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Coordination of The Apprenticeship Industrial Program with The Siakama Application

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Abstract—**This research aims to examine the implementation of the SIAKAMA application in the Apprenticeship Industrial Program. This program was created as a SIAKAMA application to overcome hurdles during the monitoring and evaluation stages. At the monitoring stage, supervising lecturers and field supervisors can use the SIAKAMA application to monitor all Apprenticeship Industrial program student activities in the field, resulting in a good and smooth communication and coordination system. At the evaluation stage, the supervising lecturer and field supervisors in the SIAKAMA application can conduct assessments based on student activities in the field, including daily evaluations and final assessments after the Apprenticeship Industrial Program has been finished. This study employs a quantitative descriptive technique, the Research & Development method, and the 4D development model. A sample of Apprenticeship Industrial Program students from five departments of the Faculty of Engineering, Padang State University, was used in this study. The SIAKAMA application was found to be valid with a value of 0.876, practical with a value of 78.67, and effective with a value of 81.22% after data analysis using SPSS 25. This suggests that implementing the SIAKAMA application to enhance the work competency of Apprenticeship Industrial Program students is viable. The Apprenticeship Industrial Program model represents a modification of the Three Set of Actor development model, yet it hasn't been incorporated with the Industrial Revolution 4.0. Engaging in this Program enables students to acquire 4C skills, including Creativity and Innovation, Critical Thinking and Problem Solving, Communication, and Collaboration.**

Keywords— **Application; apprenticeship industrial program; SIAKAMA; student.**

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I. Introduction

To obtain a workforce with the abilities the Industrial World and Labor require, the Indonesian government must empower two dimensions: higher education and the world of work/community [1]. This is consistent with the Link and Match initiative, which aims to recruit alumni qualified for industry jobs. It is hoped that the central pattern of education, which was first supply-oriented, will now be demand-oriented (market needs). Universities collaborate with industry to develop the Apprenticeship Industrial Program to carry out the Link and Match program [2]. Students at Padang State University are expected to participate in the Apprenticeship Industrial Program to apply what they have learned in lectures. This program has been in place for quite some time, particularly in the Faculty of Engineering, which the Industrial Relations Unit oversees. The Apprenticeship Industrial Program aims to enhance knowledge and skills [3]. Other advantages of the Apprenticeship Industrial Program include increased 21st-century competencies known as 4C (Creativity, Communication, Critical Thinking, and Problem-Solving, Collaboration) [4], as well as access to community networking and knowledge development [5]. Before students may participate in the Apprenticeship Industrial Program, they must first complete the prerequisite courses, which provide students with the necessary knowledge and skills to partake in the Apprenticeship Industrial Program[6]

The Apprenticeship Industrial Program includes various components, including students, supervising lecturers, and field supervisors, all of whom play vital roles [7], [8]. Supervising lecturers and field supervisors work together to monitor and guide students in implementing the Apprenticeship Industrial Program until the program's evaluation stage [9]. However, throughout its execution, problems were discovered at the monitoring and evaluation stage. Implementation Apprenticeship Industrial Program's remote location makes it difficult for supervising lecturers to maintain constant control over students in the field. One of the things that must be considered is that the field supervisor must coordinate with the supervising lecturer regarding student growth while in the field. As a result, effective and intense communication is required so that supervising lecturers and field supervisors can optimize each other's Apprenticeship Industrial Program students to meet the program's objectives.

SIAKAMA, an application developed for the Apprenticeship Industrial Program, has proven useful during the monitoring and assessment stages [10]. Optimizing the SIAKAMA Application is one technique to improve competence in attaining the Apprenticeship Industrial Program's objectives [11]. The created SIAKAMA program has elements that facilitate interaction among students, supervising lecturers, and field supervisors. The industry provides supervisors for students to guide them in the field as part of the Apprenticeship Industrial Program. Job Shadowing is a strategy in which one student activity is directed by a supervisor so that students become proficient in these tasks and later get a competency certificate [12]. Because students learn by being provided instructions for completing assignments and transparent and communicative guidelines in everyday interactions [7], [13], the Apprenticeship Industrial Program has a very excellent mentoring structure. Monitoring will be effective if the two supervisors, the supervising lecturer, and the industrial supervisor, work together [14]. The SIAKAMA application's review stage is based on the Logbook, Executive summary, Employer's survey, communication, ethics, professionalism, and students' technical ability, as seen in the industry's final student scores. Not only that but the final assessment's secrecy also may be accounted for because the field supervisor enters the student's final score straight into the SIAKAMA program, which is subsequently delivered to the supervising lecturer. Student evaluation is based not only on academic competency but also on soft skill skills that align with the competencies that students must have in the twenty-first century based on the Industrial Revolution. 4.0 [15], [16].

II. Materials and Method

This study was carried out at the Faculty of Engineering, Padang State University, using quantitative methods with a descriptive approach and the Research & Development method with the 4D development model (Define, Design, Develop, and Disseminate) [17]. The quantitative method is a research approach based on the concept of positivism that is used to analyze specific populations or samples. Data collection is through research equipment, and data analysis is quantitative or statistical [18]. A descriptive strategy seeks to discover the type and degree of relationships in variables by closely observing specific characteristics in order to acquire data that is relevant to the problem. This study's initial step of ongoing research was socialization, followed by the monitoring stage utilizing the 4D development model, and finally, the evaluation stage. Fig.1 demonstrates this.

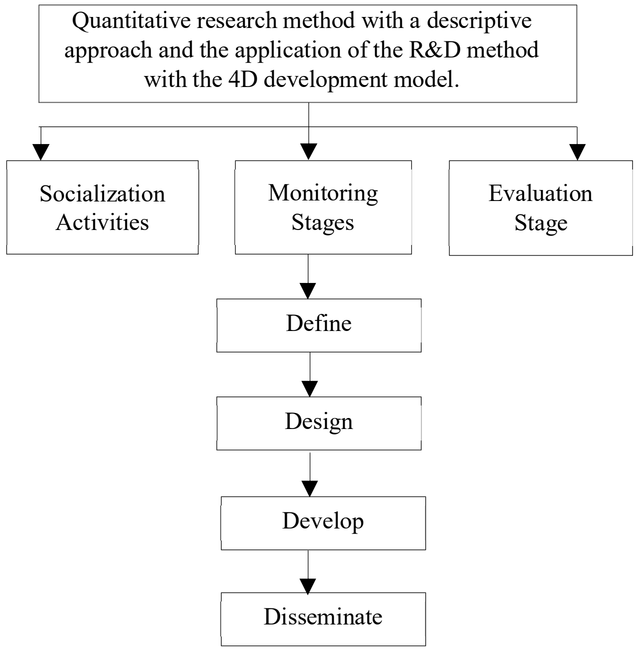

Fig.1 Research Framework

The stages in the research can be seen as follows:

A. *Socialization Activities*

The deployment of the SIAKAMA application on the Apprenticeship Industrial Program at Padang State University's Faculty of Engineering begins with the implementation of socialization activities connected to the SIAKAMA application. Socialization activities were conducted by involving all program participants, including students, supervising lecturers, field supervisors, and faculty-level officials such as the dean, deputy dean, and head of the Industrial Relations Unit. The first stage of socialization activities aims to discuss how much space the SIAKAMA application provides for interaction between students, supervising lecturers, and field supervisors and to provide an understanding of all elements involved in reporting and verifying student activities. The second stage of socialization activities entails delivering manuals for utilizing the SIAKAMA Application for field supervisors, supervising lecturers, and students, including step-by-step instructions on utilizing the SIAKAMA Application. It was also described at the socializing stage, beginning with the beginning of the student preparation Apprenticeship Industrial Program and ending with the final stage, where the supervising lecturer and field supervisor offer a final assessment. This is illustrated in the chart in Fig. 2 [13]

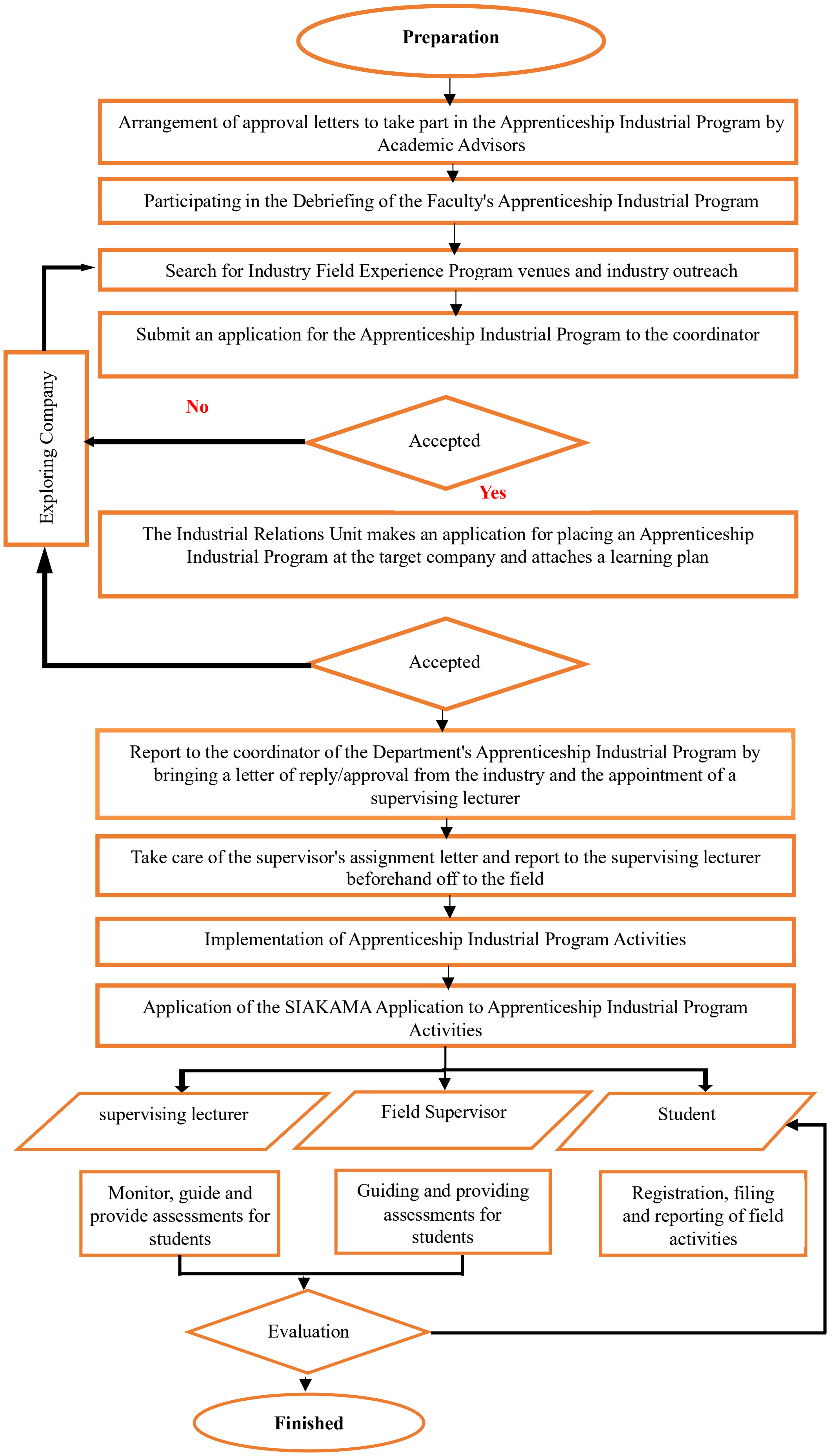

Fig. 2 Flowchart of SIAKAMA Application Implementation

B. Monitoring Stages

The monitoring stage uses a **4D** development model (Define, Design, Development, Dissemination). The **Define Stage** is the first phase in building the SIAKAMA application and involves conducting a needs study. The goal of the define stage is to define the basic challenges encountered in implementing the SIAKAMA Application in the Apprenticeship Industrial Program at the Faculty of Engineering, Padang State University so that the program development process can be optimized later. In the **Design Stage**, research product design will be carried out—design and development of features for monitoring and evaluating products using the SIAKAMA Application. Accounts for students, supervising lecturers, and field supervisors are granted access to the Monitoring Phase. The **Development Stage** includes tests such as validity analysis, practicality analysis, and effectiveness testing. In the **Dissemination Stage**, the SIAKAMA application utilized in the Apprenticeship Industrial Program at Padang State University's Faculty of Engineering can also be used in a similar program at other universities.

C. Evaluation Stage

Implementing the SIAKAMA Application, particularly for the Apprenticeship Industrial Program, is extremely beneficial in many aspects of program implementation, from the start of administration to the finish of uploading grades. Using the SIAKAMA application can ease implementing the Apprenticeship Industrial Program by allowing the field supervisor to send student evaluation findings directly to the supervising lecturer on the application, ensuring confidentiality.

D. Research Subjects

Students, supervising lecturers, and field supervisors served as research subjects. Students from Padang State University's Faculty of Engineering are taking the Apprenticeship Industrial Program for the July-December 2022 semester. It has 108 departments, including Civil Engineering, Mechanical Engineering, Automotive Engineering, Electrical Engineering, and Electronic Engineering. Person. 53 supervising lecturers supervise students and 30 field supervisors.

E. Data analysis technique

Before usage, the validity of the research product must be assessed, namely in the form of research instrument validation. Supervising lecturer, field supervisors, and students were given product validation instruments. Validators from five different fields of expertise validated the instruments. The SPSS program was utilized to analyze the construct validity of the SIAKAMA application model, while Aiken's V value was employed to analyze product content validation (application and manuals) [19]. The formula proposed by Aiken is as follows:

$$V = \sum s / [n(c-1)] \quad (1)$$

where n is a number of research panels, Lo is the lowest validity rating score, c is the highest validity rating score, r is the number given by the appraiser, and s is r – lo.

The range of V numbers obtained will be obtained between 0 to 1.00 so that for a range ≥ 0.667, it can be interpreted as a reasonably high coefficient, so that it can be categorized that the validity category is in the "valid" category. The findings of the questionnaire analysis presented to students, supervising lecturers, and field supervisors yielded data on the practicability of the generated products. The questionnaire data were statistically processed using tabulation procedures to get the total score, average score, ideal score, and % of the respondent's attainment level (TCR)[19]. Table I depicts the practicality category as defined by [18].

$$TCR = \frac{\text{Average Score x 10}}{\text{Maximum Score}} \quad (2)$$

TABLE I
CLASSIFICATION OF TCR

NO	Achievement Presentation	Criteria
1	85% - 100%	Excellent
2	66% - 84%	Good
3	51%-65%	Enough
4	36%-50%	Not Good
5	0%-35%	Terrible

Source: [18]

The efficacy test is the final stage of the implementation of the SIAKAMA application. The efficacy test is performed to determine the product's fitness for the purpose. The effectiveness testing results came from surveys issued to three groups: field supervisors, supervising lecturers, and students. As indicated in Table 2 [16], the average findings of the three respondents were then adjusted to the effectiveness value category.

TABLE II
CONVERSION OF QUANTITATIVE DATA TO QUALITATIVE DATA FOR EFFECTIVENESS

No	Scale	Quantitative Data	Qualitative Data
1.	5	90%-100%	Very effective
2.	4	80%-89%	Effective
3.	3	70%-79%	Currently
4.	2	60%-69%	Ineffective
5.	1	0%-59%	Very ineffective

Source: [20]

III. RESULTS AND DISCUSSION

A. Research Instrument Validity

The research instrument product is validated as the initial step in validation. Five specialists performed the instrument. Fig.3 depicts the findings of the validator's evaluation of the research instrument validation.

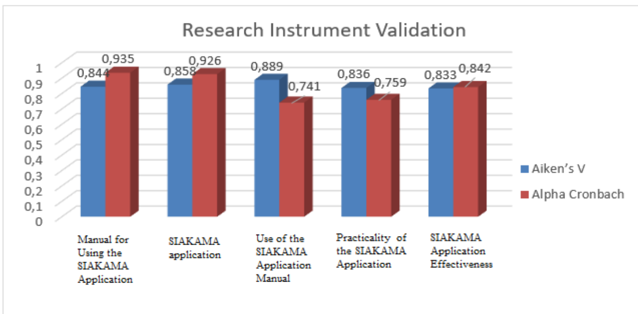

Fig. 3 Research Instrument Validation

The results of Aiken's v analysis obtained an average score of 0.852 with an average Cronbach Alpha value of 0.841 from the research instrument, which showed an average score above 0.667 and a Cronbach Alpha value above 0.6; from the results above, it can be concluded that five instruments are valid and suitable for use in research.

B. Development Product Validation

Numerous factors validate product development, including the SIAKAMA application handbook for lecturers and supervisors, the SIAKAMA application manual for students, and the SIAKAMA application.

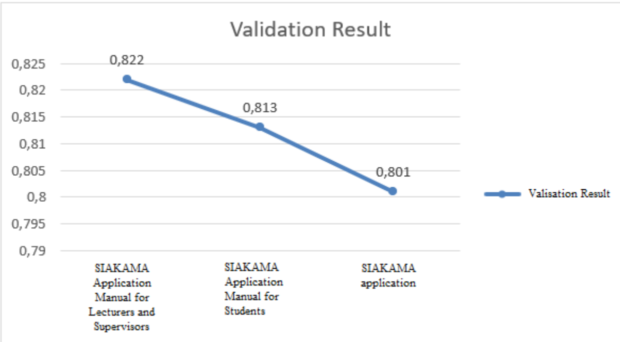

Fig. 4 Validation of SIAKAMA Application Products

The validation results show that the Aiken V score received an average score of 0.812, more than 0.667. It is possible to state that the development product is legitimate and usable. Several adjustments were made to the product during product validation based on the validator's comments and instructions. Fig.4 depicts the product validation results for the SIAKAMA application development.

C. Practicality of SIAKAMA Application Implementation

The practicality stage is used to determine whether the product is suitable for use in the implementation of the Apprenticeship Industrial Program. The findings of surveys distributed to field supervisors, supervising lecturers, and students yielded data on the practical value of the items used. The SIAKAMA application and the manual are used to assess practicality. Fig.5 depicts the outcomes of data recapitulation.

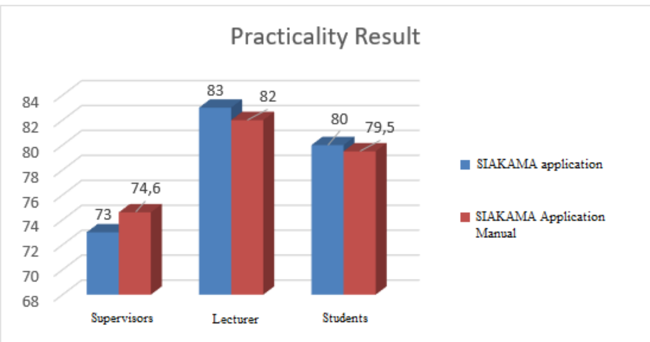

Fig. 5 Practical SIAKAMA Application Products

The average value for elements of the SIAKAMA application based on practical data is 78.67. Where these values fall within the 70-85 range, they are considered feasible. The SIAKAMA application manual's practical value was determined to be 78.7, which is likewise included in the practical category. It is possible to deduce that the SIAKAMA application is being used in the Apprenticeship Industrial Program

D. Effectiveness of SIAKAMA Application Implementation

The average value of the respondents indicates the success of adopting the SIAKAMA application in The Apprenticeship Industrial Program. The average data obtained values are shown in Fig.6.

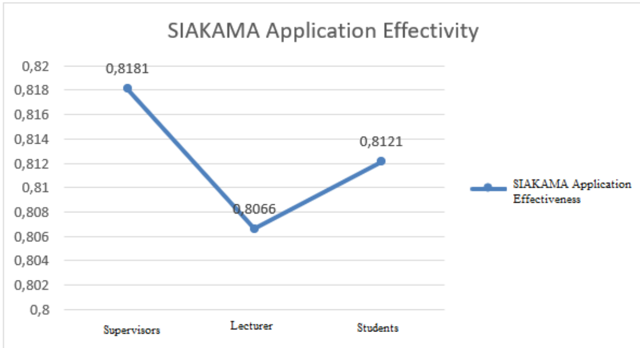

Fig. 6 SIAKAMA Application Implementation Effectiveness

Based on these figures, the respondents' efficacy was 81.22% on average. Where this statistic falls within the 80%—89% range, it is included in the effective category. As a result, the SIAKAMA Application installation is effective and may be deployed to the next Apprenticeship Industrial Program.

E. Evaluation Stage

The benefit of using the SIAKAMA application is that the supervising lecturer can monitor students who are carrying out the Apprenticeship Industrial Program in the field daily based on the logbook that students enter in the SIAKAMA application, where students can send file links in the form of photos and video documentation based on their activities in the field. Furthermore, field supervisors can supervise students by validating logbooks and maintaining a communication room with supervising lecturers and students throughout the program term. Following completion of the Apprenticeship Industrial Program, the field supervisor will provide an assessment based on the rubric, which will be uploaded directly to the SIAKAMA program and delivered to the supervising lecturer.

F. Discussion

Internship practice activities or the Apprenticeship Industrial Program are examples of Learning Activities outside of Higher Education [3]. When students complete the curriculum and get experience learning how the real world works, they will utilize theoretical knowledge in addition to the practical experience they will gain in the field [21].

The Industrial Revolution 4.0 Apprenticeship Program must be by the competencies expected in the digital era, particularly, it must use the development of internet technology known as the Internet of Things (IoT) [19]. It is envisaged that through the Apprenticeship Industrial Program, you could obtain new knowledge, enhance your soft skills, and put your existing knowledge and skills into practice. Soft skills are a set of critical skills that have been studied as a supplement to core competition (hard skills) in their study programs to prepare graduates of the Faculty of Engineering, Padang State University, to work in companies/institutions/communities as well as for entrepreneurship. During the Industrial Revolution, soft skill competencies were expected. According to the Partnership for 21st Century Skills, 4.0 is abbreviated as 4C [22], [23]. When students participate in the Apprenticeship Industrial Program, they can get 4C competencies such as: 1) Creativity and Innovation: Students are taught to express their creative ideas and diverse innovations in response to various difficulties encountered in the field. 2) Critical Thinking and Problem Solving: Students are taught to think critically and solve problems in the areas that they did not encounter in college. 3) Communication: During program implementation, students contact numerous parties in the field; students are instructed to communicate effectively so that all parties comprehend what is conveyed. 4) Collaboration: ability to work in groups [24]

The Apprenticeship Industrial Program model is a revision of the Three Set of Actor development model [25], which has not been integrated with the Industrial Revolution [26]. The refinement is using a separate Apprenticeship Industrial Program web so that parties engaged, such as supervising lecturers, field supervisors, program organizers, and students, can discuss online while monitoring and evaluating students to attain 4C competency [27], [28].

Based on the assessment of the validator, who is an expert in the domains of Vocational Education, Civil Engineering, and Stakeholders, the research findings on the implementation of the SIAKAMA application are valid. The SIAKAMA program comes with an application user manual. According to the practicality questionnaire, students of the Apprenticeship Industrial Program at Padang State University's Faculty of Engineering stated that the manual made it easier for students to run the SIAKAMA Application because the language in the manual was straightforward to understand and organized, but it needed to be disseminated to supervisors in the field and supervising lecturer to create a uniform understanding [29]. The SIAKAMA program is quite helpful since it makes it simple to report activities as well as provide a student's final grade, which can be emailed immediately from the field supervisor to the supervising lecturer [30].

IV. Conclusion

Using the SIAKAMA application improves communication and coordination among students, field supervisors, and supervising lecturers. This research aimed to assess the validity, practicability, and efficacy of implementing the SIAKAMA Application to improve the competency of Apprenticeship Industrial Program students. The instrument validation test received an average score of 0.876 in the valid category, and the product development test received an average score of 0.812 in the valid category. The practicality test score for aspects of the SIAKAMA application, with an average score of 78.67, and the value for the practicality of the SIAKAMA application manual, with a score of 78.7, where the scores of the two aspects are combined. For the results of measuring the efficacy of the responses, an average value of 81.22% was discovered, which falls into the influential group. To summarize, the SIAKAMA Application is legitimate, practical, and beneficial for developing the work competence of students enrolled in the Apprenticeship Industrial Program.

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