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Synchronisation Model of Campus-Industry Partnership Through Smart Expert System Hybrid Advisory for Industrial Internship in the Era of Independent Learning

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Abstract: The objectives of this research include (1) developing smart expert system innovation integrated hybrid advisory; and (2) Testing the attractiveness and feasibility of the hybrid advisory integrated smart expert system innovation prototype. The method in this research is in the form of research and development (Re-search and Development). Where the method includes a preliminary study; model design; development of model prototypes; model prototype testing; model prototype revision; validated model prototype results; model prototype experimentation; tested models; and dissemination. all state universities in East Java (students, equipped with lecturers, officials in PT and stakeholders). The research instrument used questionnaires, documents, structured surveys, observations, and in-depth interviews. The results of this study include: (1) the innovations developed have synchronous and asynchronous online guidance features, submit reports and daily assignments, student progress reports, live chat with supervisors and instructors, daily attendance, to review report results; and (2) the Smart Expert System Integrated Hybrid Advisory innovation developed has valid results without revision with an average score of 90.1 (user benefit aspect), an average score of 90.5 (application display aspect), an average score of 93 ,8 (newness of information aspect), average score of 97.6 (content aspect), average score of 90.6 (user-friendliness aspect), average score of 93.8 (competency achievement aspect).

Keywords: Campus industry partnership, smart expert system, internship, independent learning, TVET

1. Introduction

Increasing the capacity of students is relatively not optimal. This is through the learning process from the teacher whom the teacher and education directly transfer can determine the quality of children's lives in the future. This, of course, requires the role of a principal as an innovative leader in inspiring teachers to prepare innovative learning concepts (Ralmugiz et al., 2021; Sukardjo et al., 2021).

Innovative leadership is one of the cogs in supporting an effective learning process in educational institutions, especially in the early childhood education environment. Early childhood education is the initial level in formal education,

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so the concept of an innovative learning process is very important to be managed properly through structured and guided management by a school principal. (Mukhadis et al., 2021; Andika Bagus Nur Rahma Putra, Ulfatin, et al., 2022).

Implementation of the curriculum is part of the preparation that will be faced in the challenges of the times in the future. In the future, the world of work will be filled with educators who are currently learning to achieve their goals. They are students. This proves that the curriculum is an effort to form a reflection of the formation of character education that fully participates in the progress of education. The related curriculum policy is carried out by innovation so that it is appropriate and follows what is expected, then according to what is in the Preamble to the 1945 Constitution that, in general, the purpose of national education is to educate the nation's life. (Naufal & Pekalongan, 2021; Said & Muslimah, 2021). Following what already exists, this has meaning in the development of an intellectual individual's life with the term "intelligent living".

The degradation of the quality of learning transactions is still relatively high during this new virus pandemic, namely Omicron (a derivative of Covid-19). After the first Covid-19 pandemic, it has begun to shift from full-online learning to hybrid learning (offline-online). This impact is felt especially in the field of vocational education, which demands more practical learning than practice (Ansari et al., 2022; Bülow, 2022). On the other hand, vocational students (vocational/engineering) must also actively develop partnerships with IDUKA (industry and the world of work) to improve production skills. By the mandate of the Law of the Republic of Indonesia, Number 12 of 2012 concerning Higher Education, which is strengthened by the Regulation of the Minister of Education and Culture Number 3 of 2020 concerning National Standards for Higher Education and Regulation of the Minister of Education and Culture Number 22 of 2020 concerning the Strategic Plan of the Ministry of Education and Culture in 2020-2024, the Independent Learning - Independent Campus (MBKM) policy will be implemented. In 8 (eight) MBKM activities, 2 (two) forms of activities are closely related to the vocational field. The form of MBKM activities is industrial internships and teaching assistance. In short, the two forms of activity place students in campus partner schools and industries for 6 (six) months to carry out integrated learning. However, there are big problems and obstacles in the implementation of the two forms of MBKM activities during this pandemic (Astri Muliasari et al., 2021; Hidayatullah, 2021; Said & Muslimah, 2021; Wiratraman & Lafrance, 2021).

Today, it requires an individual to be skilled, diverse and machine. Other experts say vocational education is a key factor in economic development and even social stability in developed countries. The success of vocational education in producing a skilled workforce is an important part of the human resource development strategy to equip the community with knowledge and skills in the world of work and industry (A. B.N.R. Putra et al., 2021; Subandi et al., 2020).

Based on observations (early February) and pre-research studies of previous research results (according to the research roadmap) at several universities in East Java. The results of observations and pre-research studies concluded several findings, including (1) as many as 77% of students who took part in the form of industrial internships and teaching assistantships for the MBKM program experienced difficulties in providing guidance and consultation to supervisors; (2) it is relatively difficult for supervising lecturers to monitor the daily activities of students in schools and industry; (3) only 35% of lecturers can monitor student progress and daily assignments; (4) 75% of the supervising lecturers have difficulty analysing the competency achievements of the converted courses; (5) the school and the program implementation industry have difficulty coordinating with the accompanying lecturers regarding student activities; and (6) there is no up-to-date digital innovation system used by supervisors and students for online consultation and guidance. In percentage terms, these findings are presented in Figure 1.

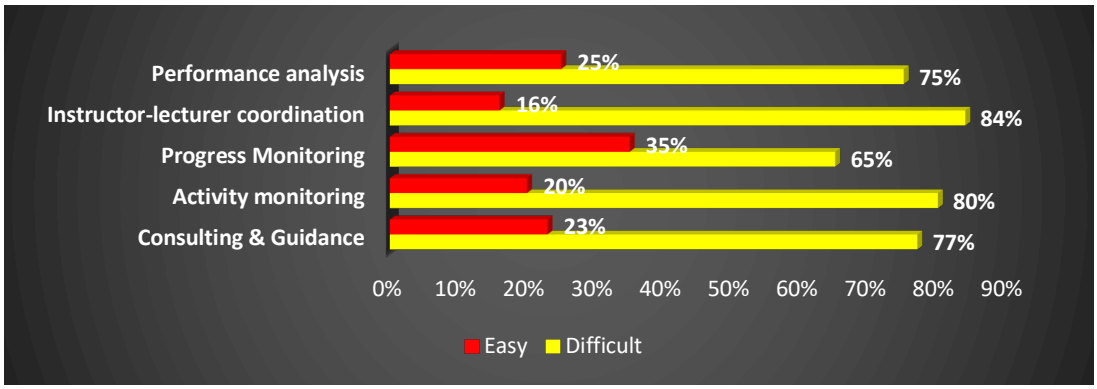

Fig. 1 - Percentage of observation findings and pre-research study of the research team

Based on the findings in Figure 1, it is proposed to solve the urgent problem by developing modern application system models and innovations. The model and application system that will be developed is a smart expert system with a campus-industry partnership synchronisation model. The hybrid advisory integrated smart expert system innovation that will be created is an expert system (intelligent) that facilitates MBKM program participants to carry out guidance. This innovation has several main features, including synchronous and asynchronous online guidance, submitting reports and daily assignments, student progress reports, live chat with supervisors and instructors, daily attendance, to reviewing report results. The smart expert system innovation that will be created is also integrated with hybrid advisory, which can be used during offline guidance through the report presentation feature.

2. Methodology

This research continues the research roadmap researchers have carried out in previous years. This research was conducted using research and development (R&D) methods. The research procedure refers to procedural steps from several experts, including synchronisation of initial studies, component mapping, model development, and model testing. Overall, this research consists of several stages. In detail, each stage of implementation is described as follows.

At this early stage, the research begins with a literature study and the design of research instruments. Activities start from instrument design, validation, and revision (e.g., there is a revision). At this stage, a qualitative approach was carried out by distributing questionnaires and documentation. Grammar experts have validated the instruments developed. The questionnaire consists of 30 question items. Next, the research area is divided. The region is centred in East Java, consisting of MBKM partner industries, MBKM partner SMKs, and state universities. At this stage, it is carried out to answer the first problem formulation, namely the components of the need for a synchronisation model of the campus-industry partnership for industrial internship students and teaching assistants for the MBKM program. Furthermore, the data were analysed through reduction, filtering, and triangulation.

An innovative prototype of an integrated hybrid advisory competent expert system will be developed in this advanced stage. The innovations developed are based on the results of component mapping in the previous stage. At this stage, it is carried out starting from designing an innovation prototype of an integrated hybrid advisory smart expert system to building a complete prototype of an integrated hybrid advisory smart expert system innovation prototype. The last stage is a continuation of the previous stage. At this stage, testing is carried out on the integrated hybrid advisory smart expert system innovation prototype. They were testing through a software expert validation team and a vocational curriculum expert validation team. At this stage, the focus of the research is still on the East Java region.

3. Results

3.1 Smart Expert System Innovation Products

The hybrid advisory integrated smart expert system innovation that was developed is an expert system (intelligent) that facilitates MBKM program participants to carry out guidance. This innovation has several main features, including synchronous and asynchronous online guidance, submitting reports and daily assignments, student progress reports, live chat with supervisors and instructors, daily attendance, to reviewing report results. The smart expert system innovation that will be created is also integrated with hybrid advisory, which can be used during offline guidance through the report presentation feature. The display of the hybrid advisory integrated smart expert system innovation is presented in Figure 2.

The hybrid advisory integrated smart expert system innovation that will be created is an expert system (intelligent) that facilitates MBKM program participants to carry out guidance. This innovation has several main features, namely synchronous and asynchronous online guidance, live chat with supervisors and instructors, daily attendance, to review of report results. The smart expert system innovation that will be created is also integrated with hybrid advisory, submit reports and daily assignments, and student progress reports, which can be used during offline guidance through the report presentation feature.

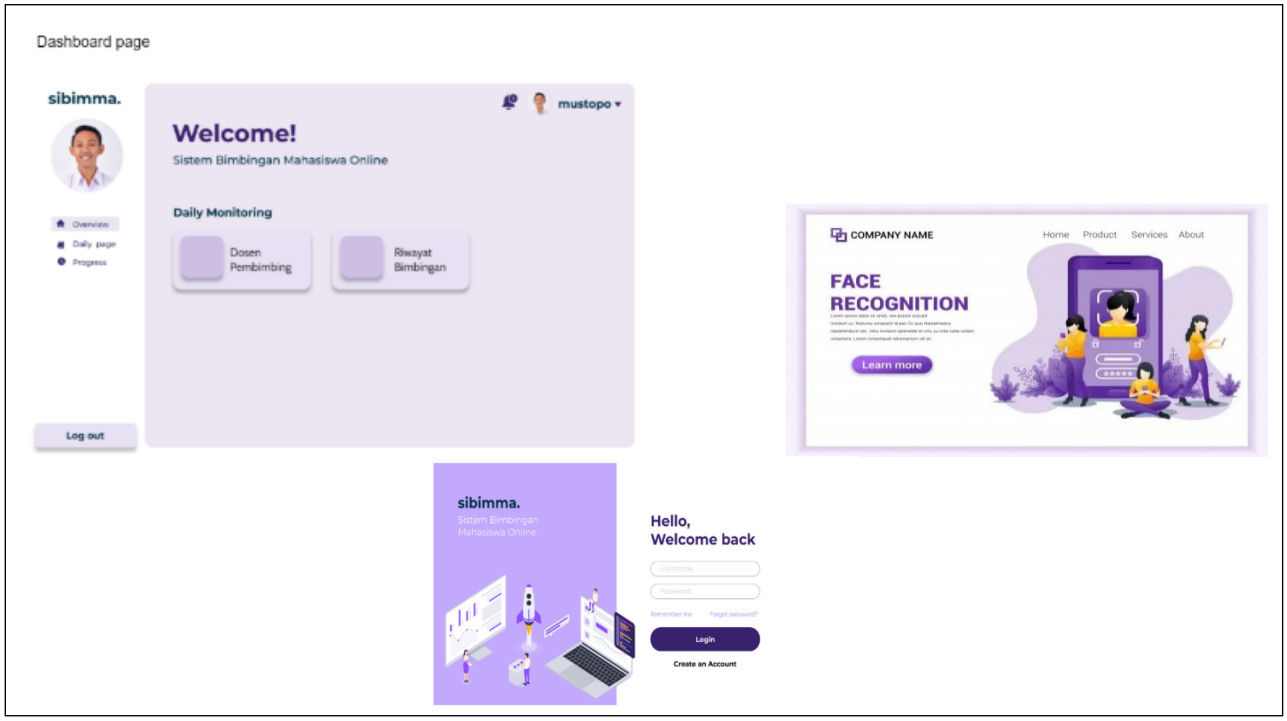

Fig. 2 - The smart expert system innovation design that will be made is also integrated with hybrid advisory

3.2 The Attractiveness and Effectiveness of The Hybrid Advisory Integrated Smart Expert System Innovation

The validity of the media product developed in this case in the form of an Integrated Smart Expert System Innovation Hybrid Advisory consists of six main aspects. The six aspects are aspects of user benefits, application display, Aspects of the novelty of information, aspects of content, aspects of ease of use, and aspects of competency achievement. More details are shown in Figure 3.

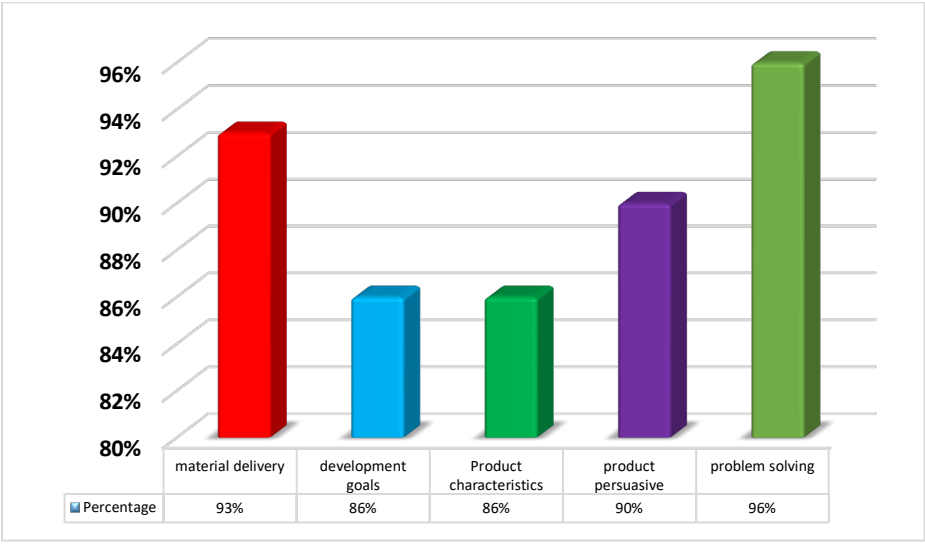

Fig. 3 - Percentage of user benefits

Based on Figure 3, there are five test items on the aspect of user benefits. These items include the material's delivery level, suitability for development objectives, characteristics of the product being developed, the level of persuasiveness of the product to users, and the level of problem-solving impact. The results of the validity test related to aspects of user benefits, such as Figure 3, can be concluded that the Smart Expert System Integrated Hybrid Advisory Innovation developed has valid results without revision with an average score of 90.1.

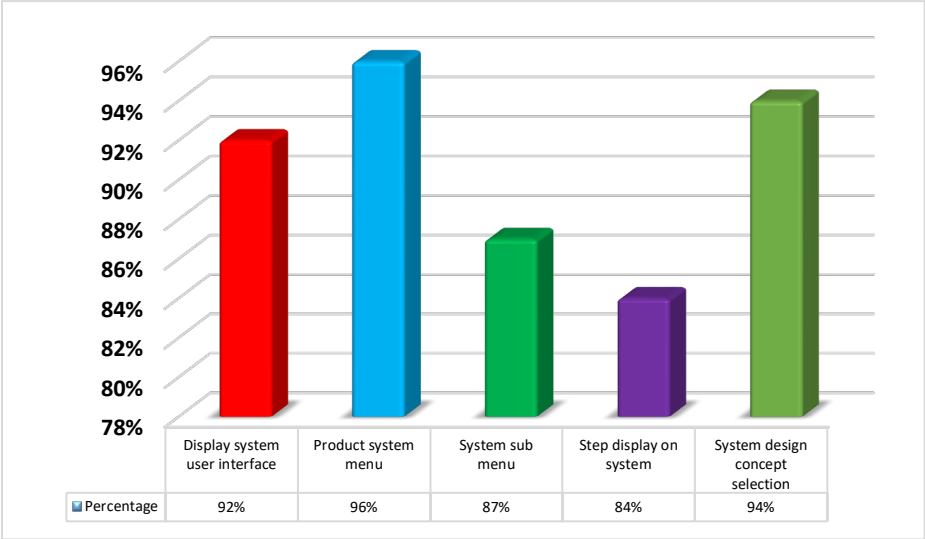

Fig. 4 - Aspects of the appearance of the application

Based on Figure 4, there are five test items on the application display aspect. The test items include the user interface system display, product system menu, system sub-menu, step display on the system, and system design concept selection. The results of the validity test related to application display aspects such as Figure 4 can be concluded that the Smart Expert System Integrated Hybrid Advisory Innovation developed has valid results without revision with an average score of 90.5.

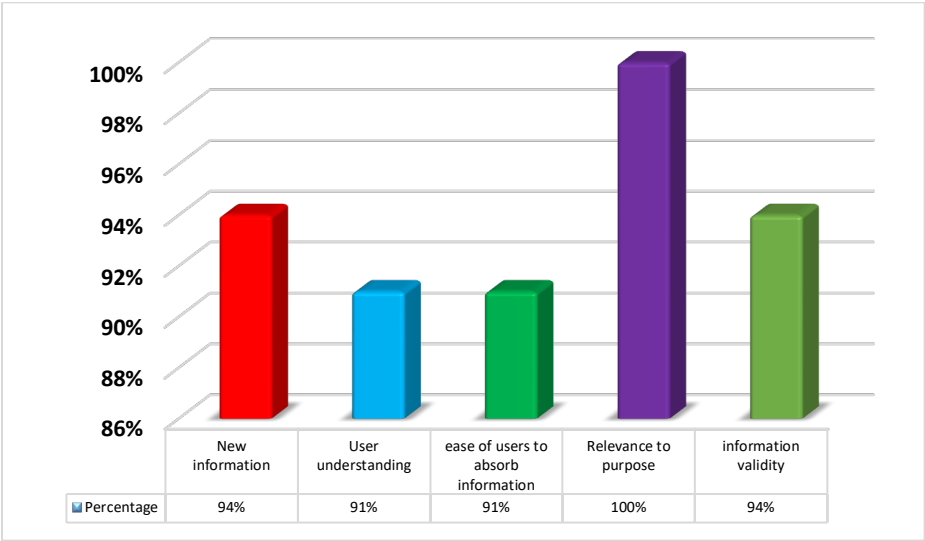

Fig. 5 - Aspect of information novelty

Based on Figure 5, there are five test items on the aspect of information novelty. These items include the latest relevant information, understanding of users processing information from the system, the ease of users in absorbing information, relevant to development objectives, and the validity of the information. The validity test results related to information novelty, such as Figure 5, can be concluded that the Hybrid Advisory Integrated Smart Expert System Innovation developed has valid results without revision with an average score of 93.8.

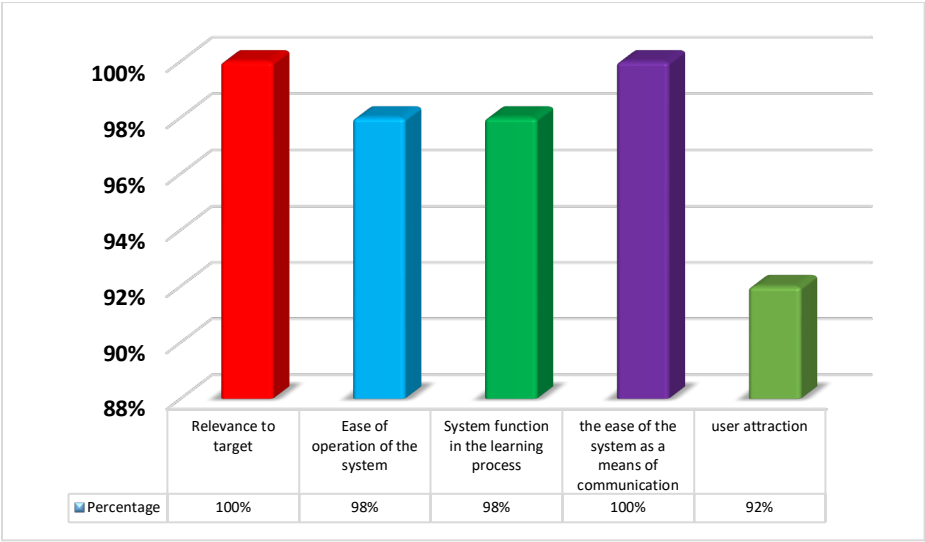

Fig. 6 - Percentage of content aspects

Based on Figure 6, there are five test items on the content aspect. These items include relevance to learning objectives, and the system is easy to operate and use, the system helps users in the learning process, the level of ease of the system as a means of communication, and the level of user interest in further developing the system. The validity test results related to content aspects, such as Figure 6, can be concluded that the Hybrid Advisory Integrated Smart Expert System Innovation developed has valid results without revision with an average score of 97.6.

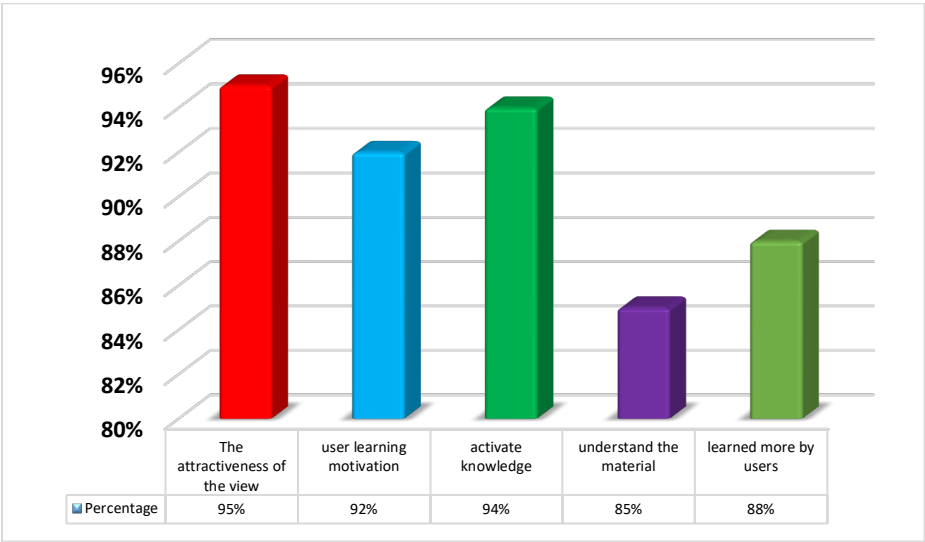

Fig. 7 - Percentage of ease of use

Based on Figure 7, there are five test items on the ease-of-use aspect. These items include the attractiveness of the system display for users, the ability of the system to create user learning motivation, the ability of the system to activate user knowledge, the ability of the system to help the system understand the material, and the level of ease of the system can be learned more by the user. The results of the validity test related to the ease of use aspect, as shown in Figure 7, can be concluded that the Smart Expert System Integrated Hybrid Advisory Innovation developed has valid results without revision with an average score of 90.6.

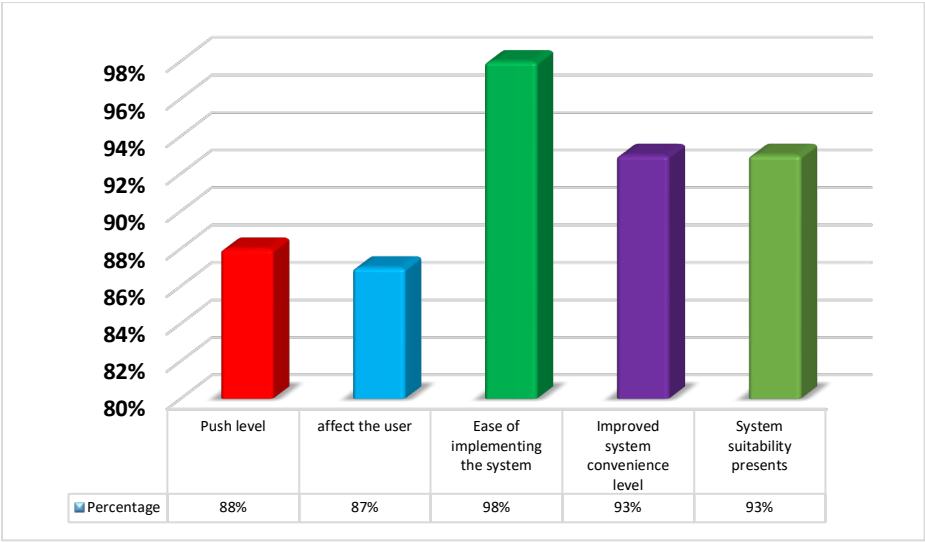

Fig. 8 - Percentage of competency achievement aspect

Based on Figure 8, there are five test items in the aspect of competency achievement. These items include the level of encouragement for users to learn more about the system, the impetus for the system to influence users to be more motivated, the ease with which the system is implemented at all levels, the level of ease with which the system is repaired when trouble occurs, and the suitability of the system in presenting menus and icons. The validity test results related to aspects of competency achievement, such as Figure 8, can be concluded that the learning media integrated e-generator practice system developed has valid results without revision with an average score of 93.8. So overall, the Hybrid Advisory Integrated Smart Expert System Innovation developed has a high score according to the concept of learning media development.

4. Discussion

Reality shows that education development is still faced with large unemployment due to the imbalance between education output and employment and the availability of existing job opportunities. A school education pathway expected to overcome unemployment is vocational education, an educational program that prepares people to enter the world of work, both formal and non-formal. This means that the expected outputs achieved from the education process in Vocational High Schools (SMK) are graduates with a certain skill level, so they are ready to enter the world of work. (Feitknecht & Lovey, 2021; Tentama & Nur, 2021). Based on UUSPN 20 of 2003 Article 15, paragraph 2, vocational education is secondary education that prepares participants to learn, especially to work in certain fields. The number of jobs that exist today provides challenges and demands on prospective workers' abilities in critical thinking, reasoning, decision making and the ability to solve a problem. Vocational High Schools (SMK) have an important role in preparing the workforce always to be able to keep up with the growing market needs. Government Regulation of the Republic of Indonesia No. 29 of 1990 concerning secondary education article 3 paragraph 2 states that SMK prioritises preparation and that SMK prioritises preparing students to enter the workforce. There is a difference in goals between the world of education and the world of industry because the world of schools wants graduates who have high grades in a fast time, while the industrial world wants graduates with technical competence and good attitudes. (Andika Bagus Nur Rahma Putra, Heong, et al., 2022; Tuwoso et al., 2021).

In the era of the Industrial Revolution 4.0, the world of education is now pushing for educational curricula in accordance with digital dynamics, the Internet of Things, artificial intelligence, and biotechnology. The industrial era 4.0 provides demands to be more creative, innovative, effective, independent and smarter. Compile or develop a curriculum in higher education must refer to the KKNI and the National Standards for Higher Education. Universities are faced with curriculum development in the Industry 4.0 era that produces graduates with new literacy skills, including data literacy, technological literacy, and human literacy with noble character based on understanding religious beliefs. Universities need to reorient curriculum development that is able to answer these challenges (Pérez-Sanagustín et al., 2022; Wang et al., 2022). Curriculum development in educational institutions is important for every university, especially in meeting the needs of the industrial world. Now the MBKM program has become the government's flagship in overcoming the problems of today's higher education world, namely the absorption of labour and the relevance of graduates to the world of work. Independent Learning Program-Independent Campus (MBKM), Kemendikbudristek, offers several programs: Certified Internships, Independent Student Exchanges, Teaching Campuses and Certified Independent Study Projects created by the Ministry of Education and Culture in 2020. The Indonesian National Education System is regulated in law no. 20 of 2003 by the Secretary of State of the Republic of Indonesia on July 8, 2003, in Jakarta. The Indonesian education

system continues to make changes with the aim of creating a higher-quality education system with a better curriculum to produce better graduates (Hidayatullah, 2021; Zulkardi et al., 2021).

The MBKM program from the government gives students the flexibility to take courses outside the study program for three semesters and off campus for two semesters, namely student exchanges, internships, research, and humanitarian projects are some of the activities that can be followed in the MBKM program (Fukami et al., 2021; Thomas et al., 2021). The independent campus policy encourages the development of student entrepreneurial interests with appropriate learning activities programs, reduces the problem of unemployment among intellectuals, and improves the quality of graduates through mastery of academic knowledge, thinking skills, management skills, and communication skills. Internship programs not only provide benefits for students but also provide benefits for companies that provide opportunities for students. In addition, the concept of an independent campus directs students to be more ready to work, collaborate, be creative and be able to benefit themselves and the community. With a fairly long period of time compared to an internship from a relatively short department, the era of independent learning provides an excellent opportunity to develop potential and experience in the industrial world. The basis for adopting MBKM is Permendikbud 3 of 2020, which relates to the National Standards for Higher Education. The curriculum is an important element interpreted as a collection of plans and setting goals, content, teaching materials, and the methodology used to direct the implementation of learning activities to achieve higher education goals. According to Article 11 (1) of the Minister of Education and Culture Regulation, the characteristics of the learning process as referred to in Article 10 paragraph (2) letter a are interactive, holistic, integrative, scientific, contextual, thematic, effective, collaborative, and student-centred (Smaragdina et al., 2019).

The era of independent learning can be interpreted as a period in which teachers and students have independence or freedom of thought, free from the burden of education that shackles them in order to be able to develop self-potentials to achieve educational goals. (Singh et al., 2021; Williamson, 2021). According to Nadiem, the essence of independence must be passed by prospective teachers before carrying out the learning process. Teachers, as the main component in education, have the flexibility and freedom to translate the curriculum before students teach it; by understanding the curriculum that has been set, the teacher can answer the needs of students during the learning process. With the existence of independent learning, prospective teachers are expected to be able to develop their potential, such as planning learning in an interesting, fun, and meaningful way. Education is used as a driving sector in the field of culture in producing creative and innovative things. The adjustment of the MBKM policy must be relevant to universities in each agency, namely as universities that can produce and develop science and technology.

The MBKM curriculum is adapted by developing the curriculum of the first study program and activity programs based on independent learning on an independent campus (Anis & Anwar, 2020; Williamson, 2021). These results will be developed and then followed up through collaboration with partners and implementing program activities. The MBKM policy prioritises active learning by developing creativity and innovation and being critical in solving problems in the learning process. The principle of the MBKM policy is contained in Permendikbud Number 3 of 2020 concerning National Higher Education Standards article 18. It is explained that the fulfilment of the period and study load for undergraduate or applied undergraduate students can be carried out: 1) following the entire learning process in the study program during the higher education period of study load; and 2) following the learning process in the study program to fulfil part of the study period and burden and the rest following the learning process outside the study program at the same university or at different universities, in the same study program or in different study programs. Therefore, there are two reference messages in the development of the MBKM curriculum, namely: (1) obtaining learning outcomes with students taking courses completely in their study programs, or (2) obtaining learning outcomes, some courses can be taken from outside the study program, both within the university itself and at other universities including internships in the field (Masitoh & Cahyani, 2020; Said & Muslimah, 2021).

The Independent Learning–Merdeka Campus policy issued by the government is focused on several things, where there are 3 main applications, namely the ease of establishing new Study Programs, modification of gadgets for better school accreditation, and the conversion of universities into prison entities related to institutional aspects. While the final program, especially those that are feasible to be carried out for 3 semesters outside the Study Program, is associated with the element of mastery. The mastery element in the request for modification of the specification of the mastery device is mainly based on the application of observations to various mastery sets, which are mainly based on totals throughout the Study Program and throughout the university (University) through giving students the right to voluntarily (may be taken or not) with take credits outside the university 2 semesters (equal to 40 credits). Plus, students can take credits in special observation applications at the same university for 1 semester (equivalent to 20 credits). Universities are required to be able to design and implement innovative learning processes so that students can achieve learning outcomes that include optimal and relevant aspects of attitudes, knowledge, and skills (MARINAH, 2019; Putriningsih et al., 2021).

The Independent Learning-Independent Campus Policy (MBKM) is expected to be the answer to these demands. Holistically, industrial internships in the MBKM program play a role so that students can apply, and compare theoretical and practical knowledge gained while in college with actual work in the industrial environment. In addition, industrial internships are expected to equip students to further enhance their experience and knowledge of skills in a professional manner in accordance with the demands of the world of work and technological developments that develop in society. The Catering Education Study Program has experience in conducting industrial internships through activities.

Learning innovation is a must that every teacher must have in order to provide quality and interesting learning. In learning, innovation is basically relative and subjective, meaning that this innovation is certainly familiar to a teacher. The speed with which the wider community accepts innovation is influenced by the characteristics of the innovation itself (Andheska & Sari, 2022; Sæbø & Midtsundstad, 2022). The characteristics of an innovation that can affect the adoption of innovation sooner or later are as follows: (1) Relative advantage, where this advantage is considered beneficial for the innovation recipient. This means that innovation can be measured based on its economic value or factors of social status, pleasure, and satisfaction, the more profitable it is for the recipient, the faster the information will spread, (2) Compatible, where this compatible is an innovation based on values, past experiences, and needs of the community the recipient. The point here is that when spreading the use of contraception in a society whose religion forbids using the device, the innovation spreader will also play late, (3) Complexity, where the complexity here depends on the level of difficulty in understanding and using the innovation of the recipient, in other words, the public understands the easier it, of course, innovation will spread faster, (4) Trialability, where Trialability is an innovation that is tried will be quickly accepted by the community than innovations that cannot be tried (must be proven first to be developed more widely), (5) Observable, where it can be observed (observability) here is an innovation whose results are easily observed will be accepted by the community more quickly, and vice versa. Today, creativity and innovation are key to ensuring Indonesia's sustainable development. Students who are currently studying in universities must be prepared to become real learners who are skilled, flexible, and tenacious (agile learners). (Corradini & D'Ippolito, 2022; Syvyi et al., 2020).

The model and application system were developed in the form of a smart expert system with a campus-industry partnership synchronisation model. The hybrid advisory integrated smart expert system innovation that will be created is an expert system (intelligent) that facilitates MBKM program participants to carry out guidance. This innovation has several main features, including synchronous and asynchronous online guidance, submitting reports and daily assignments, student progress reports, live chat with supervisors and instructors, daily attendance, to reviewing report results. The smart expert system innovation that will be created is also integrated with hybrid advisory, which can be used during offline guidance through the report presentation feature. Various forms of learning activities outside of tertiary institutions, including conducting internships or work practices in the industry or other workplaces, carrying out community service projects in villages, teaching in educational units, participating in student exchanges, conducting research, conducting entrepreneurial activities, and making studies or projects. Independent and participates in humanitarian programs (Directorate General of Higher Education, Ministry of Education and Culture, 2020). All these activities must be carried out with the guidance of the field supervisor so that students' competency and skills training can be more focused. Independent campuses are expected to provide contextual field experiences that will improve student competence as a whole, be ready to work, or create new jobs (Algehyne et al., 2022; Cimino, 2022).

The campus and industry partnership model, according to PP No. 17 of 2013, provides the definition of a partnership is cooperation in business linkages, either directly or indirectly, on the basis of the principle of mutual need, trust, strengthening, and benefit involving Micro, Small, and Medium Enterprises with Large Enterprises. Further, Law no. 9 of 1995 concerning Small Business Article 1 Paragraph 8, Partnership is business cooperation between small and medium businesses or with large businesses accompanied by guidance and development by medium or large businesses by taking into account the principles of mutual need, strengthening, and benefit. The campus and industry partnership model or educational institution is more oriented towards academic benefits. Partnerships are generally carried out for the transfer of service and production technology, knowledge/skills, and learning technology. Several partnership patterns between campus and industry that provide academic benefits include the training model. Training is the process of teaching, informing, or educating someone so that that person becomes more qualified to do their job. Partnership implies an agreement on a cooperative relationship between two or more parties to achieve common goals. According to Chandler, the strategy contains an organisation's long-term goals and the utilisation and allocation of all resources that are important to achieve these goals (Hegedüšová et al., 2021; Santos et al., 2022).

The strategy has many definitions, but the keywords that can be emphasised from the strategy are 'purpose' and 'planning'. From these two phrases, it can be explained that strategy is closely related to planning and achieving the future (goals). Collaboration is the concept of relations between organisations, relations between governments, strategic alliances, and multi-organisational networks. Collaboration discusses the cooperation of two or more stakeholders to manage the same resources, which is difficult to achieve when done individually. Collaboration is related to the existence of a clear cooperation arrangement and trust balanced with commitment, structure, and institutional capacity. Partnerships between campuses and industry can provide economic benefits if they are carried out by utilising existing resources and facilities together so that the implementation of education is more effective and efficient than if only used by each institution individually.

5. Conclusion

For the conclusion, firstly the innovations developed include synchronous and asynchronous online tutoring features, submitting reports and daily assignments, student progress reports, live chat with supervisors and instructors, daily attendance, to reviewing report results. Secondly, the Smart Expert System Integrated Hybrid Advisory innovation developed has valid results without revision with an average score of 90.1 (user benefit aspect), an average score of 90.5 (application display aspect), an average score of 93.8 (newness of information aspect), an average score of 97.6 (content

aspect), an average score of 90.6 (user-friendliness aspect), an average score of 93.8 (competency achievement aspect). Overall, this study has answered the formulation of the research problem. The results of this study are products in the form of an apprentice student monitoring application system. The developed application system can be used in a hybrid manner.

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