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Analysis of quality implementation and supervision of vocational high schools using a qualitative approach

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ABSTRACT

Academic supervision makes vocational high schools able to improve the quality of graduates to be ready to work and able to compete in the job market in people's lives. This paper aims to explore and describe the implementation of quality and supervision of vocational high schools using a qualitative approach. This type of qualitative research with a case study research design. The main target of this research is the supervisor of a vocational school in the city of Padang. This study is limited to a qualitative description of the implementation of quality and supervision of Vocational High Schools. The source of this research data is from key-informant, purposively. Data collection techniques with interview and observation techniques. Analyze data by coding, linking, and interpreting themes. The results of the research are: 1.) Supervisors are not ready to carry out supervision; 2.) The education office is less than optimal in empowering supervisors; 3.) Supervisors are less aggressive in positioning themselves; 4.) The coordinator of supervisors does not carry out his functions optimally; 5.) The low motivation of supervisors; 6.) The distribution of procurement of supervisors is uneven; 7.) The control mechanism for supervisors and the coordinator of supervisors is not working properly; 8.) Reward and punishment do not work; 9.) School visits are just routine; and 10.) Relations with teachers and schools are not well established. The conclusion is that the implementation of academic supervision is still not running optimal and lacks good communication and coordination.

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INTRODUCTION

The implementation of quality education greatly affects the quality of education. The process of learning quality in producing graduates who are able tocompeteand ready to work which is an important part in realizing the quality of education. Quality learning is an effort and effort from teachers in implementing innovative learning, including the readiness of vocational learning in the challenges of the industrial revolution 4.0 (Sudira, 2020; Sudira & Juwanto, 2019). So that qualified teachers will determine the impact of the quality of learning, high teacher performance in planning and implementing learning optimally will have an impact on quality and quality graduates. Furthermore, as professionals, teachers also need supervision and guidance to improve the learning performance that has been done so far (Berliani & Wahyuni, 2017).

In addition, some teachers' performance has not been maximized in improving their professionalism, so they must be supported by supervision and control from school principals to

foster guide, and train capacity building and teacher development through supervision and learning guidance (Dibyantoro, 2017; Evanofrita et al., 2020). Teacher quality is an important part of the learning process (Noviansyah & Sudira, 2020), so it really needs to be controlled and supervised, including in vocational high schools. Furthermore, some teachers who have been very serious in training from and meeting the standards of quality National learning also found complaints that there are indications that supervisory capacity is lower than expected (Kervadec et al., 2019; Kok et al., 2018). Especially supervisors are considered weak in the field of learning supervision, and teachers report that supervisors do not have the skills to be effective supervisors (Hernández-González et al., 2016; Karomah, 2021; Kaufman et al., 2010), this condition is no exception in vocational high schools (Krisdayati & Hariyati, 2020).

Vocational High Schools (VHS) have a different learning environment and climate from schools in general (Ganefri et al., 2017; Tasrif, 2019). VHS must be treated differently (Jamilah et al., 2020). VHS graduates in Indonesia, including in the city of Padang, must be able to compete in the world of work and survive in society based on their expertise (Hidayat, et al., 2019). In addition, thanks to the skills possessed by VHS graduates, they must be able to grow into entrepreneurs (Ganefri et al., 2017; Hidayat, et al., 2019; Hidayat, et al., 2019), and job creation (Hidayat, et al., 2019). However, in reality, based on data from the Central Statistics Agency of the Republic of Indonesia in February 2021, graduates of vocational high schools are still the highest compared to graduates of other education levels, which is 11.5%. This is very unfortunate because VHS graduates should be ready to work and become entrepreneurs (Siladana & Sudira, 2019) but empirical evidence shows otherwise that the majority of VHS graduates are unemployed (Yulastri et al., 2018). One of the factors behind this problem is the not yet optimal implementation of learning supervision by supervisors in VHS (Tasrif, 2019).

Another fact is that every teacher must teach with preparation and enthusiasm, but many teachers come and only spend hours in class. Supervisors cannot immediately detect this situation (Mette et al., 2017; Pallawagau et al., 2017). On the other hand, the role of education supervisors, especially for VHS, is not limited to "supervision" but requires more control (Riyanto, 2017). The implementation of supervision of vocational high schools, including in the city of Padang, has also been carried out according to procedure applicable supervision. However, the implementation of supervision in vocational high schools is still closed, and information is not an optimal implementation of supervision of learning in vocational high schools, so it is necessary to analyze and explore the implementation of quality and supervision in vocational high schools. This condition becomes very interesting for further study and investigation. Furthermore, from the previous explanation, it is very important to conduct research on the implementation of quality and supervision of vocational high schools.

RESEARCH METHOD

This qualitative research is designed in the form of case study research. The subject of this research is the supervisor of vocational high school in the city of Padang and is described in a qualitative descriptive form. This research is limited to a qualitative description of the implementation of quality and supervision of vocational high schools in Padang City. The data source of this research consisted of the main sources, namely two vocational school supervisors (P1 and P2). In addition, two stakeholders from the representation of teachers and school principals (S1 and S2) were used to enrich information and cross-check or triangulate data.

Determination of the sources was done purposively. Data generation techniques using interview and observation techniques. Furthermore, data analysis is performed by collecting data, coding, linking themes, and interpreting themes. The code used is a combination of letters and numbers, for example, WMD1P1 where W = interview, MD = Informant code (in this study, there were four informants, namely MD, MJ, DM, and FZ), P = Supervisor, S = Stakeholder, while the numeric code (1, 2, 3 and so on) denotes 'the process to ... .'

RESULT AND DISCUSSION

The results of the research on the implementation of quality and supervision of vocational high schools in the city of Padang were obtained from interviews, participant observations, and document studies. Data generation is considered saturated if the answers from the elaborated data sources have consistent answers.

Result of Interview

Interviews conducted with P1 can provide nuances about how the vocational school supervisor's implementation of supervision is currently. P1 emphasized that, in general, there are still many things that need to be improved, especially those related to supervisory tasks that supervisors must prepare, but it turns out that they have not been carried out optimally. Furthermore, when P1 was asked why this happened, the answer was, "...the reasons are many, for example, starting from unclear recruitment problems, then some are caused by loss of motivation because they feel ignored or less cared for after becoming a supervisor (WMD2P1)". P1 also reveals that:

> *"... activities that should be carried out by supervisors, such as data collection activities, are used instead by administrative personnel. This shows that the agency does not optimize the role of supervisors. Many activities or programs in the agency do not involve school supervisors. This is also caused by the lack of active supervisors in positioning themselves (WMD2P1)".*

Observing what was stated by P1 shows that supervisors in carrying out supervisory duties do not equip themselves with adequate supervision requirements and instruments as supervisors. Ironically, the supervisors questioned why they were not maximally involved in the service's activities, felt neglected, and their motivation decreased. As the spearhead of the school service, supervisors should act professionally, not those who are controlled by the situation, but supervisors who should condition the situation. Although P1 also realizes that there is an element of supervisors' inability to position themselves in this case, according to P1, this situation cannot be fully charged or blamed on each individual supervisor but rather on the inability of the supervisory coordinator.

When P1's perception was confirmed through a number of questions to P2 (P2 was not told what had been stated by P1 but only questioned the essence of the problem), it turned out that P2's expression was actually complementary to what was stated by P1. Furthermore, it can be observed what was stated by P2:

> *"... in general, visits to schools carried out by supervisors are just routine. This is the impact of the recruitment of supervisors who are not in accordance with the recruitment guidelines that should be. So that the existing VHS supervisors have abilities that are far from expectations and do not meet the required standards, even high-ranking officials are of the opinion that ability is not the main requirement, the important thing is to want to work, but ironically this profession should not be enough just to be willing but highly demanded by ability and expertise (WMJ2P2)".*

P2's perception revealed that the supervisor in carrying out the task of visiting schools was only carried out as a routine. This condition confirms P1's perception that the supervisors did not prepare documents and even an adequate work program in their duties. P2's perception is mutually supportive with P1's perception, this can be seen in statements related to recruitment that are not in accordance with the principles, then also related to non-standard supervisory abilities and negative support from competent parties for inadequate supervisory abilities.

Triangulation of data carried out on S1 and S2, which in this case are stakeholders from the supervisor, in connection with the description of the implementation of supervision, obtained the following perception:

> *"... supervisors go to school just to visit, look around, then fill in the data that he has visited the school, then just leave, yes, just ask for autographs. But all this is due to the supervisor's background in school, and they are 'outcasts' in their respective schools. So they only come just to tell the story of the past. That existence will build and help the school get better and provide*

input and academic guidance. It's only for a handful of supervisors, and the important thing is that they are safe, and the school is safe (WDMS1)".

Meanwhile, according to S2:

"The current supervisors are a bit chaotic, especially in terms of recruitment. There are currently people who are not 'valid,' who are not productive, former staff, and teachers who don't come in and out. It's just that they have connections. Well, that's the supervisor. Sometimes the supervisor comes into the classroom. The supervisor enters the classroom just to clash with the teacher, reprimand the teacher, blame the teacher, question the teacher's preparation, question the status of the teacher, that the teacher is an honorary teacher, and so on. All these things are done in front of the students. That's communication less (WFZS2)."

The perceptions expressed by S1 and S2 are essentially not much different from those presented by P1 and P2. This understanding can be seen from their perception regarding the profile and the way supervisors respond to their duties, and their capacity and background as supervisors. Standard books and supervisory workbooks The meaning that can be put forward is that all informants have relatively the same perception that the overall picture of the implementation of supervision carried out by vocational school supervisors. Supervision standards set out in the supervisory quality standard book and supervisory workbook published by the Ministry of National Education of the Republic of Indonesia in 2011.

The results of interviews with informants regarding the quality of academic supervision have a slightly different nuance. P1 pays more attention to quality in terms of process and implementation, while P2 focuses more on commitment and the background that causes quality itself. The perception expressed by P1 reveals that:

"Each supervisor serves, on average, three schools for managerial supervision, while for academic supervision, according to the rules, the ratio is 40 teachers for one supervisor; thus, the supervisor must look for additional teachers in other schools outside the three schools that are his responsibility, for this average On average it will involve seven other VHS for academic supervision (WMD2P1)."

What P1 stated can be interpreted that the distribution of teachers in the city of Padang is very spread out. This unfavorable distribution has resulted in school supervisors having to hurry in order to serve the seven schools under their supervision, namely three schools for managerial supervision and four schools for academic supervision. The impact of such wide distribution is that the time required for the process supervision is also increasing. In other words, the time for coaching is decreasing.

Furthermore, P1's perception also states, "... they are not ready, they come to school without provisions, without preparation (WMD2P1)." This clearly P1's perception shows that the school supervisor does not have the preparation and provision in carrying out the supervisory duties. It means they do not have a planned monitoring program. Without a planned and measurable program, everything about the supervision takes place as it is and is difficult to evaluate. When this was confirmed to P2, P2 stated, "...this profession should not be enough just to be willing but very demanding of ability and expertise (WMJ2P2)." This statement shows that P2 has doubts about the abilities and expertise of school supervisors.

Triangulation carried out on S1 informants in relation to the quality of academic supervision revealed, "... teacher development is also carried out minimally, at most filling out a questionnaire. it is very rare for such coaching to occur (WDMS1)." While S2 stated:

"... after becoming a supervisor, how could the person concerned be able to order/order the teachers/friends to make preparations, discuss problems evaluation, problem learning, and so on, while the person concerned/supervisor does not understand what he is ordered to do. Sometimes the supervisor comes into the classroom, the supervisor enters the class just to clash with the teacher, reprimand the teacher, blame the teacher, question the teacher's preparation, question the status of the teacher, that the teacher is an honorary teacher, and so on, all these things are done in front of student-student (WFZS2)."

The perception of S1 and S2 further strengthens what was revealed by P1 and P2, that school supervisors in the task of academic supervision are carried out minimally. A more minor perception was even raised by masters, who expressed distrust of the supervisor's ability substantially. This was based on the supervisor's recruitment background and the supervisor's track record. S2 also observes the lack of professionalism of supervisors in conducting coaching, causing friction with teachers or other parties at school.

The meaning that can be drawn from the perceptions of P1, P2, S1, and S2 is that academic supervision is not carried out in a well-planned manner because the supervisory function is related to the program of coaching, monitoring, assessing, and training professional teachers in 1.) Planning learning; 2.) Carry out learning; 3.) Assessing learning outcomes; 4.) Guiding and training students; and 5.) Carrying out additional tasks attached to the main task in accordance with the teacher's workload, carried out randomly and impromptu. When P1 was asked questions related to the distribution of supervisory areas of expertise in conducting academic supervision, P1 stated:

> *"The contribution of supervisors to academic supervision related to subjects in Vocational Schools is indeed not all supervisors according to the field of study. Vocational supervisors generally come from vocational technology fields, while Vocational Schools are not only in the field of technology. The existing supervisors are more dominant in the background technology in the fields of Building, Machinery, and Electricity, while for other fields such as automotive, business, and tourism, there is no supervisory authority (WMD2P2)."*

In the study of what was stated by P1 in relation to academic supervision with the distribution of areas of expertise of school supervisors, it can be interpreted that there is indeed an imbalance in the field of expertise in the procurement of supervisors in relation to the number of expertise programs and existing teachers. The procurement of supervisors is not carried out in a professional manner. Supervisors' recruitment is not based on an analysis of the level of need.

Result of Participant Observation

The results of observations made on P1 and P2 obtained an overview in relation to their duties in carrying out supervision in schools, showing data that were slightly different in several respects from the information they provided. In particular, with regard to the purpose of each visit to the school, these two supervisors have a good record of observation, meaning that they do their obligations as a supervisor, but the implementation of the visit was carried out without being properly planned and not confirmed in advance with the school or not scheduled.

The recruitment process for school supervisors is not perfect. As a result, the resources obtained are difficult to develop because changing commitment and work attitudes or ethos does not only require intellectual intelligence. How can supervisors work smoothly if what they do does not start with good planning or programs, good work is perfectly planned work.

Furthermore, the results of observations made on P1 and P2, along with all elements related to supervision, indicate that the data are not much difference between the sources. Supervision that takes place cannot be distinguished between academics and managerially. This happens because, on duty, supervisors are more likely to carry out tasks and activities without a plan instead of carrying out tasks and activities with clear procedures and plans.

Result of Document Study

Almost all of the documents related to the implementation description are only in the form of guidelines and supervision procedures specified in the school supervisor's workbook. School supervisor report documents were also obtained, but some of the data obtained were only normative documents and lacked supporting data. The search results for documents related to the quality of academic supervision are in the form of supervisor reports and several supervisory procedures. In terms of the completeness of P1 and P2, and in general, the supervisors have met the criteria for making and collecting reports. Supervisors have documents such as performance appraisal procedure documents, teacher competency assessment procedure documents, learning equipment completeness procedure documents, assessment reporting results, and supervisory results reports.

Discussion

Based on the results of the research, it is obtained that the overall picture of the implementation of supervision is: 1.) Supervisors are not ready and without provisions in carrying out supervision; 2.) The education office is less than optimal in empowering supervisors; 3.) Supervisors are less aggressive in positioning themselves; 4.) the supervisory coordinator does not carry out his functions optimally; 5.) Supervisory motivation is low; 6.) The distribution of procurement of supervisors is uneven; 7.) The control mechanism for supervisors and supervisory coordinators is not working properly; 8.) Reward and punishment does not work; 9.) School visits are just routine; and 10.) Relations with teachers and schools are not well established.

Based on the findings revealed, it can be interpreted that the supervision process for VHS in Padang is still very concerning because in carrying out their duties, supervisors act as they are and lack breakthroughs. This condition occurs as a result of the control mechanism that is not working properly. So that the overall picture of the implementation of supervision is not in accordance with the main duties and functions of the supervisor and shows that the supervisor has an unsatisfactory performance, this picture is an indication of the education office's lack of attention to the function and role of supervisors, but supervisors as professionals should be able to eliminate these unfavorable things and must be able to act independently.

It should be underlined that the non-optimal supervision process for Vocational High Schools has a chain impact on the provision of a professional workforce because vocational high schools, as the front gate, are expected to be able to supply high-quality middle-level workers. Supervisors should be able to work smoothly and not have to be bothered with all the formats that must be carried out in the task the supervision because the Ministry of National Education of the Republic of Indonesia has provided all the formats and rules through the school supervisor workbook and the supervisory quality standards guide.

Supervisors only need to adjust to real conditions and match the supervisor's calendar according to the calendar of the education office of each region where the supervisor is on duty. Furthermore, the supervisors have to process and process the results obtained from a number of these guidance documents. However, the process that should have gone smoothly because it already had a clear direction and was conditioned in such a way by the government has not yet been implemented as expected. The results of this research are quite surprising. Everything is very detailed and adequate when viewed in terms of the completeness of the rules for implementing supervision.

The supervisory profession is a position with complex work demands. Usman (2006) states that the supervisor is a middle manager who requires conceptual skills around 25%, social 50%, and operational 25% and is responsible for top managers. This statement explicitly emphasizes that being a supervisor cannot be entrusted to everyone or the will of a few people who hold influence or power. The supervisor's position as a coach for teachers and school principals requires that each supervisor have the readiness and ability to provide solutions to various school problems. Supervisors are people who have good intellectual and verbal capabilities, are individuals who can protect their clients, and act quickly at the right time.

The study results revealed that supervisors were not optimal in carrying out their duties and functions, and low motivation is a reflection of the supervisor's powerlessness to get out of his own problem. The results of this study, at the same time, reinforce what was stated by Zulfiani et al. (2021) that the supervisor is a leader. The supervisor's leadership spirit is actually tested when dealing with teacher/school principal problems in the form of protests or objections.

Recruitment and transfer of supervisors have four possibilities: 1.) Achievement; 2.) Sanctions; 3.) Selection; and 4.) Combination. Based on these four possibilities, points (1) and (3) have the opportunity to produce professional supervisors. The appointment or recruitment of school supervisors through a selection process is a long process that demands a number of requirements and qualifications as well as layered mechanisms and procedures. Based on the rules set by the Directorate General of Quality Improvement of Educators and Education Personnel, Directorate of Education Personnel (Ditnaga), Ministry of National Education of the Republic of Indonesia in 2011, someone has been determined to occupy the position of supervisor must meet administrative and academic requirements. After passing the required requirements and qualifications, must follow the

selection of candidates for supervisors of educational units in a transparent, accountable, open and fair, and competitive manner.

Besides that, recruitment is also based on a needs analysis by the city/regency education office so that it is known what field supervisors are needed and how many are needed. The selection process is under the authority of Ditnaga in collaboration with relevant agencies and the education Quality Assurance Institute (LPMP). At the same time, the study results showed that the recruitment process was carried out impromptu and not transparent, which was even worse without going through the proper procedures and not based on needs analysis. Besides that, recruitment is also based on a needs analysis by the city/regency education office to know what field supervisors are needed and how many are needed. The selection process is under the authority of Ditnaga in collaboration with relevant agencies and the Education Quality Assurance Institute (LPMP).

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Another finding in the study was the low perception of informants on the supervisory relationship with clients or stakeholders. This situation is a bad signal for the continuity of the monitoring process. Professional supervisors must be able to stimulate clients to be actively involved in the supervision process itself. This active role will be seen in the client's willingness to tell stories, ask questions, and do things assigned by the supervisor without feeling embarrassed or intimidated. Meanwhile, the research results reveal that the opposite is the case. The openness and ability of supervisors to maintain partnerships with clients are one of the successes in supervision (Henderson, 2019). Therefore, a common thread must be found in the disharmony of the relationship between the supervisor and the teacher or principal.

Supervisors are ordinary people who do not escape from all shortcomings and excess. The supervisor must still report to and be controlled by the top manager as a middle manager. In this case, the top manager is the head of the education office. The results of the study show that the education office also has a decisive contribution to the supervision picture. The impact of the recruitment of vocational school supervisors, which is carried out without prior studies or needs analysis, also causes the accumulation of supervisors in certain areas of expertise, while other areas of expertise do not have school supervisors at all. This non-compliant recruitment mechanism also has an impact on the supervisor's capability, especially in terms of motivation and work ethic.

Problems in the recruitment of school supervisors, order culture, and friendship are not easily removed. This situation is further exacerbated by inadequate control and control mechanisms, which only rely on reports that have never been reported and analyzed substantially. The control mechanism can be interpreted from two perspectives: the control of the supervisory coordinator towards each supervisor and, secondly, the control of the head of the service to the supervisor, especially the supervisory coordinator.

The overall picture of the implementation of this supervision is still not satisfactory. Many inequalities have occurred since the recruitment of school supervisors and the process of implementing supervision to control supervision. The results of the study show results that are in line with research conducted by Muchit (2005) that it is necessary to develop a model within the scope of supervision, especially related to the development/renewal of the coaching model, which can be done through three aspects, namely, aspects of supervisor appointments, aspects of education and training (training and training), and aspects of the performance appraisal of school supervisors.

The basic difference with Muchit's research is in terms of the scope of research, location, and year of research. The discussion on the scope of the quality of academic supervision at the Padang City Education Office is currently closely related to many aspects. The general meaning of academic supervision can be observed from 3 aspects including aspects: 1.) Implementation of coaching tasks; 2.) Monitoring; and 3.) Teacher professional assessment and training.

However, in its implementation in the field, these five aspects cannot be separated from various elements, such as: First, the distribution of supervisors accumulates in only a few skill programs: 1.) Building Engineering 3 people for 33 teachers should be in accordance with the number of existing teachers, only one person; 2.) Mechanical Engineering 3 people for 46 teachers should be enough for one person; 3.) Engineering Electricity 2 people for 43 teachers should be enough for this skill one person; 4.) There is only one supervisor for 71 teachers in computer and informatics engineering, and two supervisors should be needed; and 5.) There are two supervisors for 37 teachers in aquaculture engineering and production whose supervisors do not have a full fishery background, only because they have a master's degree in management. Even then, only one person is needed.

Second, the ratio of supervisors to teachers is not balanced. There are only two skill programs with supervisors that are relatively balanced between the ratio of supervisors to teachers, namely in electrical engineering skills of 1:49 and office skills of 1:42. Although the number of teachers is relatively balanced with supervisors, the teachers are spread across many schools. Third, many skills programs do not have supervisors at all, namely: 1.) Automotive engineering with 96 teachers; 2.) Aircraft Engineering with nine teachers; 3.) Broadcasting technique with seven teachers; 4.) Finance with 58 teachers; 5.) Commerce administration with 28 teachers; 6.) Tourism with 90 teachers; 7.) Fine arts and crafts with 71 teachers; and 8.) Performing arts with 31 teachers. Third, many skills programs do not have supervisors at all, namely: 1.) Automotive engineering with 96 teachers; 2.) Aircraft Engineering with nine teachers; 3.) Broadcasting technique with seven teachers; 4.) Finance with 58 teachers; 5.) Commerce administration with 28 teachers; 6.) Tourism with 90 teachers; 7.) Fine arts and crafts with 71 teachers; and 8.) Performing arts with 31 teachers.

Fourth, the supervisory method used by school supervisors is still carried out in an orthodox manner, with the image of being a *pamong* in power. This pattern results in respect of teachers and schools, in general, being not good, so this needs to be addressed so that the partnership process between supervisors and stakeholders really becomes one of the cornerstones in the process of supervision. Fifth, Fifth, control and reporting mechanisms are one of the vulnerable points in supervision. Reporting patterns without paying attention to a substance can stimulate invalid and irresponsible reporting.

Everyone agrees on the need for quality education, but many people will define quality with different perceptions. Sallis (2002) argues that quality is something that is difficult to understand because quality is a dynamic idea that involves emotions and morals. Quality is sometimes felt like something abstract, and people only feel it when it disappears from our side. Quality is easy to feel but sometimes very difficult to define. Quality is not just satisfaction but more emphasis on customer happiness and joy. In the world of education, quality can be juxtaposed with a number of educational attributes, but the ultimate goal always refers to the teaching process and the resulting product. Marzano et al. (2011) states that the most important part of supervision is an improvement in teaching. So the purpose of academic supervision is to improve the quality of learning and the teachers themselves (Zulfikar et al., 2017).

CONCLUSION

The implementation of the academic supervision of vocational high schools in the city of Padang is still not optimal. This indication is shown from the following points: The unpreparedness of the supervisor to carry out supervision; The education office is less than optimal in empowering supervisors; Supervisors are less aggressive in positioning themselves; The supervisory coordinator does not carry out his functions optimally; Low supervisor motivation; The distribution of procurement of supervisors is uneven; The supervisory control mechanism and the supervisory coordinator do not work well; Reward and punishment does not work; School visits are just routine; Relations with teachers and schools are not well established.

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Professional development and interpersonal communication: Influence on vocational teachers teaching performance

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ABSTRACT

This research was conducted to see the impact of professional development and interpersonal communication on the teaching performance of vocational teachers in West Cikarang, West Java Province, Indonesia. The research method used is the survey method and data examination, namely multiple linear regression. The populace in this research was 119, with the Slovin formula with a 5% of significance level, then the research sample obtained was 92 vocational teachers. Data collection techniques using questionnaires and hypothesis testing using t-test and F-test. The outcome of this calculation shows that professional development and interpersonal communication on teacher teaching performance have simultaneous effects as indicated by the F_{count} 34.453 > F_{table} 3.10 and the significance value 0.000 > 0.05. The large effect of professional development and interpersonal communication on teaching performance is shown throughout the coefficient determination of 0.443 or 44.3%, with the influence of professional development variables of 13.9% while interpersonal communication variables of 30.2%.

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INTRODUCTION

The Covid-19 Pandemic is a disaster that affects all sectors of life, one of which is education. The implementation of the Enforcement of Restrictions on Community Activities (PPKM) policy resulted in school closures, so schools accelerated online learning. The transition from face-to-face learning to online learning is certainly not easy. Based on a survey conducted by KPAI (Indonesian Child Protection Commission), as many as 79.9% of respondents stated that there was absolutely no interaction with teachers except for giving and collecting assignments. As many as 81.8% of respondents explained that teachers rarely conduct discussions, explain material or ask questions and only give assignments. Reflecting on the results of the survey, the implementation of online learning is more difficult for teachers and vocational students. Practical activities in the vocational curriculum are easier to do face-to-face than online. The results of the study revealed that vocational school teachers were not ready and needed to further improve their teaching skills, especially in terms of delivering material (Ruktiari et al., 2021).

The ongoing online learning resulted in unpreparedness and a decrease in the performance of vocational school teachers in teaching during the pandemic. Teacher teaching performance is

carrying out the duties and obligations in providing knowledge and skills to improve student learning performance (Rodríguez et al., 2014). Teaching performance may be a work execution performed by a teacher in carrying out their obligations and responsibilities in giving learning that contains knowledge and abilities that will lead to an increment in student accomplishment (Kusumaningrum et al., 2019). Teacher teaching performance is the ability and success of teachers in completing tasks as educators and teachers as well as possible in the learning process so that learning objectives are achieved (Dewi et al., 2018). The teaching performance of teachers is the ability to carry out their obligations in transferring knowledge to students to improve learning outcomes (Yulianingsih & Sobandi, 2017).

Teacher teaching performance is the ability of teachers in teaching and learning activities in the classroom, including providing knowledge, knowledge, and skills which are usually in the form of student learning outcomes. Teacher teaching performance is operationalized by Bafadal et al. (2018) into a series of teacher activities in: (1) preparing learning plans, (2) learning activities, (3) evaluating learning processes and outcomes, and (4) implementing of follow-up programs. One way to improve teacher teaching performance is through teacher professional development. According to research conducted by Putri and Imaniyati (2017), teacher professional development has an effect of 21.6% on teacher performance. This is following research conducted by Busyra and Sani (2020) measuring teaching performance with one of the indicators, namely professional development.

Professional development is depicted as activities to develop abilities, knowledge, mastery, and other proficient teacher characteristics (Caena, 2011). In the Indonesian literature, professional development is better known as continuous professional development. According to Efu (2020), CPD is a perspective of individual improvement comprising both formal and informal development. In the Indonesian literature used, namely Sustainable Professional Development (PKB), according to Regulation of the Minister of State Apparatus Empowerment and Bureaucratic Reform (Permenpan) of the Republic of Indonesia No. 21 of 2010, Continuous Professional Development is a long-term activity in the development of science and technology, attitudes, and skills to increase professionalism (Komara & Mauludin, 2016). Grieve and McGinley (2010) found that as a result of CPD, teachers perceived themselves as free enabled teachers empowering them to be innovative and inventive in their education and superior ability to reply to students' needs.

Professional development is an effort to improve the ability and knowledge of teachers both to improve professionalism and meet the needs of students. Continuing Professional Development (CPD) activities for teachers have several components. Following the PAN Ministerial Regulation and Bureaucratic Reform No. 16 of 2009, CPD components include: (1) attending functional training and collective teacher activities, (2) publishing research results or books, and (3) writing and publishing innovative work in learning. So that it is needed by vocational school teachers today, namely the awareness to increase their respective professionalism to face online learning starting from participating in training or research. This is following the opinion that professional development is an independent development activity (Widayati et al., 2021).

Research conducted by Busyra and Sani (2020) reveals that the main thing that is important in teaching is communication between teachers and students. This is because communication is a tool used to achieve goals smoothly (Majid, 2017). In line with this, Setyana et al. (2013) show that poor interpersonal communication between school leaders and educators, educators with education staff and other educators, educators with guardians of students and the community, and educators and students can cause a decrease in performance. WFH's policy is to make communication take place online. According to the KPI survey, the number of respondents who interact via chat is 87.2%, using the zoom meeting application as much as 20.2%, while those using WhatsApp video calls are 20.2%; with 5.2% of respondents using mobile phones to communicate directly with their teachers. Interpersonal communication can be categorized as good if all communication is established between teachers and school residents (Diana et al., 2020).

Many experts argue that interpersonal communication is very effective in changing a person's actions, opinions or character because it is a dialogue in the form of a conversation (Murniasih et al., 2016). Interpersonal communication is portrayed as communication between two people in which the people are physically connected, giving each other feedback (Murtiningsih et al., 2019). There are eight components in interpersonal communication: sender, message, code, inter-

pretation, message receiver, broadcast, and input (Robbins et al., 2013). Based on research conducted by Murniasih et al. (2016), interpersonal communication has a positive and significant effect on teacher performance.

This study was conducted to determine whether the teaching performance of vocational teachers in the West Cikarang District can be increased through professional development and interpersonal communication. The results obtained are expected to be input for new programs for school principals and teachers as a strategy for dealing with distance learning.

RESEARCH METHOD

This research was conducted using a survey method in the period from March to July 2021. The population in this study were 119 vocational teachers with technological and engineering expertise in West Cikarang District, using the Slovin formula with 5% significance level so that the number of research samples was 92. The questionnaire became data collection techniques used, previously the questionnaire was tested using validity and reliability testing. Before conducting data analysis, the data must go through a prerequisite analysis test first. Analysis of the data used is multiple linear regression with hypothesis testing includes t test and F test.

RESULT AND DISCUSSION

Pre analysis test

Data validity test

The normality test was carried out using the Kolmogorov-Smirnov calculation. The conditions for making data decisions are said to be normal if the results of Asymp Sig. (p) > 0.05. Based on the calculations, the results of Asymp Sig. count obtained is o,199. Until Asymp Sig. (0.199) > 0.05 then it is stated that the data is normal.

Table 1. Kolmogorov-Smirnov normality test

		Unstandarized Residual
N		92
Normal Parameters[a,b]	Mean	.00000000
	Std. Deviation	785.095.038
Most Extreme Differences	Absolute	.080
	Positive	.031
	Negative	-.080
Test Statistic		.080
Asymp. Sig. (2-tailed)		.199[c]

Data linearity test

The linearity test was carried out to see whether the dependent variable (teaching performance variables) had a linear and significant relationship with the independent variables (professional development and interpersonal communication variables). The linearity test uses a test of linearity with the help of SPSS version 26. The data testing requirements are said to be linear and significant if Sig. (p) > 0.05.

Table 2. Linearity test of professional development variables and teaching performance

			df	Mean Square	F	Sig.
Teaching Performance* Professional Development	Between Groups	(Combined)	34	122.463	1.180	.285
		Linearity	1	1.396.626	13.461	.001
		Deviation from Linearity	33	83.852	.808	.742
	Within Groups		57	103.753		
	Total		91			

Based on the Table 2 the value of Sig. (p) the calculation obtained is o,742. Following the data testing requirements, Sig. (0.742) > 0.05 found a linear and significant relationship between professional development variables (X_1) on teacher teaching performance (Y). Based on the Table 3 the value of Sig. (p) the calculation obtained is o,649. Following the data testing requirements, Sig. (0.649) > 0.05 found a linear and significant relationship between interpersonal communication variables (X_2) on teacher teaching performance (Y).

Table 3. Linearity test of interpersonal communication variables and teaching performance

			df	Mean Square	F	Sig.
Teaching Performance* Professional Development	Between Groups	(Combined)	50	134.281	1.637	.053
		Linearity	1	3.122.682	38.063	.000
		Deviation from Linearity	49	73.293	.893	.649
	Within Groups		41	82.039		
	Total		91			

Multicolinearity Test

The test requirements to determine whether the data does not have multicollinearity problems are tolerance values > 0.10 and VIF values < 10.00. Based on the calculation, the tolerance value is 1 and the VIF value is 1. According to the test requirements, the tolerance value is 1 > 0.10 and the VIF value is 1 < 10.00 the data does not have multicollinearity problems.

Table 4. Multicolinearity Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	58.193	15.108		3.852	.000		
	Professional Development	.389	.084	.365	4.621	.000	1.000	1.000
	Interpersonal Communication	.293	.042	.552	6.982	.000	1.000	1.000

a. Dependent Variable: Teaching Performance

Heteroscedasticity Test

The regression model that does not show heteroscedasticity is good. The test required to determine whether the data has no signs of heteroscedasticity is the value of Sig. (p) > 0.05). Based on the calculation of the calculated significance value of the professional development variable (X1) is 0.836. While the calculated significance value of the interpersonal communication variable (X2) is 0.355. From the calculation of the significance of the two variables x above > 0.05, it can be seen that the regression model does not have a heteroscedasticity problem.

Table 5. Multicolinearity Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.345	8.766		.153	.878
	Professional Development	.010	.049	.022	.208	.836
	Interpersonal Communication	.023	.024	.098	.930	.355

a. Dependent Variable: Teaching Performance

Multiple linear regression analysis

Multiple linear regression analysis was carried out to see changes in the value of a variable when other variables changed. The following are the results of multiple linear regression calculations can be seen on Table 6.

Table 6. Multiple linear regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	58.193	15.108		3.852	.000
	Professional Development	.389	.084	.365	4.621	.000
	Interpersonal Communication	.293	.042	.552	6.982	.000

a. Dependent Variable: Teaching Performance

Based on the calculation, the equation is Y= 58,193 + 0,389 + 0,293. Followed by calculating the coefficient of the determinant can be seen on Table 7.

Table 7. Coefficient of determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
a	.372[a]	.139	.129	9.821
b	.557[a]	.310	.302	8.791
c	.666[a]	.443	.431	7.939

a. Predictors: (Constant), Professional Development
b. Predictors: (Constant), Interpersonal Communication
c. Predictors: (Constant), Interpersonal Communication, Professional Development

Based on the Table 7, it is known that the influence of each variable is large, the professional development variable has an effect of 13.9% on improving teacher teaching performance and the interpersonal communication variable has an effect of 30.2%. While the influence of two variables X professional development and interpersonal communication on the teaching performance of teachers is 44.3%. From the calculation results, the professional development variable has a positive contribution to improving teacher teaching performance. This is in accordance with the opinion that teachers have the opportunity to improve their knowledge, skills, and practice by carrying out professional development (Supriadi in Tanang & Abu, 2014).

On the other hand, the interpersonal communication variable also has a positive contribution to the improvement of teacher teaching performance. This is based on the opinion that a good communication network can improve performance, because problem solving is done together. The quality of communication must be supported by the ability to reason and achieve clear goals (Eriyanti et al., 2021).

Hypothesis test

T-test

The conditions for testing the hypothesis in the t-test are if $t_{count} > t_{table}$, and the significance value is < 0.05. The following calculation of the t-test is performed on Table 8. Based on the calculation results, professional development and interpersonal communication significantly affect the teaching performance of teachers. This is indicated by the results of the calculation of the significant value of 0.000 < 0.05. While the calculation of the t value for the professional development variable is t_{count} 4.621 > t_{table} 1.662. This shows that there is a positive influence between professional development and teacher teaching performance. The results of the tcount of interpersonal communication variables were obtained, namely t_{count} 6,982 > t_{table} 1,662. These results show that interpersonal communication variables have a positive effect on teacher teaching

performance. It is concluded that professional development and interpersonal communication on teacher teaching performance have a positive and significant influence.

Table 8. T-test

Model		t	Sig.
1	(Constant)	3.852	.000
	Professional Development	4.621	.000
	Interpersonal Communication	6.982	.000

a. Dependent Variable: Teaching Performance

F-test

The F-test was conducted to determine how professional development and interpersonal communication affect teacher teaching performance simultaneously. The test conditions used are $F_{count} > F_{table}$ with a significance value < 0.05. Based on the calculation, the calculated significance value is 0.000 < 0.05. As for F_{count} 34.453 > F_{table} 3.10. Based on the following results, it can be seen that professional development and interpersonal communication affect teacher teaching performance simultaneously.

Table 9. F-test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.468.647	2	2.234.323	35.453	.000[b]
	Residual	5.609.005	89	63.023		
	Total	10.077.652	91			

a. Dependent Variable: Teaching Performance
b. Predictors: (Constant), Interpersonal Communication, Professional Development

Based on the hypothesis test carried out, it is known that professional development has a positive and significant effect on teacher teaching performance according to the results of a significance value of 0.000 <0 .05 and the results of t_{count} 4.621 > t_{table} 1.662. The results of this study are following the results of Dwi et al., (2017) where Fcount 5.2474 > Ftable 4.3248, so it is stated that professional development affects teacher performance positively. It is also stated in the research of Tati and Meitana (2014) that professional development significantly affects the performance of teachers with the resulting significance value of 0.0017 < 0.05.

Following a study that argues that professional development has a positive effect on improving the quality of teacher teaching because professional development activities can provide new information about teaching methods, improve performance in the classroom and encourage students' critical and logical thinking (Bicaj & Treska, 2014). This is similar to the opinion that professional development helps teachers to improve their ability to plan lessons, change learning methods, and initiate innovative classroom management (Afi, 2019) . In line with the opinion that professional development is the main step to increase student learning success (Kementerian Pendidikan Nasional Republik Indonesia, 2010).

Today's professional development activities are very easy to access. This type of professional development is usually carried out through teacher forums such as, PKG (Teacher Activity Center), KKG (Teacher Working Group), and MGMP (Subject Teacher Consultation or Teacher-subject Forum) (Cahyaningrum et al., 2021). Teachers must also have their own awareness to participate in the various trainings and forums held. This is in accordance with the opinion that professional development is an independent development (Widayati et al., 2021).

Meanwhile, the influence of interpersonal communication on the teaching performance of teachers is also positive and significant, this is indicated by the results of a significance of 0.000 > 0.05 with a t_{count} of 6.982 > t_{table} of 1.662. The results of this study are following the results of research by Nilasari et al. (2020) where t_{count} is 3.291 > 1.671 with a significance level of 0.002 where interpersonal communication affects teacher performance positively and significantly. This finding is in line with the research of Darmawati et al. (2020) where interpersonal communication affects

teacher performance positively and significantly according to the results of t_{count} 3.142 and a significance value of 0.002. This finding is in line with the opinion that communication is considered an attractive response when the sender and listener agree on the concept of the message. So this study reveals that communication is the initial variable on teacher performance. Because it creates intimacy, closeness, and deeper understanding between the principal and his team, allowing them to work together better. This emphasizes caring for one another (Jalalkamali et al., 2016).

Interpersonal communication is said to be successful if there is a process of transfer and understanding of meaning from one person to another (Eriyanti et al., 2021). A good idea is useless until it is passed on and understood by others. Communication can be through mind and body language. If the teacher has communication skills, the teacher's performance will also increase. Communication that occurs in schools, especially between the principal schools and teachers, if done well and intensively, it will affect the attitude of teachers in carry out their daily duties, which leads to an increase in their performance at school (Kartini et al., 2020).

The main purpose of this research is to find out how the influence of professional development and interpersonal communication on the teaching performance of teachers. Based on the results of the analysis above, it can be seen that: (1) The variables of professional development and interpersonal communication have a positive and significant impact on the teaching performance of SMK teachers in West Cikarang District; and (2) The variables of professional development and interpersonal communication can improve the teaching performance of SMK teachers in West Cikarang District.

CONCLUSION

The research results are that each independent variable of professional development and interpersonal communication affects the teaching performance of teachers positively and significantly. The t-test indicates this for the professional development variable resulting in a tcount of 4.621 > ttable of 1.662. As for the interpersonal communication variable, the tcount value is 6.982 > ttable 1.662. And supported by the results of the F-test in which professional development and interpersonal communication affect the teaching performance of teachers simultaneously, with the results of Fcount 34,453 > Ftable 3,20. The professional development variable has an effect of 13.9% on improving teacher teaching performance, and the interpersonal communication variable has an effect of 30.2%. While the influence of the two variables X on the teaching performance of teachers is 44.3%. Based on the results of this study, it is expected that both teachers and principals will pay special attention to the provision of professional development activities for teachers and establish close communication for all elements of the school community, including the provision of teacher working groups to improve teaching performance, due to the many variables that affect teachers' teaching performance, including leadership supervision, leadership, motivation, etc. The results of this study have implications for improving the teaching performance of teachers through professional development and interpersonal communication. So it is hoped that school policies related to education and training activities, workshops, group discussions, and sharing sessions discuss about attributes and problems of teaching, as well as provide information on free professional development, which the Ministry of Education usually holds, Bandiklat, MGMP, and other institutions. The next researcher is expected to improve this research by adding other variables.

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Mapping professional competency for teachers' productive arts and culture of vocational school

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ABSTRACT

The purpose of the study was to analyze the educational background, the suitability of teacher competence or linearity, and map the professional competence of productive teachers in the vocational school of arts and culture. This research is descriptive qualitative research. The research stages are; collecting information related to teacher educational background, education and training data, and interviews. The research subjects were school principals, administrative heads, and teachers. The evaluation uses the discrepancy model. The research population is principals and productive teachers of the vocational schools of arts and culture. Data collection techniques using observation, interviews, and documentation. Data validation uses source triangulation and collection. Data analysis used descriptive techniques and simple mathematical analysis. The results showed that: (1) The educational background of productive teachers; dance, musical arts, theater arts, and puppetry arts 96,67% in accordance with the legal basis set by the Ministry of Education and Culture of the Republic of Indonesia; (2) The suitability of the competence or linearity of productive teachers according to learning materials in vocational high school; and (3) A map of professional competence for productive teachers; dance, musical arts, theater arts, and puppetry are 30% of teachers in the mastering category and 70% in the very mastered category. Based on passport skills, it is recommended that 8 (26,67%) teachers attend secondary level training, 9 (30%) teachers attend advanced training, and 13 (43,33%) teachers attend advanced level training. The results of the study are recommended for consideration by the relevant agencies in making policies, recruiting, improving the quality of teachers, determining teaching tasks, teaching burdens, and developing teacher coaching models.

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INTRODUCTION

Education is one of the indicators of success in developing the quality of teachers. Education improves productivity, performance, and teachers' capability (Mahmudah & Putra, 2020). Quality improvement can be seen in how much teachers have the ability and competence to teach, especially in vocational high schools. It aims to improve students' skills. Teachers who can adapt and be ready for all changes will also be able to provide a balance to increase the competence of vocational high school students (Cahyono et al., 2021). Competence is the basis for teachers to develop their own

capacity and improve the quality of education. Teacher competencies include professional, pedagogic, social, and personality (Kementerian Pendidikan Nasional Republik Indonesia, 2007).

The competence of vocational high school (SMK) teachers in Indonesia still needs to be improved. This is like the research results, which say vocational school teachers' competence is still relatively low (Matondang, 2010). Many productive teachers have not studied their fields in depth (Darmi, 2015). The performance of high productive teachers is because there is a relationship with the competencies they have of 71,5% (Juliarti et al., 2018). The professional competence of productive teachers can increase when they have obtained teacher certification. The development of the professional competence of productive teachers requires the support of the principal (Ariyanto & Haq, 2019). Professional competence needs to be developed through the content of learning materials and the substance of knowledge regarding learning materials (Hartiningtyas & Elmunsyah, 2016). Pedagogic and professional competence teachers influence character education. Teachers understand pedagogical and professional competencies by applying learning strategies and methods that are relevant to students' characteristics, integrating strengthening character education (Wardoyo et al., 2020). Character education increases academic and non-academic achievement by 62,5% (Susatya et al., 2021).

Previous research has given complex results, but several important points must be improved. This research is different from previous research because this research is to map the professional competence of vocational school teachers in the field of arts and culture. The problem so far is that schools have difficulty meeting requests for sending prospective training participants according to the level of training that will be held by government education and training institutions because there is no mapping of productive teachers. In addition, schools have difficulty distributing teaching tasks to teachers because there is no mapping of professional competence mastery. This is because mapping is important in the process of forming the output of vocational high school graduates in accordance with the needs of DU/DI. The importance of this research is to become schools' main reference in improving teachers' competencies in depth.

Vocational high schools are the spearhead of implementing the vocational learning process. This is because it has a different education system, infrastructure, and ecosystem compared to other levels. Program development and implementation of vocational learning in vocational high schools involve official educational institutions, education stakeholders, and synergy with DU/DI. The vocational high school prioritizes the development of student competencies in accordance with certain jobs professionally. Therefore, it is important to create active student participation, teacher professional competence, and the capability of DU/DI to achieve good learning outputs (Wheeler et al., 2018).

With various kinds of literature that have been described above, the state-of-the-art of this research is the latest analysis related to the mapping of vocational teachers according to the needs of DU/DI. The thing that underlies the mapping is to be able to determine the suitability between the competence and professionalism of SMK teachers in providing learning and training to students. The ultimate goal is to be able to meet the needs of DU/DI and fill the vacancies of vocational graduates. This is interesting to do because it is one of the efforts that can help local governments to be able to improve the quality of vocational graduates through a comprehensive understanding of teachers who have competencies in accordance with their fields. Of course, it will be easier to develop teacher capacity in accordance with actual conditions that can be used as learning materials for vocational students.

RESEARCH METHOD

Research Design

The research design used is descriptive and qualitative. The reason for using this approach is to collect information related to mapping the professional competence of productive teachers without making changes to the subject being studied. This research aims to map the professional competence of productive teachers in the arts and culture vocational school of Yogyakarta Province. Mapping of professional competence and preparation of passport skills for productive teachers of art

and culture vocational schools based on interview results. Respondents' answers were analyzed and adjusted to the SKG criteria. Respondents' answers were grouped into four and entered into columns 1, column 2, column 3, and column 4. Using simple mathematical analysis, the average of the answers to questions was found to determine the indicator value. The average value of the indicators is grouped into four categories, namely: a value of 0,0 – 0,1 in the non-mastering category, a score of 1,1 – 2,0 in the less mastering category, a score of 2,1 – 3,0 in the mastering category, and a score of 3, 1 – 4,0 category is very dominant. The division of these four categories is adjusted to the level of training formulated by the UPT Ministry of Education and Culture.

Data Collection

Data collection techniques use natural setting techniques, namely: observation, interviews, and documentation. Participants' research is one principal, one head of administration, and thirty teachers in productive arts and culture. The interview guide consists of the main instruments and supporting instruments. The main instrument is humans, while the supporting instruments are interview guides, observation sheets, and documentation checklists. Data collection techniques are carried out to make it easier for researchers to explore Wagiran et al. (2019) related to the mapping of productive teachers in vocational high schools. Data collection techniques, instruments, and data sources for collecting research data are presented in Table 1.

Table 1. Data Collection Techniques

Research Problem	Data Collection Techniques	Guideline	Participants
Background analysis education, linearity, and mapping.	Interview, observation, and document study.	Interview guidelines, observation sheet, checklist.	Principal, head of administration, and teacher.

Areas of expertise consist of expertise programs, and expertise programs consist of expertise competencies. Derivatives from the field of expertise to the competence of expertise become the material for making a research grid, as shown in Table 2.

Table 2. Data Collection Guidelines

Expertise Program	Expertise Competency	Expertise	Indicator (Question)
Cultural Arts/ Creative Industries	Performing Arts	Dance Art	Measured by 11 questions, namely; knowledge of dance, bodybuilding, basic dance, basic dance elements, movement patterns, choreography I, accompaniment, make-up, fashion, choreog-raphy II, and production of works.
		Musical Arts	Measured by 10 questions, namely; basic musicality, titi laras/solfeggio, percussion instru-ments, stringed instruments, stringed instru-ments, membrane instruments, wind instru-ments, vocals, computer notation, and musical creativity.
		Theater Arts (Actor)	Measured by 10 questions, namely; dramaturgy, body work, sound processing, taste, monologue, acting techniques, fragment playing, play analysis, directing, and theater management.
		Puppet Art	Measured by 11 questions, namely; knowledge of puppetry, puppetry rhetoric, wayang movement techniques, *sabet*, vocals/chess, sulukan, puppetry accompaniment, play, puppetry standards, *sanggit*, and puppeteer criticism.

Eleven questions, namely about measuring the dance skill competency indicator; knowledge of dance, bodybuilding, basic dance, basic dance elements, movement patterns, choreography I, accompaniment, make-up, fashion, choreography II, and work production. Knowledge of dance is shown by explaining the history, functions, and types of dance. Body exercise is shown by explaining flexibility and strength training. The basic dance is shown by explaining *wiraga*, *wirama*, and *wirasa*. Elements of basic dance are shown by explaining the variety of motion, energy, space, and tempo. Movement patterns are shown by explaining the motives, phrases, and range of motion. Choreography I is shown by explaining coordination, movement stimulation, improvisation, exploration, and dance composition. Accompaniment is shown by explaining the function of accompaniment and accompaniment of dance creations. Make-up is shown by explaining contemporary make-up and make-up. The fashion is shown by explaining the materials for the dance performances and the creative dance attire. Choreography II is shown by explaining the body's flexibility and the concept of storytelling dance works. The production of the work is shown by explaining the concept of the script, staging management, and dance documents.

The indicator of competence in musical arts skills is measured by ten questions, namely, basic musicality, titi laras/solfeggio, percussion instruments, stringed instruments, stringed instruments, membrane instruments, wind instruments, vocals, computer notation, and musical creativity. The basis of musicality is shown by explaining scales, harmonies, dynamics, melodies and songs, intervals, rhythms, and tempos. *Titi laras*/solfeggio is shown by explaining how to read the melody, write the notation, and the notation transcript. Percussion instruments are shown by explaining techniques, patterns and working on percussion instruments. The plucked instruments are shown by explaining the techniques, patterns, and working on the playing of the plucked instruments. The stringed instrument is shown by explaining the techniques, patterns, and working on playing the stringed instrument. Membrane instruments are shown by explaining techniques, patterns, and working on playing membrane instruments. Wind instruments are shown by explaining the techniques, patterns, and working on the playing of wind instruments. Vowels are shown by explaining vocal techniques, rhythmic vocals, and non-rhythmic vowels. Computer notation is shown by explaining the installation of fonts/programs to the computer and computer notation writing applications. Musical creativity is shown by explaining creativity, forms of creativity, stages of creativity, creative design, and products of musical creativity.

The theater arts skill competency indicator is measured by ten questions; namely, dramaturgy, bodywork, sound processing, taste, monologue, acting techniques, fragment playing, play analysis, directing, and theater management. Dramaturgy is shown by explaining the history of theater, style of performance, and dramaturgy. Exercise is shown by explaining endurance, flexibility, and bodybuilding skills. Sound processing is shown by explaining body anatomy, breathing techniques, articulation, diction, intonation, tempo, tone, timbre, and speech. Taste is shown by explaining the imagination, concentration, gesture, and sensitivity of the five senses. Monologues are shown by explaining improvisational monologues and text-based monologues. The characterization technique is shown by explaining the individual and group characterization techniques. Playing fragments is shown by explaining character analysis, acting style, staging style, and role-playing. The analysis of the play is shown by explaining the type, style, structure of the play, and the preparation of the analysis report of the play. Directing is shown by explaining the concept of directing, role training, technical training, and staging. Theater management is shown by explaining organizational management and production management.

The indicator of the competence of puppetry skills is measured by 11 questions: knowledge of puppetry, puppetry rhetoric, wayang movement techniques, *sabet*, vocals/chess, *sulukan*, puppetry accompaniment, play, puppetry standards, *sanggit*, and puppeteer criticism. The knowledge of puppetry is shown by explaining the kawruh of puppetry, elements of the art of puppetry, the diversity of wayang, wanda and wayang characters, and the form of wayang performances. The puppetry rhetoric is shown by explaining *janturan*, *pocapan*, dialogue, and *antawecono*. The puppet movement technique is shown by explaining *cepengan*, *tanceban*, *solah*, *bedholan*, and *entasan*. Sabet is shown by describing war; failure, flowers, animals, snatches, maces, and war between characters. Vocals/chess are shown by explaining blangkon, standard, articulation, and character voices. Sulukan is shown by explaining *sulukan*, *ada-ada*, *pathetan*, *sendhon*, and *cute*. The

accompaniment of the puppetry is shown by explaining *titilaras*, *dodogan* and *keprakan*, forms of accompaniment, *gending, tembang*, and *kombangan*. The play is shown by explaining the standard play, plot, theme, storyline, and scene structure. The principles of puppetry are shown by explaining the rules of *gancaran*, *balungan*, and puppetry. *Sanggit* is shown by explaining *sanggit* plays, *sabet*, and *gynem*. The critique of the puppeteer is shown by explaining the appreciation, analysis of the play, and the evaluation of the puppeteer.

Research Procedure

The procedures used in this study are (1) identifying problems, (2) analyzing the SKG scores of productive teachers, (3) compiling data collection grids, (4) process (5) data retrieval, (6) data analysis, and (7) interpretation and drawing conclusions.

RESULT AND DISCUSSION

The discussion is carried out by processing document study data and interview results. Document study data is used to analyze the educational background of the teacher and the suitability of the competence or linearity of the teachers of the vocational high school in the Special Region of Yogyakarta for arts and culture. Meanwhile, the results of the interviews were used to map professional competencies and to arrange the passport skill positions of the vocational high school teachers in the arts and culture of Yogyakarta City.

Document study data shows that respondents with undergraduate (S1) arts backgrounds are 20 teachers, S1 arts education teachers have nine teachers, and diploma graduates (D3) is one teacher. At the same time, the postgraduate certificate (S2) teacher is one teacher for the arts and one teacher for education. Regarding teacher participation in education and training (training), 25 teachers have a functional training frequency of 0 - 3 times, one teacher has a functional training frequency of 4 - 7 times, and four teachers have a functional training frequency > 7 times. Other data shows that no teacher has ever attended technical training, and all teachers have attended leadership training. Based on teacher award data, six teachers have received regional awards, four have received national awards, and none have received international awards. The details are listed in Table 3.

Table 3. Teacher Education Background

No.	Guru	D3	S1	S1	S2	S2	Diklat Fungs.			Diklat Teknisi			Diklat Kepem.		
		D3	Seni	Pdd.	Seni	Pdd.	0-3	4-6	>7	0-3	4-6	>7	0-3	4-6	>7
1	Dance	0	6	7	0	0	13	0	0	13	0	0	13	0	0
2	Music Arts	1	10	1	0	1	10	1	1	10	0	0	10	0	0
3	Theater Arts	0	3	0	1	0	1	0	2	3	0	0	3	0	0
4	Puppet Arts	0	1	1	0	0	1	0	1	2	0	0	2	0	0

Mapping of professional competence and preparation of passport skills for productive vocational high school teachers based on interview results. Interview data were collected based on the population's answers to questions, consisting of 30 art and culture teachers, one principal, and one head of administration. The questions are derived from the teacher competency standards (SKG) compiled by the Ministry of Education and Culture Technical Implementation Unit.

The SKG is the basis for the preparation of education and training programs to improve the quality of teachers in the Ministry of Education and Culture of the Republic of Indonesia. The education and training program is divided into four levels, namely; elementary, intermediate, advanced, and advanced levels. The SKG for vocational education is grouped into six areas, namely; (1) technology and engineering, (2) business and tourism, (3) agriculture, (4) arts and culture/creative industries, (5) maritime, and (6) information technology. Meanwhile, the priority programs for revitalizing vocational education are; maritime, tourism, agriculture, and creative industries.

Analysis of educational background and suitability or linearity of professional competence of productive teachers of art and culture vocational schools based on document study data. The research data shows that the population of productive teachers at the art and culture vocational school in the Province of D.I. Yogyakarta consists of; 13 teachers of dance, 12 teachers of musical arts,

three teachers of theater arts, and two teachers of puppetry. In terms of educational background; dance teachers who graduated from S1 pure arts totaled six teachers and S1 dance education teachers totaled seven teachers; musical arts teachers who graduated from S1 pure arts with ten teachers, one teacher in arts education, and 1 D3 art teacher; theater arts teachers with a bachelor's degree in fine arts totaling three teachers; Puppet art teacher graduated from S1 pure arts with one teacher and S1 dance education with 1 teacher. Of the four skill competencies, the theater arts teachers (3 teachers) and puppetry arts (2 teachers) are classified as very few, but this is not a problem, as explained by the principal;

"It's not a small problem... but the number of subjects is that much...so there are enough people who teach... the need for teachers is only that much... it's in accordance with the required subjects"

The population of productive teachers of the arts and culture vcational school in the Province of D.I. Yogyakarta numbered 30, with details; 29 teachers (96,67%) graduated from S1, and one teacher (3,33%) graduated from D3. In detail, 20 teachers (66,67%) graduated from S1 fine arts, nine teachers (30,00%) graduated from S1 arts education, and one teacher (0,33%) graduated from D3 arts. Law of the Republic of Indonesia Number 14 of 2005 concerning teachers and lecturers, article 9 states that the academic qualifications as referred to in article 8 are obtained through higher education undergraduate programs (S1) or four diploma programs (D. IV). Based on the legal basis, there is still one teacher (0,33%) of the D.I. Yogyakarta of art and culture vocational school. Yogyakarta who have not met the requirements of academic qualifications. As a plus, two teachers graduated from the postgraduate program, teachers participated in various training, and several teachers have received regional and national awards.

Judging from the linearity of the professional competence of productive teachers at vocational high school arts and culture D.I. Yogyakarta is 100% in accordance with the needs of the learning program. In other words, the basic knowledge of the teacher is in accordance with the demand for curriculum substance. Indeed, there is a difference between S1 pure arts graduates and S1 arts education, but technically and learning theory are the same. There are only differences in the substance of pedagogical learning, where S1 arts education gets Deed IV while S1 fine arts do not get Deed IV.

This was corroborated by the principal, who stated:

"Many teachers have an art education background in dance skill competence, because there is a new S1 art education in dance, others are still pure arts, such as musical arts, theater arts, puppetry arts… but on average plus deed IV at that time…"

Based on the process of grouping the questions, assigning a score to each indicator, and taking the school average, the results of the study are as follows.

Dance Skills Competence

The results of the interviews showed that ten productive dance teachers had scores above 3,1 or categorized as very mastering, and three teachers were categorized as mastering, namely; GST 6, GST 10, and GST 12. Thus, it can be concluded that most the productive teachers of dance are very well versed in learning materials. The average of all indicators for dance teachers is in the value of 3,01 – 4,0, which means they are categorized as very mastered. The highest average is on the basic dance indicator (3,85), and the lowest is on the accompaniment indicator (3,25). In detail can be seen in Table 4.

The indicator value of mastery of professional competence of productive dance teachers is used as material for preparing passport skills and recommendations for education and training levels that must be followed. The following are skills passport positions and training recommendations that dance teachers must follow as can be seen in Table 5.

Table 4. Indicator Values of Dance Teachers (GSTa)

Name	Indicator Value										
	Dance Knowledge	Body Work	Basic Dance	Basic Dance Elements	Motion Pattern	Choreographer I	Accompaniment	Cosmetic	Fashion	Choreographer I	Production of Works
GSTa 1	3,0	3,6	4,0	3,66	3,0	3,0	3,0	3,0	3,0	3,60	3,0
GSTa 2	4,0	3,0	4,0	3,38	3,67	3,0	3,0	3,0	3,0	3,0	3,86
GSTa 3	3,5	3,4	3,71	3,50	4,0	3,60	3,50	3,33	3,80	3,0	3,29
GSTa 4	4,0	4,0	4,0	4,0	4,0	4,0	3,0	4,0	4,0	4,0	3,86
GSTa 5	3,75	3,40	3,0	3,0	3,0	3,90	3,25	3,50	3,80	3,60	3,29
GSTa 6	2,25	3,40	3,57	2,75	3,28	3,0	2,25	3,00	2,40	4,0	3,14
GSTa 7	4,0	4,0	4,0	4,0	4,0	3,0	3,75	4,0	4,0	4,0	3,28
GSTa 8	3,0	3,0	4,0	3,66	3,71	3,40	3,0	3,0	3,0	3,0	3,0
GSTa 9	4,0	4,0	4,0	4,0	4,0	4,0	4,0	4,0	4,0	4,0	4,0
GSTa 10	2,75	3,0	4,0	3,50	4,0	3,20	3,0	3,0	2,80	4,0	2,43
GSTa 11	4,0	4,0	3,71	3,66	3,28	3,70	4,0	3,87	3,20	3,20	3,14
GSTa 12	3,0	3,0	4,0	3,25	3,28	2,70	2,50	3,33	3,0	2,80	2,14
GSTa 13	4,0	4,0	4,0	4,0	4,0	4,0	4,0	4,0	4,0	4,0	4,0
Average	3,48	3,52	3,85	3,57	3,63	3,42	3,25	3,46	3,38	3,55	3,26

Table 5. Passport Skills for Dance Teachers (GSTa)

Name	Average	Passport Skill Position	Training Suggestions
GSTa 1	3,26	○ ○ ○ ●	Advanced education and training, increasing competence in knowledge of dance, movement patterns, choreographer I, accompaniment, make-up, fashion, work production.
GSTa 2	3,35	○ ○ ○ ●	Advanced education and training, increasing competence in bodybuilding, choreographer I, accompaniment, make-up, fashion, choreographer II.
GSTa 3	3,51	○ ○ ○ ●	Advanced level training, project work, staging management.
GSTa 4	3,90	○ ○ ○ ●	Advanced level training, project work, staging management.
GSTa 5	3,41	○ ○ ○ ●	Advanced education and training, improvement of basic dance competencies, basic elements of dance, movement patterns.
GSTa 6	3,00	○ ○ ● ○	Middle level education and training, increasing competence in dance knowledge, basic dance elements, choreographer I, accompaniment, make-up, and fashion.
GSTa 7	3,82	○ ○ ○ ●	Advanced level training, project work, staging management.
GSTa 8	3,25	○ ○ ○ ●	Advanced education and training, increasing competence in knowledge of dance, bodybuilding, accompaniment, make-up, fashion, choreographing II, production of works.
GSTa 9	4,00	○ ○ ○ ●	
GSTa 10	3,24	○ ○ ○ ●	Advanced level training, project work, staging management.
GSTa 11	3,61	○ ○ ○ ●	Advanced education and training, increasing competence in knowledge of dance, bodybuilding, accompaniment, make-up, fashion, work production.
GSTa 12	3,00	○ ○ ● ○	Advanced level training, project work, staging management.
GSTa 13	4,00	○ ○ ○ ●	Middle level education and training, increasing competence in knowledge of dance, bodybuilding, choreographer I, accompaniment, fashion, choreographer II, production of works.

Karawitan Art Skills Competence

The results of the interviews showed that six productive teachers of musical arts had scores below 3.0 or categorized as mastering, and six teachers were categorized as very mastered, namely, GSK 2, GSK 3, GSK 4, GSK 5, GSK 9, and GSK 12. Thus, it can be concluded that all productive teachers of musical arts master the learning materials. The average indicator of the musical art teacher is spread at a value of 2,01 - 4,00, which means that it is categorized as mastering and very mastering.

The highest average is on the titi laras indicator (3,47), and the lowest is on the wind instrument indicator (2.55). In detail can be seen in Table 6.

Table 6. Indicator Value of Musical Arts Teacher (GSK)

Name	Value Indicator									
	Musical Basics	Titi Laras	Percussion instruments	plucked instruments	String instruments	membrane instrument	wind instrument	Vocal	compilation notation	musical creative
GSK 1	3,00	3,00	2,75	3,00	3,00	3,00	2,29	3,00	2,75	2,89
GSK 2	4,00	4,00	4,00	2,13	4,00	4,00	2,00	4,00	2,00	4,00
GSK 3	4,00	4,00	4,00	3,00	3,00	3,38	2,50	4,00	2,00	3,83
GSK 4	4,00	4,00	4,00	3,50	3,50	4,00	3,50	4,00	3,00	4,00
GSK 5	4,00	4,00	4,00	3,00	4,00	3,50	3,00	4,00	2,00	4,00
GSK 6	3,00	3,50	2,00	2,50	3,50	3,50	3,00	3,43	2,50	2,40
GSK 7	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
GSK 8	2,81	3,00	2,25	1,00	2,50	2,50	1,25	2,14	3,00	2,33
GSK 9	3,13	3,00	3,00	3,00	4,00	3,00	2,00	3,00	3,50	3,06
GSK 10	3,00	3,00	3,00	2,00	3,00	3,00	3,00	2,57	2,75	2,78
GSK 11	3,13	3,14	3,00	3,00	3,00	3,00	2,00	3,00	2,00	2,44
GSK 12	4,00	4,00	4,00	3,14	3,14	4,00	3,00	3,00	3,00	4,00
Average	3,42	3,47	3,25	2,69	3,30	3,32	2,55	3,26	2,63	3,23

Table 7. Skill Passport for Karawitan Arts Teacher (GSK)

Name	Average	Passport Skill Position	Training Suggestions
GSK 1	2,87	○ ○ ● ○	Middle level education and training, improvement of competence of percussion instruments, wind instruments, computer notation, and musical creativity.
GSK 2	3,41	○ ○ ○ ●	Advanced training, competence improvement of stringed instruments, wind instruments, computer notation.
GSK 3	3,39	○ ○ ○ ●	Advanced education and training, improving the competence of stringed instruments, string instruments, wind instruments, computer notation.
GSK 4	3,75	○ ○ ○ ●	Advanced level training, project work, staging management.
GSK 5	3,55	○ ○ ○ ●	Advanced level training, improvement of computer notation competence, project work, staging management.
GSK 6	2,93	○ ○ ● ○	Middle-level training, improvement of all competencies of percussion instruments, stringed instruments, computer notation, and musical creativity.
GSK 7	3,00	○ ○ ● ○	Middle level education and training, strengthening all competencies.
GSK 8	2,28	○ ○ ● ○	Middle-level training, improvement of all competencies, especially on stringed instruments and wind instruments that have extreme values.
GSK 9	3,07	○ ○ ○ ●	Advanced education and training, increasing competency strengthening and increasing the competence of inflatable instruments.
GSK 10	2,81	○ ○ ● ○	Middle-level training, improvement of all competencies, especially in stringed instruments, vocals, computer notation, musical creativity.
GSK 11	2,77	○ ○ ● ○	Middle-level training, improvement of all competencies, especially in wind instruments, computer notation, musical creativity.
GSK 12	3,53	○ ○ ○ ●	Advanced level training, project work, staging management.

The indicator value of mastery of professional competence of productive musical arts teachers is used as material for preparing passport skills and recommendations for education and training levels that must be followed. Passports of skills positions and recommendations for training that music art teachers must follow can be seen in Table 7.

Theater Arts Skills Competence

The results of the interviews showed that the productive teachers of theater arts had scores above 3,0 or were categorized as very mastered. Thus, it can be concluded that productive theater arts teachers are very good at learning material. The average indicator of the theater arts teacher is at a value of 3,42 – 4,0, which means that it is categorized as very mastered. The average score is 4,00 in dramaturgy, taste processing, monologue, acting technique, and directing. In detail can be seen in Table 8.

Table 8. Indicator Values for Theater Arts Teachers (GATe)

Name	Value Indicator									
	Dramaturgy	Body Work	Vocal work	Taste work	Monologue	Acting Technique	Play Fragments	Action Analysis	Directing	Teather Manage.
GSTe 1	4,00	3,50	3,22	4,00	4,00	4,00	3,60	3,25	4,00	4,00
GSTe 2	4,00	3,83	4,00	4,00	4,00	4,00	4,00	4,00	4,00	4,00
GSTe 3	4,00	3,00	4,00	4,00	4,00	4,00	4,00	3,00	4,00	3,00
Rerata	4,00	3,44	3,74	4,00	4,00	4,00	3,87	3,42	4,00	3,67

The indicator value of mastery of professional competence of theater arts productive teachers is used as material for preparing passport skills and recommendations for education and training levels that must be followed. Passports of skills positions and recommendations for training that must be followed by theater arts teachers can be seen in Table 9.

Table 9. Passport Skills for Theater Arts Teachers (GATe)

Name	Average	Passport Skill Position	Training Suggestions
GSTe 1	3,76	○ ○ ○ ●	Advanced level training, project work, staging management.
GSTe 2	3.98	○ ○ ○ ●	Advanced level training, project work, staging management.
GSTe 3	3,70	○ ○ ○ ●	Advanced level training, project work, staging management.

Skills Competence of Puppeters

The interview results show that the productive teacher of puppetry has a value above 3,0 or is categorized as very mastering. Thus, it can be concluded that the productive teacher of the art of puppetry is very well versed in the learning material. The average indicator of the teacher of puppetry is at a value of 3,00 – 3,57, which means that it is categorized as very mastered. In detail can be seen in Table 10.

Table 10. Indicator Values of Puppet Arts Teachers (GSP)

Name	Value Indicator										
	Knowledge of Puppeters	Puppeters Rethoric	Puppet Movement Technique	*Sabet*	Vocal/ Catur	Sulukan	Puppeter's Accompaniment	Lakon	Pakem Pedalang	Sanggit	Kritik Pedalang
GSP 1	3,60	3,45	4,00	3,71	3,63	3,25	3,30	3,70	3,67	4,00	3,00
GSP 2	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
Rerata	3,30	3,23	3,50	3,36	3,32	3,13	3,15	3,35	3,34	3,50	3,00

Table 11. Skills Passport of Master of Puppet Arts (GSP)

Name	Average	Passport Skill Position	Training Suggestions
GSP 1	3,57	○ ○ ○ ●	Advanced level training, project work, staging management.
GSP 2	3,00	○ ○ ● ○	Advanced education and training, improvement in all competencies.

The indicator value of mastery of the professional competence of productive puppetry teachers is used as material for preparing passport skills and recommendations for education and training levels that must be followed. Passports for skills positions and training recommendations that puppetry teachers must follow can be seen in Table 11.

The recapitulation of the passport skills of productive dance, musical arts, theater arts, and puppetry teachers at the Yogyakarta Arts and Culture Vocational School is shown in Figure 1.

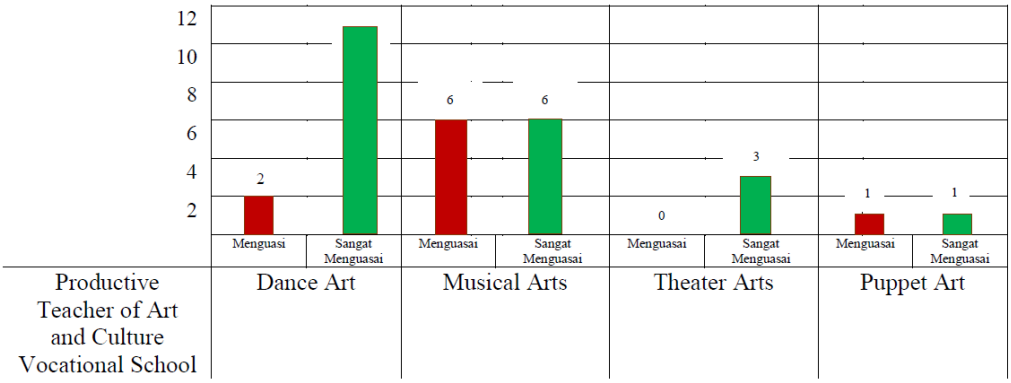

Figure 1. Recapitulation of the Passport Skills of Productive Teachers at the Cultural Arts Vocational School

Based on the discussion on the educational background of productive teachers at the art and culture vocational school of Yogyakarta Province can be concluded that; the educational background of 29 productive teachers (96,67%) is in accordance with the Act. No. 14/2005 concerning teachers and lecturers and one productive teacher (3,33%) is not in accordance with the Law of the Republic of Indonesia No. 14/2005 concerning teachers and lecturers. The aspect of teacher competency suitability or linearity strongly supports the learning process because most teachers are the best graduates from the performing arts vocational school who continue to S1 in the arts. The results of the study were corroborated by the explanation of the principal, who said;

> *"... the academic quality of mastering the competencies of productive teachers... thank God, all of them have mastered it and we even take it from practicing teachers who are indeed... especially our alumni who are the best... productive teachers are alumni of the poorest SMKI Kasihan, already entered into Institute Seni Indonesia (ISI) or other university "*

And the teacher's statement about the suitability of the course with learning materials in SMK;

> *"There is a suitability of the lecture material with the learning material in SMK, because studying at the Indonesian Art Institute (ISI) majoring in dance and teaching dance subjects, so there are no difficulties in teaching"*

The map of the professional competence of productive teachers shows 9 (30%) teachers in the master category and 21 (70%) teachers in the very master category. Taking into account the map of professional competence of productive teachers, it is recommended that 8 (26,67%) teachers attend secondary level training, 9 (30%) teachers attend advanced training, and 13 (43,33%) teachers participate in advanced level training. Mapping the professional competence of productive vocational teachers is very difficult if it only relies on discussions based on mastery of knowledge.

Ideally, mapping the professional competence of productive vocational high school teachers is carried out with practice or audit skills so that the teacher's skills can be known factually. However, this isn't easy to do, besides being expensive, time-consuming, and involving many testers. The success of mapping the professional competence of productive vocational high school teachers depends on the seriousness of all education stakeholders, principal leadership, and teachers.

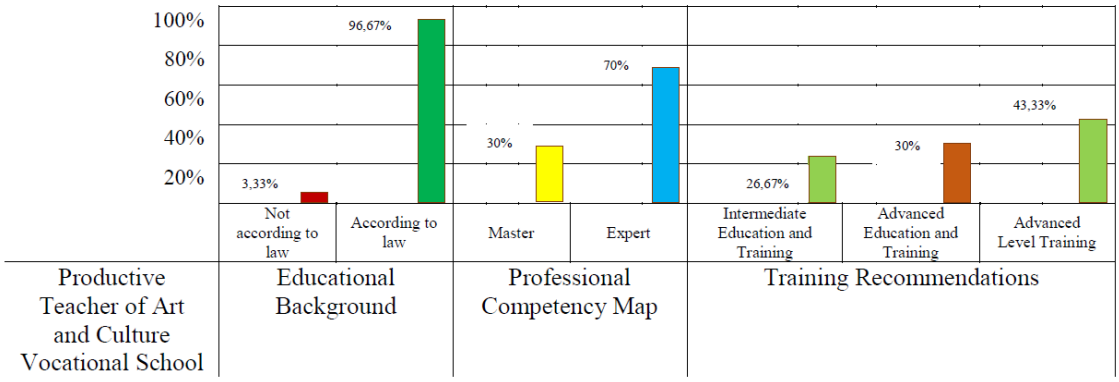

Figure 2. Background, Competency Map, and Training Recommendations

Figure 2 shows the condition of productive teachers at the Yogyakarta Special Region Province of arts and culture vocational school, a map of the professional competence of productive teachers, and training recommendations that teachers can follow. The results showed that the productive teachers of the Yogyakarta Special Region Province of arts and culture vocational high school were very qualified to carry out arts and culture learning in vocational high school. What needed improvement was the teacher's participation in functional training. Unfortunately, the opportunity to take part in functional training is very limited. Usually, the names of the training participants have been determined by the education and training organizers, so accuracy is not guaranteed. It sometimes does not match the needs of the school. This was expressed by several teachers who stated that;

> *"We haven't had the opportunity to take part in the training, because usually the education and training organization has appointed a name (by name) to participate in the training and sometimes it coincides with other activities."*

The results of this study are corroborated by the results of research which say that vocational teachers are required to master new competencies in a comprehensive manner, such as having hard skills and soft skills through education and training (Sudana et al., 2015). The same thing was conveyed in the study results, which stated that the soft skills of productive teachers need to be developed through functional training (Arifin et al., 2017). Training for productive teachers can provide new insights on individual effective job performance specific to the vocational teaching profession (Sumaryanta et al., 2018). The teacher competency test results were used to measure teachers' mastery of pedagogic and professional competence in all subject matter and at all levels of schools (Setiawan, 2015).

Functional education and training attended by productive arts and culture teachers can improve and evaluate the learning process. This is in line with the results of research which says that professional development is about teachers learning, learning how to learn, and transforming their knowledge into practice to benefit their students' growth (Mulyadi et al., 2019). Teachers' general knowledge in the context of professional development is related to improving the implementation capability of tactical and strategic tasks (Kramarski & Michalsky, 2009).

Based on the results and discussion above, it can be concluded that the importance of mapping productive teachers in vocational schools is certainly not only in the field of arts and culture but also in other fields. It aims to deepen teachers' knowledge in accordance with their competencies, skills, and capacities relevant to their ability to teach. The professional competence of teachers is very urgent in developing the mindset, skills, and abilities of vocational high school students.

CONCLUSION

The educational background of productive teachers at arts and culture vocational high school in D. I. Yogyakarta Province consists of competency skills; dance, musical arts, theater arts, and puppetry 96.67% per the legal basis set by the Ministry of Education and Culture of the Republic of Indonesia. The suitability of the competence or linearity of productive teachers at arts and culture vocational high school Yogyakarta according to learning materials in vocational high school, so there are no difficulties in implementing the learning process. Map of professional competence (skill passport) of productive teachers at the Yogyakarta Special Region of arts and culture consists of skill competencies; dance, musical arts, theater arts, and puppetry are 30% of teachers in the mastering category and 70% in the very mastered category. Based on passport skills, it is recommended that 8 (26,67%) teachers attend secondary level training, 9 (30%) teachers participate in advanced training, and 13 (43,.33%) teachers attend advanced level training.

This research implies that the mapping of professional competence of productive teachers is challenging to implement if it only relies on knowledge assessment. To get valid results, it is necessary to practice competence and need quantitative research with skill audit technique. However, at least by mapping knowledge-based professional competencies, the quality of theoretical mastery of productive teachers in the arts and culture vocational high school can be seen. The results of the study are recommended for consideration by the relevant agencies in making teacher recruitment policies and improving teacher quality, determining teaching tasks and burdens, developing teacher coaching models, as a reference for teacher quality research, as well as discussion material regarding the professional competence of productive vocational teachers.

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An analysis on students' thesis topics and research types in automotive engineering education program

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ABSTRACT

This study aims to analyze the topics and types/methods of research in the thesis of students of the Automotive Engineering Education study program, Universitas Negeri Yogyakarta. This research is descriptive research. The types/methods were descriptive models, Action Research, Ex Post-Facto, Research and Development, Evaluation, and Experimental Research (100, 69, 50, 35, 30, and 23 studies respectively). The study was conducted by analyzing 320 student thesis articles published from 2014 to 2018 in the Yogyakarta State University student e-journal. The results showed that the student's thesis topics consisted of 5 research topics, namely: education (139 topics), learning (120 topics), media development (43 topics), university issues (9 topics), and automotive engineering topics (9 pieces). Based on the results of the research, the types/research methods used were categorized into six methods, namely descriptive models (100 studies), classroom action research (69 studies), ex-post-facto (50 studies), research and development (48 studies), evaluation (30 studies), research and experimental (23 studies).

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INTRODUCTION

Tertiary education has been run for several models in Indonesia, such as academies, polytechnics, institutes, colleges, and universities as stipulated in Law of the Republic of Indonesia number 20 of 2003, article 20 paragraph one concerning the national education system. Higher education is expected to produce a well-rounded human resource who can compete in their fields at the national, regional, and international levels. To achieve this goal, higher education should maintain the learning quality and enhance the relevance of education based on the students' needs and the world of work. It has also become the focus of the Automotive Engineering Education Program, Faculty of Engineering, Universitas Negeri Yogyakarta, as one of the educational study programs aiming at producing prospective teachers for vocational high school (VHS), industrial training, as well as entrepreneurs in the automotive sector. Wagiran (2016) explains that graduates of educational programs and engineering/polytechnics have equal opportunities to become prospective teachers. It urges graduates of educational study programs to be ready to compete with non-educational competitors, especially in the job market for both VHS and industrial training.

Curriculum development in educational programs must cover the demand of the world of work, both in the field of education and non-education, based on the current challenges to ensure the

graduates have high competitiveness. In fact, Yuswono et al. (2014), in their research involving 50 teachers of automotive engineering, reveal that the number of teacher competencies is still below the standard. Hasanah and Malik (2018), in their results, highlights that the graduates' profile based on the industrial qualifications must have special skills, and their further career will be determined through their skill performance and a feasibility test. It motivates the educational study programs, including automotive engineering fields, to develop a suitable curriculum in answering the challenges from the world of education and industry.

Arifin et al. (2014) mention that the curriculum development of the Automotive Engineering Education Program, Faculty of Engineering, Universitas Negeri Yogyakarta, is designed referring to the needs of the world of work and the National Qualification Framework for each subject. Most graduates work as vocational school teachers in the automotive sector (52%), and others are in the industrial and entrepreneurial fields (Haryana et al., 2019). Suyanto et al. (2019) indicate that the graduates have good work performance based on the assessment results from the user. One of the strengths of the graduates is their ability to think systematically, which is gained from their research process and final thesis projects.

The Regulation of Universitas Negeri Yogyakarta Rector Number 1 of 2019 on the Academic Guidelines regulates that the Thesis Final Project course is mandatory. It must be taken and completed and function as a medium for actualizing the students' competencies in solving the problem based on the field of study, in addition to completing the thesis, based on the circular from the Ministry of Education and Culture of the Republic of Indonesia No. B/565/B.B1/HK.01.01/2019, students are required to produce a scientific paper through research that is published as one of the graduation requirements for the undergraduate program (S1). Research refers to creative and systematic work to improve or apply one or several fields of science in an integrated manner to benefit humans, culture, and society (Creswell, 2012). The research process includes collecting, identifying and analyzing information to enhance understanding of a topic or problem, draw conclusions, and generate new knowledge or applications in a particular field (Organisation for Economic Co-operation and Development, 2015).

The undergraduate thesis systematics consists of the title/topic, abstract, introduction, literature review, research method, results, discussion, conclusion, and bibliography. In research activities, the students must be able to identify important points raised as research topics. In addition, the methods used in research must be accountable to guarantee their valid and reliable output. After finishing writing the thesis report, the students will present the results to three examiners: the chairperson, the supervisor, the main examiner, and the examiner's secretary. The success in writing this thesis is greatly determined by the quality of the research reports and the performance of the presentation before those three examiners. The final thesis is the work students produce based on their competencies from the previous learning courses. The students must join the courses in educational research methodology and statistics to support their research capabilities. As for writing reports, they have taken Indonesian language courses. Meanwhile, students have taken other supporting courses like education and vocational competencies for educational and productive competence.

In addition to being one of the factors that facilitate students to develop a systematic and scientific mindset, the final thesis project is also one of the inhibiting factors for students' learning completion (Siswanto & Sampurno, 2015). The study period average among undergraduate students in automotive engineering is 4.69 years in the 2019/2020 academic year, which is longer than the national standard. The problems faced by undergraduate students in writing their final thesis are finding problems and research topic ideas, collecting data, writing reports, and making journal articles since they are working independently under the supervision of their lecturers (Siswanto & Sampurno, 2015). Based on this background above, it is necessary to map out the results of the students' thesis in the Automotive engineering Education Program, Faculty of Engineering, Universitas Negeri Yogyakarta. The mapping results are expected to provide an overview of the research topics and methods that will be beneficial to be used in an evaluation and curriculum development process.

RESEARCH METHOD

This research is a descriptive study that aims to describe the topics trends and the research methods on the thesis among the students of the Automotive Engineering Education Program, Faculty of Engineering, Universitas Negeri Yogyakarta. The research data was obtained from the articles of the undergraduate students' final thesis from 2014-2018, as many as 320 articles. The articles produced by students of this study program were accessed in the student e-journal http://journal.student.uny.ac.id/ojs/ojs/index.php/otomotif-s1/issue/archive. The obtained articles were classified based on the topics and the research methods. The results obtained were then analyzed and interpreted to provide a complete picture of the topics and research methods.

RESULT AND DISCUSSION

Result

The Number of Final Project Articles of the Automotive Engineering Education Students

The final thesis course (6 credits) has become one of the students' graduation requirements for the automotive engineering education study program. The students should also publish the research results in scientific articles. From 2014-2018, there were 320 articles, and each article described the overall research carried out by students, including the topics and research methods. The number of articles produced varies from 2014 (80), 2015 (60), 2016 (40), 2017 (70), and 2018 (70), respectively. This varied number is influenced by the number of students who can complete their final thesis each year. Ideally, the number of articles produced should be 80 articles/year based on the quota of automotive engineering education students each year.

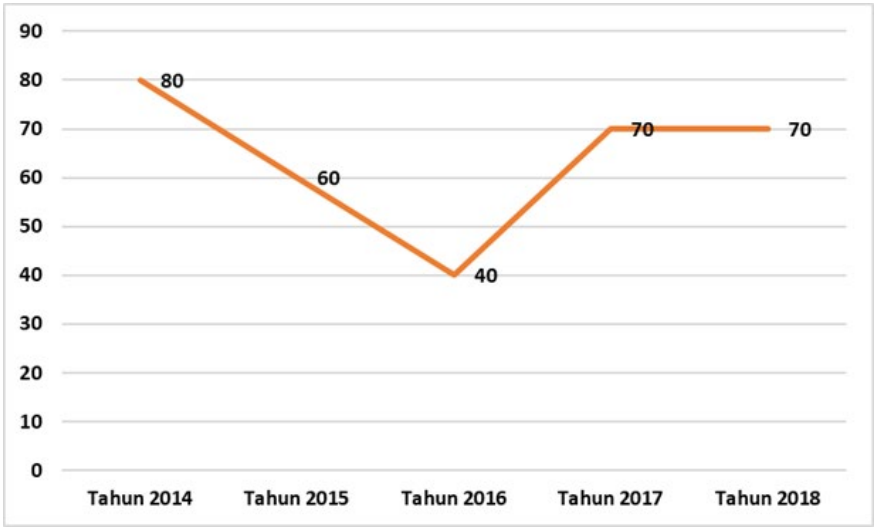

Figure 1. The Number of Final Project Articles of the Automotive Engineering Education Students (2014-2018)

The Research Topics on the Undergraduate Thesis of the Automotive Engineering Education Students

The research topic refers to the main ideas, thoughts, or problems in research that underlie the study. The research topics from 320 articles were grouped into five categories: learning, education, media development, university issues, and automotive engineering. The articles with the learning topics contained the implementation, model development, and models implementation or classroom learning models. The articles on the topic of education consisted of the components of eight educational standards, especially those in vocational high schools of Yogyakarta and the surrounding areas. The topic of media development mostly discussed the development of learning

media with android, videos, trainer kits, etc., to support learning in vocational high schools. The university topics mainly talked about the campus environment, such as the evaluation of the career unit and the implementation of students' industrial internships. Meanwhile, the articles on automotive engineering focused on the development of the university electric car named Garuda UNY and other relevant engineering studies.

The data on research topics for the student's final projects from 2014-2018 showed that there were articles on the topics of learning (120), education (139), media development (43), university issues (9), and automotive engineering (9) as presented in Table 1. From these data, the most dominant research topic is the area of education and learning, while the topics on media development, university, and automotive engineering were relatively few.

Table 1. The Students Research Topics

No.	Research Topics	Number	Percentage
1	Learning	120	37.5%
2	Education	139	43.4%
3	Media Development	43	13.4%
4	University Issues	9	2.8%
5	Automotive Engineering	9	2.8%
	Number	320	100%

The Research Methods on the Undergraduate Thesis of the Automotive Engineering Education Students

The research method is to formulate an approach for a certain problem or what is being studied in the research. Various types of research methods exist, ranging from descriptive, classroom action research, experiment, evaluation, research and development, and ex-post-facto. The analysis results on the types/research methods used in the undergraduate thesis among the students of Automotive Engineering Education, Faculty of Engineering, Universitas Negeri Yogyakarta in the last five years showed respectively the descriptive method approach (100), classroom action research (69), experiment (23), evaluation (30), development (48), ex post facto (50) as presented in Table 2.

Table 2. The Students Research Methods/Types

No.	Research Methods/Types	Number	Percentage (%)
1	Descriptive	100	31,2
2	Classroom Action Research	69	21.5
3	Experiment	23	7.2
4	Evaluation	30	9.4
5	Research and Development	48	15
6	Ex Post Fact	50	15.6
	Number	320	100

Discussion

Students' Undergraduate Thesis

The learning outcome of the Automotive Engineering Education Program, Faculty of Engineering, Universitas Negeri Yogyakarta is in the form of scientific work in the form of an undergraduate thesis project included in the research course (6 credits). Based on the mapping results for the last five years, 2014-2018, there were 320 theses. The average number for each year was 64 works. The highest number was found in 2014 with 80 research reports, while the least was 40 reports in 2016. It shows that the number of students in the automotive engineering education program who completed their studies on time was still less than the number of newly enrolled students. The data

also indicate that the academic learning time among the automotive engineering education program students is still more than four years. It is necessary to look for strategies to accelerate their learning time. Based on research conducted by Siswanto and Sampurno (2015), one of the major causes of the students' learning time is the completion of the undergraduate thesis.

Furthermore, starting in 2014, several improvements were made to the management of thesis final project management by building a synergy between the educational research methodology course and the submission of the title of the undergraduate thesis. The process of the supervisor appointment was also improved to ensure the progress of the thesis completion. As a result, in three years later, the average of the students' learning time is getting better from 5.64 (2014/2015) to 4.69 (2019/2020) (http://akreditas.uny.ac.id). Those improvements must be improved so that the average learning period can meet the expected target of 4.65 in 2021.

Topics of Undergraduate Thesis Projects

The analysis results of the student's theses in the Automotive Engineering Education Study Program, Faculty of Engineering, Universitas Negeri Yogyakarta from 2014 to 2018 showed 320 thesis works that are mostly dominated on the topics of learning (120) and education (139). Though the research topic of learning and education is in line with the automotive engineering education study program, these topics are over-used, and the choice of this topic must be reconsidered to avoid repetition. The repetitive research topics can reduce the stimulus for students to think creatively.

The topic of media development topics (43) are a few, and they need to be further emphasized for students. The topic of media development research agrees with the campus mission to develop automotive learning media which is appropriate for the development of science and technology. The ability of education graduates to develop media is crucial in the future (Emilio Álvarez-Arregui et al., 2017; Uerz et al., 2018). The needed media development skills in the future are learning video (Warju et al., 2020), online learning media (Surani et al., 2020), interactive learning media, and virtual reality or augmented reality (Fehling et al., 2016; Jan Spilski et al., 2019). The competencies that can support students to be able to develop these media need to be nurtured through formal teaching like learning media courses. In addition, almost all research on learning media is limited to testing the feasibility of the developed media. The lecturers or the management need to ensure that the developed media can be applied by testing its effectiveness, or at least it must be published to be accessed by public users.

Some research topics about universities (9) and automotive engineering (9) are still rarely discussed by the students. This topic is relevant to the missions of the Automotive Engineering Education Program, Faculty of Engineering, Universitas Negeri Yogyakarta, to carry out basic and applied research based on the current developments in science and technology. The research on-campus dynamics or study programs can also be employed as a means for self-evaluation. For instance, the university's research on the career unit can provide beneficial inputs to optimize the unit's work in building partnerships with the relevant industries. On the other hand, studies in the field of engineering can assist the lecturers in deepening their technical expertise and applying the research results to the appropriate engineering learning process.

Methods/Types of Undergraduate Thesis Projects

The analysis results show that from 2014 to 2018, there were 320 thesis works with various research methods. The most widely used type/method of the students' works is descriptive research (100). The descriptive model aims at identifying or providing a clear picture of something, for example, a study on the feasibility of practical facilities or infrastructure to carry out light vehicle engineering competency testing activities in vocational high school (Setiawan & Yuswono, 2017), a study on the management of learning facilities for autoerotic technique practice in vocational high school (Hastowo & Haryana, 2016), and a study on the factors that affect low learning motivation among vocational high school students and efforts to improve them (Santosa & Us, 2016). In general, descriptive research is carried out using quantitative methods instead of qualitative ones.

The next type or method that is often used by the students is Classroom Action Research (CAR), with 69 works. Some examples of classroom action research are improving students' learning outcomes by applying peer tutoring methods to vocational high school students (Fitrianto &

Sudiyanto, 2018), improving activities and learning outcomes in PSPTKR subjects with the snowball throwing learning model (Yulfika & Us, 2017), and jigsaw learning model (Muhlisin & Yuswono, 2018). A teacher should be able to implement CAR in their daily teaching activities. In the teacher profession education program (PPG), each participant is required to plan, implement, and report in the classroom action research. Considering the importance of CAR for the students of educational programs, they should have experience with it, at least in the form of simulations in appropriate educational courses, such as micro-teaching or vocational learning. The use of the CAR method in students' thesis should also be managed by reviewing the repetition factor that can hinder students' creativity. The application of the CAR method should also consider the subjects or the vocational schools as the research target. The implementation of CAR in the students' thesis should genuinely make a real contribution to partner schools.

Another common type of research is ex post facto, with 50 studies. This research is mainly used to determine the relationship or influence of a variable on other variables. Several research titles which are included in this research model are the extent to which family status affects the interest of vocational students to pursue to college level (Purnama & Sudiyanto Sudiyatno, 2017), the extent to which interest in learning and learning facilities influence the learning achievement of vocational students in the subject of fuel system service (Aditya & Sutiman, 2017), and the extent to which learning motivation, study habits, and learning environment affect student achievement (Wicaksono & Sofyan, 2017). This type of research is expected to provide a deeper understanding to students of various factors that can affect a student's learning achievement. This research method tends to be a repetition and without any follow-up actions. Further research needs to be done to contribute to the real learning process. For example, after it is known that the learning environment has a positive and significant influence on learning achievement, it needs to be followed up with research on what kind of learning environment which are considered good and how to build the environment.

Development research has become one of the research types used by students (48 studies). This method is generally used by students who develop learning media such as the development of signal generators in analog and digital electronics courses (Irawan & Solikin, 2017), design for FG16 competition vehicle aerodynamic devices (Murwanto & Wakid, 2017), and learning media development for coupling system subjects in vocational high school (Syakura & Us, 2017). The use of development methods helps students to sharpen their skills for analyzing problems and needs, designing, developing, as well as assessing the feasibility of a developed product. This research can also create a useful product for the study programs or the public. It is hoped that the research products can be followed up with the submission of Intellectual Property Rights (HAKI) in the form of Copyrights or patents, as well as wider publications so that they can be accessed by the public. In addition, the product also needs to be tested for its effectiveness within the learning process to guarantee sustainable improvements and support the supervisor's field of expertise.

The next research type/method category is evaluation (30 studies), including the test development or evaluation of a certain program. The examples of research for this category are the evaluation of the implementation of education quality assurance carried out at SMKN 1 Magelang (Sodiq & Haryana, 2017), item analysis for the end-semester test instrument for the light vehicle electrical maintenance course (Shodiq, 2018), and an analysis of work productivity in the Nissan workshop in Yogyakarta (An analysis of work motivation and productivity of the technicians) (Fathumina, 2018). Evaluation research, especially on item analysis, needs to be improved to assist the supervisors in developing a product in the form of a valid and reliable test instrument so that it can be used by teachers in assessing students learning outcomes in vocational high school.

The least type of research or method is the experiment model (23 results). Experimental research requires high competencies in statistics and a deep understanding of research methodology. It may decrease the students' interest in dealing with this kind of research. The lecturers should encourage the use of the experimental method for the students' thesis, especially to examine the developed learning media for the previous students or other product developments.

CONCLUSION

The learning outcome in the form of thesis projects in the Automotive Engineering Education Program, Faculty of Engineering, Universitas Negeri Yogyakarta, is 320 works. The topics used by the students can be categorized into five research topics, namely education (139), learning (120), media development topics (43), university issues (9), and automotive engineering (9 pieces). The research topics carried out need to be varied and balanced to help realize the mission of the Automotive Engineering Education program in carrying out educational and engineering studies and integrating them within the learning process. The research methods in the students' thesis can be classified into six, including descriptive (100), Classroom Action Research (69), Ex Post Facto Research (50), Research and Development (48), Evaluation (30 pieces), and Experimental Research (23 pieces). These studies need to be followed up like registering intellectual property rights and research publications, while the developed products like learning media need to be tested for their effectiveness when applied to the learning process.

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Self-directed learning readiness of automotive body repair student to face 4.0 learning system

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ABSTRACT

This study aims to reveal: 1.) Readiness of independent learning of vocational students in the department of automotive body repair to face 4.0 learning systems; and 2.) Supporting and inhibiting factors of students in implementing a 4.0 learning system. This study uses a descriptive-analytical method with a case study approach. The subject consisted of students and teachers of vocational high school majoring in automotive body repair. Data collection techniques in this study were observation, interviews, and questionnaires. The research was conducted at SMK N 2 Depok Sleman, automotive body repair engineering department. 30 respondents filled out the questionnaire to assess the level of self-directed learning readiness of respondents according to SDLR. The readiness level of self-directed learning is divided into three categories: low, medium, and high. The results of this study are (1) Readiness of students majoring in automotive body repair techniques in the face of learning systems 4.0 is included in the medium category, and (2) The supporting and inhibiting factors found in dealing with learning systems 4.0 come from internal and external of the student learning environment.

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INTRODUCTION

Industry 4.0 is a revolution in the form of technology that cannot be used for various kinds of human activities based on what they do every day into technology-based. According to *Speech by Federal Chancellor Angela Merkel at the VIIIth Petersberg Climate Dialogue* (2017), all aspects of the industrial era 4.0 are currently inseparable from unlimited use of power and data usage in the service and utilization of the internet. Industry 4.0 is defined as a comprehensive transformation in the technology of combining digital and internet technology with the conventional industry. Industrial era 4.0 also requires students' skills in using technology to communicate at the national level and internationally so that students can compete globally with the knowledge and competencies they have (Purwasih & Rahimmulaily, 2019).

Lee et al. (2013) summarise this by saying industry 4.0 is driven by several factors, namely: 1.) Increased data volume, computing power, and connectivity; 2.) Emergence of analysis, capability, and business intelligence; 3.) The formation of interactions between humans and machines; and 4.) Improvement of digital transfers into the physical world such as robots or 3D printing. The impact

of the 4.0 industrial revolution does not only change industrial and economic aspects, social processes, and aspects of learning or education.

Education is a very important aspect and has become the main need of every human being. Education creates changes in a person's attitude and ethics. Through education, a person is expected to be able to increase his competence in various fields so that he can compete with others in the face of learning 4.0 (Pusriawan & Soenarto, 2019). In the face of learning 4.0 in the 21st century, Vocational students must have four competencies which are including (1) critical thinking; (2) creative and innovation; (3) collaborative; and (4) communicative (Muslim et al., 2019). Based on this, it can be concluded that education is a very important factor in determining a person's attitudes, ethics, and competence to achieve the learning system 4.0.

Learning in the era industry 4.0 ideally fits the stages of student intelligence development. This is important because the suitability of the learning process with students will lead to an interest in learning. Classroom learning in the industry 4.0 era needs to be optimized through learning activities to develop students' abilities to learn well. The learning process using appropriate methods and media will facilitate the development of student's abilities at the optimal development stage. Learning is a process that occurs through interaction between students and teachers, as well as students and other students.

Therefore, it is important for students to get the learning process using learning models appropriate to the development stage of their intelligence. Therefore, the process of developing student competencies must begin with learning that can facilitate students through learning activities carried out by students. The importance of information regarding student characteristics relates to how to develop learning resources or media and the appropriate learning process. Learning in students must be facilitated using learning processes and resources that fit the characteristics of students (Januszewski & Molenda, 2013). Learning technology plays a role in selecting appropriate learning methods and resources for conveying the learning message.

In the educational aspect of industrial development, 4.0 is often referred to as a 4.0 learning system. The 4.0 learning system is a learning system that utilizes the internet as access to developing science and technology. This learning system is often referred to as Heutagogy Education. The pedagogy approach is seen as a platform to develop an understanding that students are empowered to see what is learned, learn new contexts, and make decisions in that context (Narayan et al., 2019). Heutagogy approach (self-determined learning) has the principle that more mature students need less control from the instructor and, of course, the structure and can be more independent in their learning, while under-developed students need more instructor guidance and prerequisite courses (Canning & Callan, 2010). According to Hiryanto (2017), heutagogy is often defined as a self-determined learning study.

The role of educators in the 4.0 learning system is as a leader of a team that collaborates with students to create science and technology by utilizing the internet and other supporting devices to improve students' ICT skills (Wardani, 2018). ICT Skill needs to be developed, this is in accordance with the opinion of (Majid & Ridwan, 2019), which states that information and communication technology (ICT) nowadays has developed so rapidly that all fields use ICT to increase their activities. Teachers and students must always associate the use of ICT tools with subjects in the area of expertise, expertise programs, and skills competencies learned in schools so that they can improve their ICT Skills (Agustini et al., 2019). Based on this explanation, it is necessary to collaborate between teachers as leaders and students as teams in utilizing ICT devices in the learning process. The use of ICT will later be integrated with the competencies and expertise programs learned by students, so hopefully, ICT skills can be increased together with the competency skills learned.

The learning process on the 4.0 learning system is carried out openly so that it is expected to increase the learners' creativity. Besides that, the learning process is done by creating social networks between classes and disciplines. 4.0 The learning system requires students to be active and have an attitude of independence in learning. Students are expected to be able to choose the learning materials used to improve their competence. Materials that are a source of independent learning in the 4.0 learning system should be easily accessible to students anywhere and anytime.

The 4.0 learning system in Indonesia has not been fully implemented either in upper secondary or vocational high schools. However, several universities in Indonesia have begun to implement a 4.0 learning system. This, in addition, is because the uneven internet network found in the regions is also due to supporting facilities and infrastructure, as well as the ability of each individual involved in learning and literacy skills both from students and educators. This literacy focuses on three things: (1) digital literacy, (2) technology literacy, and (3) human literacy. Digital literacy aims to improve the ability to read, analyze and utilize information in the digital world. Technology literacy aims to improve understanding of machine work events and technology applications. While human literacy aims to improve communication skills and mastery of design knowledge (Aoun, 2017).

About the industrial revolution 4.0, vocational schools have a huge opportunity to implement a 4.0 learning system. Vocational education is education that directs students to continually improve individual independence in improving their competencies in order to compete and the ability to entrepreneur by their competencies. This is in line with the principles of the 4.0 learning system that demands students' independence in learning.

According to Bukit (2014), vocational education has the characteristics, namely: 1.) Oriented to the performance of each individual in the world of work; 2.) Specific justification of needs in the field; 3.) Focusing on the curriculum with psychomotor, affective and cognitive aspects, 4.) Measures of individual success not only limited to school; 5.) Having sensitivity to the development of the world of work; 6.) Requires adequate facilities and infrastructure; and 7.) The existence of support from the community. Also, vocational education aims to develop knowledge, abilities, and skills to shape one's competence (Prosser & Allen, 1925).

Based on this, vocational education has great potential to implement a 4.0 learning system to produce competent individuals in their field ready to plunge into industry 4.0. One of them is a vocational school majoring in automotive body repair techniques. However, before this 4.0 learning system is implemented, it is necessary to analyze the readiness of students' independent learning and analyze the supporting and inhibiting factors that influence the application of the 4.0 learning system in vocational schools, especially in automotive body repair techniques.

The readiness for independent learning is often referred to as Self Directed Learning (SDL). According to Stockdale and Brockett (2010). SDL is a process of an individual taking the initiative with or without help from others and carried out by being aware of his own needs in learning, managing personal goals, making learning decisions and strategies, and assessing results. Besides, (Darmayanti, 1995) describes SDL as an ability to regulate, manage and control students' learning process in overcoming various kinds of problems in learning by using various kinds of alternatives or learning strategies.

According to Aruan (2015), self directed learning is defined as a person's ability to take the initiative in managing, managing, and controlling the learning process in overcoming various learning problems by evaluating and determining how to learn according to needs. SDL is also defined as an increase in knowledge, expertise, and self-development achievements where loyal individuals use various methods in many situations at all times (Darmayanti, 1995). This concept is very relevant to the theme of the 4.0 learning system, where an individual must continue to improve the competencies possessed through teaching materials that can be easily obtained so that they have the ability in terms of connectivity with others, discovery, and sharing of information and personal collecting and adaptation of information (Wardani, 2018).

These various things become urgent that it is important to examine the readiness of the education component in dealing with industry 4.0. After knowing the readiness for the implementation of learning, all aspects of support and obstacles can be anticipated for the advancement of education in a school or learning institution. This research will describe the readiness of learning in the industrial era 4.0 and the supporting factors inhibiting learning. The aspects of this research study refer to two components of the learning variable, the initial conditions and the learning method. Aspects of the initial conditions that need to be revealed are the objectives and characteristics of the field of study, the constraints of the implementation of the field of study, as well as the characteristics of students. As for the learning method variable, the aspects of the study are the

organizing, delivery, and management strategies of learning. These two variables are interconnected in order to achieve learning objectives.

Analysis of each of these components is expected to reveal the implementation of character learning in childhood. An in-depth description of the findings of the relationship between two variables in the implementation of character learning will be able to explain the question of how to implement character learning. These various descriptions explain that this research aims to: (1) school readiness in facilitating student learning in the industrial era 4.0; and (2) supporting and inhibiting factors of the implementation of learning in industry 4.0.

RESEARCH METHOD

The research was conducted using descriptive-analytical methods in the form of case studies. The data collection process was conducted to determine self-learning readiness (SDL) for students of SMK N 2 Depok, Sleman majoring in automotive body repair engineering in the face of learning system 4.0 and supporting and inhibiting factors in implementing learning system 4.0. The study was conducted at SMK N 2 Depok Sleman, automotive body repair engineering department. The population involved in this research is the entire XI automotive body repair department student at SMK N 2 Depok, Sleman, Daerah Istimewa Yogyakarta, Indonesia.

Data collection to measure the level of student's independent learning readiness in dealing with the 4.0 learning system by distributing questionnaires to 30 students in the Automotive Body Repair Technique. The questionnaire used in this data collection used the Fisher Questionnaire. The distribution of questionnaires is done by going directly to the field. The questionnaire results in measuring self-readiness readiness were then analyzed using SPSS Statistics 17.0. The stages of data management in measuring students' self-readiness are (1) data entry editing, (2) data coding, (3) data entry, (4) data cleaning, and (5) data test.

Data entry editing is the process of editing the questionnaire data. Whether there is an incomplete response or the results of the questionnaire obtained in the research are unclear. Data coding is an activity carried out by classifying data and giving a code to each question. The code provided is used as a guide in determining the scores obtained by respondents. Data entry is an activity to enter data into the SPSS Statistics 17.0 program in accordance with a predetermined code. Data cleaning is an activity carried out to double-check the data that has been entered into the computer and whether there is an error or not.

In the data test, the data analysis process that has been obtained previously is based on the results of filling out the questionnaire. These results will be used as an analysis of SDL. The SDL categories that have been analyzed are then classified to determine the categories of student learning readiness. This categorization refers to the categories proposed by Aruan (2015), as can be seen in Table 1.

Table 1. SDL Readiness Category Respondents

Category	Formula
Low	<X - Standard Deviation
Medium	X ± Standard Deviation
High	>X + Standard Deviation

The results of the data to be analyzed in the SDL category of respondents are seen from the mean obtained in the normality test using SPSS. If the normality test obtained abnormal data, the value that will be included in the SDL formula as data analysis is the median value. After knowing the limits of the SDL readiness category, the next step is to analyze the readiness of students' independent learning from aspects of connectivity with others, discovery and sharing of information, and personal collecting and adaptation of information to deal with the 4.0 learning system. Whereas to find out the supporting factors and inhibitors of the implementation of the learning system 4.0 using data obtained by direct observation and interviews. These factors include internal and external factors.

RESULT AND DISCUSSION

The results of the analysis of the normality test obtained from the questionnaire using SPSS obtained the results as seen in Table 2.

Table 2. Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
VAR00001	.151	30	.079	.918	30	.024
a. Lilliefors Significance Correction						

Based on these results, it is known that the normality test using Shapiro-Wilk obtained results of 0.024. This shows that the data has an abnormal distribution if the value is smaller than 0.05. After finding the abnormal data distribution in the next stage to enter media values into the SDL formula as data analysis, the analysis using SPSS obtained a median value of 90.5 and a standard deviation of 7.52. The results of the analysis of the median value and standard deviation using SPSS can be seen in Table 3.

Table 3. Median and Standard Deviation Analysis

N	Valid	30
	Missing	0
Median		90.5000
Std. Deviation		7.51825

Table 4. Analysis of the SDL Readliness Category

Category	Formulas	Limits
Low	<X - Standard Deviation	< 82,99
Medium	X ± Standard Deviation	82,99 – 98,01
High	>X + Standard Deviation	> 98,01

The next analysis is to interpret the data results from the readiness to learn independently from aspects of connectivity with others, discovery and sharing of information, and personal collecting and adaptation of information with the SDL readiness category. The results of the average SDLRS scores based on these aspects can be seen in Table 5.

Table 5. SDL Readiness Analysis for 4.0 learning systems

Aspects	Sample Size	Average Score	SDL Category
Connectivity with others	30	92,13	Medium
Discovery and sharing of information	30	82,63	Medium
Personal collecting and adaptation of information	30	89,56	Medium

Based on this, it can be concluded that the average readiness of students' independent learning based on aspects of connectivity with others, discovery and sharing of information, and personal collection and adaptation of information in dealing with the learning system 4.0 is included in the medium category. The category is obtained based on the results of the collection of the average score on aspects of connectivity with others, the discovery and sharing of information, and the collection of personal and information adaptation involving 30 student respondents majoring in automotive body repair techniques with the SDL readiness category. The graph that agrees with the average value of each aspect in the SDL readiness analysis assessment for the 4.0 learning system can be seen in Figure 1.

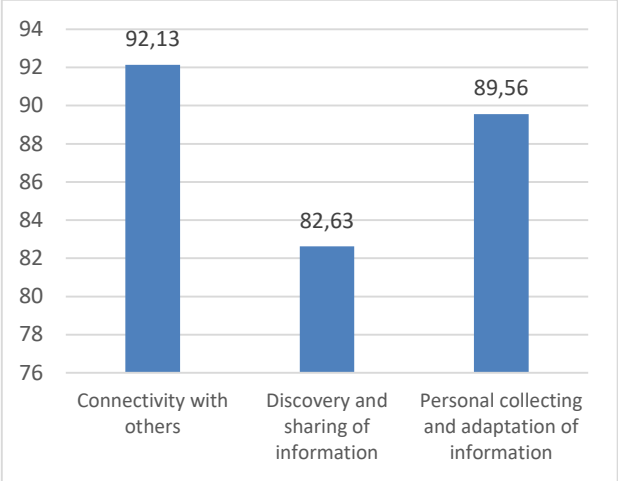

Figure 1. SDL Readiness Analysis Graphic

Figure 1 shows that connectivity aspects with others have the highest score compared to other aspects, with a mean score of 92.13. This shows that in aspects of building connections with fellow students, automotive body repair techniques are good enough or, in this case, included in the medium category. Connections are built manually and already utilizing digital networks and the internet to establish connections. This is reinforced by social media ownership by students, including Twitter, Facebook, Instagram, and WhatsApp. Connectivity with others through a variety of media, both human and digital, and ownership of digital platforms such as smartphones and notebooks that students have, of course, can support students in dealing with learning systems 4.0.

The second aspect is related to the discovery and sharing aspects of information. This aspect obtained an average score of 82.63, with the classification included in the medium category. This is influenced by not all students having a personal blog or a special website that is used maximally for learning related to the subject matter they are learning and dividing it as information. Nowadays, students are more likely to utilize social media platforms as information-sharing media.

The next aspect is related to aspects of personal collecting and adaptation of information. The mean score obtained for this aspect is 89.56. This score is higher than the discovery and sharing aspects of information. This shows that students majoring in automotive body repair techniques personally have a personal collection related to information obtained from various digital media platforms or information obtained directly. This shows that students get a lot of information and immediately adapt to the information received, but only a few explore further and share it with others as learning media either directly or through their blogs. This aspect of the results of the analysis of SDL Readiness is included in the medium category.

The overall average of the three aspects obtained a score of 88.11. This score shows that overall aspects of the independent learning of students of automotive body repair techniques in SMK N 2 Depok, Sleman are included in the medium category. However, students majoring in automotive body repair techniques still have the potential to continue to improve their learning independence. This can be seen from the characteristics and potentially given by automotive body repair techniques in accordance with what was conveyed by Guglielmino and Guglielmino (1991), namely: 1.) Students have learned and are independent in the learning process; 2.) Have responsibility for each learning process that is carried out; 3.) Having a great sense of discipline and curiosity; 4.) Have the desire and enthusiasm for learning and high self-confidence; 5.) Can study time be approved according to what was agreed; and 6.) Have a sense of pleasure and have an interest in completing each of the agreed targets.

The potential supported by these students will continue to be developed and supported by a variety of factors, both internal and external. This becomes very important because developing the potential needed by students to improve learning self-learning will be very supportive in the application of learning systems 4.0. In addition to paying attention to the potential given by students,

some key elements need to be considered to improve SDL readiness. These key elements are expenditures that need to be considered and developed six things discussed are explore, create, collaborate, connect, share and reflect. These six things, together with the potential possessed by students, will be able to give positive results to students' readiness to challenge the learning system 4.0.

Supporting and Inhibiting Factors in Learning System 4.0

Based on the results of observations and interviews at SMK N 2 Depok, Sleman majoring in automotive body repair engineering, it is known that there are several supporting and inhibiting factors in the implementation of learning system 4.0. This factor is divided into internal factors and external factors. Internal factors are factors found in the student learning environment in school, while external factors are factors from outside the school.

Supporting factors from the internal side are 1.) Most students majoring in automotive body repair techniques have a high level of activity and initiative, it can be seen from the way of communication, interaction, and activity of students in participating in activities at school; 2.) Some students already understand the development of industry 4.0 and have good digital literacy skills; 3.) Some teachers have used technology to carry out administrative processes and learning processes; 4.) Some teachers are quite active in providing information and giving students the freedom to search for material from various kinds of learning resources that students can access to improve their competence; 5.) SMK N 2 Depok, Sleman majoring in automotive body repair engineering has provided wifi and Internet facilities that students can make; and 6.) All students majoring in automotive body repair techniques have a smartphone and laptop device that can be used as a source of learning and accessing materials that are relevant to the subjects being studied.

Internal factors in supporting the learning system 4.0 originate from internal schools provided by teachers, students, and facilities provided at internal schools. The internal factors published above can be concluded from the internal aspects of both teachers, students, and public facilities that are ready to do the learning system 4.0. Especially in terms of facilities provided by internal parties of SMK N 2 Depok who have been providing internet and wifi service facilities. Also, the computer lab is provided, this is also supported by the ownership of laptops and smartphones, which are expected to be used to access learning materials that are relevant to the competencies being studied and can improve the skills needed.

In addition to internal driving factors, some factors become obstacles from internal aspects. This factor appears to be the most important for students. Obstacles from the internal side are 1.) Students' patterns and behavior are sometimes difficult to control; 2.) Some students still have individual traits that have an impact on the lack of spirit of collaboration in producing work; 3.) Students lack the motivation to maintain facilities and infrastructure that support the learning process; 4.) Lack of technical skills, teacher coding, and analysis in utilizing ICT; and 5.) There is still a lack of understanding among teachers in understanding and possessing skills related to ICT security.

This obstacle can be minimized by the role of the teacher in fostering a spirit of collaboration during the learning process. Also, the teacher also facilitates students. The role of a facilitator for students will positively impact student openness in sharing and discussing teachers and students with students so that patterns and student relationships are easier to control. After studying patterns and studying students or, in this case, the characteristics of students, understanding the teacher as a facilitator will be able to easily invite students by collaborating in exploring material in accordance with the competencies learned in order to produce results obtained from connectivity between students can be shared with those who other as a source of learning.

This is very much one of the key elements in education in the 4.0 era, namely explore, create, collaborate, connect, share, reflect, and explore. Also, this concept supports students who are highly relevant to the resolution of educational technology, namely study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources (Januszewski & Molenda, 2013).

While internal constraints by teachers are related to the lack of teacher skills in understanding related to ICT skills and ICT security levels, this can be minimized by attending ICT

seminars organized by various institutions. This is very important, especially related to the level of ICT security, because the 4.0 learning system is mostly ICT based. If educators do not understand the level of security associated with ICT systems, it will have an impact on the possibility of damage to the system that has been built. For now, some teachers in the automotive body repair major have attended training related to ICT development. However, improvements and improvements need to be made to improve schools supporting the 4.0 learning system being applied positively. Supporting factors from the external side are 1.) Industry support for using ICT in the vocational school environment facilitates the transfer of information related to needs and increases competencies needed by the industry; 2.) Positive support from the community towards the use of ICT so that they can exchange information; and 3.) The strategic location of SMK N 2 Depok, Sleman, makes it possible to get a more stable internet network.

Based on aspects of the external supporting factors provided by SMK N 2 Depok Sleman. This school has collaborated with various industries. One of them is the automotive body repair engineering skills competency in collaboration with Toyota Astra Motor. Also, the school has also cooperated with industries engaged in IT, one of which is the netbook assembly industry, with the concept of cooperation in the form of a teaching factory. In connection with the support of the industry in facilitating the transfer of information about the needs and improvement of competencies needed by the industry, Toyota Astra Motor provides supporting facilities equipped with practical teaching aids specifically designed for automotive body repair. This is also supported by the curriculum used in automotive body repair expertise competencies that have been adapted to the industry curriculum. One of the benefits of using this curriculum is that after students have gained competency in repairing automotive bodies, they can improve competencies that are by what Toyota Astra Motor needs, so they are ready to work.

In connection with the support of the use of ICT in schools, especially in automotive body repair, expertise competencies have provided several computers and multimedia rooms that can be used as a source of learning by students. The industry has provided various materials that can be downloaded or accessed easily by students through computers provided in the classroom or through the multimedia room for further study and discussion by students. This factor supports improvement in the 4.0 learning system because students can learn independently, collaborating to produce work that can be shared to produce positive value in their area of expertise.

Another supporting factor is the positive support from the surrounding environment for the use of ICT in SMK N 2 Depok so that people can exchange information related to the learning system or update developments in SMK N 2 Depok. This system has been implemented with various social media platforms and websites provided by SMK N 2 Depok. The social media and websites owned by this school are managed in real time so that they will provide information to the community updates. This positive support from the community is important to be very important in building the level of community trust in schools. This level of trust and support will positively participate in applying the learning system 4.0.

Supporting factors External factors are supported by the strategic location of SMK N 2 Depok. The location of SMK N 2 Depok is in an easily accessible environment that has a fairly stable internet network. A supportive environment in the stability of the internet network is a positive value for more and more industries to work together using ICT systems and the development of all these external factors becomes a supporting factor for the implementation of learning systems 4.0.

Obstacles from the external side are 1.) Private or government institutions still conduct little training to improve the ability of ICT for teachers or students, so not all teachers can take ICT training; and 2.) No government policy regarding applying the learning system 4.0 to vocational schools exists. External barriers are related to the still lack of teachers who have the ability in ICT, while the private or government institutions related to improving ICT are still very few. The training provider from the private sector or the government is very important in supporting the implementation of the learning system 4.0. Teachers who already have ICT skills coupled with student learning readiness in dealing with the 4.0 learning system will positively impact the process of implementing the 4.0 learning system later.

All of this certainly will not work properly without the support of government policy in implementing the 4.0 learning system. Students' independent learning readiness, teacher ICT skills,

and support facilities will not be able to run without government policies, especially for vocational schools. With the government policy in implementing the learning system 4.0, it will also be followed by educational institutions to implement the decrees and policies issued. Government policies related to the learning system 4.0 will immediately attract the interest of various industries to collaborate with vocational schools using ICT systems. Students' independent learning readiness in a variety of industry-related information in accordance with the expertise competencies that are expected to benefit both parties, educational institutions, or industry.

CONCLUSION

Based on the results of analysts conducted on independent learning readiness and supporting and inhibiting factors in implementing the learning system 4.0 at SMK N 2 Depok, Sleman majoring in automotive body repair engineering, it is known that the readiness of students' independent learning is based on aspects of connectivity with others, discovery and sharing of information and personal collecting and adaptation of information in dealing with learning systems 4.0 are included in the medium category. However, this category can continue to be improved by increasing several factors that become key elements in dealing with the education system 4.0, namely explore, create, collaborate, connect, share, and reflect. Suppose these key elements can be improved by considering the internal and external potential and supporting factors. In that case, it is expected that students' self-study readiness scores can be increased.

Broadly supporting factors based on the quality of human resources, most of which have used ICT in the learning process and aspects of facilities and infrastructure at SMK N 2 Depok, Sleman has supported the 4.0 learning system. While the inhibiting factor is the lack of technical skills, coding, and analysis that educators have in utilizing ICT, as well as the lack of training carried out by the private sector or government in improving ICT skills for educators or students. At present, only a few teachers have attended ICT-related training. It is expected that later the existence of government policies that support the implementation of the learning system 4.0 can encourage various agencies and institutions to carry out ICT training. This becomes very important because the learning system 4.0 closely relates to ICT. So with the increasing number of training being held, it can equip teachers to deal with ICT-based education systems, especially in the aspect of program security.

The results of the analysis of students' independent learning readiness in facing the future 4.0 learning system can be used as a reference to improve students' self-learning readiness in the high category. The increasing variety of supporting media and the spirit of collaboration is expected to be one of the things that can improve student learning readiness in facing the 4.0 learning system. Also, the factors that become obstacles in implementing the 4.0 learning system can be continually improved and given a solution so that later when the 4.0 learning system is implemented, it can run smoothly.

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Employability skills of state vocational high school students on welding engineering expertise competency

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Welding engineering

ABSTRACT

This study aims to: 1.) Describe the mastery level of employability; and 2.) Find out the order of mastery of the employability skills of vocational high school (VHS) students. This study was a survey research with quantitative approach. The research was conducted at a vocational high school in Madiun Regency with A accreditation. Data collection instrument was a questionnaire that had been tested for content validity by the experts. The construct validity test used the product-moment formula and was declared valid. The results that 56 items were declared valid and reliable. The questionnaire was given to 149 students of class XII of welding engineering expertise competency. Data were analyzed using descriptive statistical analysis technique. The results of the study are as follows: 1.) The mastery level of employability skills is in the high category with the mean score 168.61 greater than the ideal mean score of 132.5; and 2.) The order of mastery on aspects of employability skills, from the highest to the lowest achievement using technology skill, keeping occupational health and safety skill, learning skill, self-management skill, initiative and enterprise skill, planning and organizing skill, communication skill, and problem-solving skill.

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INTRODUCTION

Vocational High School (VHS) is one educational institution that shaped and created manpower. Vocational education focuses on developing and preparing students to have specific skills to be able to carry out certain jobs well. This is reinforced in Law of the Republic of Indonesia No. 20 of 2003, article 15 concerning the National Education System. It is stated there that vocational high schools are established to prepare students especially for entering a workplace with a certain field. The purpose of establishing vocational schools according to Sudira (2017) is to improve the relevance of education and vocational guidance in line with the rapid need for manpower in workplaces. Coherently, the outcome is expected to result in a prosperous society that is competitive and oriented towards sustainable development.

In 2017 and 2018, the tendency of unemployment rate increased among high school/vocational high school graduates. Based on the data from the Badan Pusat Statistik Republik Indonesia (2017), the unemployment rate in vocational high school was the highest among other education levels, at 11.41%. Even though in 2018 it declined, it was still recorded as the highest rate among other levels of educational institutions, numbering 8,92%. It takes one hundred thousand welders that are internationally certified, and currently, there is still a shortage of fifty thousand

skilled welding workers, so this is an opportunity for prospective Indonesian workers in the welding sector (Safuan, 2019).

The government's policy to build infrastructure and maritime really needed workers in the welding sector (Kementerian Perindustrian Republik Indonesia, 2015). This workforce is part of the industrial sector, ranging from shipping, mining, oil and gas, and power plants. Thus, the acceleration of the growth of the welding workforce must be maximized. One of the skills competencies of interest to students entering vocational schools in Madiun is the competency of welding engineering skills. Manpower in this sector is more needed than in other ones. There are several profound companies such as PT. Industri Kereta Api (INKA), Inka Multi Solusi (IMS), and other industries in Madiun that need a welding engineer or welding operator. Besides, one of VHS has a collaboration with PT. Japan Indonesian Economic Center (JIAEC) in which the welding sector is much needed there.

One of the implementations of mastering hard skill competencies is based on the mastery of the Indonesian National Competency Standards (SKKNI). The implementation of SKKNI is also the benchmark of achievement assessment level in the KKNI level II certification scheme. The BNSP certification scheme committee constructs it with the Directorate of Vocational Development. The application of SKKNI in welding techniques includes basic competencies, advanced welding techniques 1, and advanced welding techniques 2. Welding techniques as operators include metal, manual arc, and welding with oxy-acetylene welding processes. However, this does not affect the results of implementing hard skills in the business and industrial world. In the industrial work practice program for the 2016/2017 academic year, only 63.8% of students at SMKN 1 Kebonsari obtained the results of mastering hard skills in the good category.

In the era of turbulent and rapid advancement of technology, industrial development shows massive changes, for instance, in the service sector. It proves that the demands of human resources in the workplace continue to prefer highly qualified and competent ones. The characteristics of 21st-century work are changing from individuals to collaborations. 21st-century skills are based on 4C competencies, which include communication, collaboration, critical thinking, and creativity. Sudira (2018) states that problems in the 21st-century require mental and thought-based solutions. This is because the development of work activities and career life in the 21st-century is increasingly complex and requires thinking and mental abilities to develop a good career. Regarding that issue, Suarta et al. (2017) research found that business and industrial work prefer to employ graduates who can manage changes and desire to grow. Besides, flexible and adaptive employees are more favorable. Furthermore, those skills in vocational education are considered employability skills.

The characteristics of the world of work and the qualifications of the workforce required by industry are also changing rapidly. In this regard, the context of the demands of the world of work should have local, national, regional, and international attitudes (Sudira, 2017). Changes in the demands of the world of work have an impact on work patterns in the workplace and work environment. The competence of the workforce develops so that in the 21st century, it is determined by four main aspects, work skills, moral skills, knowledge skills, and work attitudes (Sudira, 2018). The involvement of those four aspects will build the competence of candidates and workers at a good level of capability. Work skills that are balanced with good knowledge create satisfying work. Creating good work outcomes needs to be accompanied by moral skills. The works should be done through inspiration and carried out with surviving spirit to improve careers for candidates and workers.

In accordance with Sudira (2018), International Labour Organization (ILO) and United Nations Educational Scientific and Cultural Organisation (UNESCO) (2002) stated that it is not enough for a workforce only to develop their vocational skill. Young graduates also need soft skill workshops such as vision determination, problem-solving, and leadership training. New and innovative learning programs help young graduates develop soft skills for success on the job. Graduates who have vocational workforce character improve and instill in themselves to be a reliable workforce candidates along with the development era. Therefore, the performance and competence of vocational high school graduates do not have a gap with the competencies needed in the world of work.

The level of absorption of graduates must remain the focus of attention of vocational education stakeholders. In addition to the demands for basic skills and technical skills in the field of

work they engaged in, the research results of Shyamalee et al. (2013) recommend that vocational education should pay great attention to improving students' skills, including personal and work attitudes, communication skills, and intellectual skills. Those skills complement basic engineering knowledge developed from ordinary knowledge-based engineering programs. International Labour Organization (ILO) & United Nations Educational Scientific and Cultural Organisation (UNESCO) (2002) defined those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupations in various sectors of economic and social life. Hence, the implementation of vocational education varies widely and is based on public policy, the educational environment there, and stakeholders.

Employability skills are indispensable and needed by the 21st-century workforce demands. The findings of Suarta et al. (2017) research mentioned that communication skills, problem-solving and decision-making skills, and teamwork skills are the job skill attributes with the highest importance. In addition, graduates are expected to possess many personal attributes, including self-awareness, self-confidence, independence, emotional intelligence, flexibility and adaptability, stress tolerance, creativity, initiative, willingness to learn, reflectivity, lifelong learning, and professional behavior. Suarta (2011), in his dissertation, stated that employability skills are a set of non-technical and transferable skills needed to acquire, maintain, and develop one's career in the workplace. As transferable skills, employability skills can be used in any circumstances according to the prevailing conditions. It is believed that these skills will support workers in carrying out their roles as best as they can. Department of Education Science and Training (DEST) et al. (2002) explained that employability skills are defined as 'skills required not only to gain employment but also to progress within an enterprise so as to achieve one's potential and contribute successfully to enterprise strategic directions.

Employability skills by National Centre for Vocational Education Research (2003) are also known as core skills, key skills, essential skills, generic skills, necessary skills, workplace know-how, critical enabling skills, transferable skills, and key qualifications. A study by Kubler and Forbes (in Lowden et al., 2011) found that employability skills are abilities with a good workability level. It includes good knowledge, specific competencies, self-compatible abilities, and technical skills and can work well in an organization that requires critical thinking to evaluate and give good impact. Employability skills help someone to get a job, keep his job, and develop his career to success in carrying out his role to benefit himself and the company (Yorke, 2004).

Studies by Department of Education Science and Training (DEST) et al. (2002) state that there are eight main skills, including communication skills, team collaboration skills, problem-solving skills, ideas, and business skills, skills planning and organizing activities, self-management skills, learning skills and skills using technology. Employability skills consist of the ability to collect, analyze and organize information, communicate ideas and information, plan and organize activities, work with others and in teams, use mathematical ideas and techniques, solve problems, and use technology (Department of Education Science and Training (DEST) et al., 2002).

Based on the previous explanation, employability skills are important for graduates of vocational high school majoring in welding engineering skills competencies. However, based on observations of the employability skills of vocational high school students, the welding engineering skills competency has not been mapped. So, this gap becomes a significant aspect of research. Therefore, research needs to be carried out to obtain an overview and describe the employability skills of vocational high school students in Madiun, which have been applied in schools and mastered by students.

RESEARCH METHOD

This research is a survey research with a quantitative approach. The research was conducted at the State vocational high school for welding engineering expertise in Madiun Province with A accreditation. The population of this research was 149 students in XII grade. This is because the class of XII has implemented industrial practices so that they have experience in the real world of work. The population was taken as the source of data. Determination of the sample using a saturated sample

technique. The use of the technique by taking the entire population is the reason that each school has less than 100 students. The research instrument used to obtain data was a questionnaire validated by the experts. The construct validity test used the product moment formula and was declared valid with a value of r > 0.344 (R table with 33 respondents). The instrument test was carried out on 33 other students, and the results obtained on 56 items were declared valid. The reliability test used the Cronbach alpha formula and was declared reliable with an alpha value of 0.994 > 0.05. The data analysis technique used descriptive statistical analysis.

Aspects being emphasized in the research of Department of Education Science and Training (DEST) et al. (2002) and Suarta (2011) include (1) communication skills; (2) teamwork skills; (3) problem-solving skills; (4) Making decision or idea and effort skills; (5) planning and organizing activities; (6) self-management skills; (7) skills in learning; (8) skills in using technology; and (9) occupational safety and health. The descriptive statistical method aims to present and analyze data to make it meaningful. Furthermore, it is to determine each aspect's category by categorizing the data's trend with the formula in Table 1.

Table 1. Calculation Formula of Category

Calculation Formula	Category
(Mi – 3 SD) < x ≤ (Mi – 1.5 SD)	Low
(Mi – 1.5 SD) < x ≤ (Mi)	Medium
(Mi) < x ≤ (Mi + 1.5 SD)	High
(Mi + 1.5 SD) < x ≤ (Mi + 3 SD)	Very High

RESULT AND DISCUSSION

The description of the research data is presented in the form of calculation results, including mean, median, mode, and standard deviation values. After calculation of the data, it is obtained that the ideal average value (Mi) of 132.5 and the ideal standard deviation (Sdi) of 26.5. The results of the employability skills data analysis of 149 students obtained a minimum score of 136 employability skills, a maximum score of 191, a mean of 168.61, a median of 169, a mode of 168, and a standard deviation of 11.03. Based on these data, students' employability skills tend to be high because it has an average arithmetic value greater (168.61) than the ideal average value (132.5). The level of employability skills of students in detail seen from the nine aspects of employability skills are presented in Table 2.

Table 2. Distribution of Employability Skills Score Categories

Category	Calculation Formula	f	Precentage (%)
Low	53 < X ≤ 92.75	0	0%
Medium	92.75 < X ≤ 132.5	0	0%
High	132.5 < X ≤ 172.25	91	38.9%
Very High	172.25 < X ≤ 212	58	61.1%

Based on Table 2, it is shown that students tend to possess employability skills ranging from high to very high of 100%. The achievement of employability skills level is also seen from the comparison between the total score achieved from the research data and the maximum expected total. The total score of employability skills based on empirical data is 25.123 (79.5%) of the expected score of 31.588. The average statement items for each aspect are described based on the research indicators.

Indicators from the communication aspect include (1) listening and understanding other people's conversations; (2) openness to receive information and share the latest technological knowledge; (3) developing attitudes and styles of conveying ideas in writing and orally; and (4) using calculations. The average value of each communication aspect indicator is presented in Figure 1. Figure 1 shows that the highest score was generated from the statement items related to openness to

receiving information and sharing the latest technological knowledge, while the lowest score was related to listening and understanding other people's conversations.

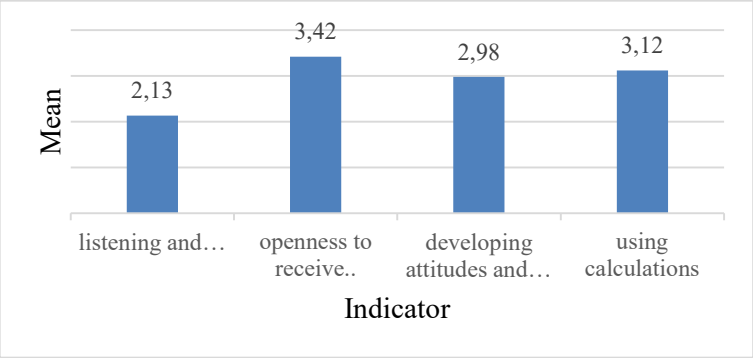

Figure 1. Bar Chart of Mean Score of Communication Aspect Indicator

The result shows that the eighth order of employability skills is the communication aspect. Complaints from employers are the lack of communication skills at the age of millennial workers. Fresh graduates have a low verbal communication level but quite a high level of communication through technology (Vasel, 2016). This is also supported by research conducted by Suarta (2011), showing that the communication aspect also has the lowest mean score of importance. It means that schools must create an atmosphere and environment that facilitates students to maintain intensive communication, share ideas, and manage information.

Communication skills need to be nurtured, practiced, and strived continuously because it greatly impacts networking and maintaining good relationships with fellows, especially in communicating with heads at work. Besides, learning another language is a plus point. It not only improves students' communication skills but also shows employers that they strive for commitment, motivation, and awareness commercially about global economics. The focus of education in vocational high school should not only emphasize technological prowess and skills to operate technology but also balance learning related to soft skills. In the context of preparing vocational high school graduates to be ready for entering the working world, according to Afandi (2017), 21st-century learning needs to insert digital age literacy, effective communication, and inventive thinking, and high productivity. Rightfully, learning indicators should contain good communication skills indicators needed in the workplace.

Indicators from the aspect of teamwork include (1) supporting other members, (2) sharing knowledge, opinions, and ideas in the decision-making process within a team, and (3). The average value of each indicator of the cooperative aspect is presented in Figure 2. Figure 2 shows that the highest averages resulted from statement items related to sharing knowledge, opinions, and ideas in the decision-making process within a team, while the lowest scores from statement items related to upholding teamwork and team decisions in various conditions.

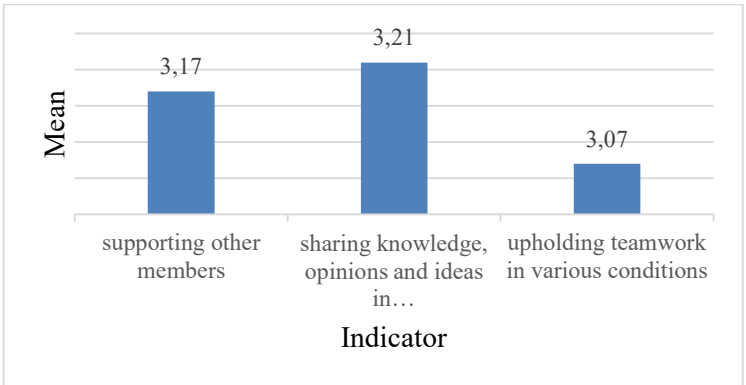

Figure 2. Bar Chart of Average Score Team Work Aspect

Furthermore, indicators from the aspect of problem-solving include (a) using calculation management to make decisions, (2) identifying problems, and (3) applying various strategies to make decisions quickly and accurately. The average value of each problem-solving aspect indicator is presented in Figure 3. Figure 3 shows the highest score resulting from the statement items related to using calculation management to make decisions.

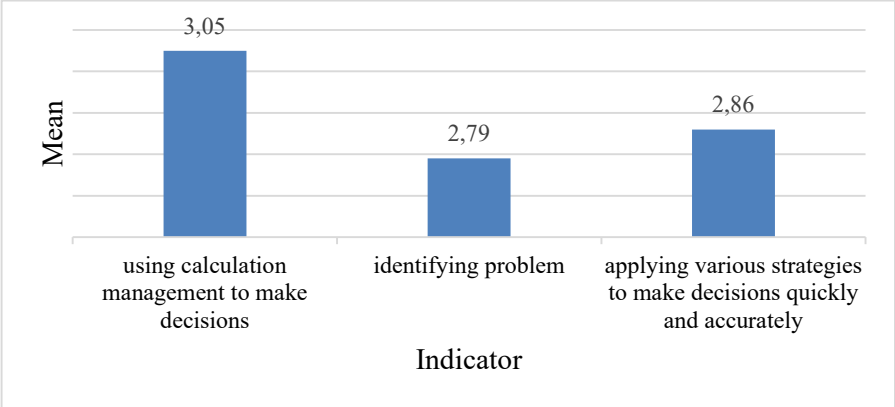

Figure 3. Bar Chart of Mean Score of Problem-Solving Aspect Indicator

Based on the research finding, the aspect of problem-solving skills is shown to be in the lowest order. Even though it is still considered a high category, problem-solving skill is lacking in mastery compared to other skill. Problem-solving skills are still less mastered than other aspects. The findings, if associated with the research findings of Abas and Imam (2016), should be further improved. That stated, although basic skills is related with performance context as a worker, but in problem-solving skill is necessary and useful for a worker.

Although it is still in the high category, His research conclusion is that graduates' competence for employability skills provides advantages when implemented in the workforce. According to their job sheet, students who have ability alongside skills tend to show immense allure and attract employers in the working world. Regarding that issue, students are required to possess significant and substantial skills. The skills include personal traits and competence, and basic skills. Moreover, these job skills are needed for manufacturing education.

Indicators from the aspect of self-management include: (1) having faith in one's own ideas and vision; (2) being responsible for the actions taken; (3) making a work plan systematically; and (4) conducting self-evaluation and seeking improvements to improve performance. The average value of each indicator of self-management is presented in Figure 4. Figure 4 shows that the lowest score was obtained from items related to belief in one's own ideas and vision. The highest score was obtained from self-evaluation and seeking improvements to improve performance.

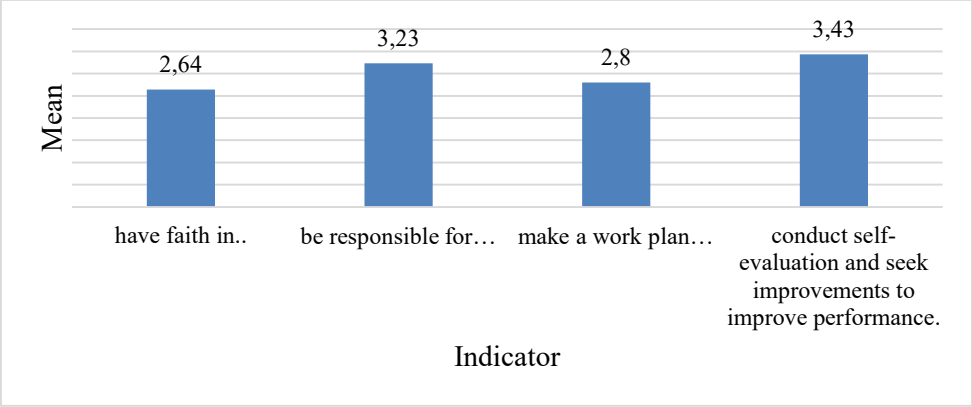

Figure 4. Bar Chart of Mean Score of Self-Management Aspects Indicator

Indicators from the aspect of planning and organizing activities include (1) managing time and priorities for self and team, (2) clearly defining project objectives, and (3) adapting the use of resources and people to address issues. The average value of each of these indicators is presented in Figure 5. Figure 5 shows the varying averages. The highest scores from the indicator about managing time and work priorities, while the lowest scores related to adapting the use of resources and people to address issues about managing time to improve welding skills.

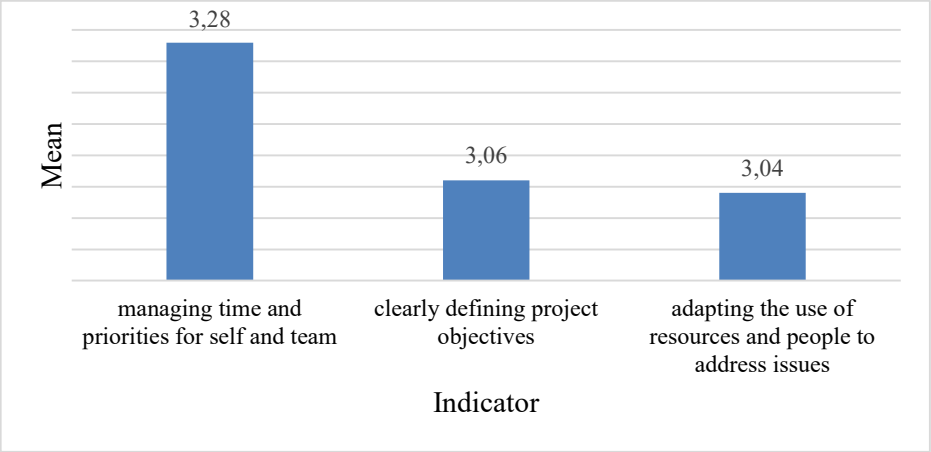

Figure 5. Bar Chart of Mean Score of Planning and Organizing Indicator

Indicators of the aspect of being able to learn include (1) applying what has been learned and using new skills and knowledge in a practical, calm, and easy manner; and (2) desiring to receive new knowledge and skills. The average value of each of these indicators is presented in Figure 6. Figure 6 shows the highest score is desiring to receive new knowledge and skills. Indicators from the initiative and enterprise include (1) Adaptation to new situations, (2) developing strategy, creativity, and long-term vision, (3) identifying opportunities, and (4) manifesting ideas into action. The average value of each indicator of this aspect is presented in Figure 7. Figure 7 shows that the highest score was generated from the statement items regarding the ability to adapt to the characteristics in the workplace or practice, while the lowest score was generated from the item about developing strategy, creativity, and long-term vision or developing strategies in the workplace.

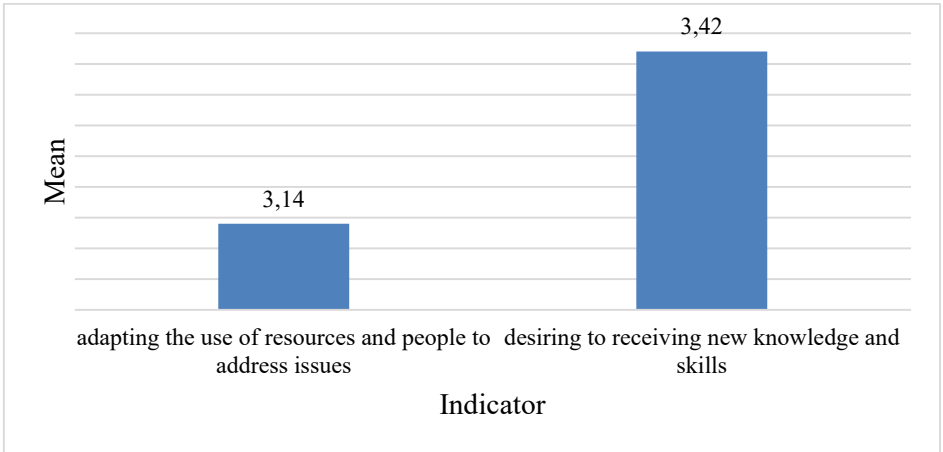

Figure 6. Bar Chart of Mean Score of Learning Indicator

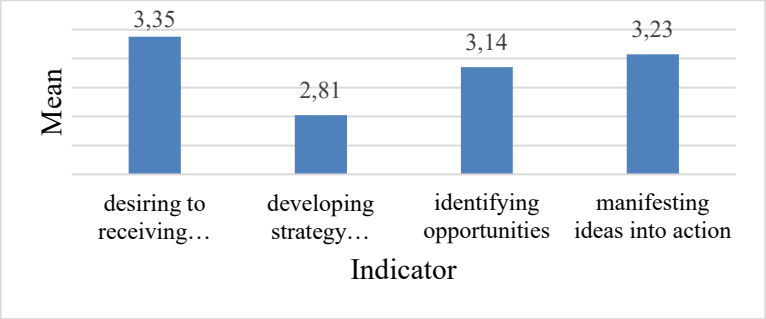

Figure 7. Bar Chart of Mean Score of Initiative and Enterprise

Indicators from the aspect of using technology include: (a) maintaining equipment, hardware, or software to ensure it is well-functioning, and (b) being willing to learn new IT skills and use the latest technology. The average value of each of these aspect indicators is presented in Figure 8.

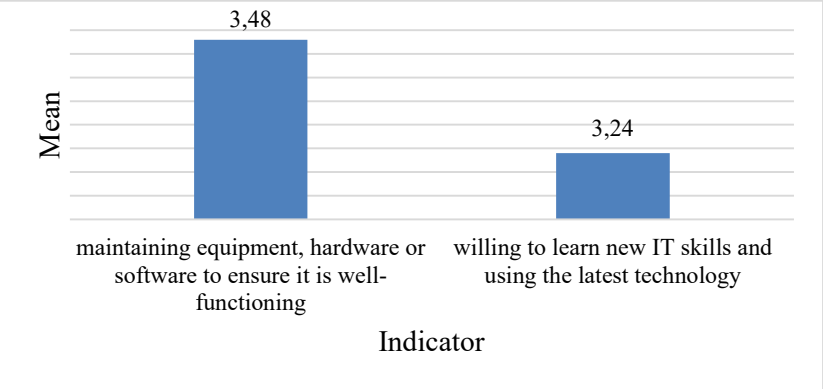

Figure 8. Bar Chart of Mean Score of Using Technology Indicator

Figure 8 shows the highest scores obtained from statement items regarding maintaining equipment, hardware, or software to ensure it is well-functioning, while the lowest scores for items related to utilizing the latest technology. Indicators from the aspect of maintaining occupational health and safety include (a) understanding occupational security, health, and safety procedures and (b) understanding the threat of danger at work. The average value of each of these aspect indicators is presented in Figure 9. Figure 9 shows the average, which varies from 2.51 to 3.8. The highest score is obtained regarding understanding threats and dangers at work, while the lowest is understanding work procedures. The order of levels of each aspect of students' employability skills is presented in Table 3.

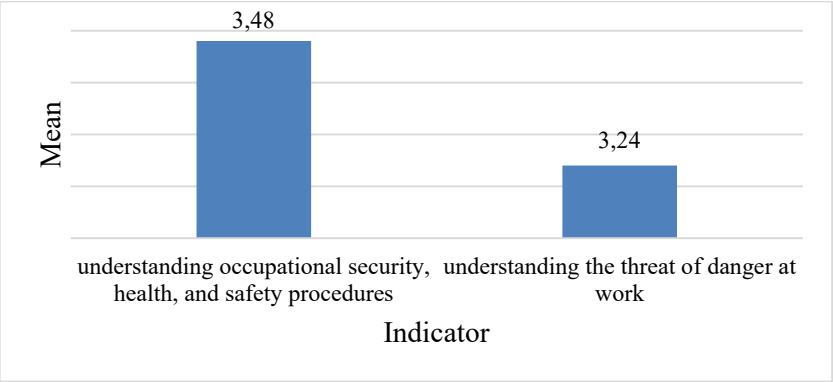

Figure 9. Bar Chart of Mean Score of Occupational Security, Health, and Safety Indicator

Table 3. The Order of Levels of Employability Skills

Interval	Mean per Item	Precentage of skor (%)	Rank
Using technology	3.39	84.7	1
Moccupational health and safety	3.37	84.3	2
Learning	3.36	83.6	3
Team work	3.21	80.3	4
Self management	3.2	80.2	5
Initiative and enterpise	3.15	78.8	6
Planning and organising	3.1	77.6	7
Communication	2.99	74.9	8
Problem solving	2.87	71.7	9

Table 3 shows the ranking of each aspect of employability skills. The average of the statement items for each aspect is described based on the research indicators. The order of mastery on aspects of employability skills, from the highest to the lowest achievement is the use of technology, occupational health and safety, learning abilities, self-management skills, the ability to take the initiative and try, the ability to plan and organize activities, the ability to communicate, the ability to solve problems. The study results indicate that students have a high skill level in the aspect of using technology by 84.7% of the expected score achievement with an average score of 3.39. The result shows that problem-solving is the lowest order of students' employability skills, with a calculated 71.7 % of the expected criteria score. When viewed from the research questionnaire statement items, the average in the high category is that each item has an average of 2.87 from a maximum score of 4.

Based on Table 3, the highest order in students' employability skills is the aspect of using technology. In today's generation, learning with the means of technology is very popular. The young generation or now widely known as the millennial generation is a creative and hardworking generation with large access to abundant information (Ardianto et al., 2020). In fact, the millennial generation grows along with technological advancement, making them very dependent on technology. Another privilege is that they are always connected to social networks and multitask with online products and advanced technology (Hariadi et al., 2016). However, an interesting phenomenon is observed in problem-solving skills, which contrasts with other skills.

In this study, the aspects of communication and solving deep problems were found in the last two sequences. Problem-solving is the process of identifying the differences between actual and desired states and then taking action to overcome deficiencies or make the most out of opportunities. Problem-solving begins with recognizing that a problem situation exists and building an understanding of the nature of the situation. Problem-solving is used to identify specific problems to be solved, plan and implement solutions, and monitor and evaluate progress during activities (Organisation for Economic Co-operation and Development, 2013). Supporting the points above, the findings of research by Baharom and Palaniandy (2013) also suggest improving learning outcomes and developing generic skills, so students' active participation in the project-based learning (PBL) learning process is required. The PBL model allows students to solve authentic problems and work in teams to find effective solutions to problems. Sunardi's et al. (2016) research also found that scientific learning can develop students' employability skills.

Concerning the employability skills aspect by the conference board of Canada, the mastery of students' employability skills includes several aspects that are in the high and above average category, which of those related to personal management skills. The ability of students to manage themselves is very important in the present and future, either when engaging in activities with other people, alone, or within an organization. This ability strongly influences feelings and emotional management and carries an individual's role in both personal and organization.

CONCLUSION

Based on the descriptions above, the level of employability skills of vocational students in Welding Engineering Competence is in the medium to high category. The mastery level of employability skills is in the high category with a mean score of 168.61, greater than the ideal mean score of 132.5. Aspects included in the high and above average category are those related to personal management skills. The ability of students to manage themselves is very important in the present and future, either when engaging in activities with other people, alone, or within an organization. The order of mastering employability skills is using technology, maintaining occupational health and safety, learning, teamwork, self-management, initiative, enterprise, planning, organizing, communications, and problem-solving skills.

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Analysis of middle semester exam subjects for Automotive Vehicle Chassis (AVC) to improve the implementation management of learning evaluation

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ABSTRACT

Entering the 21st century with the industrial revolution 4.0, the speed of progress in information and communication technology has become unstoppable. One of the most benefited from these advances in the world of education. Exploration of learning resources, and discussion forums, for the evaluation of learning can be done easily because of technological advances. Learning evaluation can use a digital platform, and it is very easy to analyze to improve the management of the implementation of learning evaluation. This study was conducted to analyze the mid-semester test instrument, which includes Higher Order Thinking Skills (HOTS) questions and is used to measure students' abilities in the subject of Automotive Vehicle Chassis (AVC) in the Department of Automotive Engineering) at SMK Dharma Bahari Surabaya, Indonesia. This research method is descriptive and quantitative. The sample in this study was 40 students. The mid-semester questions were given as many as 40 questions related to the mid-semester exam material using the Quizizz platform. Analysis of the items is carried out by using the Rasch model approach to obtain fit items. This analysis was carried out with the help of Winsteps 3.73 software. In this study, it was found that the instrument of the question that Person Reliability at mid-semester Automotive Vehicle Chassis (AVC) was 0.85 while item reliability was 0.86. The magnitude of Cronbach's Alpha is 0.86, so it can be used to evaluate learning in AVC subjects according to the Rasch model.

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INTRODUCTION

Industrial revolution 4.0 has greatly impacted the speed of progress in information and communication technology that can no longer be dammed. This has an impact on several sectors that feel benefited. One of the most benefited from these advances in the world of education. The world of education is a place for students to gain knowledge, develop concepts, apply ideas, and so on as a form of achieving goals. Advances in information and information technology certainly make it easier to explore learning resources, discussion forums, and learning evaluations can be done easily because of technological advances (Szymkowiak et al., 2021). Learning evaluation can be done using a digital platform and is very easy to analyze to improve the management of the implementation of learning evaluation for students. In the learning process in the school environment, the teacher is a

figure who plays an important role in the process of evaluating and assessing student learning success in the subjects being taught (Kaso et al., 2021).

To determine the level of students' ability to master knowledge, it is necessary to conduct an assessment. Educational assessment is a process that cannot be separated into an educational activity (Li et al., 2021). This is why the teaching and learning process if it does not involve assessment as an important thing, it cannot be known for sure whether there is progress in learning and learning objectives are achieved (Li et al., 2021). Educational assessment is a process that cannot be separated into an educational activity. Educational technology, or what is often referred to as EduTech, is a combination of the use of computer hardware, software, and educational theory and practice to facilitate learning (Tuma, 2021). When referred to using the abbreviation EduTech, it often refers to a company that creates educational technology.

Educational technology is based on practical experience in education and theoretical knowledge from various sciences such as communication, education, psychology, sociology, artificial intelligence, and computer science (Lohr et al., 2021). It also covers several other important aspects, including learning theory, computer-based training, online learning, and m-learning, where mobile technology is also very much needed and used nowadays. In addition, in the learning process, an assessment or evaluation is needed to determine student development in terms of science. Currently, the assessment or evaluation of students also uses technology. Educational assessment with technology can be in the form of a formative assessment or a summative assessment (Vittorini et al., 2021). Instructors use both types of assessment to understand student progress and classroom learning. Technology has helped teachers make better judgments to help understand where students who are having problems with the material are having problems (Tuma, 2021). Formative assessment is more difficult because the perfect form is in progress and allows students to demonstrate their learning differently depending on their learning style (Wikipedia).

A competent teacher is a professional teacher. One of the competencies that a teacher must possess is pedagogic competence. Pedagogic competence is a competency or ability that must be possessed by a teacher, which includes the ability to understand students' character, design and implement learning, analyze and evaluate student learning outcomes, and motivate and facilitate students to develop and actualize various competencies or potentials they have. Therefore, the competence of a teacher not only compiles an evaluation tool to determine the achievement of student learning outcomes but can also evaluate whether the evaluation that has been prepared has been able to carry out its function as a measuring tool for learning outcomes that has quality values so that it can improve the quality of teacher competence and learning outcomes students (Fitrianawati, 2017).

Evaluation is a term that is often said in terms of learning assessment. Evaluation comes from the word evaluation, which means measuring and also assessing (Palimbong et al., 2019). Learning evaluation is a process of determining the value of student achievement by using certain benchmarks to achieve predetermined learning objectives (Setiawan, 2021). The evaluation aims to identify whether or not the efforts made in the learning process are carried out well. For these goals to be achieved, the evaluation process needs to be carried out in a planned, gradual, and continuous manner to obtain an overview of students' learning development (Azizah & Wahyuningsih, 2020). Almost all schools hold exams as a means to evaluate the learning process. Therefore, every level of education that exists will always evaluate learning which is usually carried out in the form of exams or tests. Measurement of learning achievement can involve quantitative measurements that produce quantitative data, such as tests and scores (Winata et al., 2014).

At the vocational high school education level or other educational levels, learning evaluations are carried out per semester, which is usually held at least twice, namely an evaluation or learning exam in the first quarter known as the Mid-Semester Examination and an evaluation or exam in the second or third quarter called the End of Semester Exam (Wati et al., 2018). As demand in the 21st century learning period, teachers must develop student skills relevant to the 21st century, one of which is critical thinking (Malik et al., 2021). So that in its application, the questions used in the exam must contain HOTS (High Order Thinking Skill) types of questions. The criteria for HOTS questions can include aspects of critical thinking, creative thinking, and problem-solving skills. Critical thinking is the ability to objectively analyze, create and use criteria, and evaluate data (Wulandani et al., 2019). Thus, it is proper for teachers to train and develop students' scientific

reasoning abilities during learning to support students' preparation for mastering 21st-century skills (Malik et al., 2021).

The vocational school of automotive engineering has several productive subjects that must be taken. Automotive Vehicle Chassis (AVC) is one of the productive subjects of the automotive engineering department, which discusses two competencies. The first competency is about the chassis. In this competency, students are taught several materials such as steering system, wheels, spooring, and brake system. Power transfer includes materials such as clutch, transmission, propeller shaft, and axle/differential. Therefore, to evaluate students' abilities in the first quarter, the Mid-Semester Examination is carried out on the Automotive Vehicle Chassis (AVC) subjects. All school exams generally use a scoring approach to describe student achievement. So that students' abilities can be known and distinguished.

SMK Dharma Bahari Surabaya is one of the schools that has implemented a learning evaluation process, namely the Mid-Semester Examination with the paperless method, which uses a digital platform that currently supports distance learning, namely Quizizz. The appearance of the Quizizz application can be seen in Figure 1. Quizizz is an Indian creativity software company headquartered in Bengaluru, India, that creates and sells a gamified student engagement platform. The software is used in class, group assignments, pre-test reviews, formative assessments, and pop quizzes (Wikipedia).

Figure 1. Platform Digital Quizizz

This digital platform is one platform that makes it easier for teachers to evaluate or conduct cognitive assessments for students today. Through Quizizz, the teacher can see the level of mastery of the material that students have (Amany, 2020). Quizizz has not been used as a learning evaluation medium as a benchmark for assessment because it is only considered a game or game. Even though the Quizizz feature is quite feasible if it is used as an evaluation medium, especially during online learning, this is following with Agustina and Rusmana's (2019) research that Quizizz is an application that is feasible to use as a learning application that supports the 4.0 learning revolution because of its easy use and fast assessment process.

The integration between Quizizz as an evaluation tool and ease of analysis of test instruments is the right solution to help teachers know the instruments' quality. Instruments for testing and determining student abilities are very important in educational assessment. An analysis that can produce more precise measurements (resulting in the same interval scale) will determine the quality of the analysis results and improve the educational process to help students learn. Using the Rasch model can make it easier for teachers to assess or evaluate student learning outcomes. Besides that, it can also improve the quality of the analysis carried out because it applies the basic principles of proper data processing. This is because the Rasch model addresses the five objective measurement requirements. The application of Rasch modeling informative tests has many advantages in terms of measurement accuracy. Therefore, this Rasch model can be used to detect item difficulty and item bias and identify individual abilities so that teachers can provide appropriate learning assistance (Sumintono, 2018).

This study aims to provide accurate information about students' abilities and, at the same time, determine the quality of the questions given through the Rasch Model approach. Besides that, it can also show the ease of managing student learning evaluations. Dr. Georg Racsh first created the Rasch model in 1950 and he was a mathematician from Denmark. One of the characteristics of this Rasch model is that it produces scales whose quality is the same as measurements on physical dimensions in physics, such as measuring length with a centimeter ruler, or measuring weight with a kilogram scale, in which case the results can be compared because they have the same units, linear, and have the same interval (Kurniawan & Andriyani, 2018). In developing this model, Rasch developed a model to measure the probability relationship between a person's ability and the difficulty level of the problem by using the logarithmic function to produce the same interval measurement (Sumintono, 2014). The output of the analysis is a new unit called logit (log odds unit), which shows the ability and difficulty of students' problems (Kurniawan & Andriyani, 2018).

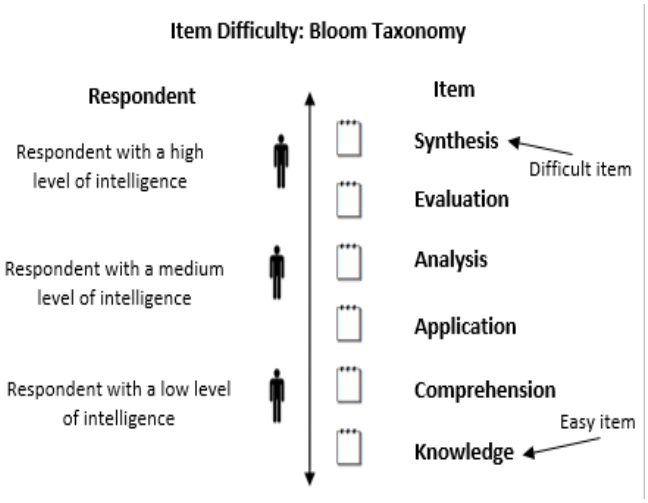

Figure 2. Illustration of Bloom Taxonomy Construct Map

If we illustrate Bloom's taxonomy (Figure 2), an individual who can correctly answer the questions that measure the ability to synthesize can be ascertained that they have a higher ability than other individuals who cannot do the problem correctly. In this study, the researcher wanted to know the quality of the mid-semester test instrument used to determine the student's ability in the Automotive Vehicle Chassis (AVC) subject at SMK Dharma Bahari Surabaya by using the Rasch model approach.

RESEARCH METHOD

This research method is descriptive and quantitative. The subjects of this study were students of class XII TKR 2 who took the Automotive Vehicle Chassis (AVC) subject consisting of 40 students. Subjects were selected randomly and did not pay attention to gender because the majority of students majoring in Automotive Engineering at SMK Darma Bahari Surabaya, Indonesia were male. Questions are given to students through the Quizziz digital platform. There are 40 items in the form of multiple choice. In the output results from Quizzis, data obtained from the number of students who took the exam, questions answered correctly got a score of 1, and questions answered incorrectly got a score of 0, so the data obtained was dichotomous. This makes it easier to process into the analysis software, namely Winstep.

Data were analyzed using WIN STEP Rasch Software version 3.73. From the output of the Winsteps software, the results of several parameter items will be obtained according to the Rasch model. In addition, Cronbach's alpha value will also be obtained, which is the result of the overall item reliability test. Meanwhile, the Outfit MNSQ value, Outfit ZSTD value, and the correlation value between items and the question as a whole will show the limit items that are declared fit with

the model. Where the item is declared fit with the model if the value generated from Outfit MNSQ is in the range of 0.5 to 1.5, ZSTD Outfit values are in the range of -2.0 to 2.0, and the item correlation value with the total score is in the range of 0.4 to 0.85 (Sumintono, 2018).

RESULT AND DISCUSSION

Student responses in answering the Mid-Semester Examination for Automotive Vehicle Chassis (AVC) subjects were obtained through a Quizizz report. Through the Quizizz digital platform, it is known that students who have worked on the questions will be recorded, and it will be known whether the student answered correctly or incorrectly. Student response data to answer the Mid-Semester Examination questions are shown in Figure 3.

Student 01L	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1
Student 02L	1	1	0	1	1	1	1	1	1	1	0	0	0	0	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1
Student 03L	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0
Student 04L	1	0	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
Student 05L	1	1	0	1	1	1	1	0	0	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	0	0	1	1
Student 06L	0	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1	1	0	0
Student 07L	1	1	0	0	1	0	1	1	0	1	0	0	0	1	1	0	1	0	0	1	1	0	0	0	1	0	1	0	0	0	1	0	0	1	0	1	0	0	0	1
Student 08L	1	0	0	0	1	0	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	1	0	1	0	1	0	1	1	1	1	0	1	1	0	0	1
Student 09L	1	1	0	0	0	0	1	1	0	1	0	0	0	0	1	0	1	1	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0
Student 10L	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Student 11L	1	1	0	0	0	0	1	1	0	1	0	0	0	0	1	0	1	0	1	0	0	1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Student 12L	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	1	0	1	1	0	0	0	1
Student 13L	0	0	0	1	1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	1	0	0
Student 14L	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	1	1	0	0	0	1	1	1	1	1	0	0	0	1	1	1	0
Student 15L	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0
Student 16L	0	1	0	0	1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0
Student 17L	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1
Student 18L	0	1	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	1	0	0	0
Student 19L	1	1	0	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Student 20L	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	0	1	0	1	0	1	1	0
Student 21L	1	1	1	1	1	1	1	1	0	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	0	0	0	0	0	1	0	1
Student 22L	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	0	1	1	0	1
Student 23L	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	0	1	0	0
Student 24L	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	0	0	0	0	1	0	1
Student 25L	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	0	1	1	0	1
Student 26L	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	0	1	0	1	0	1	1	0
Student 27L	1	1	1	1	1	1	1	1	0	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	0	0	0	0	1	0	1
Student 28L	1	1	0	1	1	1	1	1	0	1	1	1	0	1	0	0	1	1	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	0	1	1	0	0	0	1
Student 29L	0	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0	0	1	0	1	0	1	0	0	0	1	1	0	1	0	0	1	1	1	0	0
Student 30L	1	1	0	0	1	0	0	1	0	1	0	0	0	1	1	0	1	0	0	1	1	0	0	0	0	0	1	1	0	1	1	0	0	0	0	1	0	0	0	1
Student 31L	1	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0	1	0	0	0	0	1	1	0	1	0	1	1	0	1	1	0	0	1	1	1	1	0
Student 32L	1	1	1	0	1	0	1	1	0	1	0	1	0	0	1	0	1	1	0	1	0	0	1	1	0	1	1	0	0	1	0	1	0	1	0	0	0	0	1	1
Student 33L	0	1	1	0	1	0	1	1	1	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	1	1	0	1	1	1	1	1	1	1	0	0
Student 34L	1	1	1	0	0	0	1	1	0	1	0	0	0	0	0	0	1	0	1	0	0	1	1	1	0	0	1	1	0	1	0	1	0	1	0	0	0	0	0	0
Student 35L	1	1	1	0	1	0	1	1	0	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1	0	1	1	1	0	0	0	1
Student 36L	1	1	1	1	1	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	1	0	1	0	1	0	1	0	0	1	1	0	0
Student 37L	1	1	0	1	1	0	1	1	0	0	0	0	0	0	1	1	1	1	0	1	1	0	0	0	1	0	0	1	0	1	1	1	1	0	0	1	1	1	0	0
Student 38L	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0
Student 39L	1	1	1	0	1	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	1	0	0	1	1	0	1	0	0	1	1	0	0	1	1	0	1
Student 40L	1	0	1	1	1	0	1	1	0	0	0	0	0	0	1	0	1	1	0	0	0	1	1	0	0	1	0	0	0	1	0	1	0	0	0	0	1	1	0	1

Figure 3. Student responses to the Mid-Semester Examination Automotive Vehicle Chassis (AVC) questions

Based on Figure 3, the scores were analyzed by students' abilities using the Rasch model whereas previously the scores were analyzed using Winstep software. The following is the result of the output shown in Figure 4.

```
TABLE 3.1 ANALISIS BUTIR SOAL UTS PSPTKR         ZOU231WS.TXT  Nov  8  7:59 2021
INPUT: 40 Person  40 Item  REPORTED: 40 Person  40 Item  2 CATS    WINSTEPS 3.73
-------------------------------------------------------------------------------

     SUMMARY OF 40 MEASURED Person

-------------------------------------------------------------------------------
|          TOTAL                          MODEL         INFIT        OUTFIT    |
|          SCORE     COUNT     MEASURE   ERROR      MNSQ   ZSTD   MNSQ   ZSTD |
|-----------------------------------------------------------------------------|
| MEAN      21.6      40.0         .25     .38       .99     .0   1.01     .0 |
| S.D.       7.2        .0        1.02     .04       .17    1.1    .29    1.0 |
| MAX.      36.0      40.0        2.62     .55      1.37    2.3   1.76    2.3 |
| MIN.       8.0      40.0       -1.69     .35       .70   -2.2    .58   -2.1 |
|-----------------------------------------------------------------------------|
| REAL RMSE    .40 TRUE SD     .93  SEPARATION  2.35  Person RELIABILITY  .85 |
|MODEL RMSE    .39 TRUE SD     .94  SEPARATION  2.44  Person RELIABILITY  .86 |
| S.E. OF Person MEAN = .16                                                   |
-------------------------------------------------------------------------------
Person RAW SCORE-TO-MEASURE CORRELATION = 1.00
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .86

     SUMMARY OF 40 MEASURED Item

-------------------------------------------------------------------------------
|          TOTAL                          MODEL         INFIT        OUTFIT    |
|          SCORE     COUNT     MEASURE   ERROR      MNSQ   ZSTD   MNSQ   ZSTD |
|-----------------------------------------------------------------------------|
| MEAN      21.6      40.0         .00     .38       .99    -.1   1.01     .0 |
| S.D.       7.9        .0        1.09     .04       .19    1.2    .34    1.3 |
| MAX.      36.0      40.0        1.91     .54      1.36    2.4   1.78    2.2 |
| MIN.       8.0      40.0       -2.29     .35       .59   -3.2    .53   -2.9 |
|-----------------------------------------------------------------------------|
| REAL RMSE    .40 TRUE SD    1.01  SEPARATION  2.53  Item   RELIABILITY  .86 |
|MODEL RMSE    .39 TRUE SD    1.02  SEPARATION  2.63  Item   RELIABILITY  .87 |
| S.E. OF Item MEAN = .17                                                     |
-------------------------------------------------------------------------------
UMEAN=.0000 USCALE=1.0000
Item RAW SCORE-TO-MEASURE CORRELATION = -1.00
1600 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 1675.77 with 1521 d.f. p=.0032
Global Root-Mean-Square Residual (excluding extreme scores): .4177
Capped Binomial Deviance = .2274 for 1600.0 dichotomous observations
```

Figure 4. Output Summary Statistics

From the output summary statistics in Figure 4, important information is obtained regarding the person and item reliability, Cronbach's Alpha value and person measure is obtained. The values obtained are shown in Table 1.

Table 1. Summary of Statistics

	Information	Score
Logit	Person	0.25
	Items	0
Reliability	Person Reliability	0.85
	Item Reliability	0.86
	Alpha Cronbach	0.86
MNSQ Outfits	Person	1.01
	Items	1.01
ZSTD Outfits	Person	0
	Items	0

In Table 1, it can be seen that the logit person measure value is 0.25, and the item measure value is 0. This means that the person measure value is greater than the item measure value, so it can be concluded that students' abilities tend to be higher than the difficulty level of the question. In other words, there is a possibility that all questions can be answered correctly by students so that students who have the highest ability can answer the most difficult questions correctly. Meanwhile, item reliability (item reliability) is 0.86, person reliability is 0.85, and Cronbach's Alpha is 0.86. From this value, it can be stated that the level of consistency of students' answers is relatively high, and the quality of the items on the test instrument used has good reliability of 0.86.

Another number shown in Table 1 is the Outfit Mean Squared (Outfit MNSQ) value of 1.01 in the person and item columns. The value of 1.01 is included in the fit criteria, which is located between the interval 0.5 < MNSQ < 1.5, this means that the test instrument used follows the model

to measure student competence in AVC subjects. Furthermore, the Outfit Z Standard value (Outfit ZSTD) is 0 for persons and items. The value 0 is between -2.0 < ZSTD < 2.0. This can be interpreted that the data have a possible rational value. In other words, overall, the questions or items follow the Rasch model so that these questions can be used as instruments for the Mid-Semester Examination in the automotive vehicle chassis subject.

The distribution of items deemed inappropriate or inconsistent with the model can be seen in Table 1. Provisions or item limits can be declared fit with the model if one or both of the following conditions are met: 1.) The MNSQ Outfit value lies between the interval 0.5 to 1.5; 2.) Outfit ZSTD value is between the interval -2.0 to 2.0; and 3.) The item correlation value with the total score (point measure correlation) lies between the intervals of 0.4 to 0.85 (Sumintono, 2018). Then Figure 5 is an output image of the item statistics.

TABLE 10.1 ANALISIS BUTIR SOAL UTS PSPTKR ZOU231WS.TXT Nov 8 7:59 2021
INPUT: 40 Person 40 Item REPORTED: 40 Person 40 Item 2 CATS WINSTEPS 3.73

Person: REAL SEP.: 2.35 REL.: .85 ... Item: REAL SEP.: 2.53 REL.: .86

Item STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
2	32	40	-1.40	.42	1.08	.4	1.78	1.6	A .16	.31	80.0	80.4	Soal 2
35	11	40	1.41	.39	1.36	1.7	1.76	2.2	B .07	.42	67.5	76.3	Soal 35
9	11	40	1.41	.39	1.15	.8	1.53	1.7	C .24	.42	77.5	76.3	Soal 9
5	31	40	-1.24	.40	.91	-.4	1.47	1.2	D .35	.33	82.5	78.4	Soal 5
15	24	40	-.27	.35	1.31	2.3	1.43	1.8	E .11	.40	50.0	67.5	Soal 15
25	11	40	1.41	.39	1.26	1.3	1.41	1.3	F .17	.42	72.5	76.3	Soal 25
3	20	40	.22	.35	1.22	1.6	1.39	2.0	G .20	.43	55.0	68.4	Soal 3
14	11	40	1.41	.39	1.10	.5	1.39	1.3	H .29	.42	77.5	76.3	Soal 14
19	10	40	1.57	.40	1.16	.8	1.36	1.1	I .23	.41	82.5	77.8	Soal 19
37	20	40	.22	.35	1.34	2.4	1.34	1.8	J .14	.43	45.0	68.4	Soal 37
11	10	40	1.57	.40	1.18	.9	1.30	.9	K .25	.41	72.5	77.8	Soal 11
29	21	40	.10	.35	1.19	1.4	1.28	1.5	L .23	.42	62.5	67.7	Soal 29
16	8	40	1.91	.43	1.21	.9	1.25	.7	M .21	.39	75.0	81.3	Soal 16
31	23	40	-.15	.35	1.16	1.2	1.22	1.1	N .26	.41	60.0	67.3	Soal 31
36	22	40	-.02	.35	1.12	1.0	1.12	.7	O .31	.41	65.0	67.3	Soal 36
39	12	40	1.26	.38	1.10	.6	1.04	.3	P .35	.43	72.5	75.2	Soal 39
40	21	40	.10	.35	1.07	.6	1.09	.6	Q .35	.42	67.5	67.7	SOal 40
32	26	40	-.52	.36	.99	.0	1.08	.4	R .37	.38	75.0	69.1	Soal 32
33	25	40	-.40	.36	.99	.0	1.04	.3	S .39	.39	72.5	68.0	Soal 33
26	21	40	.10	.35	.92	-.6	1.02	.2	T .47	.42	72.5	67.7	Soal 26
27	32	40	-1.40	.42	1.01	.1	.79	-.4	t .33	.31	80.0	80.4	Soal 27
8	34	40	-1.79	.46	1.01	.1	.76	-.3	s .31	.28	85.0	84.9	Soal 8
34	24	40	-.27	.35	.99	.0	.90	-.4	r .43	.40	65.0	67.5	Soal 34
17	36	40	-2.29	.54	.99	.1	.76	-.1	q .26	.23	90.0	90.0	Soal 17
24	26	40	-.52	.36	.90	-.7	.76	-1.0	p .50	.38	65.0	69.1	Soal 24
7	33	40	-1.59	.44	.90	-.3	.76	-.4	o .39	.30	85.0	82.6	Soal 7
1	30	40	-1.08	.39	.88	-.6	.73	-.7	n .46	.34	80.0	76.2	Soal 1
21	23	40	-.15	.35	.87	-1.0	.77	-1.2	m .54	.41	65.0	67.3	Soal 21
10	25	40	-.40	.36	.86	-1.0	.74	-1.2	l .54	.39	62.5	68.0	Soal 10
38	26	40	-.52	.36	.86	-1.1	.73	-1.1	k .53	.38	75.0	69.1	Soal 38
18	25	40	-.40	.36	.86	-1.1	.76	-1.1	j .53	.39	72.5	68.0	Soal 18
22	23	40	-.15	.35	.85	-1.2	.74	-1.3	i .56	.41	70.0	67.3	Soal 22
20	20	40	.22	.35	.84	-1.3	.82	-1.0	h .57	.43	75.0	68.4	Soal 20
30	35	40	-2.02	.50	.82	-.4	.54	-.7	g .44	.26	87.5	87.4	Soal 30
28	24	40	-.27	.35	.81	-1.5	.70	-1.5	f .59	.40	70.0	67.5	Soal 28
4	22	40	-.02	.35	.78	-1.8	.70	-1.7	e .62	.41	75.0	67.3	Soal 4
23	20	40	.22	.35	.77	-1.9	.71	-1.8	d .64	.43	80.0	68.4	Soal 23
13	8	40	1.91	.43	.73	-1.1	.53	-1.3	c .64	.39	85.0	81.3	Soal 13
12	12	40	1.26	.38	.65	-2.1	.53	-2.0	b .74	.43	87.5	75.2	Soal 12
6	17	40	.59	.36	.59	-3.2	.54	-2.9	a .79	.43	90.0	70.7	Soal 6
MEAN	21.6	40.0	.00	.38	.99	-.1	1.01	.0			73.3	73.3	
S.D.	7.9	.0	1.09	.04	.19	1.2	.34	1.3			10.3	6.4	

Figure 5. Misfit Order

In Figure 5, it can be seen that, when viewed from the boundary conditions, the item is declared to fit with the model, so question number 35 is a misfit or does not follow the model so that the question can be replaced or revised. Furthermore, the items' difficulty level is known from the item measure order shown in Figure 6. The measured column shows the logit value of each item ordered from highest to lowest. For items 13 and 16 or questions number 13 and 16, the logit value of 1.91 logits indicates the most difficult item, while item 17 or item number 17 shows the easiest item with a logit value of -2.29 logit. The output of the Guttman scale of student responses can be seen in Figure 7.

TABLE 13.1 ANALISIS BUTIR SOAL UTS PSPTKR ZOU231WS.TXT Nov 8 7:59 2021
INPUT: 40 Person 40 Item REPORTED: 40 Person 40 Item 2 CATS WINSTEPS 3.73

Person: REAL SEP.: 2.35 REL.: .85 ... Item: REAL SEP.: 2.53 REL.: .86

Item STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
13	8	40	1.91	.43	.73	-1.1	.53	-1.3	.64	.39	85.0	81.3	Soal 13
16	8	40	1.91	.43	1.21	.9	1.25	.7	.21	.39	75.0	81.3	Soal 16
11	10	40	1.57	.40	1.18	.9	1.30	.9	.25	.41	72.5	77.8	Soal 11
19	10	40	1.57	.40	1.16	.8	1.36	1.1	.23	.41	82.5	77.8	Soal 19
9	11	40	1.41	.39	1.15	.8	1.53	1.7	.24	.42	77.5	76.3	Soal 9
14	11	40	1.41	.39	1.10	.5	1.39	1.3	.29	.42	77.5	76.3	Soal 14
25	11	40	1.41	.39	1.26	1.3	1.41	1.3	.17	.42	72.5	76.3	Soal 25
35	11	40	1.41	.39	1.36	1.7	1.76	2.2	.07	.42	67.5	76.3	Soal 35
12	12	40	1.26	.38	.65	-2.1	.53	-2.0	.74	.43	87.5	75.2	Soal 12
39	12	40	1.26	.38	1.10	.6	1.04	.3	.35	.43	72.5	75.2	Soal 39
6	17	40	.59	.36	.59	-3.2	.54	-2.9	.79	.43	90.0	70.7	Soal 6
3	20	40	.22	.35	1.22	1.6	1.39	2.0	.20	.43	55.0	68.4	Soal 3
20	20	40	.22	.35	.84	-1.3	.82	-1.0	.57	.43	75.0	68.4	Soal 20
23	20	40	.22	.35	.77	-1.9	.71	-1.8	.64	.43	80.0	68.4	Soal 23
37	20	40	.22	.35	1.34	2.4	1.34	1.8	.14	.43	45.0	68.4	Soal 37
26	21	40	.10	.35	.92	-.6	1.02	.2	.47	.42	72.5	67.7	Soal 26
29	21	40	.10	.35	1.19	1.4	1.28	1.5	.23	.42	62.5	67.7	Soal 29
40	21	40	.10	.35	1.07	.6	1.09	.6	.35	.42	67.5	67.7	SOal 40
4	22	40	-.02	.35	.78	-1.8	.70	-1.7	.62	.41	75.0	67.3	Soal 4
36	22	40	-.02	.35	1.12	1.0	1.12	.7	.31	.41	65.0	67.3	Soal 36
21	23	40	-.15	.35	.87	-1.0	.77	-1.2	.54	.41	65.0	67.3	Soal 21
22	23	40	-.15	.35	.85	-1.2	.74	-1.3	.56	.41	70.0	67.3	Soal 22
31	23	40	-.15	.35	1.16	1.2	1.22	1.1	.26	.41	60.0	67.3	Soal 31
15	24	40	-.27	.35	1.31	2.3	1.43	1.8	.11	.40	50.0	67.5	Soal 15
28	24	40	-.27	.35	.81	-1.5	.70	-1.5	.59	.40	70.0	67.5	Soal 28
34	24	40	-.27	.35	.99	.0	.90	-.4	.43	.40	65.0	67.5	Soal 34
10	25	40	-.40	.36	.86	-1.0	.74	-1.2	.54	.39	62.5	68.0	Soal 10
18	25	40	-.40	.36	.86	-1.1	.76	-1.1	.53	.39	72.5	68.0	Soal 18
33	25	40	-.40	.36	.99	.0	1.04	.3	.39	.39	72.5	68.0	Soal 33
24	26	40	-.52	.36	.90	-.7	.76	-1.0	.50	.38	65.0	69.1	Soal 24
32	26	40	-.52	.36	.99	.0	1.08	.4	.37	.38	75.0	69.1	Soal 32
38	26	40	-.52	.36	.86	-1.1	.73	-1.1	.53	.38	75.0	69.1	Soal 38
1	30	40	-1.08	.39	.88	-.6	.73	-.7	.46	.34	80.0	76.2	Soal 1
5	31	40	-1.24	.40	.91	-.4	1.47	1.2	.35	.33	82.5	78.4	Soal 5
2	32	40	-1.40	.42	1.08	.4	1.78	1.6	.16	.31	80.0	80.4	Soal 2
27	32	40	-1.40	.42	1.01	.1	.79	-.4	.33	.31	80.0	80.4	Soal 27
7	33	40	-1.59	.44	.90	-.3	.76	-.4	.39	.30	85.0	82.6	Soal 7
8	34	40	-1.79	.46	1.01	.1	.76	-.3	.31	.28	85.0	84.9	Soal 8
30	35	40	-2.02	.50	.82	-.4	.54	-.7	.44	.26	87.5	87.4	Soal 30
17	36	40	-2.29	.54	.99	.1	.76	-.1	.26	.23	90.0	90.0	Soal 17
MEAN	21.6	40.0	.00	.38	.99	-.1	1.01	.0			73.3	73.3	
S.D.	7.9	.0	1.09	.04	.19	1.2	.34	1.3			10.3	6.4	

Figure 6. The Results of the Output Item Statistics

GUTTMAN SCALOGRAM OF RESPONSES:

```
Person |Item
       |13   2  233113123223 3224 223 13 1231111
       |7087275142808358412146690303762994551936
       |----------------------------------------
    19 +1111111111111111111111111101111111110110  19L
     1 +1111110111111111111111101111111111100110  01L
     4 +1111011111111111111011111111111010110100  04L
     3 +1111011111111011111111001111111101001011  03L
    20 +1111111111111001111111100111011101001111  20L
    22 +1111111110111111111111011101111011000010  22L
    23 +1111111111111011111111001110111000101001  23L
    25 +1111111110111111111111011101111001001000  25L
    26 +1111111111111001111111100111010101001011  26L
     2 +1111111101111111111111111011010010010000  02L
    24 +1111111111111111101101011111101000000010  24L
    27 +1111111111111111101101011111101000000000  27L
    21 +1111111111111011011010111111011000000000  21L
    10 +1110111011100101111101111001100100011000  10L
    28 +1111111111011101000111011000011001011000  28L
     5 +1101111101011100100111011000010100011010  05L
    32 +1111111111011010100000101111001100000000  32L
    37 +1111101101101111010111000010100000100001  37L
    17 +0110111101101101101100111001100100000000  17L
    29 +1111100010111100001111100100110010000100  29L
    33 +1111111001100110111001010100100010010000  33L
    35 +1111111101010011100001101100000001010001  35L
    31 +1101111111100110000001010000100110100100  31L
     6 +0111100000111100101111000100110010000100  06L
    14 +1111001011101000101000100101001100100001  14L
    39 +1111111110100111110000001100100000000000  39L
     7 +1011111100010010110101001010000001100000  07L
     8 +0010011111000110100101011000100101100100  08L
    36 +1111101101100011111010000100100000000000  36L
    40 +1111001101101010001010101101100000000000  40L
    30 +1110111100010011010101001010000001000000  30L
    34 +1111110111010001101000000101000000000100  34L
     9 +1111110110011010100000000011000100000000  09L
    12 +1000111010010101000001111000000000110001  12L
    38 +1101010101001100100110110100000000010000  38L
    11 +1111110110010010001000000001000000100100  11L
    13 +1101001001100111011010000001000000001000  13L
    16 +1101111010100010010000010000000000001000  16L
    18 +0010100000000000000101100110100001000000  18L
    15 +1010010000001000000100010000000010010000  15L
       |----------------------------------------
       |13   2  233113123223 3224 223 13 1231111
       |7087275142808358412146690303762994551936
```

Figure 7. Guttman Scalogram Output

The analysis of the output of the Guttman scalogram shows that 19L students have the highest ability to answer questions correctly. 19L students can work on the easiest questions (15) to the most difficult ones (13). This indicates that the student has more authentic skill suitability. In contrast to 15L students, where 15L students have the lowest ability to answer questions correctly. The results of this data can provide information to teachers to identify the skills and suitability of students. Thus, these results provide recommendations to implementers of learning to apply learning by paying more attention to students who have poor skills and to improve students who still have low thinking skills. Teachers can then use this scalogram analysis as learning implementers to describe what students have obtained from the test results. The analysis of the Rasch model has provided comprehensive information on data processing based on student responses to the Mid-Semester Examination.

Furthermore, the level of difficulty of the test items with their indicators for assessment can be identified. These results illustrate that the items that have been compiled can describe the pattern of student skills and their suitability. However, the results of the analysis of the Rasch Model are more specific to provide a comprehensive picture of the learning carried out. The results of the Rasch model analysis can be different or similar depending on the conditions and learning situations, such as student characteristics and the implementation of learning in a particular class or school. In addition, the value of the student's ability level in working on the problem is also shown from the Winstep output, namely the Wright map. Wright map output results are presented in Figure 8.

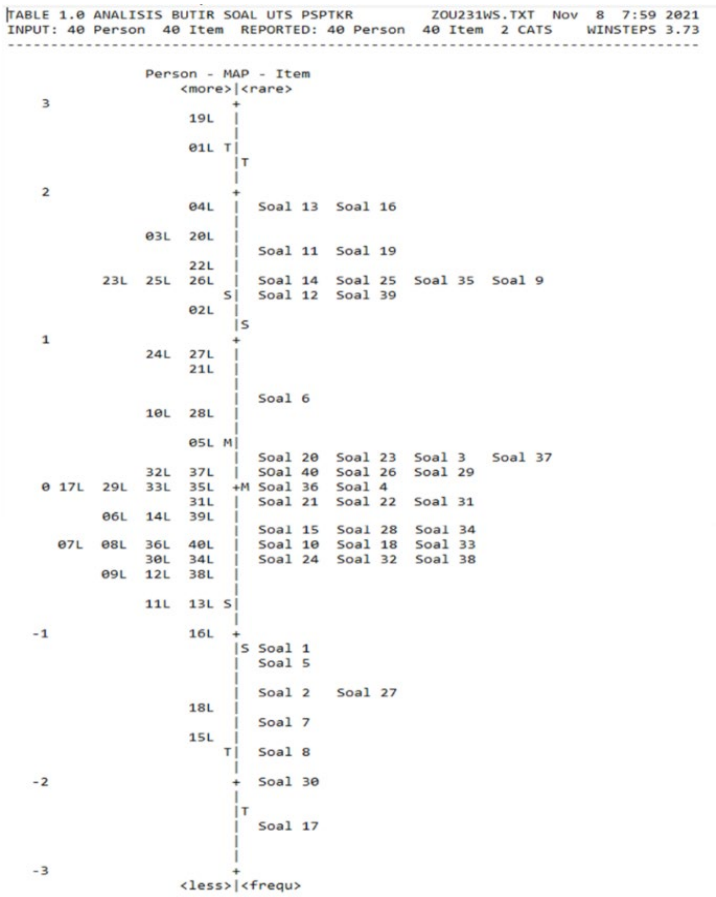

Figure 8. Map of Wright

From Wright's map, data obtained from students with code 19L have the highest level of ability or ability, while students with code 15L have the lowest level of ability or ability. In addition, it can also be seen that the item questions that have a level of difficulty in the difficult category are questions number 13,16,11,19,14,25,35,9,12,39. Then the questions with the medium category are questions number 6, 20, 23, 3, 37, 40, 26, 29, 36, 4, 21, 22, 31, 15, 28, 34, 10, 18, 33, 24, 32, 28.

Furthermore, the easy categories are questions 1, 5, 2, 27, 7, 8, 30, and 17. It can be summarized that there are ten questions in the difficult category, 22 questions in the medium category, while the easy category questions have eight questions.

Figure 9 shows the measurement information obtained from the Mid-Semester Examination instrument for Automotive Vehicle Chassis (AVC) subjects. The X-axis shows the level of students' ability to do the given test, while the Y-axis shows the value of the information function. Based on the graph, the information obtained by the measurement is very high at the medium ability level. So that the mid-semester exam instrument for Automotive Vehicle Chassis (AVC) subjects is suitable or optimal if it is used for students with moderate abilities.

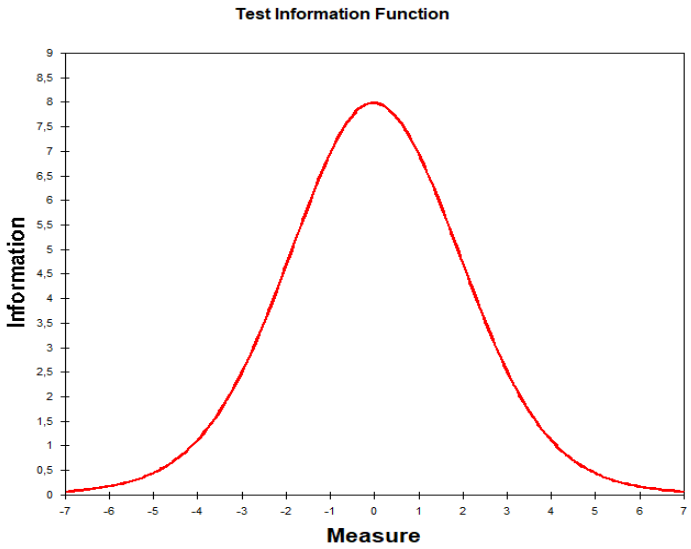

Figure 9. Test Information Function

Item analysis using the Rasch model approach has several advantages, which can help teachers detect whether the questions are fit or not and can measure student abilities or abilities so that teachers can more easily provide treatment, especially for students who still have low abilities or abilities so that it can be done actions to motivate students to improve their abilities or abilities in certain subjects. Therefore, learning evaluation management is very important to be carried out by a teacher where this evaluation can determine the value of student achievement by using certain benchmarks to achieve predetermined learning objectives.

The purpose of assessing educators' learning outcomes on students is 1.) Knowing the level of mastery of competencies in attitudes, knowledge, and skills that have and have not been mastered by a person/group of students to be improved in remedial learning and enrichment programs; 2.) Determine the completeness of mastery of student learning competencies within a certain period; 3) Establish improvement or enrichment programs based on the level of competency mastery for those identified as slow or fast learners in learning and achieving learning outcomes; and 4.) Improve the learning process at the next semester's meeting (Setiawan, 2021).

Teachers must be more creative in filling learning and be more innovative in utilizing technology. The development of interactive questions to measure scientific reasoning skills is a step toward solving the problem (Malik et al., 2021). Regulation of the Minister of Education of the Republic of Indonesia Number 4 of 2020 concerning the Implementation of regarding education policies in the emergency phase of the coronavirus pandemic. Minister of Education of the Republic of Indonesia. Nadiem Makarim has provided an overview of learning assessments on the online learning system, which is contained in 4 main points. First, learning is done at home (study at home) by applying distance learning to provide a learning experience without the burden of completing curriculum targets and grade promotions or graduation. Second, distance learning can focus on life skills education, such as about Covid-19. Third, student activities and assignments may vary

according to their interests and conditions, including learning gaps and facilities at home. Finally, evidence or product activity should be given feedback (Mahmud et al., 2021). Therefore, this research tries to provide solutions and facilities for teachers to determine students' abilities so that the feedback that will be given follows student needs.

CONCLUSION

Based on the above discussion, it can be concluded that the Automotive Vehicle Chassis (AVC) Mid-Semester Exam questions with the help of Winsteps Software show that Person Reliability at Mid-Semester Exam Automotive Vehicle Chassis (AVC) is 0.85 while item reliability is 0.86. The magnitude of Cronbach's Alpha is 0.86. In addition, the integration between Quiziz and analysis using this Rasch model can facilitate the management of learning evaluation for teachers to determine student abilities and student abilities in mastering the knowledge that has been taught and can help teachers identify students who need more treatment so that there are no gaps in the learning process.

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Curriculum and learning management: Integration of creative economy value to improve students' life skill

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ABSTRACT

The impact of the ASEAN economic community on the development of industry 4.0 is increasingly massive. The education system needs a new buzz to respond to the development of industry 4.0. The Indonesian government continues to make changes and developments in the field of education to prepare learners to become knowledgeable, capable, creative, independent, and responsible human beings. The research uses a qualitative approach, with data collection techniques through observation, interview, and one in the documentation of strengthening life skills with integrase creative economic value. In this study, researchers successfully interviewed the principal, teacher, student, and creative ruler of the alumni element of Grafika Desa Putera Vocational High School (SMK Grafika Desa Putera). The results showed that SMK Grafika Desa Putera integrates the important value of the creative economy for students in adaptive programs, local content, normative, productive, and self-development to produce productive, creative work. Vocational education aims to prepare graduates to be ready to work and innovate. The main purpose of this research is to know the content of the creative economy in shaping learners' life skills.

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INTRODUCTION

Since Indonesia agrees with the ASEAN Economic Community (AEC), consequently, Indonesia has to be ready to compete with ASEAN countries. Its natural resources and human resources are required to be distinctly superior to other countries to win the ASEAN economic integration. National education serves to develop students' abilities and potentials and shape their characters of knowledgeability, capability, creativity, independence, and responsibility. Vocational education is part of the secondary education system that prepares ready-for-use graduates. Thus, it should lead the way to education development for the formation of creative students (Raffe, 1991). The data from Statistics Indonesia show that in 2020, the largest contributor to the national unemployment rate (8.49%) was the vocational high school (VHS) graduates (Badan Pusat Statistik Republik Indonesia, 2020). The World Economic Forum 2016 argued that the graduate absorption issue no longer deals with demand and supply imbalances (Rahadian, 2019). It lies in the student admission process with a lower passing grade than that for senior high school students (Ratnasari, 2018).

In 2019, it was 79.11 for senior high school and 66.17 for vocational high school in Jakarta. In Bogor, it was 75.00 for senior high school and 60.00 for vocational high school. Furthermore, it was 58.63 for senior high school and 42.50 for vocational high school in Kupang. This indicates the imbalances among regions and the discrepancy between what education provides and the market needs (Malaikosa et al., 2020). Institute of Good Governance and Regional Development (IGGRD) stated that the high unemployment rate of vocational school graduates results from the inefficient education system (Ratnasari, 2018). Currently, according to National Recap Data of the Education Data Center (DAPODIK) on May 2, 2018, 14,075 VHSs still appeal to the central curriculum, although schools may administrate their own curricula by involving stakeholders, actors, and industry experts to bridge the yawning gap between the graduates' competencies and market needs (Rahadian, 2019).

Vocational education focuses on skills, while general education gives extra weight to knowledge. Hence, it requires teachers with vocational skills to develop a curriculum that can shape the entrepreneurial character of students (Garbin & Stover, 1980). To bring about a character through the educational process, creative human resources should develop the creative economy to produce creative work (Munro, 2017). Hence, character education should be the basis for developing a learning model with a creative economy in vocational high school. At the level of implementation, the SMK Grafika Desa Putera, Jakarta has integrated the creative economy in the 2013 curriculum on craft and entrepreneurship subjects as both curricular and extracurricular activities.

Vocational secondary education can integrate it into the students' character, attitude, and positivity (creativity). Organizing creative economy education aims to foster positive (creative) character, attitudes, and behavior at the most basic level that supports the formation of creative students. Ministry Regulation of the Republic of Indonesia No. 32 of 2013 concerning National Education Standards mandates that the learning process has to be actively, creatively, and innovatively carried out in student-centered learning. Wu and Jia-Jen-Hu (2015), conducting a study on skill learning attitudes, curriculum satisfaction, and vocational self-concept, concluded that most students have good learning attitudes and skills but low motivation. This is because the learning process remains teacher-centered learning with conventional learning approaches and methods. This certainly challenges teachers to develop innovative learning models to stimulate and develop students' creative thinking skills. During the learning process, they are supposed to provide the students with motivation and the values of creative economy education (Tronsmo & Nerland, 2018).

The student's creativity can also be developed outside of classroom learning through various extracurricular activities since they allow the independence to develop student creative economy value (Malaikosa et al., 2020). This will enable students to improve their creativity in innovations. The implementation of VHS's creative economy is to produce creative people as entrepreneurs in Jakarta, Kupang, and Bogor. Thus, it is necessary to improve the quality of creative economy education in an attempt to improve the quality of vocational high schools. To ensure the quality improvement of creative economy education, an analysis of its implementation in VHS is required.

Regulation of the Minister of Education of the Republic of Indonesia Number 4 of 2020 states that the structure of the Vocational High School (SMK) or Islamic Vocational High School (MAK) curriculum includes the national content, territorial contents, and vocational specialization contents consisting of basic expertise areas, expertise program basics, and expertise competencies as well as time allocation for each subject. The curriculum is an important component (instrumental input) in the unity of the learning system to achieve educational objectives (Ulfatin, 2016). It is vital as a part of the educational program set (D'Andrea, 2012). It not only pays attention to present developments but also directs its attention to the future.

Curriculum development, defined as the process of planning, constructing, implementing, and evaluating learning opportunities to produce students' desired changes, is essential for high quality and relevant curriculum (Albashiry et al., 2015). The curriculum should be frequently updated in line with the changes. The revitalization of the vocational high school curriculum aims to change the mindset of solely producing graduates failing to fulfill the working world needs into a role paradigm and activeness in the job market. On top of that, it calls for active cooperation with business entities to establish it in the vocational curriculum structure. Subsequently, the Indonesian

Certification Authority or Badan Nasional Sertifikasi Profesi (BNSP) standardized the formulation of required job skills.

Curriculum development at the school level is generally carried out through a systematic approach over other approaches (Brinkerhoff, 2001). By this approach, the curriculum development was learning outcome-oriented, which became the basis for further development activities such as selecting learning program content, learning strategies, assessment methods, and evaluation forms (Albashiry et al., 2015). This approach involves a cycle of five phases, namely analysis, design, development, implementation, and evaluation (Akaninwor, 2001). An approach involving stakeholders in curriculum development is also needed to ensure that the curriculum responds to stakeholder needs (Akaninwor, 2001; Albashiry et al., 2015). This approach revolves around extensive collaboration and discussion between curriculum developers, in this case, the school and stakeholders, during the drafting process to arrive at a consensus on the main objectives of the education program, such as results, content, pedagogy, and assessment.

To achieve the stated educational goals, the curriculum has to be strategically formulated into certain programs relevant to social changes. The curriculum preparation has to consider various aspects such as student development, scientific development, community needs development, and the demands of the working world. The curriculum in classroom learning should cover all student learning experiences and bring cognitive impacts on their personal development.

A creative economy is a world trend encouraging economic growth and environmental degradation by prioritizing economic creativity to maximize the added value of life sustainability and human civilization (Comunian et al., 2015; Cummins et al., 2018; D'Andrea, 2012; Malaikosa et al., 2020; Sung, 2015). A creative economy is a business that encourages innovation, a convergence of expertise, and advanced scientific technology centered on organized learning to build new markets and new employment (Sung, 2015). It has strong ties with the creative and cultural industries. The critical industry refers to forms of cultural production and consumption, which are symbolic or expressive elements such as music, art, writing, fashion and design, media, and handicraft production (Pratt & Hutton, 2013).

A creative economy is the driving force of a competitive Indonesia and quality social life in 2025. It allows the people to compete fairly, honestly, and uphold ethics and excellence at the national and global levels, as well as have the ability to make continuous improvements and think positively to face challenges and problems (Rokhman et al., 2014). It also aims to create a qualified Indonesian society, which is physically and mentally healthy and educated, has the awareness to protect the environment, has a balanced life, a social concern, and tolerance in accepting differences (Yuan et al., 2014). The increasingly important creative economy in the national economy and the state socio-cultural diversity spread throughout the archipelago certainly become a never-ending source of inspiration in developing the creative industry. The diversity characterized by local wisdom in preserving culture has been for generations.

The creative sector in developed countries is difficult to imitate in other countries since it emphasizes specific abilities that involve creativity, expertise, and talents, including art, beauty, design, play, story, humor, symphony, caring, empathy, and meaning aspects (Sung, 2015). This implies that the highly demanded quality of human resources is those with character and creativity. Masunah (2017) stated that the creative industry is one of the sectors in the creative company subsystem. The creative industry employs individuals' creativity, expertise, and talents to create products bringing real benefits and added value to life.

Besides, the creation of added value is evident in using social, cultural, and creative human resources assets (Masunah, 2017). The creative industry creates not only economic transactions but also social and cultural transactions. This underlines that added value, in this case, is social, cultural, and economic values. Meanwhile, the London government supports new policy ideas related to the creative economy to meet the high demand and reduce budget cuts (Schlesinger et al., 2015). How about Indonesia, with its various cultural heritages from Sabang to Merauke?

The Indonesian cultural heritage has a lot of creative values such as art, beauty, social, empathy, and ceremonies. This prefigures the great creativity of Indonesian society displaying their particular skills and talents. This comes about by the ethnic diversity remaining coexist because of their high tolerance. It proves that Indonesia has powerful supporting factors in developing a creative

economy. Various efforts to utilize traditional cultural heritage, apart from preserving it, are the pride of the national identity. Moreover, it is necessary to use appropriate information technology as an important supporting factor. The recent rapid development of information technology brings ample opportunity to synthesize culture. Thus, the development of the creative economy will be a fundamental force as it is supported by culture and the development of information technology.

RESEARCH METHOD

The research uses a qualitative approach with a research design of case studies. The qualitative approach aims to explore and understand the meaning of social phenomena to understand research problems. The rationale of research design with a qualitative approach is to understand the problems related to the process of strengthening learners' life skills through the creative economy content approach. Qualitative research is an attempt to plan certain possibilities broadly without showing exactly what will be done about their respective elements (Moleong, 2014; Sugiyono, 2013; Ulfatin, 2015). In the research process, researchers use observation techniques, interviews, and documentation studies to gather information from principals, teachers, learners, and creative actors from the alumni elements of SMK Grafika Desa Putera.

In the observation, researchers make observations related to learning activities naturally to find out the integration of creative economic value in the process of strengthening learners' life skills. After observing researchers continuing interviews with the principal related to creative programs integrated into the learning process, while the role of teachers in the integration of values in the learning process. To find out teachers' role in integrating the creative economy's content in the learning process and forming life skills, and planting creative value in learners, researchers also conduct document studies related to learning plans provided by teachers. After collecting data, researchers then conduct data analysis using Miles et al. (2019) to sharpen the information and data that has been collected in the research process.

RESULT AND DISCUSSION

The creative economy is a new idea that relies on creative ideas as the main capital in developing creative industries. Creative industries are born and developed in big cities and become the main support for the regional economy. Most creative actors are young people with original and creative ideas. The creative economy can be defined as students' creative work with superior values. With the existence of a creative economy, schools, teachers, and students are used to accommodating creative work with superior value.

An example of schools that integrates the creative economy is those in which students of class X-XII work on orders from school partner companies and creative actors to sharpen their competence of skills in high printing, perfect binding, montage, graphic design, billboard printing, offside printing, and the production of logos and stickers. Figure 1 shows the creative activities of students at the SMK Grafika Desa Putera.

Figure 1. Student Creative Activities

The creative economy is defined as the application of the value of the creative economy integrated into the curriculum, learning activities, and self-development activities to increase the creativity and innovation of students. This allows the students to produce something with a sale value. The idea of creative economy education comprises thinking creatively, being creative, and acting creatively can be stated in the indicators of creative values. The values explored in this study include curiosity, critical thinking, the ability to determine the right methods, appropriate choice, intuition, innovation, and productivity (Widyadharma et al., 2020).

In the learning activities, the teacher always instills creative values through self-development and habituation activities of, for example, honesty, independence, creativity, discipline, and responsibility, as well as achievement appreciation. This is apparent from the students' avidity in completing assignments given by the teacher. On the other hand, they were also facilitated by technological developments to promote their creative work on social media platforms. This highlights the significant role of teachers in engraining good values in shaping students' mental and character, as well as generating their motivation to compete and consistently produce creative work.

Education should be carried out based on the context. Thus, the educational process should align with the local community's social and cultural environment. Education serves to maintain values and norms to meet future achievements. Developing the value of the creative economy requires a systematic process in an integrated learning process. In developing a model for planting and integrating creative economic values, the SMK Grafika Desa Putera uses the model developed by Malaikosa et al. (2020), as seen in Figure 2.

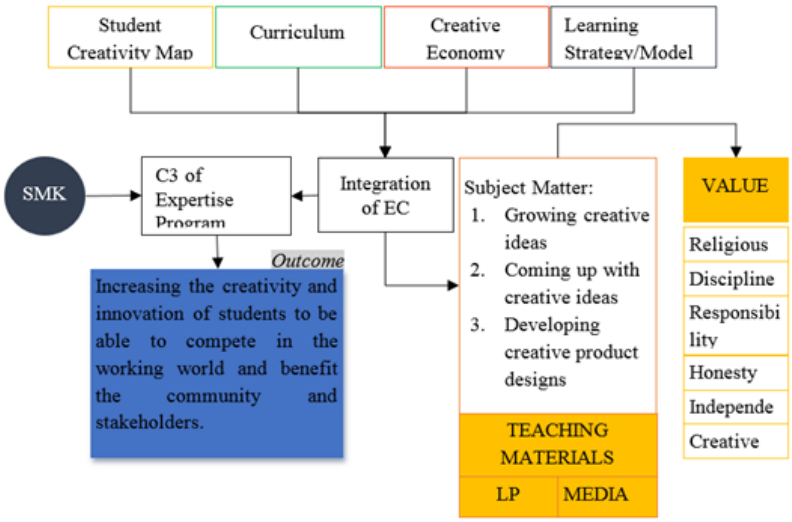

Figure 2. The Model of Cultivating Values and Integrating the Contents of the Creative Economy in Vocational School

The process of instilling the creative economy value has been carried out on an ongoing basis in their respective programs. This was done either to satisfy the demands of the school's curriculum or to prepare students to work in a certain field and join the workforce. Also, this is to develop students' trustworthiness, respect, responsibility, fairness, caring, citizenship, honesty, courage, diligence, and integrity. Character-building activities developed in schools might help teachers to improve learning habits closer to industrial work cultures, such as self-confidence, responsibility, discipline, competitiveness, resilience, honesty, responsiveness, appreciation, presentence, carefulness, thoroughness, and leadership.

Life skills education is an effort to build student character of hard skills and soft skills. Hard skills emphasize the ability of students in cognitive and psychomotor aspects. Soft skills emphasize the affective abilities of students. Life skills aim to prepare students to have the courage and willingness to face life and its problems naturally without feeling depressed and then creatively find

solutions to overcome them. The process of activities at the SMK Grafika Desa Putera in the formation of students' soft skills and life skills can be seen in Figure 4.

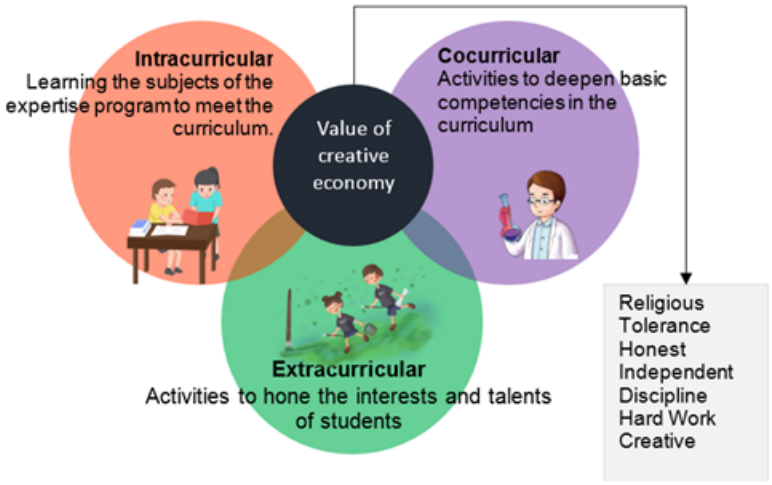

Figure 3. Instilling the Creative Economy Values (Source: Malaikosa et al., 2020)

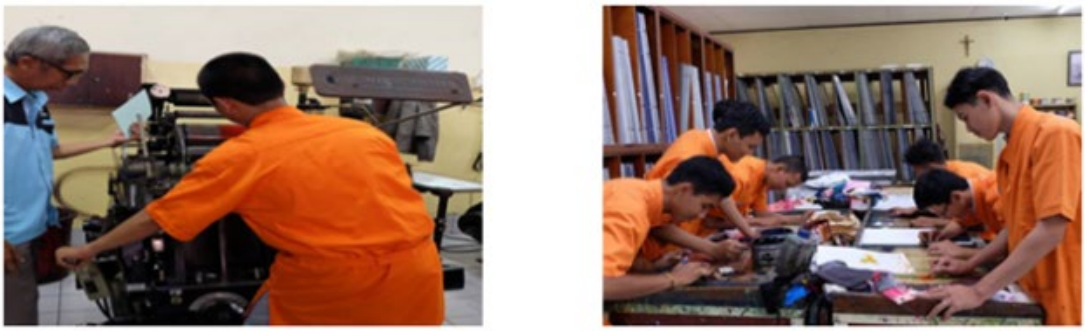

Figure 4. Student Soft Skill and Life Skill Formation

The working world believes that superior Human Resources (HR) are those who have the ability in the aspects of both hard skills and soft skills. Therefore, they are believed to have a good impact on the aspects of life skills. In reality, education in Indonesia shows that learning only provides a larger portion of technical or hard skills. Meanwhile, the soft skill aspect is one's skill in dealing with others and himself.

Equipping students with soft skills does not mean adding new subjects to the curriculum. However, providing more value and meaning in the learning process is necessary. Therefore, the teachers need to use the right model to train students' hard and soft skills. These models include cooperative learning, experiential learning, contextual teaching and learning, and problem-based learning. If both skills are obtained, the needs of users of vocational high school graduates in the working world focusing on high productivity might be achieved.

Developing a creative economy always prioritizes students' creativity, ideas, and knowledge as an effort to strengthen the life skills of students by balancing the aspects of hard skills and soft skills. Learning models are important to help teachers convey theory to practice. These models include cooperative learning, experiential learning, contextual teaching and learning, and problem-based learning. One indicator of learning outcomes is that students can produce creative work with high value. Thus, if some students have developed printing and graphic design business, they can compete to produce high-value work.

Life skills education is an effective step for students of SMK Grafika Desa Putera as a basis for orientation to equip students' skills regarding aspects of knowledge, and attitudes, which include

mental, honesty, responsibility, and cooperativeness that have a direct relationship with the development of competency skills of students. Thus, students might be able to face the demands and challenges of life. Life skills education is an alternative educational change to anticipate future demands. The learning process in the classroom can be carried out in the form of an activity procedure involving students at each stage of the activity systematically to build students' hard and soft skills.

The curriculum needs to be developed in line with changes. The revitalization of the vocational high school (SMK) curriculum aims to change the mindset that previously only aimed to produce graduates regardless of the demands of the working world into satisfying the demand of the working world. Thus, it is necessary to cooperate with the business world and the industrial society to establish it in the curriculum structure. Therefore, students might be equipped with new creativity and innovation according to their respective fields of expertise. The creative economy is seen as a new method that might help teachers shape students' creativity in their respective areas of expertise. The curriculum is a component (instrumental input) that is important in the unity of the learning system to achieve educational objectives (Ulfatin, 2016). The curriculum is also seen as an educational program (D'Andrea, 2012). Curriculum development is a process of planning, developing, implementing, and evaluating learning to realize quality and relevant curriculum (Albashiry et al., 2015).

If the creative economy has been integrated into the curriculum and vocational learning, teachers are required to find the right method to integrate the value of creative economy through self-development activities, production unit activities, honest canteen, and school operations, as well as school business partners. Therefore, students' learning processes are accustomed to creating new ideas and innovations. Integrating the contents of the creative economy needs to focus on creating creative works by relying on skills, talents, and creativity as intellectual property. Integrating the creative economy could produce creative people and entrepreneurs with brilliant and new ideas. Howkins (2001) added that the more ideas created, the faster the community welfare increases, either in its economic, social, or environmental perspectives.

The creative economy value is integrated into learning activities to build students' honesty, responsibility, confidence, resilience, discipline, and competitiveness. Teacher evaluation results show that students always showed honest and responsible behavior. They were confident, resilient, and disciplined in completing the given task. Moreover, in completing creative work, they constantly innovated to produce creative work with high competitiveness (Figure 1 and Figure 4). To increase their creativity and innovation, students should be able to think creatively, be creative, and act creatively by involving their curiosity and critical thinking (Munastiwi, 2015). The creative economy value must be integrated into the learning process and practiced in the students' daily behavior. Another beneficial aspect of the creative economy to be developed in learning is hard skills, soft skills, and life skills to make it easier for teachers to direct students based on their interests and talents (Pane & Patriana, 2016).

In integrating the value of the creative economy in curriculum and learning, the school has positioned itself as a driving force for creating a competitive Indonesian and a high-quality community of life in 2025. The role of schools in shaping the student's creativity, expertise, and talents is worth the appreciation and full support of the government, stakeholders, and society. Accordingly, education output can compete fairly, honestly, and uphold ethics and excellence at the national and global levels. Moreover, they will also have the fighting power to improve and think positively in facing challenges and problems continuously.

CONCLUSION

The curriculum is the teachers' instrument for learning activities to achieve national education objectives. They have implemented creative ideas and conducted curriculum development tests in classrooms to obtain the right formula for the vocational curriculum. The government has anticipated the application of a creative economy in the national education curriculum by focusing on creating goods and services by relying on expertise, talents, and creativity as intellectual wealth.

Provided with these great ideas, the school has integrated the creative economy to form the competency skills of students through creative and innovative actions.

Entrepreneurship in vocational high school has already been formed by exploring creative and entrepreneurial products. Teachers also stimulate students' creativity through creative activities involving the business world, industrial society, creative business actors/home industries, and stakeholders. This is to integrate the creative economy value into learning activities to build their honesty, responsibility, confidence, resilience, discipline, and high competitiveness based on their respective expertise. They will habitually innovate to produce creative work with increased competitiveness. This features life skills education as an essential part of the educational process. Also, teachers play a significant role in providing students with guidance, training, encouragement, and learning skills that direct them individually or in groups to new skills, including vocational skills. Contextually, life skills education emphasizes the link and match between the education world as the provider of human resources and the business world, the industrial society, and the community as the users. Therefore, education can prepare students to compete in the present era and have a future-oriented life.

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Realization of vocational high school curriculum based on work culture

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ABSTRACT

This research aims to find out the implementation of work attitudes based on the business world, the industry, and the world of work in the curriculum used by vocational high schools, where the work culture is a work attitude that prospective workers must own in entering the workforce. The realization of this work culture is seen from several indicators such as the application of work culture needed in schools, the existence of Links and Matches with the needs of the world of work, interpersonal skills owned by students, and intrapersonal abilities possessed by students who are realized in the 5R work culture (Concise, Neat, Resik, Care and Rajin) that apply to the school curriculum. The method used in this research is the Mixed Methode method, combining quantitative research and qualitative research. The study was conducted using instrument questionnaires and structured and open interviews involving respondents from educational institutions and the world of work under the auspices of the Indonesian Electrical and Mechanical Contractors Association. The data analysis technique used is the Milles and Huberman model Likert scale by looking at the percentage generated on the indicator of the competence of the world of work in the good category of 63.73%. But this must remain a thing that needs to be considered and maintained by vocational high schools to produce graduates of good character and a good working culture.

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INTRODUCTION

Improving and maintaining human resources becomes part of the main objectives of a country, one of which is through whole education. This process can be done through education at a vocational high school known as vocational education. This effort begins by preparing learners through science, good work skills and attitudes, and professional skills that suit the needs of the business world, the industrial world, and the world of work oriented to the 5R work culture (Concise, Neat, Clean, Care and Diligent). The Changes and demands of the world of work are increasingly rapid, and then a strategy is needed to make it easier that must be built into the 5R work culture (Kholidah & Prasetyo, 2018).

The work culture created in the work environment can help the performance of both students and employees to be able to provide their best abilities in work and work (Sari, 2019). One of them is to apply 5R. 5R is a concept that distinguishes between what is needed to be done and what is not

required. It can be used to make wise decisions and apply stratification management to dispose of what is not needed (Osada, 1995).

The role of human resources becomes the dominant factor in an educational institution. This is certainly part of the responsibility of carrying out duties and roles in the field of education. Policy changes in educational institutions in Indonesia are certainly an effort to improve the quality of education in Indonesia, where good educational outcomes will be seen from how much positive impact the changes have. There is the availability of vocational high school graduates who are in demand or needed by the business world, the industrial world, and the world of work in the present and the future.

This, of course, is supported by a comprehensive curriculum that pays attention to needs so that all the implementation of learning in vocational education must boil down to applying a good work culture. Human data resource preparation is pursued through educational aspects to improve quality that focuses on increasing the number of skilled and certified workers to meet the needs of the 4.0 work era, which refers to the Indonesian National Qualification Framework. In this case, the main point is that the school has a main role, periodically with other companies and institutions, in terms of preparing a training curriculum that suits the needs of the job.

Vocational education directs vocational education towards how learners can master the abilities and have skills and expertise in certain applied fields that will direct vocational graduates to have a profession in their area of expertise that will direct learners to areas of work that require special skills (Presiden Republik Indonesia, 2005). Vocational education strategizes how to prepare competent workforce candidates in their areas of expertise. One of the policy roadmaps in developing Indonesian vocational education 2017-2025 is the improvement of the curriculum that generally refers to the needs of the world of work today, keeping up with the times and technological advances (Disas, 2018).

The high unemployment rate of vocational high school graduates every year becomes a very worrying thing. The Central Bureau of Statistics summarizes that the eviction of vocational graduates is at 53.01% in 2020, the sense increasing by 36% and becoming the highest from 2016-2020. This is due to the imbalance or incompatibility (mismatch) between vocational high school graduates and the needs of the world of work. Cooperation with industry (link and match) with the world of work becomes an urgent thing that must be done immediately by vocational high schools. Link and Match decision making is considered as a smoothing of the skills competencies needed by the world of work in the future that requires a new paradigm that education is no longer as supply minded but more demand minded or known as the world of work/market needs (Disas, 2018).

A curriculum is something that is planned as a handle to achieve educational goals (Nasution, 2014). What is planned is usually ideal, an ideal about humans or citizens that will be formed through a curriculum that hopes to create quality human beings both in the eyes of their own people and in the eyes of the world. The curriculum in vocational education is inseparable from developing knowledge about a particular field but must simultaneously prepare learners to be productive (Finch & Crunkilton, 1979). The vocational education curriculum is directly related to helping students to develop a broad level of knowledge, expertise, attitudes, and values.

Based on the previous description, this study aims to determine the implementation of work attitudes based on the business world, industry, and the world of work in the curriculum used in vocational schools, where work culture is a work attitude that prospective workers must possess in entering the world of work.

RESEARCH METHOD

This research is descriptive research using mixed methods research, combining quantitative and qualitative research. Mixed methods research collects, analyzes, and combines quantitative and qualitative research methods in a series of studies to understand research problems (Creswell, 2013). The dominant data used is quantitative data and is corroborated by qualitative data. The strategy used in this study is integrated data collection. The strategy used in this study is integrated data collection. Respondents to this study are the world of work under the auspices of the Indonesian Electrical and

Mechanical Contractors Association, Education Office of West Sumatra Province, PT. Haleyora Power Region 4 West Sumatra, and vocational high school.

The instruments in this study used are non-test intrusions in the form of questionnaires, interviews, and direct observations or observations. The test that will be done on this instrument consists of a validity test and reliability test that is used to test each item guided by the grid. The researcher's research instrument trial was conducted on ten respondents, and the researcher also asked for the validity of questionnaires from 3 experts. If the instrument has been declared valid and reliable by the validator or expert, then the instrument can be used for the next research step (Sugiyono, 2021). Based on the results of the trial using SPSS with Cronbach's Alpha method obtained results of 0.992 greater than 0.6, it can be concluded that questionnaires can be relied upon to measure in this study with results as can be seen in Figure 1.

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.992	65

Figure 1. Results of Validity and Reliability using SPSS

This conclusion is seen from the achievement of the correlation between the effectiveness of the reliability value as seen in Table 1, and to see the results, a standard Likert scale is used with the criteria as seen in Table 2.

Table 1. Interpretation of the Correlation Coefficient on the Reliability Value

Coefficient Interval	Relationship Level
0,80 – 1,000	Very high
0,60 – 0,799	high
0,40 – 0,599	Quite high
0,20 – 0,399	Low
0,00 – 0,199	Very Low

Table 2. Categorization Based on Likert Scale

No.	Percentage	Criterion
1	81%-100%	Excellent
2	61%-80%	Good
3	41%-60%	Enough
4	21%-40%	Less
5	Less than 21%	Less Once

RESULT AND DISCUSSION

The results of the analysis of questionnaire dissemination data to 16 respondents obtained the results of achieving competence in the world of work, where the application of work culture. From the research results, students have started to implement a work culture in schools through the application of a work culture that is applied to the world of work. In addition, productive learning or expertise has led to behavior in the world of work, and every student instills a good work attitude. Learning every subject that has been instilled with work character values is enough for students to have a good work culture. Learners have begun to pay attention to the learning provisions carried out in workshops/workers/workshops have referred to the operational standards of the world of work procedures both in dress and equipment used in schools.

Implementing this work culture also pays attention to the 5R culture (Concise, Neat, Clean, Care, and Diligent). Based on the analysis results, the results of the realization of the work culture-based SMK curriculum can be seen in Table 3.

Table 3. Work Culture Analysis

No.	Indicator	Jlh Scor	Average	category
1	Application of Work Culture	473	65.69%	good
2	Link and Match with the World of Work	249	62.65%	good
3	Intrapersonal capabilities	250	62.50%	good
4	Interpersonal Skills	205	64.06%	good
	Total	1177	63.73%	good

The research results in Table 3 show that the indicators of implementing work culture are in a good category (65.69%). Intrapersonal abilities possessed by learners in the form: of the ability to be responsible for good in every job charged, the ability to manage work, the ability to control themselves well, learners already have a high commitment and dedication to the work, and learners already have courage in every decision making. The results showed that learners already in the category of good (65.50%) owned indicators of intrapersonal abilities. The world of work requires a workforce that has competence in accordance with its field of work and has high adaptability and competitiveness (Hadi, 2012).

Interpersonal skills possessed by learners in the form of the ability to be good in having empathy for others, learners quite good in having a good ethic in getting along with others, learners can adapt quickly to the environment in which they feel comfortable, and learners have sensitivity to the surrounding environment by having a high spirit in work. The results showed that on indicators of interpersonal skills possessed by learners are already in the good category (64.06%). Link and match efforts made by schools to the world of work are strong through MoU or cooperation with the world of work. Some schools have compiled school curriculum along with the world of work, and schools have tried to adjust equipment. Practice in schools based on the world of work, some schools have made periodic visits (1 x 6 months) to see the development of the world of work, and schools have begun to involve the role of universities in preparing graduate competencies. The results showed that the Link and Match indicator with the world of work is in a good category (62,65%).

This competence will continue to be maintained by the alignment of links and matches between educational institutions and the world of work. Link and match are expected to reduce the unemployment rate of graduates in vocational high schools (Disas, 2018). There is a link and match between the school and the industry so that vocational graduates have not been absorbed in the industrial world, and the competence of vocational graduates expected by the industry has not been formed properly. Competencies expected in the world of work are skills in accordance with their fields (hard skills). The world of work wants graduates with technical competence and good attitudes, competence attitude, cooperation, and motivation that belongs to soft skills (Wibowo, 2016).

Based on the analysis results, researchers can conclude that the indicator of the competence of the world of work in that category is good, with a percentage rate of 63.73%. But this must remain something that should be considered and maintained by vocational high schools to produce graduates

of good character and good work culture. This is in line with the definition of work culture, which is a value that is used as a guideline for human resources to deal with external problems of integration adjustment, and able to understand existing values, adjust to behave with a good work culture will provide encouragement for good work results (Faizal et al., 2019).

The skills needed in the world of work also significantly affect the availability of graduates in the world of work. Based on research conducted, the world of work looks at a person's competencies through his certificate of competence. It is recommended that every vocational school graduate has a certificate of competence issued by a professional certification body as a benchmark of the world of work in considering someone competent at work.

This becomes something that is very urgent vocational high schools must consider that to prepare graduates with certificates of competence of expertise in the field of competence in line with the regulation (Presiden Republik Indonesia, 2012), which states that the benchmark of a person in having competence is through certification and training that makes the Indonesian national work qualification as an embodiment of the quality and identity of the Indonesian nation with the Indonesian national education and training system (Menteri Ketenagakerjaan Republik Indonesia, 2014). The world of work requires competencies seen from two aspects, namely technical aspects related to scientific background or skills learned and skills needed in the world of work, including parts of technical skills or hard skills (Baiti & Munadi, 2014).

Indicators of the ability to analyze problems or solve problems are also very important in the world of work. In this competence, a person is required how to find solutions to the work problems he faces, express opinions about a job, and provide advice and input related to the problems faced in work. For the competence of vocational graduates to be improved in accordance with the needs of the world of work, it is necessary to make structured improvements in each enactor's achievement of these competencies. Habituation of work culture on the competence of analyzing problems or solving problems can be applied through learning that familiarizes learners to think about finding the cause and effect of what is happening, observing directly, and finding solutions to those problems (Basito et al., 2018).

Implementing problem-based learning and speech delivery can also improve critical thinking skills for learners, supported by good argumentation skills (Ariyanto et al., 2020). Indicators of the competence of the world of work obtained in this study in the category of good, in sub indicators of the application of work culture carried out by schools in the process of learning implementation have referred to the existing culture in the world of work such as: the ability to argue or issue arguments, carry out work in accordance with good work attitudes, follow the rules applicable in the learning process and the ability to adjust to the world of work.

The competencies of the world of work that someone must possess include intrapersonal abilities and interpersonal skills. This competence will continue to be maintained by the alignment of links and matches between educational institutions and the world of work. Link and match are expected to reduce the graduate unemployment rate at vocational high school (Disas, 2018). This is in line with the definition of work culture, which is a value used as a guideline for human resources to deal with external problems of integration adjustment, and being able to understand existing values, and adjusting to behave with a good work culture will provide a boost to good work outcomes (Faizal et al., 2019).

CONCLUSION

The overall realization of a work culture-based curriculum shows good results. World of Work competencies that include the application of work culture, link and match, Intrapersonal abilities, and interpersonal skills oriented to the application of 5R-based work culture (Concise, Neat, Clean, Care, and Diligent) in vocational high schools have entered the good category with research results being at a percentage of 63.73%. This means that all competencies in the world of work can be applied well and realized in the learning curriculum in vocational schools as an effort to bring a good, fun, and comfortable work atmosphere in vocational schools.

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Appropriate learning media for mild mentally impaired students at inclusive vocational schools: A literature review

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ABSTRACT

In inclusive vocational high schools, students with mild mental retardation have limited thinking and communication. This limitation needs to be overcome by teachers with aid. Students with mild mental retardation study using learning media to improve their knowledge. This study aims to determine what learning media are appropriate for mild retarded learners of Inclusive Vocational High School. This study is a literature review of documents. There are four stages in writing this literature review: determining research topics and questions, searching for literature, analyzing literature search results, and writing a literature review. The documents are journals, conference proceedings, books, thesis reports, and website pages on the internet. The number of documents analyzed is 32 documents. Learning media that is suitable for students with mild mental retardation can be seen from 1.) The text: i.e., short readings, common words used, not convoluted, Arial or Tahoma fonts with the size of 14 pt, non-italic sentences and underline, adding an illustration like image or table; 2.) The colors of the media take on the hot colors: i.e., red, orange, and yellow; 3.) The types of tests that can be used: i.e. multiple-choice tests, right-wrong choices, yes-no question, crossword, cause-effect, test descriptions, and essay; 4.) The shape of learning media is 3D; 5.) the types of aromatherapy that can be used: i.e. lavender essence, calm, citrus melablend, and Northwoods blend.

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INTRODUCTION

Students with mild mental retardation are defined as having Intelligence Quotients (IQ) in the range 50-55 and 70 and have limitations in communication, self-care, daily or community skills, or social skills (Hoffenberg, 2011; Hyman, 2007). In several other countries in the world, mental retardation has different names, including; Cognitive limitation, Developmental delay, Learning disability, Slow learner, Mentally handicapped, and Intellectual disability (Hyman, 2007; Shea, 2012). Physical characteristics in this group are that they have an average slow physical development compared to children their age. In addition, school assignments cannot be adequately completed (American Psychiatric Association, 2013).

Currently, developmentally disabled students can not only continue their education at the special high school but also at the Inclusive vocational school (Cahya, 2014; Yuliyanik & Juwita, 2020). Therefore, the limitations of inclusive vocational students need to be overcome with a guidance learning model. Mild mentally disabled students will be guided in learning by the teacher.

However, for students to gain skills, students must be taught to learn independently. Independent learning can improve students' skills. In this case, the role of the media is essential to aid the role of the teacher.

Various learning innovations have been carried out to help students with intellectual disabilities, including; Computer-assisted instruction (Jerome & Barbetta, 2005), online strategy instruction (Fitzgerald et al., 2012), eText (Douglas et al., 2009), word prediction and text-to-speech technologies (Silió & Barbetta, 2010), pentop computers (Bouck et al., 2009), and audio-video based reading learning model (Dharmawan & Wahyuni, 2017). Learning technology should be able to involve all the senses of students. However, mostly only one media. Even though the more diverse the media, the easier it will be for students to understand the material. For example, students who see and listen to learning have learning effectiveness of 50% (Meierhenry & Wiman, 1969).

Although various media have been developed, there are still obstacles to learning. Ishartiwi (2010) research provides an overview of the variations in the implementation of learning in special schools, namely: (1) the determination of teaching materials and material content does not fully refer to student needs, and (2) learning resources do not use replicas and or real environments. The learning media in most schools still seem modest and have not been managed effectively (for example, children bring equipment from home or use school equipment that has not utilized technology).

These problems need to be addressed. For this reason, this study aims to find out what kind of media is suitable for learning for mild mental retardation. The novelty of this research is that no specific research explains the criteria for learning media for mentally retarded people, especially mild mental retardation in inclusive vocational schools. Many researchers only discuss children with special needs issues, which are universal for all persons with disabilities at extraordinary schools.

RESEARCH METHOD

This research is a literature study. The type of data collected is secondary data. There are four stages in writing this literature review: determining research topics and questions, searching for literature, analyzing literature search results, and writing a literature review (Fakultas Kesehatan Masyarakat Universitas Jember, 2020). The passwords used in the search on the google search engine are assistive technology, instructional technology, aromatherapy, 3 Dimension, texts, tests, colors, images, and combined with mental retardation, intellectual disability, disability, children with special needs, and special education.

The documents that have been collected were obtained from journals, conference proceedings, books, thesis reports, and website pages from the year 1969 until now. Document searches are done by going to the search website on Google Scholar, SpringerLink, ScienceDirect, and directly searched using the Google search engine. The documents collected are in Indonesian and in English. The collected documents are then categorized into publication type and publication year.

RESULT AND DISCUSSION

In Indonesia, there are many inclusive vocational schools. Teachers need to facilitate every student, including students with mental retardation. Therefore, knowing the appropriate learning media for them is very urgent. Based on the results of a literature search through Google Scholar, SpringerLink, ScienceDirect, and directly searched using the Google search engine and using adjusted keywords. The researchers found 102 articles that matched these keywords. Then after checking the articles, there were 30 duplicate articles, so the articles were excluded, and the remaining 32 articles/documents were screened based on the title, abstract, and full text, the theme of which was adjusted to the theme of the literature review.

The collected documents or articles are then analyzed. Table 3 shows the publication type overview, Table 2 shows the publication year overview, and Table 3 shows the analysis results of each research document.

Table 1. Publication Type Overview

Publication Type	Amount
Paper Journal	17
Paper Proceeding	3
Thesis	3
Book	9
Web Page	1

Table 2. Publication Year Overview

Publication Type	Amount
2017-2022	9
2013-2016	3
2009-2012	7
2005-2008	4
< 2004	4

Table 3. Research Document Review

Authors	Samples	Collecting and Methods	Types of Research
Shea (2012)	12 documents	Document study	Qualitative
Taylor et al. (2018)	3 students	Observation and test	Quantitative
Evmenova and Behrmann (2011)	5 students	Observation and test	Quantitative
Fitzgerald et al. (2012)	53 students	Test	Quantitative
Douglas et al. (2009)	11 students	Participatory observation	Qualitative
Silió and Barbetta (2010)	6 students	Test	Quantitative
Bouck (2004)	3 students and 1 teacher	Test and interviews	Quantitative
Dharmawan and Wahyuni (2017)	3rd grader and 4 SDLB	Observation, interviews, and document study	Qualitative
Ishartiwi (2010)	13 documents	Document study	Qualitative
Anjarsari (2018)	23 inclusive and extraordinary school	Questionnaire and documentation	Quantitative
Shearman and Sheehan (2000)	Students and teachers	Documentation study and observation	Qualitative
Ece and Çelik (2008)	25 students	Questionnaire an observation	Quantitative
Ramandi et al. (2012)	50 students	Questionnaire	Quantitative
Ranjan (2016)	50 students	Questionnaire	Quantitative
Witter (2020)	64 participants	Questionnaire, observation, and survey	Quantitative
Mustaji et al. (2019)	1st grade students	Questionnaire	Quantitative
Harrison and Ruddle (1995)	5 participants	Observation	Qualitative
Passig (2009)	Eighty-seven teenagers	Observation and test	Quantitative

Learning media is not only a teaching intermediary between teachers and students but more than that. Learning media can be used for independent learning in mild developmentally disabled students. In addition, the designed learning media must also accommodate and be accessible to students with mild mental retardation at inclusive vocational schools. Not all types of learning media are suitable for mild mental retardation. Teachers need to pay attention to this. Moreover, if mild developmentally disabled students study at inclusive vocational schools, teachers must be able to prepare learning media for them (Anjarsari, 2018). The media that can be used are movies, slides, videotapes, teaching machines, and charts (Altfest, 1975).

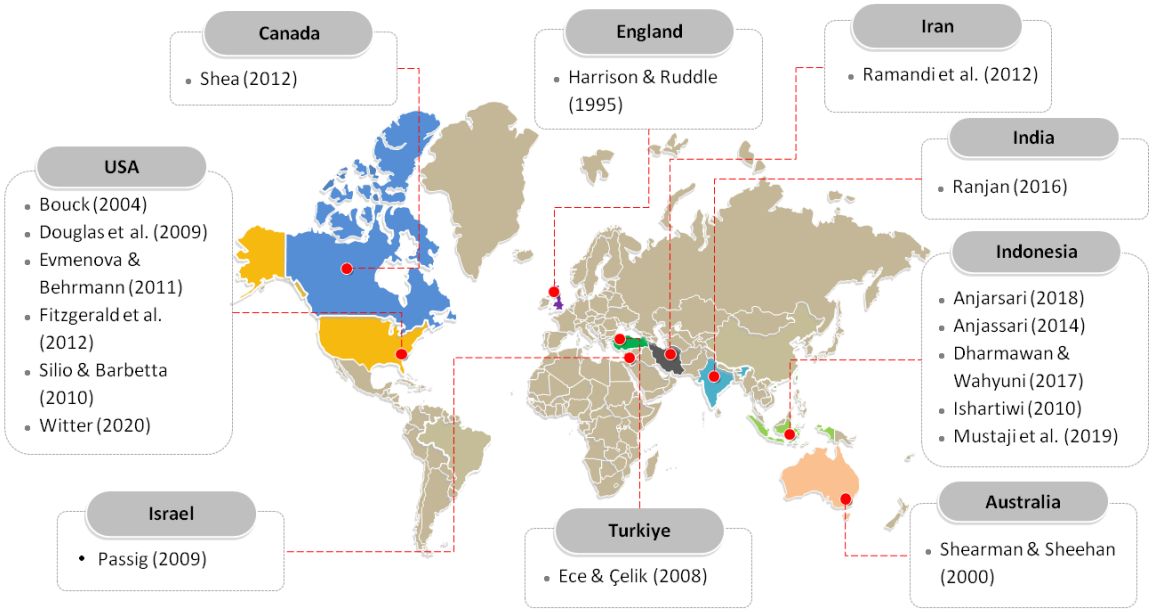

Figure 1. Geographical Distribution of Included Studies (Map Created by Authors Using an Open)

Learning media with text also need to pay attention to several requirements. Do not let mild developmentally disabled students cannot understand the written text. Learning media to have legibility for mild mental retardation requires requirements, namely: 1.) Short, where sentences only use words as necessary. For example: What I will do now is press the green button so the machine can start working (wrong). It should be press the green start button; 2.) Common words if possible. But sometimes there are technical words used in Industry. These words cannot be replaced. For example, pliers, screwdrivers, socket wrenches, pistons, and spark plugs; 3.) Easy or straightforward, which only provides what should be known. A false example is that hand tools must be in accordance with their function so as not to provide safety for the tool being used and the material being tightened. The correct example is to use hand tools according to their function; 4.) The use of sample units for specific work or concepts. For that, it is necessary to explain. The sizes are large, small, thick, and thin. Measurements are read on a unit scale, for example, kg or cm. shapes such as ovals, squares, and triangles; and 5.) Alternative formats other than writing are audio recordings, video recordings, and real picture sheets (Shearman & Sheehan, 2000).

Another opinion is to convey information to developmentally disabled people should use simple words and language and illustrate with pictures or other visual representations, especially for those with intellectual disabilities who are illiterate or intellectually limited (International Labour Organization, 2016). Furthermore, the words used must also have the appropriate size and font for the mildly mentally retarded so that they can read easily. Taylor et al. (2018) stated that the font type and size suitable for mild mental retardation is Arial with a size of 14 pt. While the Victoria Govermenent State (2019) recommends (1) paper size A4 or A5, (2) font used is Arial or Tahoma, (3) do not use Times new roman or Serif, (4) font size is 14 pt, (5) reduce the use of sentences using capital letters, (6) only use 1 type of writing, (7) do not use italic sentences, and (8) sentences should not be underlined.

The design of instructional media should also pay attention to color. Everyone's favorite color is different, including mild mental retardation. Stated that mild mental retardation preferred hot colors (red, orange, and yellow) to cold colors (blue, green, and purple) (Ece & Çelik, 2008). The types of tests that can be used for mental retardation are draw a line, find a word, fill in the blanks (with or without alternative answers), true and false, and crosswords (Shearman & Sheehan, 2000). While mild mental retardation can use multiple-choice tests, true-false choices, yes-no, match-making, cause-and-effect, description tests, and essay tests (Rochjadi, 2016). For multiple-choice

tests, the number of alternative answers used needs to be considered of the age factor and the material tested (Mehrens & Lehmann, 1991).

Learning is not only through visual and auditory but also learning can also be done through touch and smell. Learning media can also be touched and have a taste/smell. Learning media should be not only two dimensions but also three dimensions or real objects. Three-dimensional media can improve the ability of developmentally disabled students (Mustaji et al., 2019; Passig, 2009). Learning media can also be added with aromatherapy. Aromatherapy can provide sensory stimulation, help develop communication, improve coping skills, and reduce aggression (Harrison & Ruddle, 1995; Ramandi et al., 2012; Ranjan, 2016; Witter, 2020). The types of aromatherapy that can be used are lavender essence, lemongrass, eucalyptus, geranium, cinnamon, calm, citrus melablend, and Northwoods blend (Harrison & Ruddle, 1995; Ramandi et al., 2012; Ranjan, 2016; Witter, 2020).

CONCLUSION

Learning media for students with mild mental retardation in Inclusive vocational schools must be easy to understand and interesting. Several aspects need to be considered when designing learning media. These aspects are letters and sentence forms. Other media need to be added, such as images, display colors, types of tests, three dimension shapes, and aromatherapy. Further research suggests examining other theoretical studies such as images, videos, animations, and the metaverse.

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