual System Education program (PSG) or Industrial Work Practice (Prakerin). The industrial world work practice program directs vocational graduates to have a background in the business world (Tao & Gao, 2017). The program is a realization in schools and the corporate world. Prakerin is a form of an activity-driven business program. Work directly in the world of work to reach a professional level. This industrial world work program provides opportunities for vocational students.

Especially vocational interest in industrial disciplines to adapt to the climate of the real-world work environment. Prakerin provides input and feedback for educational improvement and progress (Nirmawati, 2012). Each supervising teacher must supervise all aspects of student activities in the field at least once a month and coordinate with the field supervisor (Phillips & Johnson, 2022). Teachers must do it track student progress through journal checks, baseline visits, and discussions with industry and students at the internship location.

The Ministry of Education and Culture of the Republic of Indonesia stated that: (1) teachers who are educators who are responsible for preparing students are supervisors, and (2) students are participants in Prakerin activities in the Business/Industry World (DU/DI). (3) Equipment is a device that helps to achieve fast, accurate, and effective results. (4) Materials are materials used to make a product. (5) teaching materials are a set of materials that teach students to achieve the level of skills and competencies needed in the world of work, (6) methods are methods of delivering materials used to achieve learning objectives, and (7) schedules are tools for implementing school activities. Furthermore, in the workplace, with who, what, and where the behavior occurs (8) software/administration is a tool to carry out teaching and learning processes that differ from school to school and in the world of work, and (9) funding (cost of capital) is a fixed cost that must exist for its implementation.

It is necessary to evaluate the results of implementing the industrial world work practice program. In essence, program evaluation is determining the achievement of objectives, informing decision-makers, comparing performance against benchmarks to see if there is a gap, and systematically investigating the value/quality of objects (Ananda & Rafida, 2017). The program must be evaluated to determine whether the stated objectives have implemented the intervention or assistance.

This model chosen is CIPP to be evaluated as a complete and comprehensive system. In addition, the CIPP assessment concept is that the principal purpose of the assessment is not to prove

it but to improve it. Many factors, such as the following prompted researchers to choose VHS 1 Rejotangan as a research location, namely: (1) VHS is a vocational high school; (2) Collaborating with businesses and large industries; and (3) A large number of graduates from both institutions are employed by businesses or industry, especially graduates with a high level of proficiency in their profession.

RESEARCH METHOD

The type of research chosen by the researcher is evaluative research. This research aims to determine the extent to which a program is carried out. Evaluation is an activity to collect information, then the information already obtained can be used as an alternative when making decisions. Evaluation research is defined as a combination of research and evaluation. That is, evaluation research is neither research nor purely program evaluation. The population of this study was 15 students involved, five worlds of work instructors, 21 teacher councils, and the headmaster of Vocational High School of 1 Rejotangan.

Qualitative data will be obtained through observation and interviews. Interviews are conducted openly and behind closed doors. The interview was conducted at the principal of VHS 1 Rejotangan. The observations made by the researchers aimed to capture data on pre-employment activities, sincerity, and cooperation of participants and instructors during the activity. Interview grids with school principals adopted from Stufflebeam and Zhang (2017) can be seen in Table 1 and Table 2.

Table 1. Grills of Industrial Work Practices Interview with Headmaster

No.	Evaluation Stage	Researched aspects
1	Context	Legal basis
2	Input	Schedule. Mechanism, number of participants, and material
3	Process	Duration of pre-employment and scope of prekerin
4	Product	Benefits for schools

Table 2. Grills of Industrial Work Practices Observation with Headmaster

No.	Evaluation Stage	Researched aspects
1	Context	Legality of prekerin, Pre-employment program background, Vision and mission of VHS 1 Rejotangan, and identify student needs and market needs for pre-employment
2	Input	Participants of the pre-employment program, scheduling of pre-employment program implementation, pre-employment program implementation strategy, management and budget of the pre-employment program process, facilities and infrastructure and human resources
3	Process	Identify the process of implementing the pre-employment program and implementation of the pre-employment program
4	Product	Quality of pre-employment programs and pogram improvement intepretation

Qualitative data analysis was obtained from several stages: data reduction, presentation, and conclusion (Miles et al., 2019). The evaluation method used is the CIPP model. CIPP is an acronym for Context, Input, Process, and Product. The meaning of the CIPP model is that evaluation is related to a program's context, inputs, processes, and outcomes. The most important thing from the CIPP model is at stages of improving the evaluation of the currently implemented program. Information can be obtained with the help of the CIPP model to help improve academic activities and bring get the efficiency desired by an educational institution (Ghafari et al., 2016). The data analysis technique proposed by Miles et al. (2019). Data analysis is interactive and continues until the data is saturated. Before concluding, the data are sequential, starting with concessions and data display.

FINDINGS AND DISCUSSION

Prakerin from VHS 1 Rejotangan is fully managed by the Prakerin working group. The working group prepares management issues from license files to revocation and evaluation files. The Working Group cooperates with all skill supervisors from VHS 1 Rejotangan. In other words, the Prakerin working group manages all the expertise of VHS 1 Rejotangan.

Context evaluation is carried out to determine the plan and suitability of the Prakerin program according to supervisors, students, and teachers. The industrial work practice planning process begins with a joint meeting between the coordinator, the Deputy Director of Public Relations, and members of the Pokja Prakerin consisting of the Pokja Chair, Curriculum Leader, and Main Teacher, which discusses the preparation of the internship program to: Follow the Schedule Curriculum and Pokja Prakerin. In addition, 3 to 6 months to complete an internship at VHS 1 Rejotangan consists of 2 periods and two waves.

From the interviews above, information is obtained that several components form the basis for the success of the Prakerin program. First, the role of teachers and instructors. The teacher is an educator who has the task of preparing students to enter the world of work. When detailed in more detail, the teacher's duties are (1) to provide moral support; (2) explore information related to the development and difficulties of students; (3) create problems and find solutions to problem-solving; (4) observe all activities carried out so that they can be used as material in improving the quality of industry and schools. Instructors are supervisory staff from the world of work who have the task of educating and teaching students to have a professional spirit. The rest of the duties of the supervising staff are (1) to provide support during implementation by facilitating all student needs, (2) to describe various things related to the industrial world, such as the nature and work ethic, (3) to realize the training according to a predetermined schedule, and (4) deliver penalties to students who violate the rules in the industrial world.

Second, students. Before implementing the internship program, students are prepared with sufficient knowledge and skills. The supplies given to students will get easy for students to contribute to the world of work. Third, tools and equipment for obtaining products quickly and precisely. Fourth, teaching materials. Teaching materials are a horde of several materials that will deliver to the students. Teaching materials are several materials that will be delivered to students. Arranged teaching materials prepared later can assist students in increasing their level of skills and competencies to the needs of the world of work. There is a link between curriculum and teaching materials to form each student's competence.

The results of the Prakerin location survey by the working group team will be held together to discuss the competencies required by the world of work. The purpose of the meeting held by the school with the world of work is to equalize perceptions about the competencies taught to students. The agreement that resulted from the meeting can be used as information material and develop the curriculum. The meeting also resulted in several activities at VHS 1 Rejotangan.

The activities carried out at VHS 1 Rejotangan are designed for (1) drafting an agreement, (2) the process of mapping/mapping internships, (3) the location survey process and the student placement process, (4) practice of productive subjects, (5) mapping/ mapping of students, (6) budget planning/making RAB, (7) identification, application letters, which are needed during the internship program, (8) information and motivation to teach students' mental preparation courses or face the world of work and industry, (9) collaborate with a world of work to provide teaching/guidance, (10) the process of planning supervision and mentoring of internships if there are no students with problems, followed by intensive guidance by curators and curriculum leaders onsite and instructors or supervising teachers.

VHS 1 Rejotangan must prepare several components in dealing with the internship program: making a curriculum in the internship program compiled by the world of work, making curriculum analysis to introduce work production methods, does not interfere with implementing the curriculum and normative subjects. The next step in the planning process is to map students according to their competencies. The Working Group of VHS 1 Rejotangan consists of the Pooja Chair, Curriculum Supervisor, and Guiding Teacher. The three of them work together to develop student data and the needs location data according to student competence.

The school will also send a readiness letter to the world of work, which is ready to welcome students to carry out their duties. Welcoming done through the working group's chairman has like with the authorities. Then, the working group team drafted a student placement plan at several predetermined locations. The student placement itself is organized to the approval and form regarding student data desired by the business world.

Input evaluation is used to determine the readiness of industrial practice programs by supervisors and students. This stage is divided into departmentalization and division of labor activities. A departmentalization is a group of work activities. An organization that allows similar and related activities to be carried out together. Reflected in the official structure of the organization and displayed on the organization chart. The division of labor is the division of work tasks so that everyone in an organization is responsible and carries out limited activities. Organizing can be done in three stages: (1) detailing all the work that must be carried out to achieve organizational goals; (2) dividing the workload.

The distribution of work is carried out in two stages, namely, a structured division of labor and a structured and unstructured division of labor. The structured division of labor is reflected in the organizational structure of VKS. The organizational structure was formed by considering aspects of implementing school collaboration with the world of work, distribution of the Rejotangan working group, instructors, and leaders in business and industry. The unstructured division of labor begins with the activities of the planning stage in the work experience program.

The principle of the industrial work practice program at VHS 1 Rejotangan leads to a SWOT analysis. SWOT analysis systematically defines various factors to state a strategy while optimizing strengths and opportunities and minimizing solutions to weaknesses and threats. The implementation of the SWOT analysis can be seen in Figure 1.

Strenght	Opportunities	Weakness	Threats
Creating a curriculum together with world of work. The creation of a supporting laboratory The creation of a professional teacher.	The creation of approval from world of work in conducting the internship program. Implementing the internship program with world of work in accordance with the established skill program.	The low competence of students in reproduction	World of work positions students not according to their expertise. There is an implementation schedule that is in line with other institutions.
SO Strategy	WO Strategy	ST Strategy	WT Strategy
Recruitment of students after the implementation of the prakerin program	The creation of an agreement with world of work when direct guidance by the world of work supervisor	The creation of a world of work Joint agreement to make it easier for teachers to observe student progress	Arranging the schedule for prakerin implementation so that it does not coincide with other institutions. Placement of students in prakerin programs.

Figure 1. SWOT Analysis at VHS 1 Rejotangan

The SWOT analysis is used to identify in detail the events that occur in the field. If a problem occurs, armed with a SWOT analysis that has to carry out can make it easier to find a solution. The SWOT strategy developed is more focused on the deliberation process carried out by a member of an organization. Of course, members of the organization have responsibility for the program implemented.

Process evaluation is carried out to determine the process of implementing Prakerin in the field according to teachers, supervisors, students, and instructors. The process of implementing the internship program is carried out through several tasks: (1) efficient world of work data collection, (2) another world of work over a certain period, (3) Prakerin students, (4) student survey program,

(5) appointment of coaching teachers and sending students Prakerin, (6) Prakerin implementation reports and guidance, (7) Prakerin student monitoring, and (8) internship student recruitment.

A good Prakerin program is realized by meeting the needs of schools and industry needs. The on-the-job training model is used to develop the management of the internship program implementation. At the time of implementation, the training and material sections must be synchronized. The importance of doing this program is one of the means to foster students with competencies that follow qualifications that are following the demands of the job market. Students can integrate knowledge into the real world of work. Moreover, the internship program forms students' work ethic, skills, abilities, or competencies following those required by the world of work.

The internship program at VHS 1 Rejotangan is offered to Class XI students in odd and even semesters. This program, organized by the world of work, has partnered with schools. There is also assistance or providing theory and knowledge when implementing production methods at VHS 1 Rejotangan. The quality standards of each examination program of each educational institution have carried out the provision of competencies. In its implementation, the competency provision is integrated into the real world of work. The goal is to shape students' work ethic, skills, abilities, and graduate competencies. The achievements of some components are also accustomed to the provisions during the implementation of the Prakerin program.

The internship program is a means of preparing vocational school graduates to meet market qualifications. In school, using Prakerin in integrating education and skills delivery will shape student achievement in the world of work requirements. Theories, guidance, and competencies are built from the start. The effective steps are teaching students to participate in the learning process and teaching and mentoring in schools. Another activity that has contributed to the success of the internship program is field visits, which students can use as a vehicle for review while working in the industry. In this case, cooperation becomes important as a coordinator organizes this activity.

The principle applied to the internship program is learning while working. These principles are used as the basis for developing self-competence independently. The teacher only conveys brief information to the students. The rest of the students are asked to find solutions to problems independently. Thus, students will get a better experience and impression.

Administrators, students, and instructors must do product evaluations to determine the benefits of internships. The internship program assists students and especially their needs. The Internship Program offers excellent student benefits tailored to the student's needs. The Prakerin program benefits students and educational institutions by providing opportunities for students to apply the knowledge they have learned in real terms. In addition, institutions/schools can also cooperate with industry to distribute graduates. The benefits of the Prakerin program at VHS 1 Rejotangan are excellent, but further improvements are needed to address or predict potential problems.

Meanwhile, the results of the observation sheet stated that from the context evaluation, the connector dived into the legal basis, the background, vision, and mission, and the objectives of implementing the pre-employment program. The supervisor also understands the suitability of the pre-employment program with the needs of the world of work and the needs of competencies that should the school should learn viewed from the evaluation of inputs; the mentor understands the prerequisites that must be met by students in participating in the pre-employment program and the targets of the pre-employment program. In addition, the supervisor dived into the agreement between the school and the world of work on the pre-employment program and conducted socialization on the pre-employment program activities. When the pre-employment program activities occur, a fee is charged to the participants.

Although the facilities still need to be completed, the school still provides them. This is shown by most students still using their laptops to facilitate learning activities from the point of view of process evaluation, namely the conformity of the scope of implementation of the pre-employment program with the competence of the expertise. The needs of the participants of each division in the world of work are different. As a result, the entire participant is placed in different rooms. Through the conformity between the volume of work and the target competence of the electorate

Industrial work practice program actions must be evaluated immediately (Devani & Refdinal, 2020). There are to determine if the previously planned program is still relevant to DUDI's

requests or wants. According to Nasution (2000), assessment is always necessary for all productive actions. Feedback is acquired via evaluation, then utilized to enhance or amend all forms used—materials, techniques, and program implementation.

Accept Rumanti's (2002) view that assessment must always be a priority in an organization, such that evaluation is carried out in each activity and as a whole. Evaluation will reveal the impediments to planned projects. Furthermore, the company will develop a suitable solution so that future program implementations operate smoothly.

Industrial work practice activities will run smoothly due to the delegation of authority given to subordinates under the supervision of the leadership or head of the organization, which is sufficiently capable of giving freedom to each person to express thoughts, concepts, and attitudes (Yansahrita, 2020). Assessment operations are carried out in each organization according to the evaluation strategy (Igartua et al., 2021). The evaluation plan includes information about the work program to be assessed and a description of the activities, timing, and techniques to evaluate the program.

In addition, evaluation findings are demonstrated in the results and efforts to address problems or provide solutions. It is very important to evaluate to measure the effectiveness and achievement of the programs that have been implemented (Guyadeen & Seasons, 2018). The existence of collaboration between schools, the business world, and the industrial world (DUDI) in the implementation of industrial work practice activities are evaluated using evaluation sheets for students which contain components of attitude and competency assessment (Casmudi et al., 2022).

CONCLUSION

Based on the results of the interviews and observations above, there are several findings. First, synchronizing the curriculum with the world of work at the evaluation stage within the framework of the industrial work practice program at SMK 1 Rejotangan. At this stage, an MoU was signed between the world of school work, the Student Readiness Planning Section (Competency Mapping), and the Placement Planning Section (World of Work Placement Mapping), which is used for fieldwork based on student competencies needed by the world of work. Second, information has been obtained in the input evaluation that a cooperative organization was formed. Cooperative organization between schools, the business world, and industry in the industrial practice program has two aspects: departmentalization and division of labor. The division of labor comprises teachers/principals and teachers of the business/industrial world. Departmentalization consists of mapping students' placement of students in existing competencies and the appropriate world of work. Third, at the evaluation stage of the process, collaboration is established between the school and the world of work for student development that is flexible and consistent with each school's policies. The last stage is product evaluation. The internship program has many benefits for schools and the world of work.

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Indonesia-Germany cooperation in efforts to improve vocational education levels: Analysis of the Ausbildung program

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ABSTRACT

The quality of Indonesian human resources still needs improvement to compete in the international world. Currently, the international market requires a lot of competence in technical skills in the vocational field. For this reason, Indonesia focuses on developing vocational training and education. This demand was not fulfilled because Indonesian vocational graduates did not have the right skills. With abundant but ineffective resources, Indonesia must learn much from other countries, including Germany. The output of this international collaboration is the Ausbildung program or Apprenticeship Training. This article seeks to reveal how Indonesian-Germany cooperation in vocational education impacts the two countries by using a qualitative method of reviewing documents and interviews with relevant sources. Findings from this article's cooperation opens up new opportunities for exploiting intellectual labor, which is neo-capitalism. In terms of salary, the wages received by Indonesian workers are far below the minimum wage that should be given to professional workers in Germany.

INTRODUCTION

Indonesia has the fourth largest population in the world, and this asset should be further developed in various ways for the progress and welfare of the Indonesian nation. However, unfortunately, according to the UNDP (The United Nations Development Program) in 2018, the Human Capital Index or the Index of Indonesian human resources was ranked 107th out of 189 countries which shows that Indonesia needs to improve in improving the quality of its human resources (United Nations, 2018).

One indication that shows a significant change in the quality of a country's human resources is the level of education. A high level of education will be directly proportional to the quality of the country's human resources (Ivanova et al., 1999). One of the ways that Indonesia can effectively improve the quality of its human resources is to improve the quality of the vocational education system. Another reason for efforts to improve the quality of the vocational education system itself is that today the international labor market is dominated by companies that require skilled workers who are competent in the field of engineering and technical skills, which are the outputs of the vocational education area (Wiriadidjaja et al., 2019). The great demand for skilled workers in the labor market comes from various industrial countries, which can also be categorized as developed countries, especially countries on the European and American continents.

Indonesia, which has abundant human resources, has great potential to fill the void in the demand for skilled workers. With this potential in mind, Indonesia seeks to improve the quality of its human resources effectively. Therefore Indonesian vocational education, which is based on the provision of programs that are oriented to market needs and practices that improve the abilities and skills of vocational school graduates supported by the principle of participation in lifelong learning, needs to be intensified (Hendarman et al., 2016).

As previously explained, the demand for skilled laborers in vocational education is very high and open. However, Indonesia needs help meeting the market demands because Indonesian vocational graduates cannot match the right skills sufficiently (Verawardina & Jama, 2019). This is also the reason why despite the high demand for labor, according to the Central Statistics Agency (BPS), there are still around 6.87 million unemployed people in Indonesia, and unemployment among vocational school graduates or VET holds the largest portion of the unemployment rate in Indonesia (Wiriadidjaja et al., 2019).

The Indonesian government, in addition to internally carrying out various efforts such as increasing investment in the VET sector by establishing vocational schools and allocating the development of vocational schools to become a priority aspect of national education level development by increasing the ratio of students enrolled in vocational education as well, and also providing expertise certification to graduates.

However, another collaboration is needed to appropriately and effectively increase Indonesia's VET level. In this case, Indonesia needs to learn much from other countries that have effectively implemented a quality VET system, including Germany. Germany has implemented VET as one of the important pillars of education, which is very influential in the country's economy. The learning system applied seeks to improve the workability of the population based on comprehensive knowledge, which produces citizens who are fully knowledgeable about a particular aspect of the field (Wiriadidjaja et al., 2019).

Germany has widely become one of the largest donors in education, especially in the field of VET in the international world. The German government, through the Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) or the German Federal Ministry for Economic Cooperation and Development, has developed a strategy on how VET can be implemented globally throughout the world (Wiriadidjaja et al., 2019). Germany did this with the justification that a global increase in VET could comprehensively improve global welfare. From the point of view of International Relations itself, the promotion of VET was carried out in Germany's efforts to strengthen cooperation both bilaterally and multilaterally as well as in cooperation. Internationally, in general (Hummelsheim & Baur, 2014).

Germany and Indonesia have signed an international cooperation. The two country leaders, President Joko Widodo and German Chancellor Angela Merkel have also committed to operating a partnership in the VET education system using elements of the German dualism approach, which closely collaborates with the private enterprise sector. The output of this collaboration is a program called Ausbildung or Ausbildungsplatz which can be translated as training or internships carried out by the Indonesian people or referred to as Ausbildung students from Indonesia who go to Germany to do this VET education.

With those backgrounds, this article seeks to discuss how cooperation international cooperation between Indonesia and Germany in the field of vocational training and education or VET in the output of the cooperation program, namely Ausbildung (internship training), in terms of the impact and objectives of this collaboration using the basic concept of international cooperation based on the principle of mutual gain between countries that carry out this cooperation (Grieco et al., 1993).

This article also intends to comprehensively look at how the Ausbildung program can assist Indonesia in developing the quality of its human resources and whether there are problems that threaten Indonesia in the implementation of this cooperation that can be used to be considered as a concern so that this cooperation can remain in its circumstances as cooperation that based on mutual benefit or mutual gain. Therefore, the main question of this article is whether the Ausbildung program could improve the quality level of vocational education to reduce unemployment and unskilled labor in Indonesia and provide benefits for both countries.

RESEARCH METHOD

This article uses descriptive qualitative research methods to explain. It seeks to reveal whether Ausbildung can increase vocational education in Indonesia and how it can benefit the two countries. The research in this article uses literature review data collection techniques complemented by interviews conducted with practitioners in education management, namely Reiner Bima Arigupta, who serves as operational director of Maxima Stiftung Indonesia. In addition, the process of compiling articles with qualitative methods is supported by supporting literature, like journal articles, books, official data on official websites, booklets, official reports, international agreements, and related archives, as well as news that discusses issues and topics that intersect with the discussion in the article.

In this research, the data analysis process is divided into several stages: data collection, interpreting and describing data, analyzing data, and drawing conclusions. The process of analyzing and interpreting the data in this article is assisted by tools, namely the Atlas.ti qualitative data analysis application version 9.0 using quotation and coding features. In terms of the validity of the data obtained, it is done by collecting data from various sources to obtain valid data. At the same time, the reliability of the data in this research was obtained through the use of a citation and bibliography maker application Mendeley.

FINDINGS AND DISCUSSION

This article was written with the help of the Atlas.ti 9.0 application with a limited version using nine codes against 24 literature sources consisting of 16 journal articles, four books, three reports or reports, and one country-specific document. There are 150 quotations divided into nine codings starting from Reasonings, literature review, forms of cooperation, hypotheses, legal basis, the background of the problem, potential, system, and objectives of Indonesia-Germany bilateral foreign cooperation.

Conditions of Vocational Education (VET) in Indonesia

Vocational is a general term in any education world. Therefore, several studies have been carried out to develop vocational systems in several countries, especially those with large populations, and Indonesia is one of them. The Indonesian TVET system comprises vocational education and training, which are regulated separately (Kadir et al., 2016). The vocational experience can be gained by enrolling in formal vocational education, receiving vocational training, or combining both. Recognizing the importance of vocational education in preparing job-ready students, the Government of Indonesia is rapidly increasing the number of vocational schools and colleges. Despite the Indonesian government's efforts to increase the number of vocational schools and colleges, the demand for vocational education remains weak (Hendarman et al., 2016).

It is partially right. According to the Central Statistics Agency (BPS), there are still around 6.87 million unemployed people in Indonesia, and unemployment from vocational school graduates or VET holds the largest portion of the unemployment rate in Indonesia (Wiriadidjaja et al., 2019). The low demand for vocational education can be attributed to the negative image of the VET system. Parents in Indonesia usually view vocational school graduates negatively because of low salaries, unclear career paths, and low academic abilities compared to university graduates (Nagels, 2012).

Parents also think that students with general academic education fared better socio-economically than those with vocational education (Linten et al., 2014). In addition, male and female SMK students' lower academic abilities than their high school counterparts appear to have reduced their chances of pursuing higher education (Kadir et al., 2016). Therefore, Indonesian parents prefer that their children pursue general academic qualifications culminating in a university degree. Skills mismatch, referring to the gap between skills learned in school and skills needed in the job market, further weakens demand for vocational education (Wiriadidjaja et al., 2019).

The Indonesian government internally made various efforts to solve the problem through government policies. The president of Indonesia released a Presidential Regulation on Vocational Education and Training or also called Vocational Education and Training (VET), in 2007, which

aims to transform and increase the effectiveness of the education system concretely. Indonesian vocational education is based on providing programs oriented to market needs and practices that improve the abilities and skills of vocational school graduates, supported by the principle of participation in lifelong learning (Hendarman et al., 2016).

The Indonesian government, in addition, also increasing investment in the VET sector by establishing vocational schools that focus on technological and agricultural capabilities and allocating the development of vocational schools to become a priority aspect of national education level development by increasing the ratio of students enrolled in vocational education as well (Hendarman et al., 2016).

Germany and the Vocational Education Training System

Germany is widely known for its high-quality vocational education and training (VET) system. The two main features of the system are (1) an enterprise-based training program accompanied by a school-based component (one to two days per week), in which interns acquire upper secondary general education in core subjects (such as mathematics and German) and theoretical knowledge in their training work. This duality of practical and theoretical knowledge acquired in the workplace and vocational schools, (2) is accompanied by a private-public duality in governance structures (i.e., public governance of vocational schools, providing enterprise-based training governance) (Deissinger, 2015). In the recent recession, this so-called dual system has received much international attention, for example, in the US, UK, and Spain. While youth unemployment has increased rapidly in recent years in many (European) countries, this is not the case in Germany. Therefore, from the outside, Germany's low youth unemployment rate is attributed to the dual system (Hummelsheim & Baur, 2014).

In vocational education and training (VET), the German Federal Government is responsible for vocational training in enterprises, while Länder is responsible for vocational training in schools and vocational schools. Länder is responsible for public sector education, and vocational schools are under the responsibility of local authorities. All laws regarding schools, including vocational schools, are Land (territory) laws (Raggatt, 1988). The Federal Government is in charge of corporate, non-school VET.

The Federal Department of Education and Research (BMBF) is responsible for the centralized coordination of vocational education and training responsibility for fundamental issues in VET policy. The dual system is applied at the upper secondary level. After completing the dual system training, most participants took up jobs as skilled workers. Most of them take advantage of the opportunity to continue vocational training. Under certain circumstances, eligible students may attain the academic standards required to enter the Fachhochschule within one year of full-time schooling and continue to a higher level of education.

Participants who successfully continue their vocational education are allowed to continue their studies in higher education. Full-time vocational schools have the highest number of students. These schools prepare for vocational work or training in a dual system. Full-time vocational school attendance is carried out in the first year of training in a dual system. The right to study at a college or Fachhochschule can be obtained in several educational programs in full-time vocational schools (Hummelsheim & Baur, 2014).

A distinctive and unique thing that is owned by the German VET system is the duality program or dual system, which is a system that integrates vocational training schools owned by the government but also in collaboration with the private sector (Dittrich, 2010). This dual system of schools and internships in business companies ensures the output of a skilled and qualified workforce. This system is considered a mutually beneficial system for the various parties involved, namely to fulfill the needs of the parties while still upholding the goodness of both parties by improving the welfare of the community by increasing the community's economic competitiveness and also the active participation of the community in improving the national economic level which allows many people to contribute also benefit from the results of this system (Raggatt, 1988).

German dual system does have its advantages. This system allows youth without a university entry diploma to learn a trade and move fairly smoothly into skilled work. The German Dual System has attracted much attention in recent years, with several countries, especially Southern Europe,

trying to introduce a similar concept of structured apprenticeship leading to early vocational qualification (Hummelsheim & Baur, 2014). There is hope among politicians, in particular, that such a system can help address the problem of integrating school leavers into the education and vocational training sector and support the fight against youth unemployment (Reuter, 2019). However, Germany's vocational education and training system is more complex than it seems, with a still-heavy 'transition system' and full-time courses in vocational education and training in addition to apprenticeships and internships.

International Cooperation between Indonesia and Germany in the Ausbildung Program

Various studies have focused on cooperation between countries in the last decade. The recent international relations literature on cooperation has adopted a different approach. Instead of using a concept that only uses absolute gain and relative gain (Waltz, 2010), Snidal and Powell are modeling the conditions in which the two countries that work together can get the same benefit, namely the principle of mutual gain (Milner, 1992; Munn-Giddings, 2001; Snidal, 1991). In this article, international cooperation is the main focus of research on international development and education based on international assistance. Cooperation in the form of international development for education can be identified as a social network. In this network, the donor or the country that is the center and the recipient country are actors who are connected through the flow of cooperation. The network perspective is profound in this context because of its understanding of power and influence (Graf, 2013; Reuter, 2019; Shields & Menashy, 2019).

A bilateral cooperation relationship is a ridge that describes the reciprocal relationship between cooperation carried out by two countries while still respecting the rights and obligations of both countries in international agreements in order to provide added value to both countries even though the main purpose of establishing this bilateral cooperation is to pursue and fulfill their respective national interests. International cooperation is based on the concept of mutual respect and mutual gain (Munn-Giddings, 2001). Indonesia has carried out many forms of bilateral cooperation in bilateral relations. However, in this article, the bilateral international cooperation between Indonesia and Germany will be analyzed in depth, especially in the field of vocational education (McGrath, 2002).

The bilateral cooperation between Indonesia and Germany will focus on a relationship that will no longer only use government-to-government contact instruments. However, the efforts of the two countries to build people-to-people contact between the Indonesian people and the German people will be promoted and become an important point in contemporary bilateral relations between the two countries (Cherkes et al., 2016).

However, the main challenge remains that the theory of cooperation is based on the fulfillment of self-interest, where the results are beneficial to both parties and can be obtained by working together. There are several reasons why a country cooperates with other countries: (1) to increase economic prosperity, (2) to increase efficiency related to cost reduction, (3) to minimize problems that threaten common security, and (4) to reduce negative losses caused by individual countries. Actions that have an impact on other countries (Snidal, 1991).

The Indonesian government and the German government have declaratively committed to strengthening and deepening international cooperative relations in the field of vocational education by signing an agreement, namely the Joint Declaration of Intent between Indonesia and Germany on the Strengthening and Deepening of the Partnership in the Field of Technical and Vocational Education and Training. This agreement is the result of a long history of development cooperation between the two countries, which is mutually beneficial for both countries and is carried out in the education aspect and in various fields of cooperation. Cooperation in VET is one of the most prominent topics of cooperation among other collaborations that the two countries have done (Hendarman et al., 2016).

This collaboration was initiated by two state leaders, President Joko Widodo from Indonesia and German Chancellor Angela Merkel, who are committed to strengthening cooperative relations between the two countries with the VET instrument as one of the areas of cooperation (McGrath, 2002; Wiriadidjaja et al., 2019). This collaboration is based on the historical success of cooperation

in Technical and Vocational Education and Training (TVET), which has been going on for a long time. Also, this collaboration is expected to improve the quality of the VET system in Indonesia using the key elements possessed by the system that has been implemented for a long time and become the basis for implementing the VET system in Germany, which briefly applies a dualistic approach to formal education in education as well as conducting practical education in the field of education, which is carried out by collaborating with the private sector, which makes graduates have the expertise and skills that are needed by the market for labor demand which in fact, is demanded by private sector business drivers (Dittrich, 2010).

Dialogue about this cooperation has occurred at various levels. It is being intensively encouraged to accelerate the implementation of the basic principles that will be fulfilled by both parties in this cooperation. To improve and strengthen Indonesia-Germany cooperation in the field of VET, several points have been agreed declaratively by both parties to be implemented while developing the VET system. Some of these points are clearly stated in the cooperation agreement, which will be explained in the agreement.

The points that become the fulcrum of this article are actively providing a long way and green light for the citizens of the two cooperating countries to make significant exchanges. In addition, it is stated that German support is an integrated support that supports a sustainable linkage or relationship between the vocational high school system and vocational higher education, which until now is still very limited and can even be said to have not met certain international standards that need to be achieved by an institution. higher education in order to produce VET graduates who can have the right set of skills to work directly in the VET field. This is supported by the agreement about developing educators and instructors so that they can train and educate graduates to a certain standard by conducting training and exchanges for instructors and teachers of vocational education in Germany.

In addition, the German and Indonesian parties paved the way for the dualistic principle of the German VET system for various parties, including VET institutions, private companies owned by Indonesia and Germany, and Indonesian citizens to interact directly in this system. This collaboration allows the provision of training courses with a German dual system hosted by Indonesian citizens through the Indonesian-German Chamber of Commerce, which acts as one of the providers of course and training delivery services.

This course and training are based on interviews conducted by researchers with related resource persons, namely language training institutions and sending Indonesian students to Germany "Maxima Stiftung," referred to as Ausbildung or Ausbildungsplatz, translated as Internship Training. Maxima Stiftung is a private educational management institution that is half owned by Indonesian citizens and half owned by German citizens. Researchers had the opportunity to interview the operational director of Maxima Stiftung Indonesia, Reiner Bima Arigupta, on May 5, 2021, at the Maxima Stiftung Indonesia head office in Bandung.

Reiner clearly explained what he could explain about the Ausbildung program, one of the results of the Indonesia-Germany international cooperation program. When asked in general about Ausbildung, Reiner answered that this program can be followed by every Indonesian citizen aged 17 to 27 years. This program does not have physical requirements that need to be met. The only requirement that every Indonesian citizen who wants to participate in the Ausbildung program has to fulfill is the ability to speak German at a certain level, namely B1, as evidenced by a certificate of passing the German language test as a foreign language. The official German institution that promotes German language and culture is the Goethe-Institut (Komala, 2018).

Then after graduation, this management will find a vocational higher education institution that provides education in the field of VET in Germany according to the interests of every student who is an Indonesian citizen. After obtaining approval from the German embassy, having a visa permit, and being permitted by the Indonesian government through the regional manpower office, this Ausbildung student can go to Germany. Arriving in Germany, several facilities provided by this VET educational institution were waiting for Ausbildung students.

Some of them are housing, salaries, food allowance, transportation fees, uniforms, and several other educational support facilities according to the needs of the students and the field of education they take. The salary Ausbildung students receive is Rp 6,000,000, - or 300 Euros per

month. Ausbildung students carried out this Ausbildung program for three years, and only for three years were Ausbildung students contracted by the company without any official ties afterward. In Germany, Ausbildung students will receive formal education in theory classes for two days a week. Then they will conduct an internship training program in the field they are engaged in for three days a week, and the remaining two days, the students can enjoy their holidays.

This internship is one of the results of the dual system of VET education in Germany in close collaboration with private companies. In short, according to Reiner, this VET educational institution looks like a high school owned by Indonesian companies such as STT Telkom, Telkom Indonesia owns has a system if you want to work in the company. The students need to do education in the educational institution they have. or official ties.

After graduation, Ausbildung students will receive a certificate from the relevant educational institution stating that they have undergone internship training in Germany for three years with specific competencies, which can then be used to apply for jobs or continue their studies to a higher level, such as undergraduate and postgraduate. The certificate is valid for applying for a job that matches the qualifications of Ausbildung education participants throughout Europe and America. It makes them reliable experts with their abilities with German standards, which incidentally is one of the countries with an education level recognized as above average by the German government. Countries in the world.

However, according to Reiner also, the various facilities provided by Germany to the Ausbildung students are indeed fear in itself Germany for several things. First, Germany, with a background in a country with a very low crime rate but a high standard of living, has anxieties about foreigners and whether these foreigners can survive the harsh life in Europe.

Based on this skepticism, the private sector, which will employ the students part-time, needs to provide various supporting facilities so that these foreign nationals can survive in Germany. In addition, with the shortage in the labor market sector in European countries against the backdrop of a low labor force due to the low rate of population growth, Germany itself, according to Reiner, requires 17,500 foreign workers per year to meet its workforce needs. This makes Ausbildung students highly valued by Germany.

Based on the results of these interviews, it can be concluded that basically, Ausbildung Students are an outcome program of the Indonesia-Germany International Cooperation that focuses on sending Indonesian students to study and gain skills and certifications in specific vocational and training fields (VET) which will open various doors of work in the international world. This is what is expected by Indonesia as one of the parties collaborating in an international cooperation agreement to benefit from this cooperation.

The Dark Side of Vocational Education Cooperation

The main findings of this article will be presented in this sub-chapter. As previously discussed, although the principle of mutual gain (Snidal, 1991) used in the implementation of international cooperation in the field of vocational education carried out by Indonesia-Germany continues to be upheld and used as a guide, no ivory is not cracked. Since the first time processing various data and sources that are massively spread about the benefits and positive sides of this international cooperation program in the VET field, it seems that various aspects of this collaboration seem to lead to various aspects that can improve the quality of vocational education or vocational education in Indonesia (Nagels, 2012; Wiriadidjaja et al., 2019). On the other hand, Germany also gets many benefits from this cooperation. However, as a country that generally dominates and spends more capital than Indonesia, it seems odd if Germany only distributes aid as a good cause for Indonesia (Arel-Bundock et al., 2015).

Based on the theory of international relations, namely realism, every country in the current international system, which tends to be an anarchic international system, will encourage every country to seek strength and power, commonly called power, concerning other countries in the international arena (Morgenthau, 2014). According to realists, even the state will seek various relative advantages to achieve a goal, namely the national interest (Michelmann & Hocking, 1995; Pardo, 2017). In this case, the context of soft power from Germany is highly highlighted in

international cooperation efforts in education, which incidentally is a low-level affair in politics (Nye, 2008).

Germany, which has economic strength, uses Indonesia as a source of materials for industry, namely using Indonesia, which has abundant human resources. Germany uses these human resources to fulfill its need for skilled labor, which is necessary to make a strong industry. Unfortunately, Germany's population growth (Samani, 2018) based on research conducted by the Max Planck Institute for Demographic Research and population data according to the Federal Statistical Office (Destatis) 2021 (Kreyenfeld et al., 2012; Statistisches Bundesamt, 2021) continues to decline. The birth rate per year in Germany is lower than the death rate (mortality), which causes a low level of the German population overall despite the high life expectancy and the number of the population in terms of productive age (Kreyenfeld et al., 2012).

From the German point of view, the arrival of Ausbildung students from developing countries such as Indonesia is very beneficial. However, when viewed from the level of equality of welfare, even with conditions in Indonesia's point of view, the facilities provided and provided for Ausbildung students are very attractive and sufficient to meet the needs of the students. Economic level in Indonesian society, but in terms of equality, the income received by German and Indonesian people at the same level of education is very different (McGrath, 2002). As information obtained from a joint interview with Reiner, director of an education management company in Germany, an Ausbildung student from Indonesia only earns €300 a month for three years.

In contrast, based on research from several sources from other education management companies from European countries, an Ausbildung student with the same major and competence but from a European country gets three times more wages paid, around €1000 per month. Professional salary standards in Germany are far above what Ausbildung experts receive. The minimum wage for Germany is 9.35 euros per hour or 1584 euros per month professionally in 2020 (Nienaber, 2018; Statistisches Bundesamt, 2023).

This indicates that there is an unequal difference in terms of wages received by Indonesian citizens who undergo the Ausbildung program. In terms of macroeconomics, this can be categorized as a form of Neo-Capitalism that seeks to exploit intellectual workers with the mask of vocational education that gets honorariums, even though the use of these workers is, in fact, not following the labor laws of certain countries (Coleman & Underhill, 1998; Grieco et al., 1993; Ivanova et al., 1999). In addition, with the hustle and bustle of abroad and Europe minded as the blue continent, Indonesia's potential youth become interested in carrying out a job that can essentially be done for their own country with various pseudo-work ethos behind it. This is what in the study of International Relations in the view of eastern realism can be a doctrine to promote that western countries are superior and superior to eastern countries that are still developing (Baber, 2012; Raggatt, 1988).

This needs to be the concern of the Indonesian government to reduce the negative impact of the entry of western ideas that can affect the development and culture of the Indonesian nation if allowed to expand massively. In addition, the Indonesian people deserve to have a better life following the basic philosophy of life of the Indonesian people, namely Pancasila and the 1945 Constitution. Education development in the country also needs to be further improved to reach a certain level that can increase the quality of Indonesian human resources.

Continue to rise to achieve Indonesia's national interest (Hendarman et al., 2016; Muhtadi, 2008; Verawardina & Jama, 2019). Because, according to the perspective of sovereignty, by conducting international cooperation, the country's sovereignty will be eroded more or less by the emergence of an international regime that must be obeyed and ratified by the countries involved in the cooperation (Pardo, 2017). However, the author argues that it should be fine if you lose a little in order to get more results.

CONCLUSION

International cooperation between Indonesia and Germany with one of its outputs, namely the Ausbildung program, is a collaboration that is generally accepted and justified by the various facts presented in this article as a successful collaboration between Indonesia and Germany to fulfill their respective interests respectively. Especially in this research, Indonesia has had a direct, concrete

impact as a donor country. The impact that is felt the most is the increasing number of Indonesians who can continue their education in one of the countries with the best education levels in the world, especially in the vocational field. With this program, the job opportunities of the Indonesian people are increasingly wide open, not only competing domestically but also being able to penetrate the international market with the Ausbildung certification they have obtained. In addition, the Ausbildung program is also an arena for the transfer of knowledge and technology from Germany to Indonesia. With the increasing number of graduates from Ausbildung, the level of vocational education in Indonesia will gradually increase both in terms of teachers and graduates in Indonesia. Ausbildung students with work experience and training with high European qualifications can also practically transmit their knowledge to Indonesia. In addition, with the Ausbildung program, vocational students in Indonesia can increase, which ultimately encourages the development of the domestic economy.

On the other hand, for Germany, this program can solve its population problem by filling the many available education seats in Germany but needing more population in Germany. In addition, with the low population of Germany but with the form of the German state, which is economical and in the industrial sector, which incidentally requires a lot of skilled workers, the Ausbildung program can also be one of the answers to fill the shortage of skilled workers. This cooperation has also become the basis for strengthening Indonesia-Germany bilateral relations.

Therefore, it can be concluded that the Ausbildung program, either directly or indirectly, is the right effort and can be done to increase the level of education and the quality of Indonesian resources, which will also increase the level of economic welfare, increase the number of experts as a whole and improve the education system. vocational education that will boost the image of the Indonesian nation.

However, what is found in this article is that there is a dark side to the implementation of this international cooperation. International cooperation in VET is indeed based on the principle of mutual benefit. However, it still contains the national interests of both countries, like the Ausbildung students, who are skilled workers and intellectuals but are only paid a third of what they are supposed to earn under German law. This is evidence of the exploitation of cheap labor by industrial countries in developing countries.

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Cognitive apprenticeship in vocational students mathematical decision making skills

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ABSTRACT

Exploring the decision-making abilities of undergraduate students, including students from vocational education backgrounds, is the main priority in the achievement of mathematics learning in general and in Calculus courses particularly. Decision-making processes require cognitive guidance through activities describing in detail the systematic steps of each process. It is implicitly said as part of a cognitive apprenticeship procedure. There are claims that students with a vocational education background can develop their academic and practical potential more through a cognitive apprenticeship model. In addition, using video as visual media learning allows students to sharpen their skills. Therefore, the study aims to explore the distinction in achievement and improvement of mathematical decision-making skills between undergraduate students who learn with a Video-assisted Cognitive Apprenticeship approach (CAV), and they are who receive Cognitive Apprenticeship learning (CA) with conventional learning. A quantitative study with the Static-Group Pretest-Posttest Design was employed as a methodology in the research. Based on the research stage, there are differences in achievement and improvement of student decision-making skills with a review of the type of vocational school between undergraduate students.

INTRODUCTION

The expected students' competencies from Calculus course, in general, is understanding not only the elements of mathematics, algorithms, and the complexity of computational systems but also the ability to apply these concepts and theories to overcome various real-life problems. In solving the problem effectively, the procedures of finding, developing, analyzing, selecting, implementing, and evaluating alternative solutions from various possibilities are needed quickly, precisely, and accurately (Heidari & Shahbazi, 2016; Mitchell & Reiter-Palmon, 2017). These processes by Bruch and Feinberg (2017) are categorized in a realm of thinking activities, namely judgment (the stage of deciding a solution).

Dörner and Funke (2017) and Meyer (2018) emphasize that the decision-making stage of choosing a solution is critical in solving a problem because it is related to determining and justifying the strategies. These activities are challenging since it belongs to the cognitive domain of high-level thinking, and the process also involves an important affective area that accepts responsibility for each choice and its consequences (Kim et al., 2018; Turkan & Jong, 2018). This ability is part of an

individual's life in dealing with uncertainty on each aspect of diversity which is generally understood as the interaction and processing of complex information from high-level thinking processes. Hence, it is not excessive if Haupt (2018) and Rabe et al. (2019) recommend improving decision-making abilities in individuals as early as possible to support problem-solving, a consistent personal shaper and ready to face various future challenges. Thus, exploring and optimizing the potential decision-making abilities of undergraduate students is the main priority in the achievement of mathematics learning in general and in calculus courses particularly.

The development of students' decision-making abilities is determined by many factors, including the learning experience (Ramos et al., 2016; Weir & McAvinue, 2013). The learning experience is the crystallization of the forging process of cognitive, affective, and psychomotor competencies received by students in previous high school education (Wismath et al., 2014; Zhan et al., 2013). In addition, the learning experience relates to how often students carry out the trial-and-error process in mathematical exercises (Amidei et al., 2016). Corresponding to this situation, first-level students of the FKIP Mathematics Education Study Program at Universitas Serang Raya come from heterogeneous high school graduates with different learning experiences.

In general, students come from Senior High School (SMA), Vocational High School (SMK), Madrasah Aliyah (MA), and Vocational School of Madrasah Aliyah (MAK), both public and private schools, which are then simplified into two main parts, namely Senior High School (SMA), including MA, and Vocational High Schools (SMK), including MAK. The categorization of undergraduate students based on the performance of mathematical decision-making abilities for calculus courses, especially chapter limits, and functions, for the last three years from 2019 to 2021.

The achievement results in the period showed that students with a high school education background had higher average achievement scores than students with a vocational education background. Besides the lower achievement score, the students from vocational education backgrounds have decreased achievement from year to year, as seen in Figure 1.
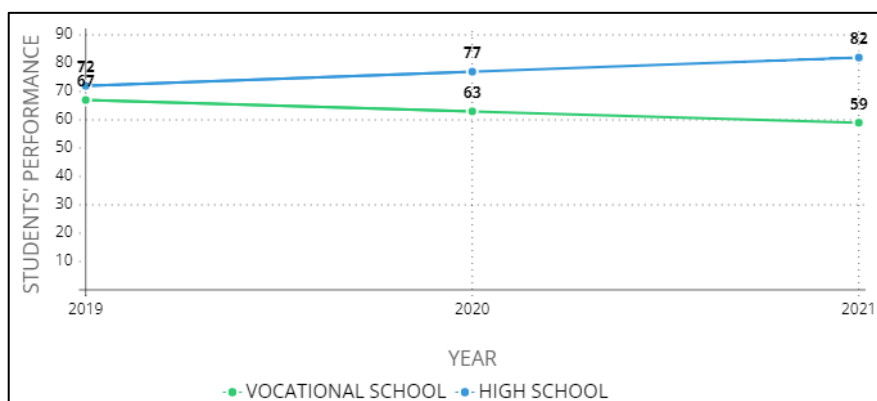
Figure 1. The Data Performance of Undergraduate Students' Decision-making Ability of Calculus

Furthermore, more than 70% of undergraduate students from vocational education background yield on thinking activities that involve a logical analysis and argumentation process in choosing the most appropriate, minimal risk and accountable problem-solving alternatives (R. Oktaviyanthi & Dahlan, 2018). If this condition is sustained, it could inhibit the achievement of the instructional purpose of the course. Furthermore, the preliminary study's results reveal that the instructor's learning process in the three-year interval uses a conventional approach assisted slide PowerPoint. Responding to this, Zeynivandnezhad et al. (2012) stated that the characteristics of vocational schools have learning patterns that focus on procedural abilities.

Meanwhile, the characteristics of calculus courses, particularly limits, and functions, involve formal definitions emphasizing the analysis process (Juter, 2005; Liang, 2015). The analytical expertise needs to be stimulated in various ways, such as providing proper instruction through modeling activities, directing the framework of thinking through guided training activities, and accompanying learning through structured activities starting from the basic to the high level (Brennan

& Resnick, 2012; Collins et al., 2018). However, there needs to be more alignment between the abilities formed in the vocational school. It should fulfill the cognitive abilities of factual learning outcomes at the university level.

Meanwhile, the teaching model in higher education has yet to explore and elaborate on the undergraduate students' abilities that have been mastered. Therefore, there is a significant need to apply other learning approaches to accommodate mastering and optimizing mathematical decision-making abilities. Decision-making is classified into three parts, namely strategic level, tactical level, and operational level, in which individuals require cognitive guidance through activities describing in detail the systematic steps of each process (Bertoni, 2017; Louis & Dunston, 2018).

The cognitive guidance is implicitly said by Lyons et al. (2017), and Oktaviyanthi and Dahlan (2018) as part of a cognitive apprenticeship procedure. In line with previous thought, Tompkins (2016) and Huang et al. (2019) revealed that determining the options in making decisions is most likely developed through a cognitive apprenticeship approach. Collins et al. (2018) emphasized that cognitive apprenticeship in developing decision-making skills stimulates finding as many of the existing options in solving a problem or dealing with certain situations.

Stefaniak (2018), Brown et al. (2019), and Miyauchi et al. (2020) revealed that cognitive apprenticeship in a learning context serves as a driving force for developing students' cognitive skills and abilities through the observation of an expert when responding to situations or dealing with problems by fulfilling the learning stages of modeling, coaching, scaffolding, articulating, reflecting, and exploring. Rina Oktaviyanthi (2019) formulated the first three stages, namely modeling, coaching, and scaffolding, related to the decision-making ability for Limit and Function materials. These stages focus on directing students to find alternative solutions, developing the alternatives, and analyzing the alternative of solving the limit value of the function f(x) in c.

Further, the second three stages, namely articulation, reflection, and exploring. These stages are devoted to students' activities to choose the best alternative for solving the limit value, applying the selected alternatives, and evaluating the application of the alternatives. Whereas, the individual decision-making abilities in vocational education must be developed in a balanced manner to enable the transition from school to the working because, during education, they are more directed at practice-oriented implementation that emphasizes procedural (Golsteyn & Stenberg, 2017; Hampf & Woessmann, 2017). Therefore, the cognitive apprenticeship learning approach is the potential to be implemented to support empowerment and develop the potential decision-making abilities of students with a vocational education background, particularly in clculus for limit and function materials.

Meanwhile, the decision-making process requires clarity of judgment to optimize the visibility of the problems (Nyathi, 2018). The optimization process of the appearance of problems can be accommodated by three main cognitive apprenticeship activities: modeling, coaching, and scaffolding (Minshew et al., 2021). Cakmakci et al. (2020) emphasize that those three main activities are critical stages of exploring the central idea or primary focus of a concept or problem. Furthermore, Brame (2016) claims that visual media help adds almost half the understanding of individuals in observing an idea or problem.

Moreover, audio-visual media significantly impact exploring a concept (Fiorella & Mayer, 2018). The integration of video in learning as a form of audio-visual media provides clarity for students in defining an idea or problem, guides students to construct solutions, and choose the right solution that is most likely to be taken (Knight, 2019; Nilsson & Karlsson, 2019). Since one of the characteristics of vocational school students is that they build skills through strategic work plans (Hu et al., 2018). Therefore, the transfer of knowledge and expertise can work better through demonstrations that display information visually (Babb et al., 2019). Thus, the integration of video in cognitive apprenticeship learning becomes a recommendation that supports the development of students' decision-making skills, particularly in the calculus course.

There are several research that has focused on the application of cognitive apprenticeship learning approaches recently, particularly for concepts that require high-level cognitive exploration. Yusepa et al. (2018) focused on implementing the cognitive apprenticeship approach to improve the mathematical representation ability of junior high school students.

Meanwhile, de Bruin (2018) focused on the perspectives of teachers and students in using the cognitive apprenticeship approach. Further, Ibrahim et al. (2020) focused on the impact of using cognitive apprenticeship modules on the ability to higher order thinking. Moreover, Khudhair (2021) raised mathematics achievement and mathematical proficiency in students who received learning with the cognitive apprenticeship approach.

Using the cognitive apprenticeship model, Pinto and Zvacek (2022) showed student perspectives on mechanical computational learning. The conclusions of the five studies state that there are differences in the average value of experimental classes that implement learning using the cognitive apprenticeship approach with the control class. Considering these findings, applying the cognitive apprenticeship learning approach can improve the results, interests, and motivation of learning or cognitive abilities such as problem-solving and reasoning.

Furthermore, the collaborative research on cognitive apprenticeship approaches with multimedia such as computer applications, websites, or other technologies has been done by several research J. A. S. Brown (2018), Davis (2020), García-Cabrero et al. (2018), Holmberg (2019), and Lin et al. (2021) shows that the learning stage is more visible in uncovering abstract material concepts or ideas. However, many studies related to the implementation of cognitive apprenticeship, whether with multimedia integration or not, it has yet to be done to empower students' decision-making abilities, especially in the background of vocational education in calculus courses, especially limit and function materials.

Therefore, the study aims to explore the differences in achievement and improvement of mathematical decision-making skills between undergraduate students who learn with a Video-assisted Cognitive Apprenticeship approach (CAV) and receive Cognitive Apprenticeship learning (CA) with conventional learning. The findings are expected to provide information about the appropriate learning model for students with a vocational background and serve as input for teachers in designing teaching materials that consider differences in character and experience of students from various educational backgrounds.

METHODS

To achieve the research objective, the study used quantitatively as a collection process approach and analyzed numerical data. A quasi-experiment is a temporary design study that implements quantitative methods. The study includes four variables. This consists of three independent variables and one dependent variable. The independent variables in this study are (1) Video-assisted Cognitive Apprenticeship (CAV) learning; (2) Cognitive Apprenticeship (CA) learning approach; and (3) Conventional learning. At the same time, the dependent variable of research is decision-making ability. There are three research classes: experimental class 1 (E1), which implements the Video-assisted cognitive apprenticeship learning approach; experimental class 2 (E2), which implements the cognitive apprenticeship learning approach; and control class, which uses conventional learning.

The research population is all Universitas Serang Raya undergraduate students, with the research sample being second-level students who take calculus courses. Three sample classes were selected based on the grouping of students studying limits and functions. The distribution of the sample is presented in Table 1.

Table 1. Characteristics of Sample

Research Class/ Number of Students	High School Type	
	High School/vocational school	**Total**
Experiment 1/ 32 people	High School	20 people
	Vocational school	12 people
Experiment 2/ 35 people	High School	25 people
	Vocational school	10 people
Control/ 31 people	High School	24 people
	Vocational school	7 people
Total	**98 people**	

The research instruments for gathering and measuring the data were the pretest and posttests on decision-making abilities, student worksheets designed according to the Cognitive Apprenticeship (CA) learning approach, observation sheets, and interviews. Experts, revised and piloted, have validated these research instruments. The questionnaire grids and interview points used in this research can be seen in Table 2, while the math test grids can be seen in Figure 2.

Table 2. The Grid of Questionnaires and Interview Points

No.	Aspect Observation		Evaluation				
A. Students' Activity om Respond Hints/Questions from Lecturer							
Introduction Activities							
1	Take note of the lecturer's explanation of the importance of the material, as well as the objective learning.		1	2	3	4	5
2	Respond to the lecturer's question about basic ability and initial knowledge.		1	2	3	4	5
Care Activities							
3	Modeling	Take note of the depiction-assisted lecturer video narration about material from a simple example, including the use of properties, rules, and theorems.	1	2	3	4	5
4		Observe the steps for answering a variety of questions that are neither exemplified by the lecturer nor shown in videos.	1	2	3	4	5
5	Coaching	Pose the question-related material, questions, or task, along with possible solutions.	1	2	3	4	5
6		Disclose difficulties encountered in finishing the problems.	1	2	3	4	5
7		Inform us of what you should do to finish the problems.	1	2	3	4	5
8		Examine instruction settlement questions carefully, both from the lecturer and from videos.	1	2	3	4	5
9		Train do question tiered with help instruction lectures and video playback.	1	2	3	4	5
10	Scaffolding	Solving problems step by step, guided by the lecturer's instructions, until it can be completed in an independent manner.	1	2	3	4	5
11		Watching videos for assistance in gradually completing the question with increasing complexity.	1	2	3	4	5
12	Articulation	Create draf material or intermediate knowledge processes based on your understanding and language.	1	2	3	4	5
13		Respond to the lecturer's question or contribute to making a verbal comment about current ideas, thoughts, knowledge, and understanding.	1	2	3	4	5
14		Play related video content to gain a thorough understanding of the subject.	1	2	3	4	5
15	Reflection	Join another student in the group in accordance with the lecturer's instructions.	1	2	3	4	5
16		Discuss ideas and compare results according to the lecurer's instructions.	1	2	3	4	5
17		Play-related video content for discussion purposes.	1	2	3	4	5
18		Discuss with lecturer.	1	2	3	4	5
19		Results should be expressed in thinking groups and discussed with the entire member class.	1	2	3	4	5
20		Write the discussion of the results on the whiteboard write or in notebooks.	1	2	3	4	5
21	Exploring	Slove the problems on the developing material.	1	2	3	4	5
22		Play-related video material as additional reference in solving the problems.	1	2	3	4	5
Closing Activities							
23	Take note of the lecturer's explanation of the main points of the material and clarify any incorrect concepts (if any).		1	2	3	4	5
24	Understandable questions about unfinished material.		1	2	3	4	5
25	Writhe review results form today's learning.		1	2	3	4	5

Mathematical Ability	Indicator		Question	Answer question
Decision Making	B11	Look for an alternative solution	7 Please specify whether the function's limit at point c exists from the functions listed below. If so, how do you explain that the limit value is correct? $f(x) = \begin{cases} 2x, x \neq 0 \\ 1, x = 0 \end{cases}, c = 0$	a. Use the concept of left limit and right limit $\lim_{x \to c} f(x) = \lim_{x \to c^-} f(x) = \lim_{x \to c^+} f(x)$ b. Use graphic method c. Use table approach through calculation in a manner numeric
	B12	Develop alternative solution		a. Write down the left limit and right limit function that is known b. Draw a sketched graphic from existing information available c. Enter any x values in the function For get mark function f(x)
	B13	Analyze alternative solution		Detail and complete choice solution both in form algebra, sketch neither graphic nor numeric table. a. Left limit $\lim_{x \to 0^-} 2x = 0$ and right limit $\lim_{x \to 0^+} 2x = 0$ b. Sketch the graph c. Numeric table calculation
	B21	Choose the best alternative		Choose a solution as believed correct
	B22	Apply alternatives in solving the problem		Finish the question with use the selected solution
	B23	Evaluate application alternative		a. Based on argument b. Based on calculation algebra c. Based on proof with a formal definition that involves ε and δ

Numeric table calculation:

x	f(x)	(x, f(x))
-3	-6	(-3, -6)
-2	-4	(-2, -4)
-1	-2	(-1, -2)
0	0	(0, 0)
1	2	(1, 2)
2	4	(2, 4)
3	6	(3, 6)

Figure 2. The Grid of Mathematical Test

To determine the magnitude of the achievements and the increase in the ability of the research sample, the quasi-experimental static-group pretest-posttest design proposed by Creswell (2013) was used, as shown in Figure 3.

$$
\begin{array}{ccc}
O & X_1 & O \\
O & (X_2) & O \\
\hline
O & & O
\end{array}
$$
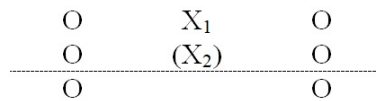
Figure 3. Quantitative Research Design

Notes:
X1: Video-assisted Cognitive Apprenticeship learning approach (E1)
X2: Cognitive Apprenticeship learning approach (E2)
O: Decision-making ability test
Dashed line: The selection of research sample was not randomly choosen

The three classes were given a pretest regarding decision-making abilities that experts, revised, and tested had validated. After that, each class was treated differently, which ended with the post-test that was the same as the pretest. The assumption test consisting of normality and homogeneity test on the data was carried out first to determine the statistics used in the average equivalence test between the three research classes. The data homogeneity test analysis results can be seen in Table 3, while the results of the data normality test can be seen in Table 4. The analysis of data homogeneity and normality tests was carried out with the help of SPSS software.

Based on the normal distribution and data homogeneity tests, to measure the difference in the average achievement and improvement in decision-making ability of undergraduate students among three research classes used, the One-Way ANOVA test.

Table 3. Levene Statistic Homogeneity Test Results

Type of Data	Sig.	Test Results
Reach_Making_Decision	.948	the data variance is Homogeneous
N_Main_Making_Decision	.803	the data variance is Homogeneous

Table 4. Kolmogorov-Smirnov Normality Test Results

Data Reach of Decision Making Capabilities					
Type_School_Middle_And_Class		Sig.	Test Results	Type_School_Middle_On_ Merge_Class	Sig.	Test Results
Reach_Making_ Decision	CAV Class High School	.071	Data is normally distributed	High School	.103	Data is normally distributed
	CAV Class Vocational School	.200*	Data is normally distributed			
	CA Class High School	.052	Data is normally distributed	Reach_ Making_ Decision		
	CA Class Vocational School	.200*	Data is normally distributed			
	Conventional Class High School	.060	Data is normally distributed	Vocational School	116	Data is normally distributed
	Conventional ClassVvocational school	.200*	Data is normally distributed			
Data for Improved Decision Making Capabilities						
Type_School_Middle_And_Class		Sig.	Test Results	Type_School_Middle_On_M erge_Class	Sig.	Test Results
N_Gain_ Making_Decision	CAV Class High School	.077	Data is normally distributed	High School	.070	Data is normally distributed
	CAV Class Vocational School	.099*	Data is normally distributed			
	CA Class High School	.188	Data is normally distributed	N_Gain_ Making_ Decision		
	CA Class Vocational School	.060	Data is normally distributed			
	Conventional Class High School	180.	Data is normally distributed	Vocational School	.091	Data is normally distributed
	Conventional Class Vocational school	.200*	Data is normally distributed			

RESULTS AND DISCUSSION

The differences in achievement of decision-making abilities of students with a vocational education background (Problem Formulation 1)

The data on students' decision-making ability among the three classes based on the type of vocational school are similar. Therefore, the test used to test the achievement of the data difference is called the One-Way ANOVA test. The rejection criterion H0 in this test is if the probability value (Sig.) < 0.05. The results of the One-Way ANOVA statistical test for vocational school category learning class data can be seen in Table 5.

Table 5. Statistical Test Results of Differences in Achievement of Decision Making Abilities from Three Classes of Undergraduate Students in the Vocational Learning Category

ANOVA

Reach_Making_Decision

Sum of Squares		df	Mean Square	F	Sig.
Between Groups	529.936	2	264.968	3.442	.048
Within Groups	15602.064	26	600.079		
Total	16132.000	28			

A probability value (Sig.) = 0.048 < 0.05, then H0 is rejected, which means there is a difference in the average achievement of decision-making ability of vocational students who receive video-assisted cognitive apprenticeship learning, cognitive apprenticeship learning, and conventional learning.

The Post Hoc test is carried out to determine the difference in the average achievement of students' decision-making abilities based on vocational schools in different learning classes. The hypothesis of the data test in question is H0: There is no difference in the average achievement of student decision-making abilities between each learning class of the vocational category, and H1: There is a difference in the average achievement of student decision-making abilities between each learning class of the vocational category.

Acceptance criterion H0 if the probability value (Sig.) > 0.05, based on the Post Hoc test results, the probability value (Sig.) < 0.05 was obtained in the comparison between class with video-assisted cognitive apprenticeship learning and class with conventional learning.

Table 6. Post Hoc Test Results of Achievement of Decision Making Ability from Three Classes of Undergraduate Students in the Vocational Learning Category

Multiple Comparisons

Dependent Variable: Reach_Decision-Making_

	(I) Class_ Learning_Vocational School	(J) Class_ Learning_ Vocational School	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Video-assisted Cognitive Apprenticeship	Cognitive Apprenticeship	1.950	10.488	.981	-28.01	24.11
		Conventional	-8.728	12.072	.025	-38.72	21.26
	Cognitive Apprenticeship	Video-assisted Cognitive Apprenticeship	-1.950	10.488	.981	24.11	28.01
		Conventional	10.678	11.650	.635	-39.62	18.27
	Conventional	Video-assisted Cognitive Apprenticeship	8.728	12.072	.025	21.26	38.72
		Cognitive Apprenticeship	-10.678	11.650	.635	-18.27	39.62
* The mean difference is significant at the 0.05 level							

From the complete calculation of the Post Hoc test shown in Table 6, the provision of different learning in video-assisted cognitive apprenticeship classes and conventional classes significantly affects students' decision-making abilities. The average difference between these two classes is 8.278, which means that the average achievement of student decision-making ability in the class with Video-assisted cognitive apprenticeship learning is higher than that of undergraduate student decision-making ability in a conventional class. Therefore, video-assisted cognitive apprenticeship learning is more effective in optimizing students' decision-making abilities than conventional learning.

The Differences in improving the decision-making ability of students with a vocational education background (Problem Formulation 2)

Applying the equivalent expression, the One-Way ANOVA test was performed to test the difference in the average increase in students' decision-making ability among the three research classes. The results of the One-Way Anava statistical test are provided in Table 7.

Table 7. Statistical Test Results of Difference Improvement (N-Gain) in Decision Making Ability from Three Classes of Undergraduate Students in the Vocational Learning Category

ANOVA					
N_Gain_Making_Decision					
Sum of Squares		df	Mean Square	F	Sig.
Between Groups	45.225	2	31.201	3.973	.007
Within Groups	1412.031	26	62.012		
Total	1505.344	28			

Table 7 shows that the probability value (Sig.) = 0.007 < 0.05, which causes the rejection of H0. It means there is an average difference in the increase in decision-making ability of undergraduate students who receive video-assisted cognitive apprenticeship learning, cognitive apprenticeship learning-only, and conventional learning in the vocational category.

Then the Post Hoc test was carried out with a hypothesis test: H0: There is no difference in the average increase in student decision-making ability between each of the learning classes in the vocational category, and H1: There is an average difference in student decision-making ability between each learning class of the vocational category. If the probability value (Sig.) >0.05, the criterion H0 is accepted. Post Hoc test results are presented in Table 8.

Table 8. Post Hoc Test Results (N-Gain) Decision Making Ability from Three Classes of Undergraduate Students in the Vocational Learning Category

Multiple Comparisons						
Dependent Variable: N_Gain_Making_Decision						
	(I) Class_ Learning_Vocational School	(J) Class_ Learning_ Vocational School	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
						Lower Bound / Upper Bound
Tukey HSD	Video-assisted Cognitive Apprenticeship	Cognitive Apprenticeship	.06900	.03628	.453	-.0714 / .2874
		Conventional	-.00754	.05826	.042	-.2480 / .2361
	Cognitive Apprenticeship	Video-assisted Cognitive Apprenticeship	-.06900	.03628	.453	-.2874 / .0714
		Conventional	-.07554*	.04730	.047	-.3117 / .0829
	Conventional	Vide-assisted Cognitive Apprenticeship	.00754	.05826	.042	-.2361 / .2480
		Cognitive Apprenticeship	.07554*	.04730	.047	-.0829 / .3117
* The mean difference is significant at the 0.05 level						

Table 8 shows the probability value (Sig.) < 0.05, which causes the rejection of H0. This indicates a difference in the average achievement of students' decision-making abilities, namely in comparing video-assisted cognitive apprenticeship learning classes with conventional learning classes and cognitive apprenticeship learning classes with conventional instruction classes.

Based on the result of the One-Way ANOVA statistical test, which answers the first problem formulation regarding the differences in achievement and the second problem formulation regarding the differences in improvement in decision-making ability reviewed from vocational school, it shows a rejection of the null hypothesis. The decision to reject H0 is the difference in achievement and

improvement in the decision-making ability of undergraduate students among classes of the type category of vocational school.

Following the results of the Post Hoc test in Table 6, the difference in achievement obtained a probability value (Sig.) < 0.05 in comparing undergraduate students' decision-making abilities between CAV and conventional learning classes. These calculations mean that the treatment of learning in CAV learning classes has a significantly different effect on the decision-making ability of vocational school graduates. The average difference in achievement between CAV learning classes and conventional learning classes is 8.728, which means that students' decision-making ability in CAV learning classes is higher than in conventional learning classes. These results show that the decision-making ability of undergraduate students from vocational schools can be more effectively supported through CAV learning.

Meanwhile, the Post Hoc test results for differences in students' decision-making abilities showed a rejection of H0 in testing between CAV and conventional instruction classes and between CA learning and conventional instruction classes. The statistical calculation in Table 8 supports the explanation of the rejection of the null hypothesis between CAV learning class and conventional instruction class that the difference in the increase in decision-making ability between undergraduate students in the two classes.

The results suggest that students with a vocational education background have opportunities to improve decision-making abilities through CAV learning. Furthermore, statistical calculations to support the exposure to H0 rejection between the CA learning class and the conventional instruction class are presented in Table 8. The results presented in Table 8 indicate that the decision-making ability of undergraduate students from high schools and vocational schools is developed and improved by implementing CA learning. Thus, CA learning and CAV learning effectively increase the decision-making ability of undergraduate students from vocational school significantly compared to conventional learning.

In general, from this category of vocational school types, this learning approach has an important contribution to improving decision-making skills, especially having a major impact on undergraduate students from the vocational school. There is a considerable difference between the implementation of CA learning and CAV learning with conventional learning at the type of vocational high school. The low improvement in decision-making ability of undergraduate students from vocational school among three classes indicates that students in this category need intensive assistance and serious attention compared to other category students in CA learning activities and CAV learning.

The observer of students' activity evaluates the implementation of learning in two main namely (1) students' activities in response to the instructions/questions from the lecturer and (2) students' activities in the group discussion/class. Similar to the observations on the lecturer's activities, the observation of students' activity was also done in eight times activity with indicators observing whether exists or no response to the activity in question through information scale evaluation, namely 1 for 'no active; a response which is less than 20% of students who responded active, 2 for response 'less active' which is 20 – 40% of students who respond active, 3 for response 'active enough' which is 40 – 60% of students who respond active, 4 for response 'active' 60 – 80% of students who respond active, and 5 for response very active that is more than 80% of students who responded active. As for percentage average yield evaluation from two observers on the activity student for eight meetings stare advance served in Table 9.

In general, the students that successfully observed and witnessed by observers both in the cognitive apprenticeship help self-paced video classroom and in the learning cognitive apprenticeship classroom obtained results of 70 – 80% from each observer. This indicates that around 22-32 students respond to active interaction And discussion groups/classes on each class learning.

Table 9. Recapitulation Results of Students' Activity Observation

No.	Aspect Observation		Percentage CAV Class		Percentage CA class	
			Observer 1	Observers 2	Observers 1	Observers 2
1	Activity student in respond instructions/questions lecturer	Modeling	66.67	78.33	77.50	79.17
		Coaching	75.83	77.50	79,17	86.67
		Scaffolding	85	90	78.75	86.25
		Articulation	69,17	72.50	65	70.83
		Reflection	77.92	86.67	78.75	87.08
		Exploring	81.25	88.75	78.75	85
Sub Percentage Point 1						
2	Activity student in activity discussion group/class		69.09	69.77	67.73	68.64
Sub Percentage Point 2						
Total Percentage			74.99	70.54	75.09	80.52

The CA learning approach, which is applied to the teaching and learning activities in the classroom, can trigger the excavation of the ability to find and develop alternative student problem-solving, called hidden creativity thinking skills (de Bruin, 2018). According to Kuo et al. (2012), creativity in finding problem solutions is facilitated through modeling activities as the main step where students' understanding is determined by the successful delivery or visibility of the problem and modeling how the experts solve the problem. Understanding the problem, followed by applying problem-solving to obtain meaning from the solutions offered in the CA learning approach, focuses on students' direct practice activities with their experts. Khaled et al. (2014) respond to hands-on activities as a typical form of vocational education for their learners to achieve curriculum objectives.

In addition, Wedelin and Adawi (2015) state that modeling in cognitive apprenticeship provides a directed and systematic work stimulation for students with a vocational education background. The characteristics of coaching in CA are considered as situations that correspond to the environment and habits of vocational education, namely mentoring (M. Brown et al., 2019), so that through this learning, students are more easily directed and fostered to develop creative thinking potential and produce problem-solving (Yusof et al., 2015). Individuals from vocational schools tend to be able to follow an internship learning pattern where expertise is obtained by learning directly from their experts in theory, practice, and experience, both cognitive and non-cognitive expertise (Poortman et al., 2011).

Students from vocational education are prepared to meet the demands and needs of the business and industrial world (Ulicna et al., 2016), which is loaded with high qualifications both in the mastery of knowledge, skills, attitudes, and values of the world of work (Eichhorst et al., 2015). Some qualifications that students from vocational schools must master include critical thinking, logical view patterns, and analytical, systematic workflows to support the quality of performance dominated by decision-making procedures when facing problems, especially analyzing and choosing alternative problem-solving (Aaltonen et al., 2013).

The necessary qualifications must be cultivated, developed, built, and directed at individuals as early as possible through the educational process. Ghefaili (2003) states that implementing the cognitive apprenticeship learning strategy has the same mission as the vocational education curriculum in shaping a critical, logical, and analytical mindset to characterize students' skills through learning directly with experts. CA learning technique is carried out through scaffolding which focuses on gradually assigning tasks with increasing problem complexity and reducing the level of assistance.

Verenikina (2008) and Radford et al. (2015) explain that scaffolding has a positive impact and high acceleration power to characterize thinking skills and work skills so that it is appropriately applied to students who are specifically prepared to dive into the world of work directly. In addition, articulating CA learning provides opportunities for vocational students to build knowledge, translate

understanding, and clarify their way of thinking, especially on problem-solving and, in general, on other aspects that have a foundation to synergize in the world of work (Greenleaf, 1977; Moss & Brookhart, 2012).

Furthermore, McGrath (2012) explains more deeply about the responsive and anticipative attitude that must be reflected in the upbringing of the vocational curriculum, not only on the problems that arise but also on the solutions offered. Such attitudes tend to be effectively instilled through familiarizing reflection activities with brainstorming and exchanging views and experiences with experts. In CA learning, reflection activities carried out by students stimulate the connectivity scheme of understanding and experience carried out by oneself with others. Therefore, there is an exchange, the dissemination of knowledge and experience with each other.

This thought aligns with Burgon et al. (2012), who stated that knowledge assimilation occurs due to scientific alterations from two parties interacting, such as students with teachers or other students. With the formation of a mix of knowledge, it is possible to diversify understanding in solving problems, especially in selecting, implementing, and evaluating alternative solutions. In addition, Anastasiou and Kyriakou (2017) assessed the factors of readiness and willingness to explore self-efficacy through learning by doing to focus on the mental formation of students in vocational schools, which according to Middleton (2011) can be facilitated by learning cognitive apprenticeship through stages of exploring. Fernandez et al. (2014) said exploring activities encourage students to explore the knowledge acquired, deepen the skills learned and promote their actual understanding. These attitudes are expressed by Bayle and Mettas (2010) as supporting the building of decision-making abilities, especially activities evaluating the implementation of solutions that require.

The use of integrated learning media in CA learning, according to Valentine (2011), can help the performance of students in vocational schools who are known to have mathematical abilities below students in general secondary schools, especially in mathematical concepts with a high level of abstraction. Specifically, on the inclusion of audiovisual media such as video, although there are no findings that specifically support the application of video-assisted mathematics learning in students in vocational schools, the use of video for introductory material and guidance for working has been widely implemented in vocational education curricula (Holsted, 2016). Colasante and Leedham (2013) concluded that students with vocational education curricula showed great enthusiasm and positive achievements after attending video-assisted learning. Moreover, in their research report, Cakiroglu and Yilmaz (2017) reveal the picture of student responses in vocational schools that video helps visualize techniques about a material clearly and in detail to provide a complete understanding.

Cognitive apprenticeship learning assisted by self-paced video implicitly contributes to improving adaptive reasoning skills, decision-making, and self-directed learning of students with vocational high school backgrounds and those from high schools in rural areas. However, what needs to be considered in more detail is the selection of learning videos that suit the needs and abilities of the students being measured so that their contribution can be more comprehensive for all students with any background and origin from any school. Cognitive apprenticeship learning assisted by self-paced video has not optimally improved all indicators of cognitive and affective ability in this study, so it is necessary to conduct a deeper study of the causes of this non-optimality or conduct further research by collaborating ideas from other learning models.

Adaptive reasoning abilities, decision-making, and self-directed learning cannot be improved simultaneously. Therefore, an intense focus is required to create learning tools such as student worksheets that include all indicators. There are numerous and diverse studies on calculus. However, there are which specialize in the definition of formal limits, particularly on how to understand the concept to students in their first year at university.

CONCLUSION

There are differences in achievement and improvement of student decision-making skills with a review of the type of vocational school between undergraduate students who experienced cognitive apprenticeship learning assisted by video with undergraduate students who instructed

cognitive apprenticeship learning only and the undergraduate students who received the conventional learning. Partially, (1) the decision-making ability of undergraduate students from vocational school between those who experienced cognitive apprenticeship learning assisted video is not different from those who instructed cognitive apprenticeship learning only; (2) The decision-making ability of undergraduate students from vocational school between for those who received cognitive apprenticeship learning assisted video is better than for those who taught conventional learning; and (3) The decision-making ability of undergraduate students from vocational school between for those who received cognitive apprenticeship learning only is better than for those who received through the conventional learning.

Cognitive apprenticeship learning assisted by self-paced video can be applied to the limit of functions calculus course to improve adaptive reasoning abilities, decision making, and self-directed learning of students from secondary schools in urban and rural areas. Self-paced video-assisted cognitive apprenticeship learning can be taught in the function limits chapter calculus course for increasing adaptive reasoning ability, retrieval decision, and self-directed learning students by paying attention to learning devices, learning environment, and students intrinsic motivation. The choice of research subjects plays a significant role in the success of a learning experiment. Students used as participants in cognitive apprenticeship classes using self-paced videos are ideal students with an audiovisual learning style. In classroom practice that includes learning videos and worksheets, creating an LKM incorporating video sections as instructions for understanding a concept or creating interactive guided worksheets based on videos is best.

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Industry practice platform based on work-based learning: Solutions to improve student competence

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ABSTRACT

This study aims to (1) Develop a work-based learning-based industrial practicum platform; (2) Know the feasibility of a work-based learning-based industrial practicum platform; and (3) Know whether there is an effectiveness of student learning with a work-based learning-based industrial practicum platform. This type of research is Research and Development (R&D) with the Four-D model, and the research subjects are class C students as an experimental class with a total of 21 students and class B students as a control class with a total of 22 students. Data collection uses a questionnaire method to determine the feasibility of the media used for research and written test questions in the form of multiple choice with a total of 20 questions. The data analysis test used a normality test, homogeneity test, and t-test. The research data showed that: (1) The procedure for developing practical learning media based on work-based learning includes the defining stage, planning stage, development stage, and dissemination stage; (2) Work-based learning media is feasible to use as a learning media in light vehicle electrical maintenance subjects. This can be proven from the validation results of media expert lecturers who showed 82.50% of the score indicating valid criteria. Validation by material expert lecturers showed 78.75% of the score obtained, indicating quite valid criteria; and (3) The t-test results (t-count = 6.021 and p = 0.000) prove that the work-based learning-based practicum platform made is effective for improving student learning outcomes. This is shown through the response of trial students, which includes small group trials, obtaining 77%, which includes five students, and large group trials, obtaining 80.50%, which includes 15 students. The normality test obtained p = 0.059 in the control class and p = 0.115 in the experimental class because p > 0.05 indicates that both groups are normally distributed. Through the homogeneity test, F count = 0.762 with p = 0.388 because p > 0.05, the two groups have homogeneous variants. Thus, the industrial platform practice based on work-based learning can improve student learning outcomes.

How to cite:

INTRODUCTION

The rapid development of technology has had much influence on human life. Technological development aligns with its goal to facilitate human work, starting from economic, social, and educational aspects (Alfarsi et al., 2020; Bagila et al., 2019; Banjongprasert et al., 2019). This convenience should be addressed, even though this technological advancement should also be balanced with an increase in the quality of its human resources. Efforts to improve human capabilities can be made in various ways, including courses (training) or education (schools).

Both training and education have similarities in their implementation, namely, using a learning process (Agustina et al., 2017; Billett, 2011; Sarwandi et al., 2019). From this process, learning outcomes will be obtained, which are used as a benchmark for the success of a learning process. Media is an intermediary or message delivery from the sender to the message's recipient. Implicit learning media includes tools that are physically used to convey the contents of teaching material, including books, tape recorders, video cameras, video recorders, films, slides (picture frames), photos, pictures, graphics, television, and computers (Fatah & Sudiyanto, 2018; Fathia et al., 2018; Haryanto et al., 2021; Suyitno et al., 2018, 2019). Work-based industry practice platform learning is an electronic-based learning tool that can be accessed with electronic media designed to be learned by students or users who can be used and studied independently (Agustina et al., 2017; Sarwandi et al., 2019; Sofyan et al., 2020). Learning outcomes are related to processes within students, such as remembering and strengthening, both specific to students. According to Gagne (1970) in Suprihatiningrum (2016), learning outcomes are abilities possessed by students as a result of learning actions and can be observed through student performance (learner's performance).

So far, one of the ways to train the professional competence of automotive students is by having training somewhere (Allan, 2014; Fjellström, 2014). However, most of the training conducted so far has only been theoretical. This platform offers a work-based industry practice platform-based learning (PI-WBL) for Automotive Engineering students. Work-based learning is a learning approach that utilizes the workplace (in the business/industry world) to structure experiences gained in the workplace to contribute to social, academic, and student career development (Allan, 2014; Ariyanti et al., 2018; Suyitno et al., 2022; Suyitno & Pardjono, 2018). In addition, the PI-WBL platform also integrates training in higher education institutions with those in the industry (Agavelyan et al., 2020; Cuendet et al., 2014; Hof & Leiser, 2014). For students, integrating on campus and in the industry will make understanding more quickly regarding professional abilities.

Observation results show that students' learning outcomes are less than optimal due to the limited memory and minimal material possessed by students, especially those who do not have conventional modules, as well as the lack of enthusiasm for student learning due to distance learning (Agustina et al., 2017; Kholifah et al., 2020; Mubarak et al., 2020; Nurtanto et al., 2020). This problem can be overcome with work-based industry practice platform-based learning.

METHODS

This research is Research and Development (R&D). The research and development used is a 4D model. The research researchers use is the Four-D Model suggested by Thiagarajan et al. (1974) in Suyitno et al. (2018). This model consists of 4 stages of development, namely define, design, develop, and disseminate or adapted into a 4-D model, namely defining, designing, developing, and deploying. This research was conducted at Universitas Muhammadiyah Purworejo and several industries in the Yogyakarta area, Java Central, and Greater Jakarta. The time of this research is August-November 2022. The subject of this research uses students from class C and class B, with a total of 43 students as experimental and control classes.

Data collection used in this research included media expert responses, material expert responses, and student responses (Purnamawati et al., 2021; Sakulviriyakitkul et al., 2020; Sukardi et al., 2020; Syahril et al., 2020). The data collection instrument uses a questionnaire and test instruments. This social phenomenon has explicitly been determined by researchers, now referred to as research variables (Sugiyono, 2017). Data analysis prerequisite test using normality, homogeneity, and t-test. Then, the data were analyzed using quantitative descriptive analysis to find out the research

data statistics and analysis prerequisite tests (Coghlan, 2011; Walpole et al., 2012). The tests carried out are: (1) The normality test aims to determine whether the dependent variable and independent variable regression model has a normal data distribution or not; (2) Homogeneity test is conducted to determine the similarity of the variants of two data groups; and (3) The t-test is used to compare the average learning outcomes of the experimental group and the control group.

RESULTS AND DISCUSSION

This research involved automotive engineering education students at Universitas Muhammadiyah Purworejo as respondents. Work-based industry practice platform-based learning that has been developed is validated in advance by material experts and media experts, for this research, the validators are from academic lecturers, vocational education experts, and practitioners of the automotive industry.
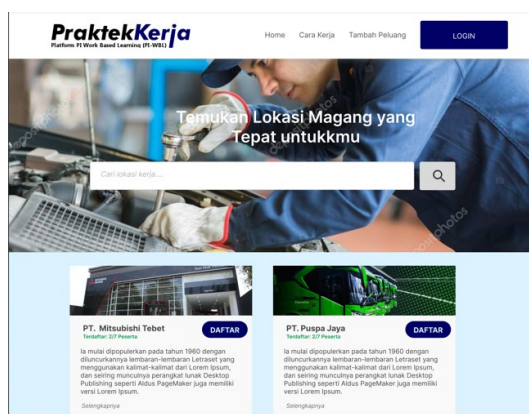

Figure 1. Practice Platform Industry based on Work-Based Learning

Figure 1 illustrates the initial interface of the work-based learning platform. This platform was developed as a tool to assist the implementation of industrial practice and as a learning medium for students. There are several menus on this platform, including a menu for login, a menu for searching industrial practice locations, a menu for filling out logbooks, a menu for writing daily reports, a menu for writing weekly reports, a menu for writing final reports and a menu for entering grades. The media expert's assessment of the learning media scored 66. Thus, the validation results by media experts show that the learning media for industrial practice based on work-based learning is included in the valid category.

Based on data analysis of the ten aspects validated by media experts, the assessment criteria are as follows: The total score obtained from the media expert validation is 66 out of a maximum score of 80. With this score, the percentage of the results of the data is 82.5% and is included in the "valid" classification. The media expert's note on the platform lies in testing the pretest and post-test questions to students before this platform is used for research. The conclusion is that the platform developed is suitable for use. The value of validation results from media experts can be seen in Figure 2.
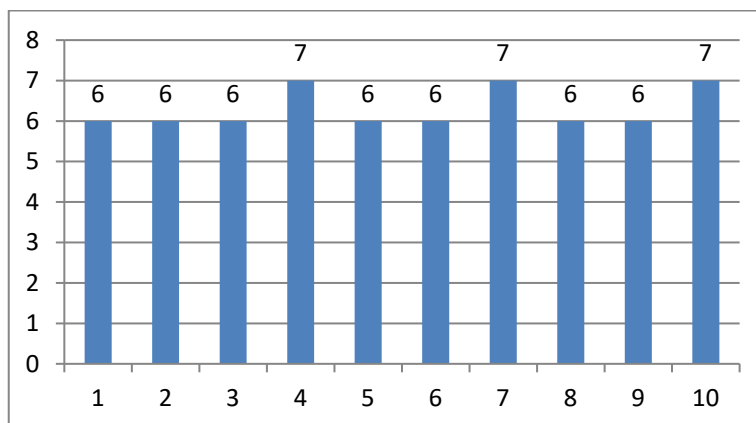
Figure 2. Histogram of Media Expert Validation Score

The score of the material expert's assessment of the material made is shown in Figure 2, which shows the score data of 63; thus, it can be said that the results of validation by material experts show that the work-based learning-based industrial practice platform is included in the valid category (Abdullah et al., 2020). Based on the data analysis of the ten aspects validated by the material expert, the assessment criteria are as follows: the total score obtained from the theoretical expert validation is 63 from the maximum score of 80. With this score, the percentage result of the data is 78.75% and is included in the "valid" classification. The results of the theorist validation can be seen in Figure 3.
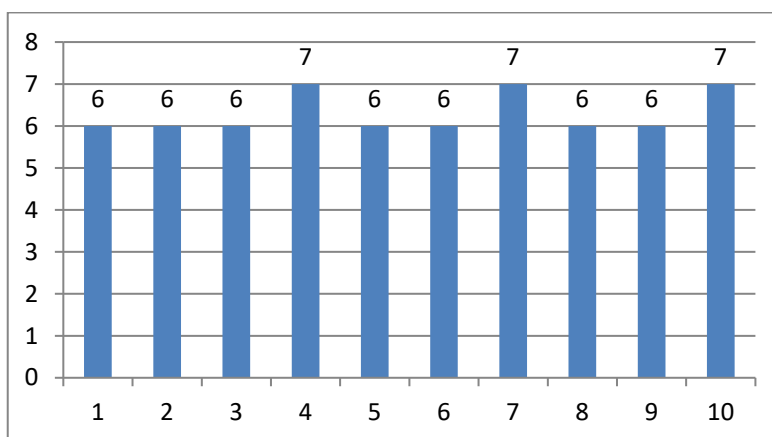

Figure 3. Histogram of Material Expert Validation Score

Based on the data on the value of the material expert validation results listed in Figure 3, the average results are above 6. The data obtained in this study is in the form of student learning outcomes data totaling 43 students. The data was then processed using the Microsoft Excel 2010 data processing program. The results of descriptive statistical analysis can be seen in Table 1.

Table 1. Comparison of Learning Outcomes of Control and Experimental Class Students

Indicator Statistics	Class Control	Class Experiment
Amount	1460	1675
Average	66,36	79.76
Highest score	80	90
Lowest score	50	70
Standard deviation	7,7	5,8
mode	70	75
Median	70	80
N	22	21

Based on Table 1, it is known that the average learning outcome of the control class is 66.36 and the average learning outcome of the experimental class is 79.76. To test the difference in the average learning outcomes of the experimental and control classes, the normality test, homogeneity test, and t test were used. The results of the normality test using SPSS software can be seen in Table 2.

Table 2. Normality Test Results Study Student Class Experiment and Class Control

		Kolmogrov-Smirnov			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df.	Sig.
Learning outcomes	Control	.260	22	.000	.915	22	.059
	Experiment	.175	21	.093	.926	21	.115

The output of the SPSS program is in accordance with Table 2, showing the significance value of Shapiro Wilk a score of 0.059 in the control class, and a score of 0.115 in the experimental class, the data is valid if the p significance is > 0.05. The data shows that both groups are normally distributed (Nghia & Duyen, 2019). The results of the homogeneity test using SPSS software can be seen in Table 3.

Table 3. Test Results T-test Study Student Class Experiment and Class Control

		Levene's Test for Equality of Variances		t-test for Equality of Means				95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig	Mean Difference	Std Error Differnce	Lower	Upper
Learning outcomes	Equal variances assumed	.762	.388	-6.02	41	.000	-12.03	1.99	-16.07	-7.99
	Equal variances not assumed			-6.05	39.91	.000	-12.03	1.98	-16.05	-8.01

The results of the t-test in Table 3 use the paired technique samples t-test obtained t-count of 6,02 with p = 0.000 < 0.05, indicating that there are differences in the learning outcomes of the experimental class and the control class, meaning that the average learning outcomes of the experimental class are significantly higher than the control class.

The test results that researchers have carried out show a percentage difference between the control class using conventional media and the experimental class using a work-based learning industry practice platform. The learning process using a work-based industry practice platform based on work-based industry learning can improve student learning outcomes in light vehicle electrical maintenance lessons, especially car air conditioning systems. The results of this study are also similar to research by Dragicevic et al. (2019) related to the development of electronic testing systems using artificial intelligence.

In this study, the electronic testing system can be used after undergoing small-scale and large-scale trials (Dhahir et al., 2020). Based on the data obtained in this study, there is effectiveness in learning based on industrial work practices compared to learning conducted using conventional media. This can be proven by the results of data analysis calculations in the experimental class, which obtained an average value of 78.83, greater than the control class average of 69.78. With these results, an increase in student learning outcomes occurs after using industrial practice work platform-based learning.

CONCLUSION

The research data shows that the stages in developing work-based include defining, planning, developing, and implementing. Based on the research that has been conducted, work-based industrial practice platform-based learning is feasible to use as a learning platform in automotive engineering courses. This is evidenced by the results of validation conducted by media experts, which

show that the score obtained shows valid criteria. The t-test results prove that work-based industrial practice platform-based learning effectively improves student learning outcomes. This is indicated by student responses, which include small-group trials and large-group trials that are good. The normality test shows that both groups are normally distributed, and the homogeneity test obtained homogeneous variants. Thus, work-based industrial practice platform-based learning can improve student learning outcomes.

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