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The appraisal model of remedial and enrichment activities integrated with the independent curriculum in vocational field

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ABSTRACT

Implementing remedial and enrichment strategies followed by modeling the weight of the appraisal is the goal to be achieved in this study. The ASSURE model in this study has been used to develop an appraisal model for remedial and enrichment activities integrated with the independent curriculum in the vocational field. The results showed that the peer tutoring strategy among students could optimize remedial and enrichment outcomes. The students have shown their ability in independent and collaborative learning. In remedial and enrichment activities, groups of enrichment students have been directed to help their friends to be successful in remedial. Students' success in the remedial process is the success of enriching other students and vice versa. Each student has received an appreciation of the value according to his effort. The progress of remedial students is 8% to 82%, with an average of 10%. This progress forms the basis for determining the final score for the remedial, intermediate, and enrichment groups as tutors. The difference between the remedial and enrichment appraisal weights was determined using mathematical model 1. The final score of students who become tutors is determined using the mathematical model 3. The three mathematical models above can calculate remedial, enrichment, and tutor results. The use of this model helps teachers or lecturers to be more objective in giving grades. Lecturers' appraisal of student learning outcomes has been carried out in a transparent, fair, and accountable following the differences in the potential competencies of each student. Students have followed the learning process, the assessment process has been carried out properly, the teacher's documentation is complete, and the teacher is more confident.

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INTRODUCTION

The curriculum contains plans and arrangements regarding objectives, content, and teaching materials and how to use them. The curriculum is used as a guide for learning activities to achieve educational goals (Pratycia et al., 2023). Educational planning begins with analyzing learning outcomes to determine learning objectives within a semester or yearly period. Planning in the independent curriculum is very important because it has an impact on determining learning content, implementing teaching strategies up to the assessment and evaluation stage (Idris et al., 2023). Even the curriculum must facilitate differences in the potential abilities of students. Students must serve according to their respective characteristics in the learning process. This strategy is called differentiated learning (Cope & Kalantzis, 2016).

At the beginning of the Covid-19 pandemic, Indonesia implemented an independent curriculum (Minsih et al., 2023). This curriculum was first implemented by a driver school in the last 3 years to overcome the problem of learning loss and recovering well of learning. This curriculum provides a direction of change so that schools focus more on optimizing student-centered learning, differentiated learning, strengthening the character of the Pancasila student profile, and consistency in the implementation of formative and summative assessments to improve the learning process (Kementerian Pendidikan Kebudayaan Riset dan Teknologi Republik Indonesia, 2022). The pattern of implementation of differentiated learning begins with a diagnostic assessment by the teacher to students before the start of the learning process. Analysis of the results of the diagnostic assessment provides information to teachers to organize differentiated learning starting from determining learning content, applying teaching strategies to the assessment and evaluation stages.

Appraisal is the process of collecting and processing information to determine learning needs and developmental achievements or learning outcomes of students (Kementerian Pendidikan Kebudayaan Riset dan Teknologi Republik Indonesia, 2022). Formative and summative assessments in the independent curriculum must be integrated into every learning process and carried out consistently (Ali & Khaeruddin, 2012; Budianto, 2011). Summative assessment is carried out by the teacher at the end of each delivery of material or teaching modules. This assessment aims to find out whether the goals set in each teaching module have been completed by each student? If there are several learning objectives that have not been completely achieved by certain students or by several other students, the teacher must facilitate these students through remedial activities (Karyanto, 2022).

When a group of students in one subject must carry out remedial activities, it is possible that there are other groups of students who must be facilitated with enrichment activities. A similar situation like this will also be found at the higher education level which implements independent learning on an independent campus, including in the vocational field. In term of the 2 differences in remedial and enrichment activities, teachers or lecturers are more likely to facilitate remedial for their students who have not yet completed their learning objectives (Ali & Khaeruddin, 2012). While other groups of enrichment students were not given any opportunity to get grades. This difference in treatment will be felt unfairly by each student. This possibility can occur because the teacher does not have time to remedial as well as provide enrichment to other groups of students. Teachers more focus on remedial students than on facilitating the enrichment of other students who are considered to have succeeded in exceeding their learning objectives.

In the concept of mastery learning which was applied in the 2013 curriculum and previously included being refocused in the independent curriculum, teachers more focus on on facilitating the students (Mahlianurrahman & Aprilia, 2022; Oktaviani et al., 2023). The concept of mastery learning in the independent curriculum must be able to facilitate each student to be able to complete learning objectives. If there are still learning objectives in certain modules that have not been completed, then students must be facilitated with remedial. However, the majority of teachers are not comprehensive in carrying out remedial and even tend to repeat the test and give the same score as the minimum completeness criteria (Dhelilik, 2018).

Therefore, to solve this problem what kind of strategy should the teacher implement to make remedial and enrichment effectively? How to determine the weight of the final value of remedial results and enrichment results so that they are objective, fair and accountable? What is the

mathematical model for appraisal of remedial and enrichment outcomes as the principle of learning and assessment in independent curriculum?.

RESEARCH METHOD

The implementation of differentiated and learner-centered learning in the independent Curriculum begins with an assessment diagnostic (Budiono & Hatip, 2023). Diagnostic assessment aims to analyze the characteristics of students. This strategy becomes the basis for the teacher to develop the learning process until finally evaluating how it is achieved. The ASSURE (Analyze Learners, State Standards and Objectives, Select: Strategies, Technology, Media, and Materials, Utilize: Technology, Media, and Materials, Require Learner Participation, Evaluate and Revise) model (Abdelaziz, 2014; Ariefiani et al., 2016; Goode, 2017; Pribadi, 2011) in this study was adapted to develop a model of remedial assessment and enrichment of student learning outcomes integrated with the Independent Curriculum. Paying attention to student characteristics followed by setting learning objectives and choosing teaching strategies, technology, and teaching media that are very appropriate to use this model.

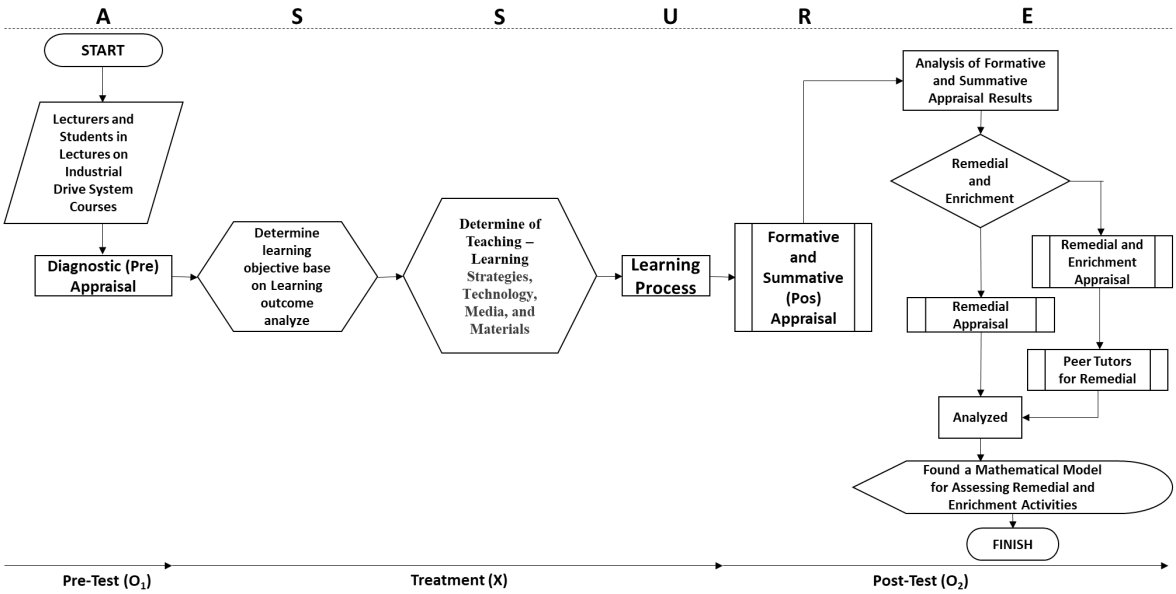

Figure 1. Conceptual Model of Remedial and Enrichment Appraisal

The integrated experiment in the ASSURE model of this study used the pre-experimental method: One Group Pretest – Posttest (Schmidt et al., 2016). Treatment was given only to one class of Sistem Penggerak Industri (SPI) course. The assessment instrument used in this study is a test instrument and practice using a simulator. Pre-test and post-test are given to the same group of students in the course (Bonate, 2000).

Table 1. Pretest – Posttest to Remedial and Enrichment Appraisal in Differentiated Learning of ASSURE Model

One Group Students		
A	SSU	RE
Diagnotic Appraisal as Pre-Test	Implementation strategies, technology, and media in SPI learning process	Formative and Sumative Appraisal to determine Remedial and Enrichment Activities

If there are still students who have not reached the minimum value criteria, then these students are given remedial opportunities (Kao et al., 2012) while other students are assigned as

tutors in one activities remedial and enrichment. The results of these activities are then analyzed to find a fair appraisal mathematical model for different student groups. In this study, the term pre-test is referred to as the pre-appraisal and the post-test is referred to as the post-appraisal.

FINDINGS AND DISCUSSION

Findings

In this study, the processed data is the result of assessment of forty students in the Sistem Penggerak Industri (SPI) course. This course is one of the engineering vocational courses in the Electrical Engineering Education Department, Universitas Sultan Ageng Tirtayasa, Banten. In the independent learning and learning campus curriculum system, the focus is that lecturers no activities as actors but tend to activities as facilitators (Forbes, 2013; Yogi Anggraena et al., 2021). The learning process should be more student-centered. Lecturers must be pay attention to the characteristics of students and facilitate these differences.

The implementation of student-centered differentiated learning in this course begins with providing an assessment instrument. Analysis of the results of the assessment is a diagnostic of student learning needs and strategies to be applied by lecturers. One method to find out the differences in student characteristics by giving an initial assessment as a diagnostic appraisal. Analysis of student diagnostic appraisal will provide information to lecturers to choose models, media, technology, and learning materials (Bauman & Tuzhilin, 2018). In this study, forty students in the Sistem Penggerak Industri (SPI) course were given a pre-test to determine the next strategy in learning. The pre-test results for the forty students in the SPI course are shown in Figure 2.

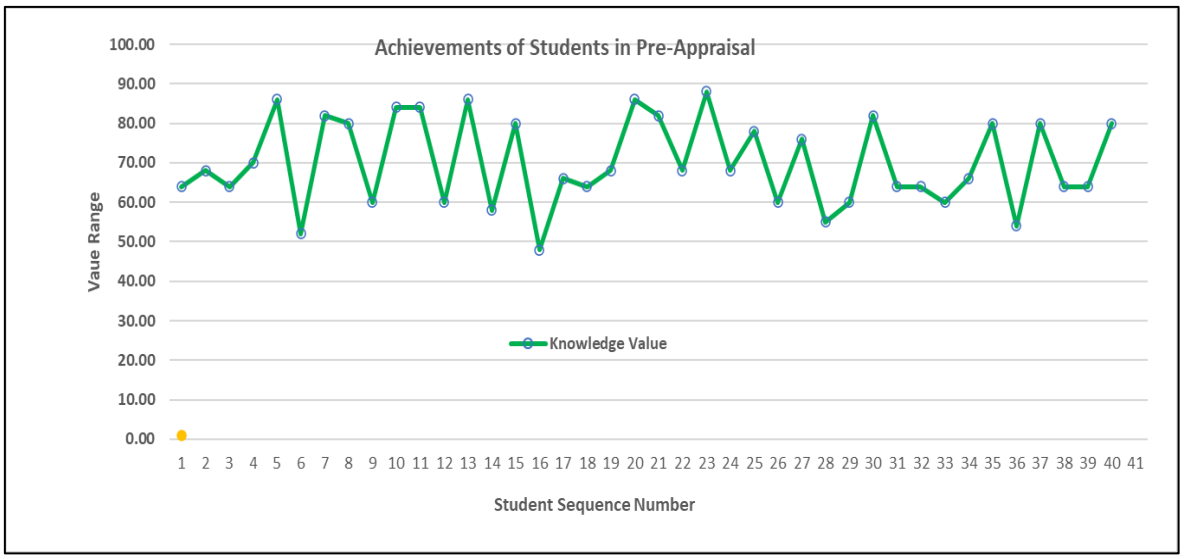

Figure 2. Achievements of Students in Pre-Assessment of SPI Courses

In this study, the forty students were divided into three groups. This grouping is made based on the results of the pre-appraisal by comparing it to the class average score in the SPI course (look at the Figure 3). The class average value is also used as a barrier to provide information to the lecturer in determining the next learning step. Analysis of the results of the initial assessment is a diagnostic to determine student competencies that will be the focus of special services.

It is possible that the differences in student pre-assessment results in the SPI course are caused by differences in educational background. In the SPI course, there are students from SMK, SMA and MA. Students from SMK understand more about electric motor control circuits compared to students from SMA and MA. This is evidenced by the results of their achievements in the pre-assessment process as shown in Figure 3. Scores below the class average were achieved by seventeen

non-vocational school students. However, this difference must be facilitated in different ways so that each learning objective can be completed properly.

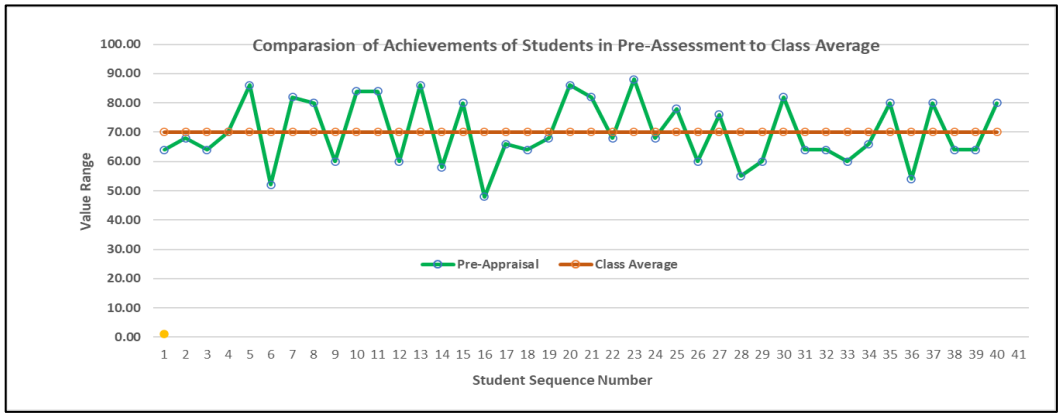

Figure 3. Comparasion of Achievements of Students in Pre-Assessment to Class Average

Referring to the results of the pre-appraisal, the learning process applied in this study uses the flipped classroom learning model (Al-Shabibi & Al-Ayasra, 2019). SPI course lecturers provide lecture materials earlier to be read in advance by each student in their respective homes or before the start of face-to-face lectures. This model equips students to be more active in class discussions. The activeness of the students was shown through asking questions, giving answers, and helping to respond by adding answers to questions submitted by other students.

To increase student competency in the skills aspect, the lecturer provides three different simulators to test a series of programmable logic controller ladders. These three simulators are freely chosen according to the abilities of each student. Control problems can be simulated logically using the simulator. In this case, problem-based learning really supports improving student skills (Noviati, 2022).

Improving student competence in the aspects of knowledge, skills and attitudes is the target of achievement in this study in the SPI course. The combination of flipped classroom learning models, problem-based learning, different simulator-based simulations has been able to increase the competence of the majority of students. The progress of the improvement can be seen through the results of a summative assessment. This point of improvement occurred in the class average in terms of knowledge and skills as shown in Figure 4.

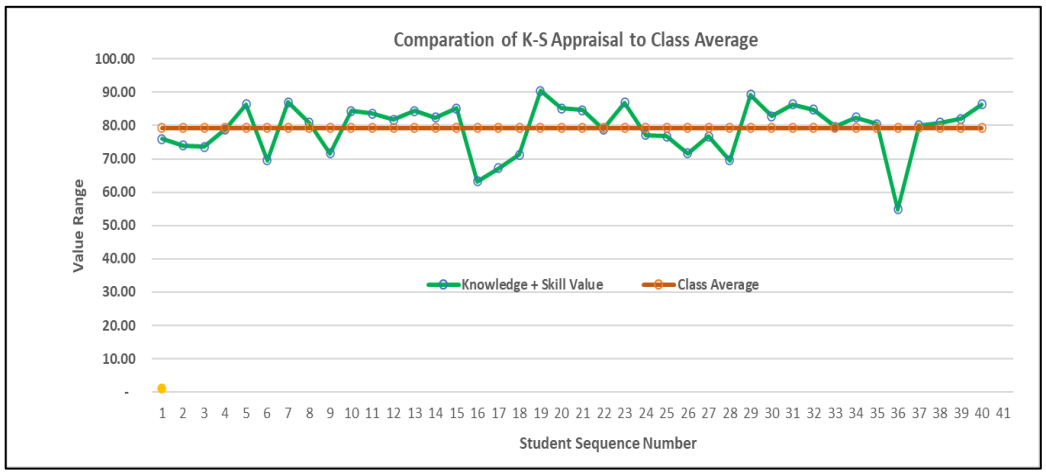

Figure 4. Comparasion of Knowledge and Skill (K-S) Appraisal to Class Average

Comparison of the summative assessment weights of knowledge and skills in SPI courses is made differently. Knowledge summative assessment is given a weight of 40% while skills are weighted 60%. The same assessment techniques and instruments are used in research in the SPI

course, but with different content weights. However, the difference in content weight is directed at achieving the same learning objectives. The focus of the results of this study is whether there is an increase in the results of the assessment after the SPI lecture process applies a different strategy?

There is a saying that process or effort will not betray results. so is the case with the efforts and learning processes that have been held in the SPI courses studied have succeeded in increasing student competence. The learning objectives have been well achieved by students in the SPI module on the topic of timer and counter applications as automatic control of 3 sequential motors. Even so, if the results are compared to the class average scores, there are still 17 students who still need to get remedial guidance (look at the Figure 4).

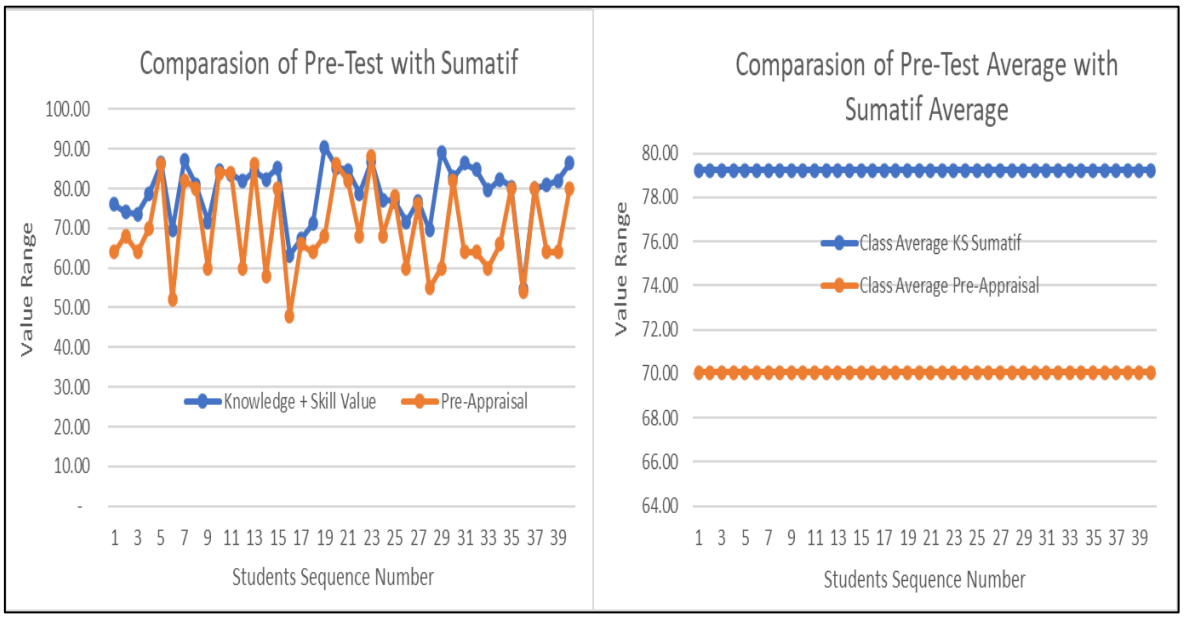

Figure 5. Comparasion of Pre-Appraisal to Sumative Appraisal and Pre-Appraisal Average to Sumatif Appraisal Average

The average pre-appraisal result of 70.08 as a diagnostic assessment increased to 79.22 after students participated in a differentiated learning process (Haniya & Roberts-Lieb, 2017) ending with a summative assessment. However, the increase in the average summative assessment percentage score of 13.04% from the pre-assessment average score still left 17 students who scored below the average (look at the Figure 4 and Figure 5). The seventeen students must be facilitated in order to achieve the learning objectives. The student's failure to reach the summative assessment was analyzed to find out which items were declared incomplete.

In this study, 3 groups of students were distinguished, namely the group of students who received scores below the average were referred to as the remedial group. The second group is students who get scores above the average. The third group is students who get scores much higher than the average and are willing to become tutors. Students who are willing to become tutors are assigned by the lecturer to guide their friends from the remedial group. Assignment to some students who become tutors is a strategy to implement enrichment for these students.

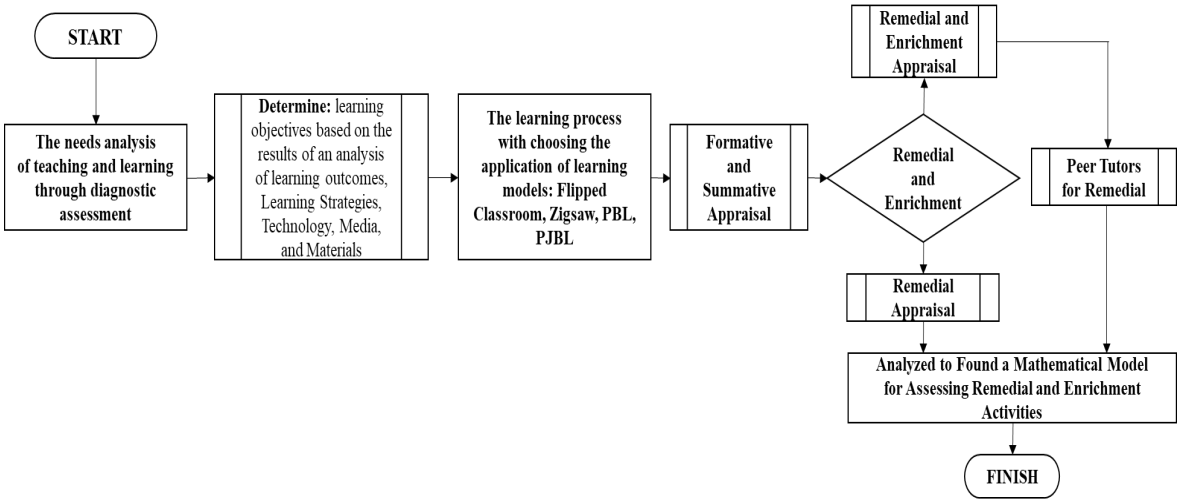

Figure 6. Final Appraisal Model of Remedial and Enrichment Activities Integrated in Independent Curriculum

Tutors teach, guide, and train remedial group preparations to successfully complete learning objectives that are still failing (Phillips, 1967; Villiger et al., 2019). The success of the student group in remedial activities was compared to the summative average scores they previously participated in. Student success in remedial is the success of the group of students who become tutors. steps of remedial and enrichment activities on the basis of the results of pre and summative appraisal analysis are explained with the Figure 6.

The remedial implementation technique in this study was adjusted to the type and level of difficulty of students, so that the method used was different. Remedial is carried out in the form of individual guidance by a friend who is assigned as a tutor. Remedial by providing group guidance by lecturers and several tutors. Remedial by way of re-learning using, methods, and media guided by tutors. These three types of remedial activities end by providing a final remedial appraisal. The progress of the achievements of the seventeen students in remedial is shown in Figure 7.

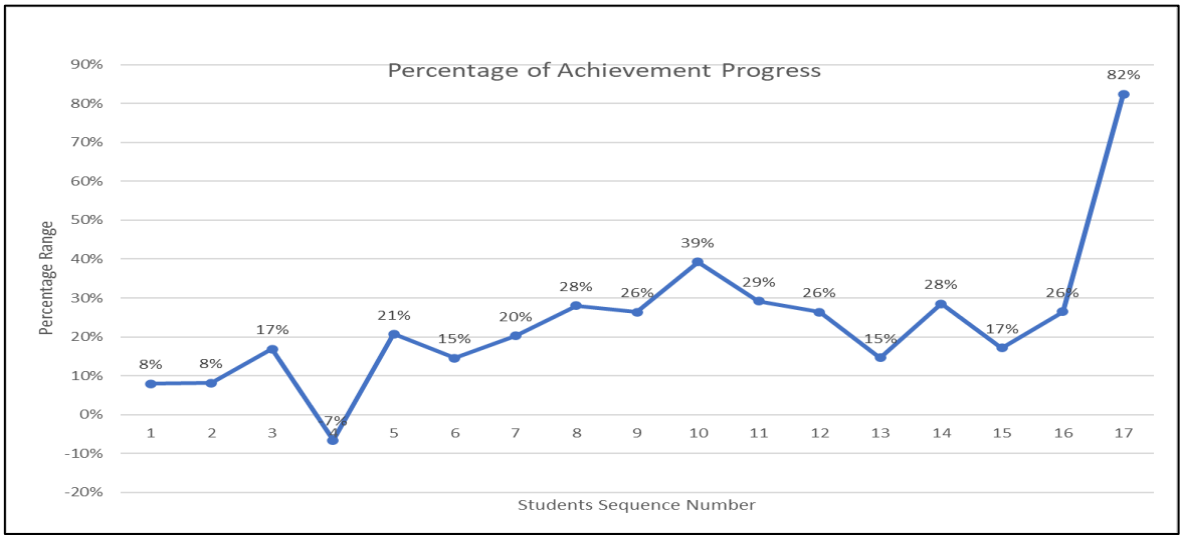

Figure 7. The Percentage of Student Achievement Progress in the Remedial Group

There was one remedial student who experienced a decrease in his remedial results in the SPI course, but the majority of remedial results increased significantly. The increase in remedial results is in the range of 8% to 82% (see Figure 7). Of course, the success of the remedial student

group is the success of their friends who become tutors. Therefore, the Joint effort is an aspect of consideration to be appreciated by giving a fair value. The minimum criteria for completeness determined from the average summative score provide direction whether each student has succeeded in achieving the learning objectives? At the same time, how to appreciate remedial and non-remedial students with fair grades? The answers to these questions were obtained through an analysis of the progress of the achievements of the remedial and enrichment assessment activities as shown in Figure 8.

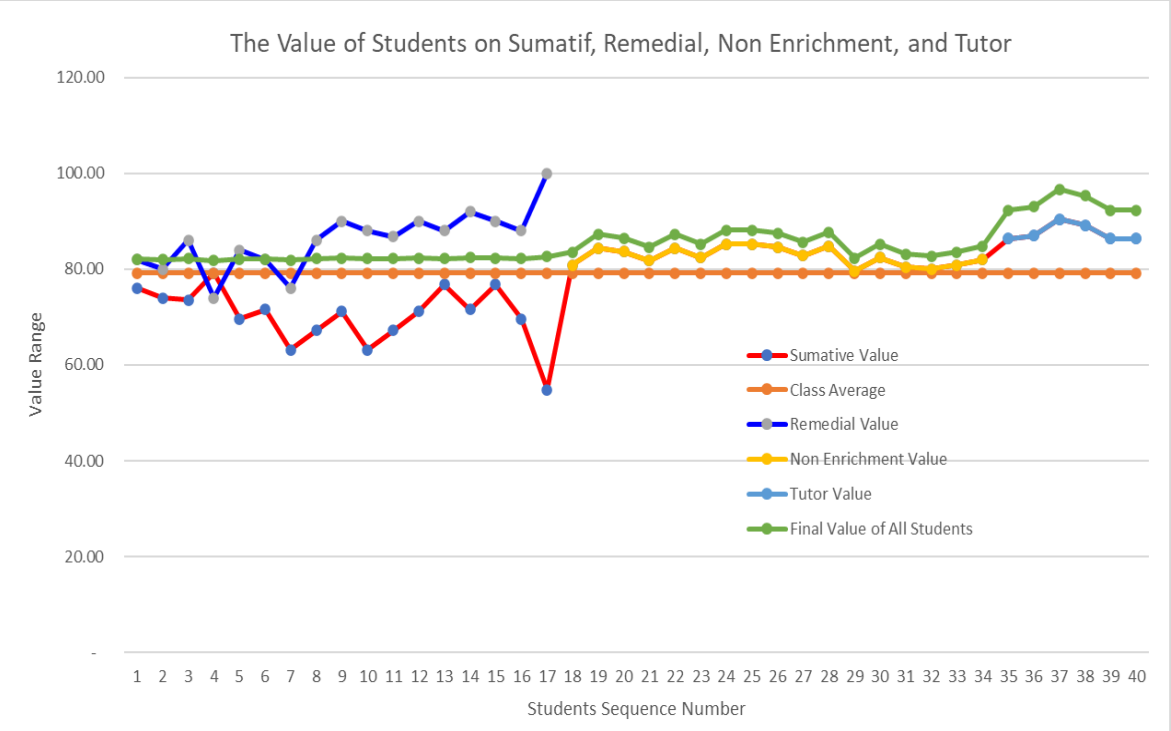

Figure 8. Value Comparasion of Students on Sumatif, Remedial, Non-Enrichment, and Tutor to Class Average

On the basis of the achievement of remedial and enrichment results, teachers or lecturers no longer need to worry about assessing remedial students. Remedial students will get grades, as well as enrichment students and students who become tutors. The value appreciation given to the three groups of students is calculated using the following mathematical model 1.

$$N_{A-R} = N_{cm} + N_R \, x \, (\frac{\sum \%R_a}{n_{stu} \, \text{x} \, n_c})/100 \quad (1)$$

N_{A-R} : Final Score of Remedial Student
N_{cm} : Score of Class Average
N_R : Value of Remedial
$\%R_a$: Achievement percentage of Remedial Value
n_{stu} : Number of students in groups/classes
n_C : Number of Differentiated Clusters/Classes

The second group is students who have tried from the start to get scores above the minimum criteria. They get an appreciation of value above their friends who are remedial. Giving value appreciation to this group of students is calculated by the following mathematical model 2.

$$N_{A-nE} = N_a + N_a\, x\, (\frac{\sum \%R_a}{n_{stu}\, \mathrm{x}\, n_c})/100 \quad (2)$$

$N_{A\text{-}nE}$: Final Score of Enrichment Student
N_a : Pre-Achievement Value
$\%R_a$: Achievement percentage of Remedial Value
n_{stu} : Number of students in groups/classes
n_C : Number of Differentiated Clusters/Classes

While the third group is students who are assigned to be tutors. These students teach and mentor other students who are remedial. The success of remedial students in increasing their remedial scores is the success of tutors. Therefore, tutor students get value appreciation using the following mathematical model 3.

$$N_{AT} = N_a + N_a\, x \left(\frac{\frac{\sum \%R_a}{n_{stu}\, \mathrm{x}\, n_c}}{100} \right) x2 \quad (3)$$

N_{AT} : Final Score of the Group of Students who Become Tutors
N_a : Pre-Achievement Value
$\%R_a$: Achievement percentage of Remedial Value
n_{stu} : Number of students in groups/classes
n_C : Number of Differentiated Clusters/Classes

In the end all student groups: remedial, enrichment, and enrichment as tutors will get value appreciation. Different scores were obtained by them according to each initial effort and the progress of the achievements in the group. The acquisition of value appreciation with different increases is shown again briefly in Figure 9.

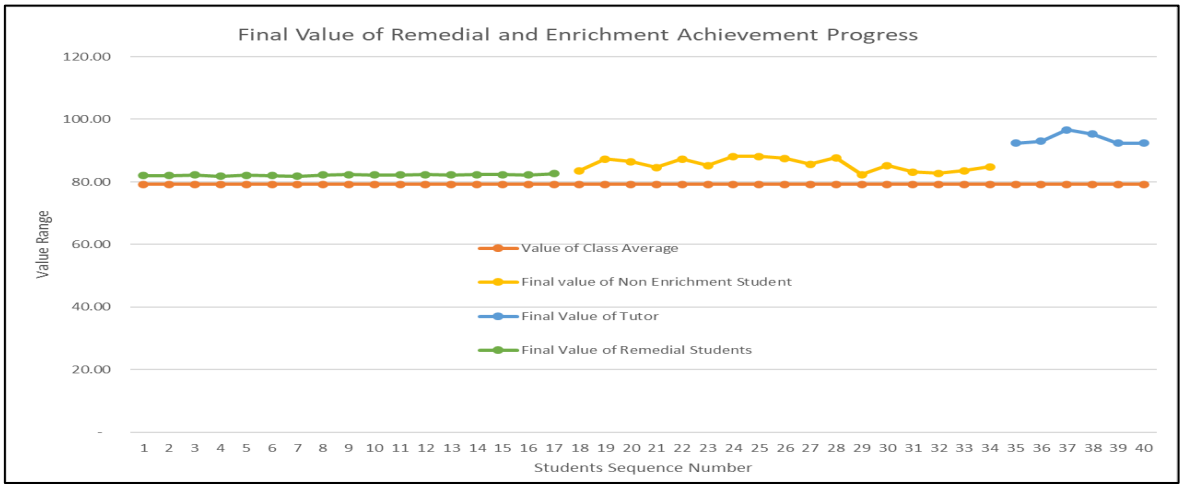

Figure 9. Final Value of Remedial and Enrichment Achievement Progress

In the graph of Figure 9, it can be seen that the three mathematical models can be used to assess remedial, enrichment, and tutor students. The mean summative value is used as a benchmark to see the ability of each student in completing the learning objectives in each teaching module. In the end the lecturers or teachers can give grades in a fair, transparent, and accountable manner. This is in accordance with the direction of change in the independent curriculum, independent learning independent campus (MBKM), i.e new paradigm learning, differentiated learning, learner-centered learning, and comprehensive, collaborative, and integrated assessment.

Discussion

The first step of research is to analyze the needs of the learning process, especially in terms of student needs. Students who contract SPI courses are required to pass one of the previous courses, namely algorithms and programming. Before the lecture begins, the lecturer provides an assessment instrument to diagnose students' initial abilities. Diagnostic assessment (analyze learners) is very important to explore the characteristics and needs of students in learning (Ariefiani et al., 2016; Goode, 2017; Pribadi, 2011). The characteristics and needs of students really guide lecturers in preparing learning objectives, choosing teaching strategies, applying technology and learning media (Burgstahler & Cory, 2010).

Assessment at the beginning of learning is intended to determine the readiness of students to learn teaching material and achieve the planned learning objectives. This assessment is included in the formative assessment category because it is aimed at the needs of teachers in designing learning (Kementerian Pendidikan Kebudayaan Riset dan Teknologi Republik Indonesia, 2022). Different needs and characteristics of students must be facilitated in different ways. Facilitation should be more focused on helping students improve their competence so that each learning objective can be completed properly.

After the lecturer knows the characteristics and learning needs of students based on the results of the diagnostic assessment, the next step is to choose a learning model. The learning model applied in SPI lectures is the flipped classroom learning model, problem-based learning, and project-based learning. In this study the application of the flipped classroom learning model (Al-Shabibi & Al-Ayasra, 2019) guides students to study more SPI material first at home according to the assignments given by the lecturer.

This model is also used by lecturers to facilitate students who are not present in face-to-face lectures in class. Lecturers must prepare learning materials in print, audio or video form that can be studied by these students. In addition, the application of problem-based learning models in SPI lectures is directed at increasing student competence (Agustina et al., 2022) in the skills aspect. Students will be given several examples of control problems that must be practiced or simulated with the help of a simulator. In several examples, student groups were assigned to simulate several examples of control circuit projects using several types of simulators. Another effort to realize an independent curriculum is by implementing project-based learning (Afriana et al., 2016; Condliffe et al., 2017; Goodman & Weare, 2010). In this model students are given group assignments so that they are trained in planning and creating project frameworks, making schedules, monitoring implementation, testing and giving assessments, and evaluating the results of their work.

The end of the process of one SPI lecture module is closed with a summative assessment activity. Summative assessment (Kementerian Pendidikan Kebudayaan Riset dan Teknologi Republik Indonesia, 2022) is carried out to assess the achievement of each learning objective as a basis for determining whether students still have to study again or can continue to the next module. The summative assessment on the aspects of knowledge and skills of forty students (see figure 4) shows that a number of seventeen students were stated to have not completed the learning objectives of sequential circuit modules using PLC timers and simulators. The seventeen students must be remedied.

In this study, the summative results showed that there were twentythree non-remedial students or commonly called enrichment student groups. These two different student groups, in the end, must get an appreciation of the value according to their respective efforts. Several students from the enrichment group were assigned to be tutors to teach and guide the remedial group of students so they could complete the next reassessment. The treatment model for enrichment student groups in this study aims to ensure that collaborative learning that is carried out simultaneously and integratively does not give rise to new remedial groups. This is because if an enrichment student is given a different assignment and the weight is higher, he must be assessed again to ensure his success in enrichment. However, if several students are assigned as tutors, they will get many benefits. Student-centered learning, differentiated learning, collaborative learning, and improving 21st century skills (Noor & Wangid, 2019) will be achieved by implementing this strategy.

Remedial achievement progress in the range of 8% to 82% with an average of 10.03% is a good improvement. The average summative score of 79.22 encourages students to be even more active in completing their studies by collaborating as integrated tutors in remedial activities. The success of students exceeding the summative class average is a joint success in the implementation of learning.

The application of peer tutoring strategies in remedial guides students to learn independently, communicatively, creatively, and able to work together. It is this kind of practice that is expected by the independent learning curriculum concept of an independent campus (Direktorat Jendral Perguruan Tinggi Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2020) in Indonesia. For lecturers or teachers, the application of the peer tutoring strategy in remedial activities will give confidence in assessing and appreciating the different efforts of each student. Under different conditions, lecturers or teachers can appreciate remedial activities as well as enrichment using mathematics model 1 for remedial students, mathematics model 2 for non-tutor enrichment students, and mathematics model 3 for tutor students. The use of these three mathematical models encourages lecturers or teachers to assess objectively, comprehensively, transparently, fairly and accountably (Budiono & Hatip, 2023; Karyanto, 2022; Yogi Anggraena et al., 2021) according to the principles of assessment.

CONCLUSION

The application of the peer tutoring strategy between students is very effective in remedial students who fail to complete the previous learning objectives. The lecturer selects several enrichment students and assigns them as tutors. The success of students in remedial activities is the success of other students who become tutors. Remedial students and every other student get a final grade appreciation based on their respective achievements.

The teachers or lecturers can appreciate remedial students with final grades using the following mathematical model:

$$N_{A-R} = N_{cm} + N_R \, x \, (\frac{\sum \%R_a}{n_{stu} \, \mathrm{x} \, n_c})/100$$

The Final Grade for students who become tutors is calculated using the following mathematical model:

$$N_{AT} = N_a + N_a \, x \left(\frac{\frac{\sum \%R_a}{n_{stu} \, \mathrm{x} \, n_c}}{100} \right) x2$$

The final grades for the other students are calculated using the following mathematical model:

$$N_{A-nE} = N_a + N_a \, x \, (\frac{\sum \%R_a}{n_{stu} \, \mathrm{x} \, n_c})/100$$

Remedial activities as well as enrichment and assigning students to be tutors can facilitate an active and student-centered learning process. The use of the mathematical model above can assist lecturers in evaluating learning outcomes in a transparent, fair and accountable manner. The effectiveness of applying the mathematical model must be tested further in subsequent research with a wider sample size.

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