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A Management Model of Competency-Based Block System Automotive Learning

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Abstract

For students graduating from the automotive engineering education study program, this study aims to (1) determine a competency-based block system practice learning management model to improve the students' skills; (2) to implement the competency-based block system practice learning management model; (3) to know the level of effectiveness of the model. This research implemented a research and development (R&D) approach including (1) preliminary studies including needs and contents analyses, (2) development including design, implementation and evaluation, and (3) testing the effectiveness of the product as a semi-summative evaluation. The data for this study were drawn using interview, documentation, observation, and questionnaires. The data were validated by testing their reliability and validity. The data were then analyzed using descriptive percentages and quantitative models. The results of the subsequent analyses were transformed into constructs of percentages of feasibility in the implementation of practical learning activities. The results of the study show that (1) the factual model has not been equipped with an analysis of the basic needs of practice, the formulation of objectives of the block practice, the design of the practice program, the implementation of the practice program, and the evaluation of the block practice programs so that the student's proficiency level is still low; (2) the results of the validation from management experts and FGD indicate that the conceptual model of learning is feasible to be applied in learning activities; (3) after going through various suggestions and improvements to the hypothetical model it proved to be feasible to apply in learning. The model of automotive learning systems is very effective and easy to implement.

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INTRODUCTION

The implementation of technology in education is seen as a system with interdependent components so that they determine the success of the system; failure of an institution can be caused by a disruption of the sub-system. Abdurrahman (2015) states that, as efforts to support this goal, educational material was designed by grouping it into three major categories, namely normative, adaptive, and productive groups. One of the education program groups specifically aims to equip students with the vocational competencies needed to work independently, useful for filling job vacancies to fulfill their daily needs, and in the form of productive program groups.

One important problem faced by the Indonesian people is the low competitiveness of the work capabilities of compared to workers from other countries. Peter (2013) said that the competitiveness of a nation indicated by the number of products of the nation in the international market is no longer determined by the abundance of natural resources and cheap labor but by the superiority of innovation and science or a combination of both and accompanied management system to optimize the management elements.

Human character is formed through national education. National education functions to develop capabilities and form dignified national character and civilization to educate the life of the nation, to develop potential students to become human beings who believe in and fear of God Almighty, to have noble character, to be healthy, knowledgeable, capable, creative, and independent, and to become democratic and responsible citizens (Republic of Indonesia Law No. 20 of 2003 concerning the National Education System).

The formation of human character aims to (1) provide knowledge, attitudes, and skills to graduates as a means to enter the workforce and (2) provide knowledge, attitudes, and basic skills to graduates as a basic provision to develop their quality sustainably through formal, non-formal, and informal education. In other words, the development of human resources aims (1) to transform students from human burdens (they must be alive but not yet skilled) into human resources (those who earn so that they can support themselves and even support others); (2) to prepare graduates with professional competencies that are in accordance with the needs of the workforce to fulfill the needs of development and industrialization; (3) to prepare superior quality graduates so that they have a competitive advantage for the Indonesian workforce to face global competition; (4) to produce graduates who have entrepreneurial skills so that they can create jobs for themselves and others. There are three factors that contribute to it, namely policy makers, government, and education, especially technology education institutions and vocational training. According to Alam (2008), the quality of education is very much needed by-products to fulfill the requirements needed by the users. Quality means compatibility with its use. Graduates should be able to meet the needs and challenges of the workforce (Link and Match with industry) in the future, both operational staff and implementers of education.

Competency is something that masters a person's ability to move. Hase & Saenger (2004) state that "competencies are the underlying bodies of knowledge, abilities, experiences, and other requirements necessary to successfully perform the job". Competency consists of hard competence such as understanding certain functional and occupational fields, soft competence, integrated mindset based on multidimensionality, reliable, intelligent communicators and high emotional stability, and able to work and be ethical. Based on the various opinions above, education aims to manage human and other resources to realize a predetermined goal. Education is effectively and efficiently managing five Ms, namely Man, Money, Machine (equipment), Material, and Method.

Management principles divide work using authority and responsibility as resource persons/educators by increasing discipline in the form of unity of command in the implementation of continuous learning as a unity of direction, and as a motivator who must have a consistent understanding (motivation), which means that management must obey the principle and prioritize the interests of the organization above the real interests. In the implementation, education providers pay attention to employees

carefully by noticing the centralization and hierarchies so that order and justice can be realized as honesty management.

Beeby defines educational planning, as adopted by various developing countries, as "the exercise of foresight in determining the policies, priorities and costs of educational systems, having due regard for economic and political realities, for the system's potential for growth, and for the needs of the country and the pupils served by the system."

This study aims to (1) determine a competency-based block system practice learning management model to improve skills for students graduating from automotive engineering education program; (2) implement a competency-based block system practice learning management model to improve skills for students of the study program; (3) know the level of effectiveness of the evaluation of competency-based block system practice learning management model to improve the skills of the students.

RESEARCH METHODOLOGY

This study used the Research and Development (R&D) approach. As explained by Borg & Gall (1983: 772) "Educational R & D is a process used to develop and validate educational products" including the steps of planning and implementing (1) basic needs of block practice, (2) formulating block practice objectives, (3) designing block practice programs, (4) implementing block practice programs, and (5) evaluating block practice programs. The development uses a 4-D model by implementing stages (1) defining, i.e. gathering information based on literature; (2) design, i.e. summarizing the need for information validity; (3) development, i.e. developing results based on functions, types, and principles of work results (FGD); (4) Dissemination, i.e. promoting products that have been collected. As claimed by Thiagarajan in Mulyatiningsih (2014: 194) and Sukmadinata (2006: 176), the research step was modified into three: (1) preliminary studies as need and contents analyses; (2) development as design, development, and evaluation; (3) testing the effectiveness of the product as semi-summative evaluation.

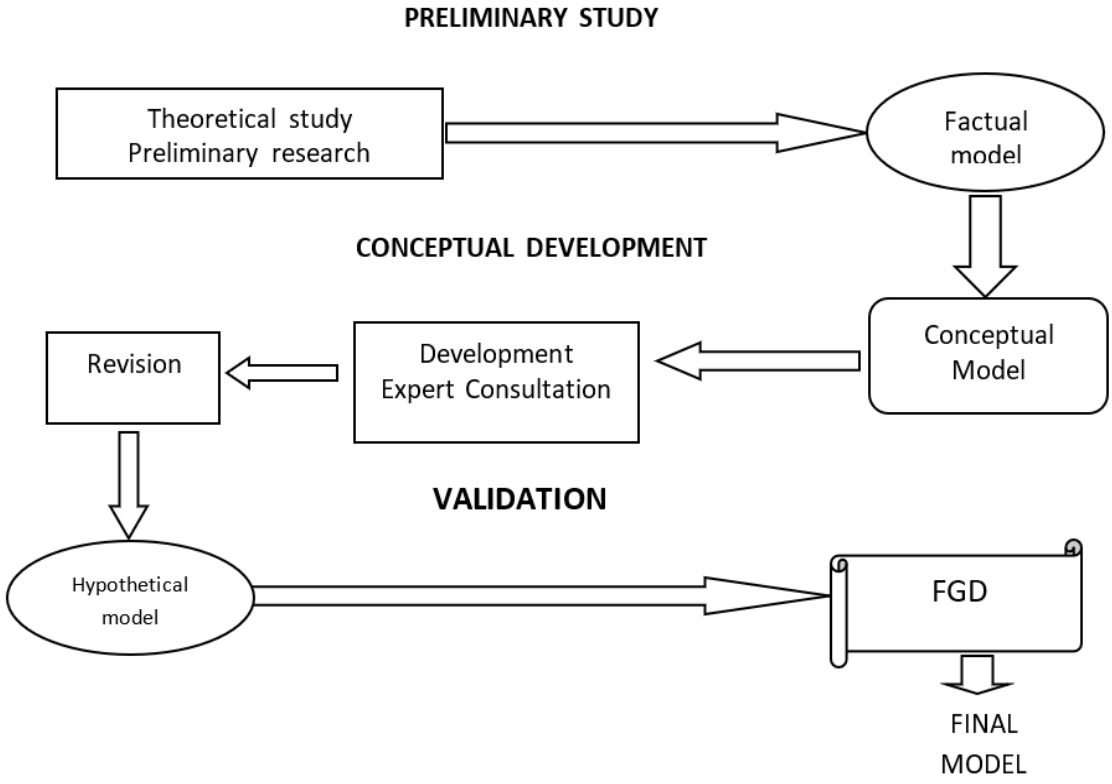


Figure 1. Stages of the research

The research subjects were practice students, policy makers, users, lecturers and instructors, and management experts involved in practice teaching. The instruments of data collection were (1) questionnaire and a checklist that is used to ask questions and observations at the preliminary study stage; (2) a list of questions and a checklist are also used to ask questions and observations in the stages of developing limited and broader trials, and the stage of implementing the model design. Data in the form of comments, suggestions, interviews, and open questionnaires were described qualitatively. The data obtained based on closed questionnaires, accuracy, clarity, and usability of the model was analyzed by percentage descriptive statistics.

RESEARCH RESULTS

Description of the Factual Model

The factual model design can be seen in Figure 2.

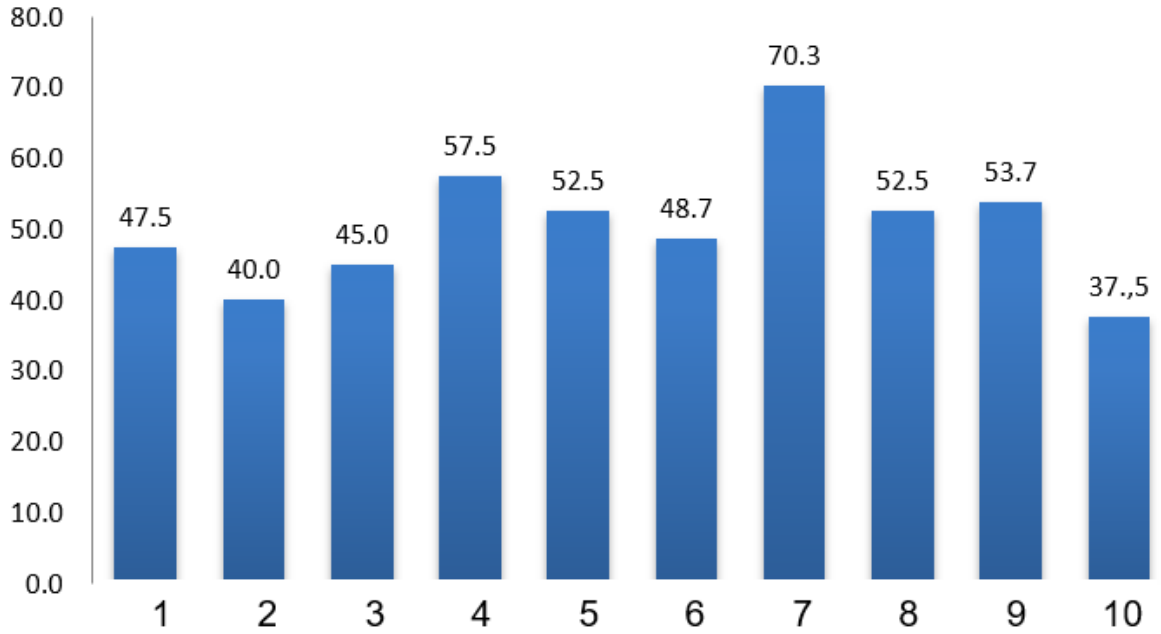


Figure 2. The factual conditions.

Notes:
1. The basic need for practice
2. Formulation of practice objectives
3. Designing practiced programs
4. Implementation of practice programs
5. Evaluation of practice programs
6. Practice service
7. Practice supporting facilities
8. Quality of academic facilities
9. Appropriateness of practice materials
10. Availability of module and job sheet

As a result, the factual condition is 10% good and 90% bad or infeasible, meaning that in the factual conditions there are only 10% of the components that are declared good or feasible, namely the practical support facilities (70.3%) which are categorized as feasible; the basic practice needs (47.5%) are not feasible; the formulation of practice objectives (40%) is not feasible; the practice program design (45%) is not feasible; the implementation of the practice program (57.5%) is not feasible; the practice program evaluation (52.5%) is not feasible; the practical services (48.7%) are not feasible; the quality of academic facilities (52.5%) is not feasible; the suitability of practice material (53.7%) is not feasible; the availability of modules and job sheets (37.5%) is not feasible. Therefore, in the implementation of practical learning, there are elements that need to be improved based on management aspects and implementation in the field. Based on these conditions, the elements of learning management require improvement and development in order to be able to reach the expected competencies in accordance with the conditions in the workforce.

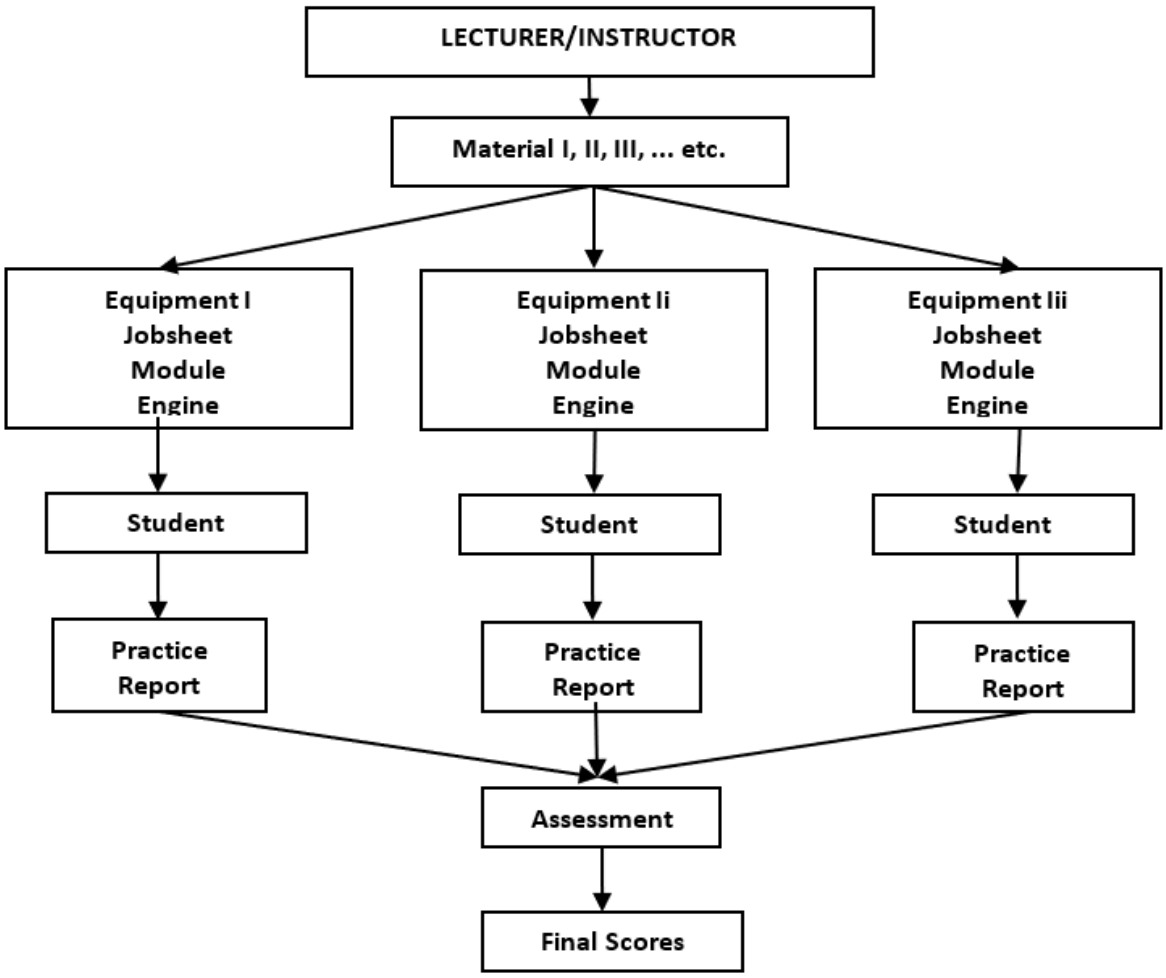


Figure 3. The Factual Model Design.

Description of the Conceptual Model

The condition of factual learning is improved by updating the implementation of the block system practice learning as an effort to improve work performance, competence, and skills abilities that shape creativity in solving problems faced by conditioning laboratory workspace that is commensurate with the industry situation. The implementation includes (1) the basic needs of the practice of blocks, (2) the formulation of the objectives of the block practice, (3) the design of the block practice program, (4) the implementation of the block practice program, and (5) evaluation of the block practice program.

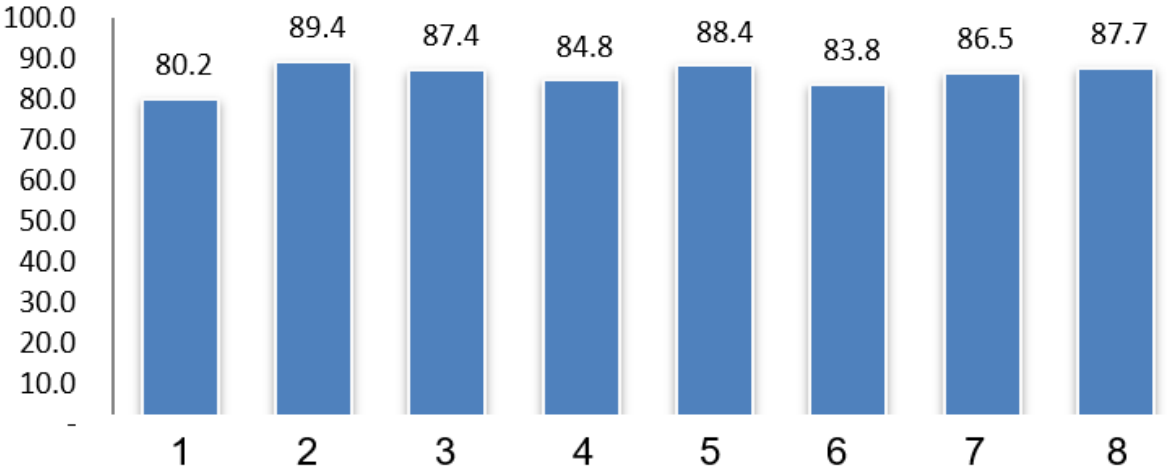


Figure 4. Block Basic Practice Chart.

Notes:
1. Instructor for each group.
2. Students of PTO Study Program.
3. Practice tools (all tools available in the automotive engineering lab.
4. Practice materials (provided in the automotive engineering lab.
5. Practice location (the automotive engineering lab.)
6. Practice schedule (8 hours a day for 8 days).
7. Practice period (prior to the odd semester).
8. Practice evaluation (in theory and practice).

All elements of the need for block practice turned out to provide an average benefit of 80.2% - 89.4%, which was in the very feasible category. That is, the average is in a very good category, with the lowest position in the number of instructors in each group; one instructor is in the position of 80.2%. This shows that the composition requires attention, namely by increasing the number of instructors, the purpose and objectives; the more instructors the resource person who becomes the center of excellence becomes more stable. The highest composition of the highest percentage was in the position of the criteria of students consisting of automotive engineering education students with an 89.4% score in the very feasible category. That is, the placement and use of practical learning planning with block systems are very good to be applied to automotive engineering students. Thus, the block practice carried out eight hours per day in an eight-day period strongly supports the planting of practical skills competencies and fosters creativity as innovation, development, discovery, and invention.

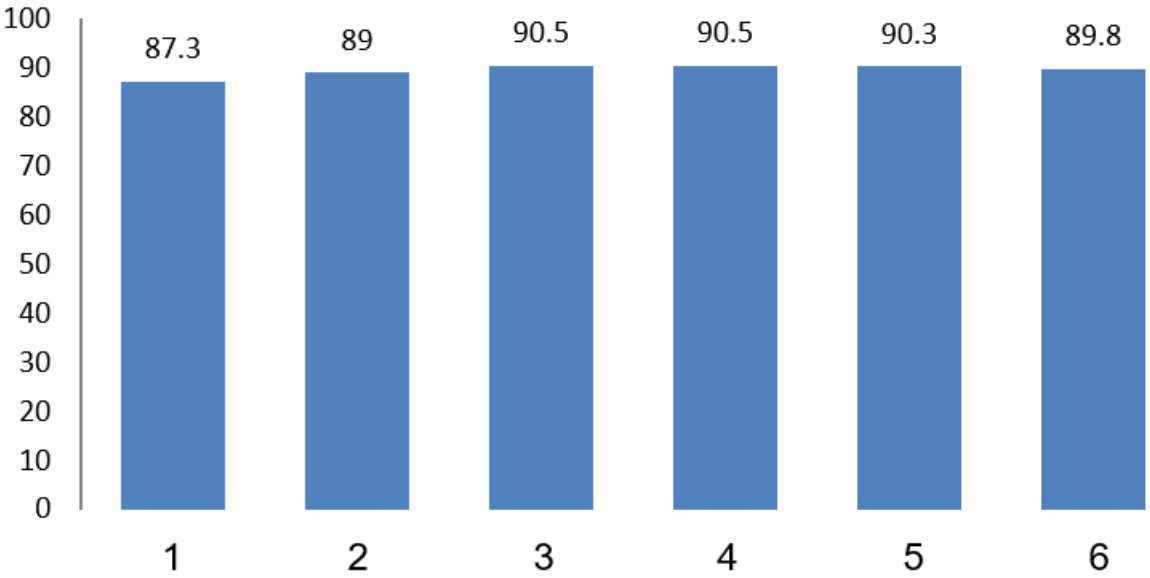


Figure 5. Formulation of Block System Practice Objective.

Notes:
1. To improve the effectiveness of block practice management.
2. To improve the effectiveness of the block practice time.
3. To match to the industrial working condition.
4. To improve the quality of the students' practice.
5. To improve the students' practice working condition equivalent to that of the industry.
6. To improve the working condition of students to be equal as that of industry

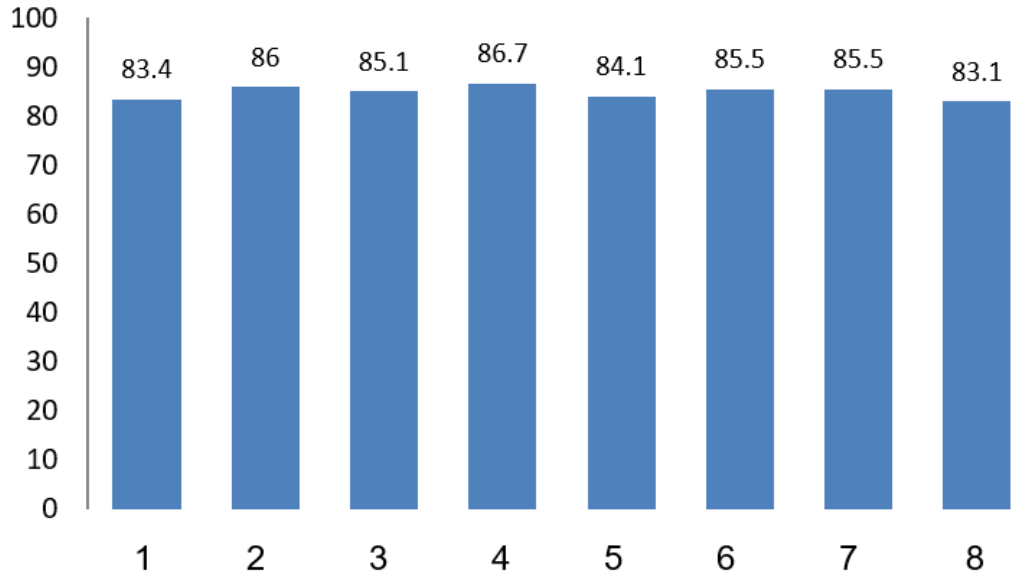


Figure 6. Design of Block Practice Program.

Notes:
1. Subject: gasoline and diesel motor practice.
2. Schedule of practice material for each group.
3. The number of students in each block (4-6 per group).
4. Number of tools in each block (available in automotive engineering lab)
5. The number of instructors in each block (1).
6. The total amount of time for block practice (8 days).
7. Amount of time for practice each day (8 hours).
8. The number of supporting tools for practice (automotive engineering lab).

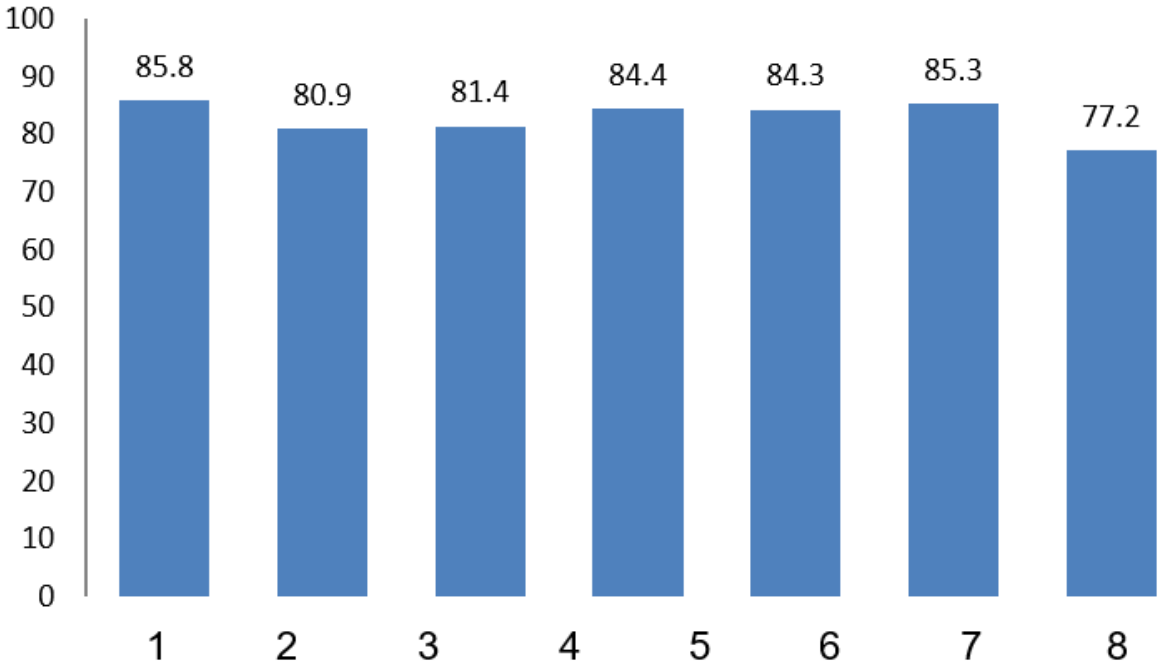


Figure 7. Program Implementation.

Notes:
1. Subject implementing block practice (subject matter).
2. Equipment.
3. Toolset:Student ratio (1:4-6).
4. Engine: Student ratio (1:4-6)
5. Time allocated for each job (8 hours for each work).
6. The total amount of time for practice (64 hours in 8 days).
7. Break time (1 hour per day).

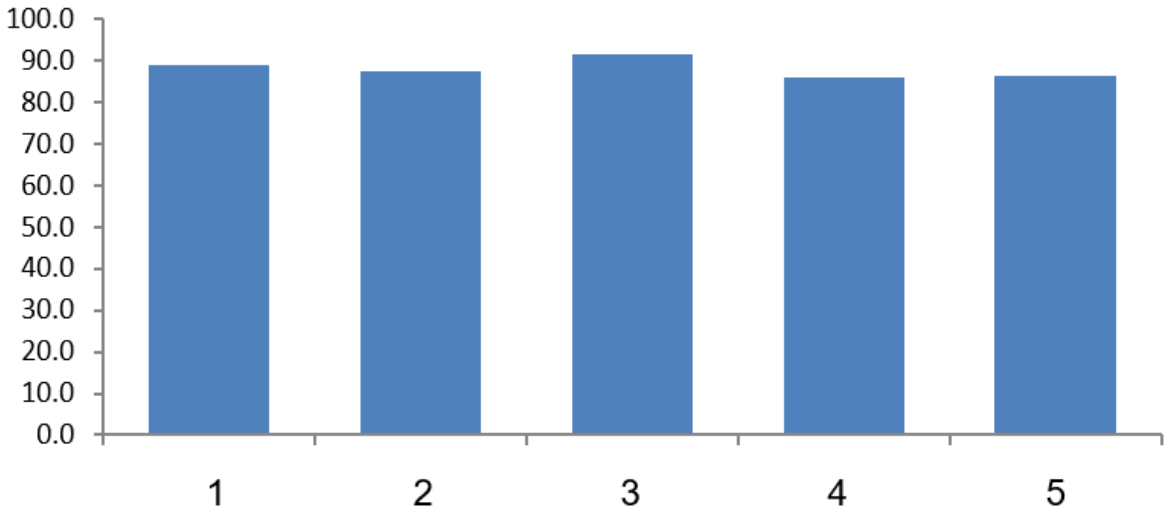


Figure 8. Program Evaluation

Notes:
1. Needs analysis
2. Objectives
3. Program planning
4. Program implementation
5. Program evaluation

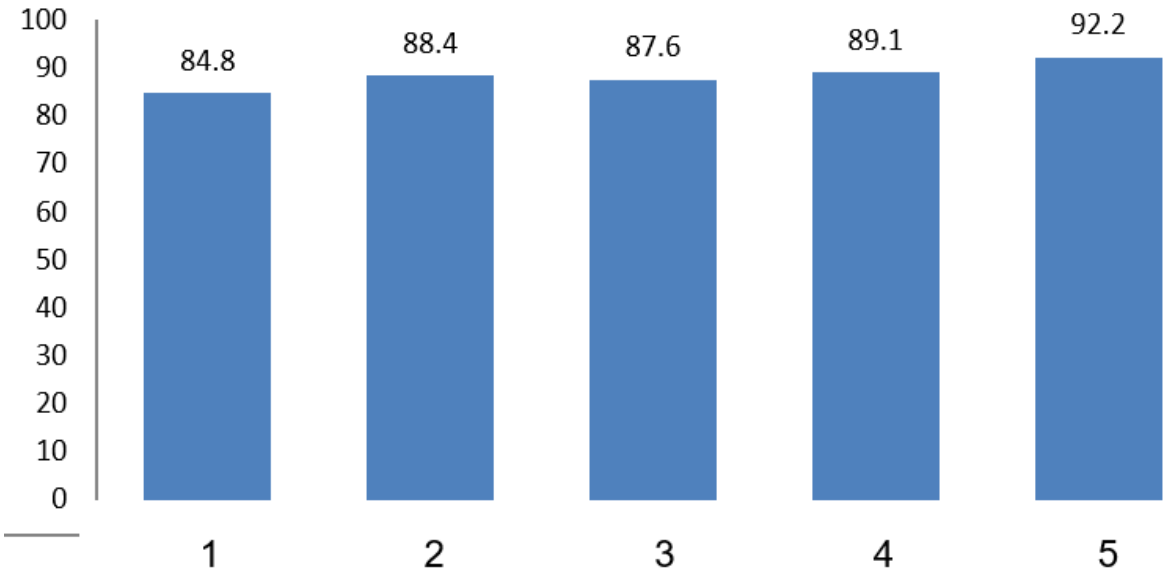


Figure 9. Evaluation of the students' learning results

Notes:
1. Written test including knowledge and skills competencies.
2. Practice assessment including work procedures competencies.
3. Practice assessment including work product competencies.
4. The score of practice report.
5. Final score (30% written test + 60% practice assessment + 10% report).

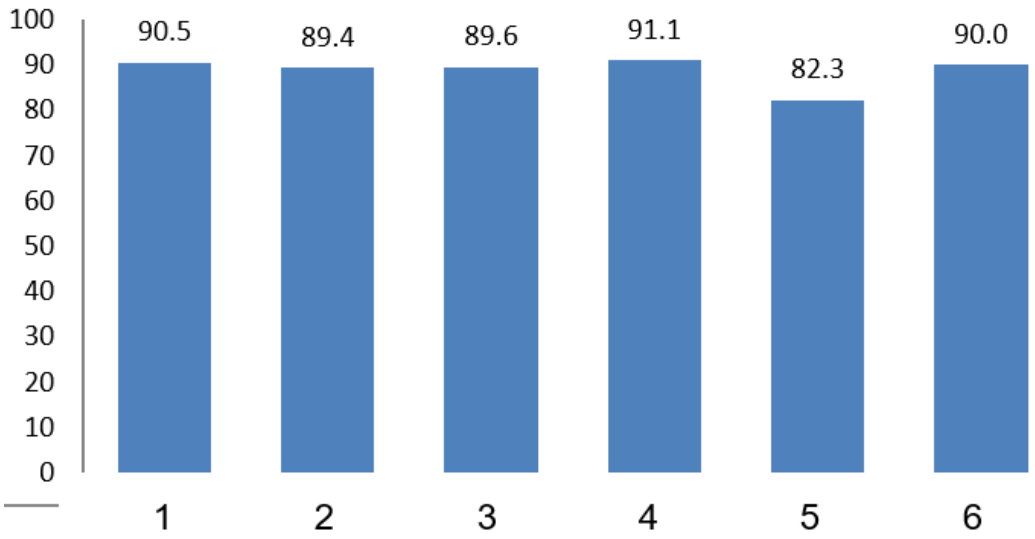


Figure 10. Program Quality

Notes:
1. Suitability of materials with the learning objective.
2. Suitability of materials with students' needs.
3. Quality of program/learning materials.
4. Adequacy of program/learning materials.
5. Adequacy of learning time and materials.
6. Resource person's mastery of materials.

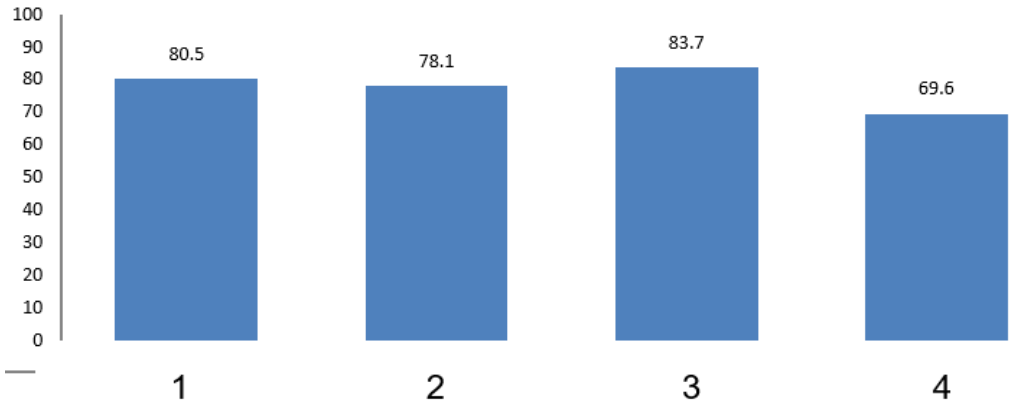


Figure 11. Supporting Facilities

Notes:
1. Quality of supporting tools.
2. Quality of K3 tools.
3. Quality of teaching.
4. Quality of resting area

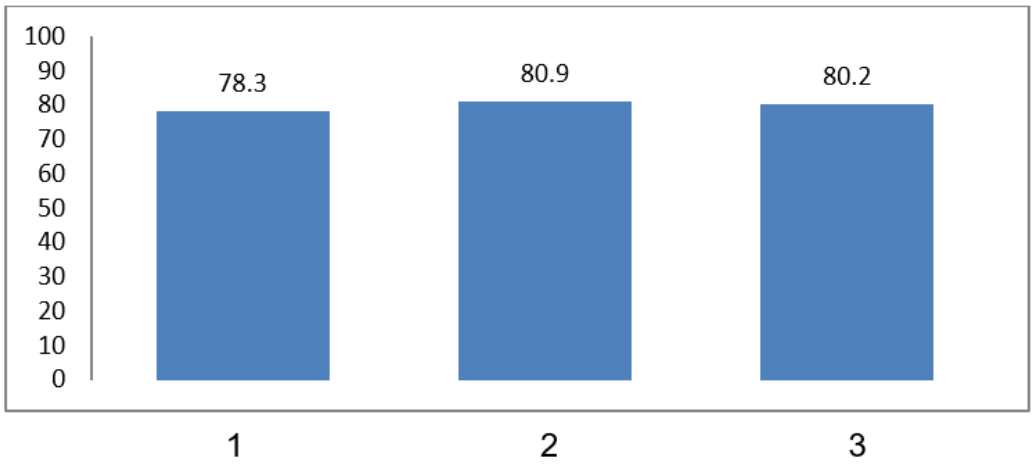


Figure 12. Service Charts

Notes:
1. Quality of tools services.
2. Quality of administration services.
3. Quality of activity, stationery, working costumes.

Factual model of practical learning

In fact, the average initial condition is 50.52% of the overall feasible category. Partially, conditions below the standard of feasibility are (1) the availability of job sheets with an average of 37.5% (inadequate); (2) supporting facilities at the highest position with an average of 70.3% (feasible); (3) five elements below the average standard, namely the basic needs of practice 47.5% (inadequate), formulation of practical goals 40% (inadequate), program design practice 45% (inadequate), service practice 48.7% (less feasible), and availability of modules and job sheets 37.5% (less feasible).

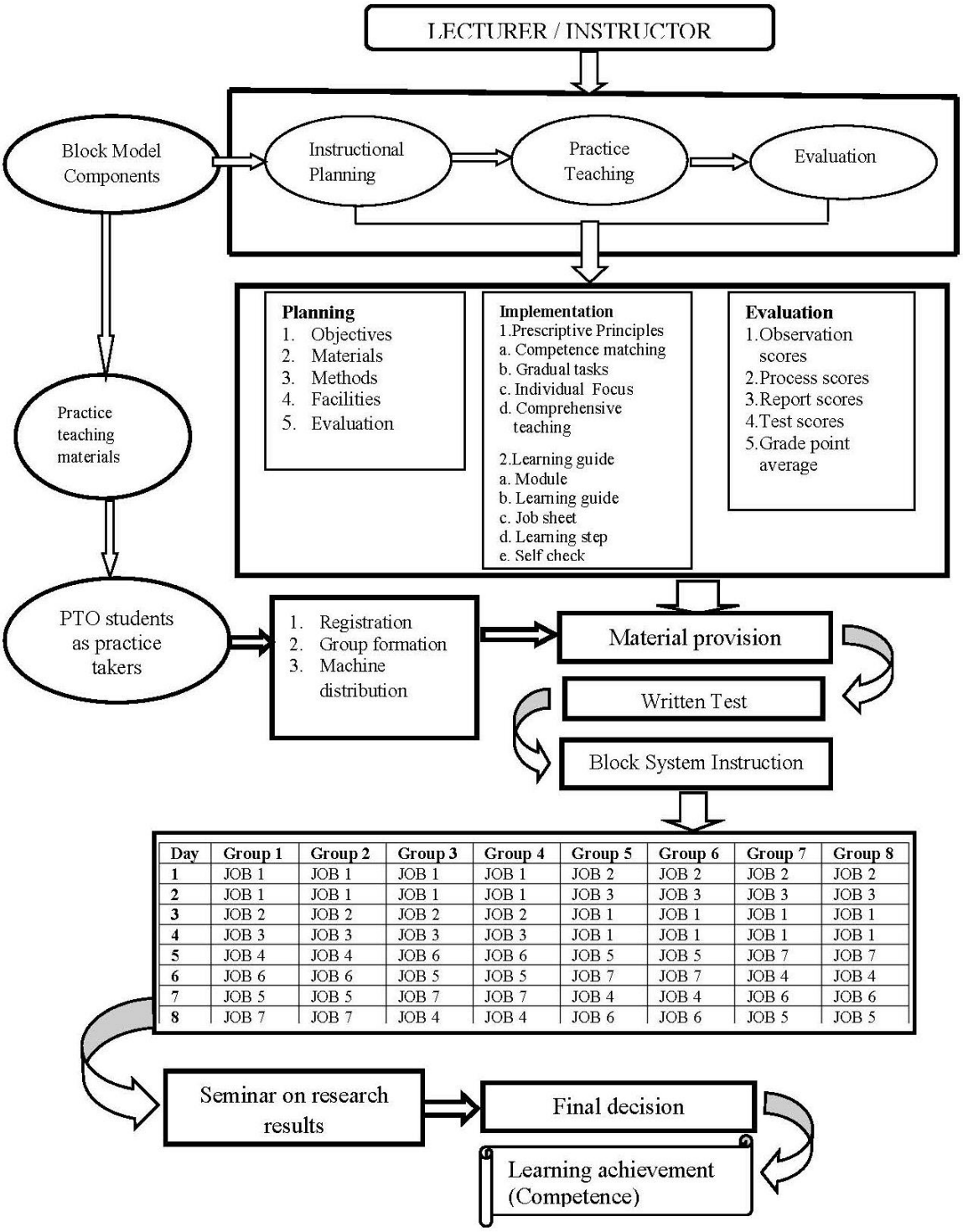
Hypothetical model using block system practice learning management

The management model for implementing apperception block system learning is feasible to be used in practical learning trials on compositions which include (1) basic needs of block practice, all existing elements, in fact, have an average benefit of 80.2% to 89.4% in the very feasible category; (2) the formulation of block practice objectives has a mean range of 87.3% to 90.5% (very feasible); (3) block practice program design: there are eight elements in the formulation of the block practice program design with an average of 83.1% to 86.7% (very feasible); (4) implementation of the block practice program: all elements that have a mean of 77.2% up to 85.8% (very good) and it can be used in learning automotive practices; (5) block practice program evaluation has an average range of 86.0% to 91.5% which means it is very feasible or very good to do.

Final Model Design

The results of the analysis and consideration in the FGD forum, which was held on Wednesday, November 21, 2018, at the Pascasarjana UNNES provides input that refers to the learning equipment sourced from management studies. These include: (1) practical learning materials, (2) languages used, (3) guidebooks, (4) modules, (5) job sheets, and (6) attachments to job sheet troubleshooting.

Based on the feasibility scale, practical learning material is categorized as very feasible. Input from the FGD on block learning systems can be used to improve the ability of practical skills. The lowest average value is in the suitability of the material with skills (79.16%), which needs attention to equalize this field with other fields. This is in accordance with Barnett's (2006) theory that the formation of competencies is a basic knowledge of basic skills, experience, and requirements needed to carry out work successfully. That is, skill formation needs to be sought so that graduates are able to face work according to their expertise. The highest value is in the suitability of practice skills with the required skills (93.75%). Refinement of learning material requires conformity with the type of work in the field. The results obtained from practical learning materials and guidebooks are as shown in graph 6, d. 12. Strengthening practical work using modules and job sheet devices gives results as shown in the following graph so that the final model is used to determine the next practice.



Day	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
1	JOB 1	JOB 1	JOB 1	JOB 1	JOB 2	JOB 2	JOB 2	JOB 2
2	JOB 1	JOB 1	JOB 1	JOB 1	JOB 3	JOB 3	JOB 3	JOB 3
3	JOB 2	JOB 2	JOB 2	JOB 2	JOB 1	JOB 1	JOB 1	JOB 1
4	JOB 3	JOB 3	JOB 3	JOB 3	JOB 1	JOB 1	JOB 1	JOB 1
5	JOB 4	JOB 4	JOB 6	JOB 6	JOB 5	JOB 5	JOB 7	JOB 7
6	JOB 6	JOB 6	JOB 5	JOB 5	JOB 7	JOB 7	JOB 4	JOB 4
7	JOB 5	JOB 5	JOB 7	JOB 7	JOB 4	JOB 4	JOB 6	JOB 6
8	JOB 7	JOB 7	JOB 4	JOB 4	JOB 6	JOB 6	JOB 5	JOB 5

Figure 13. Final Model.

CONCLUSION

Based on the analysis accompanied by input from various parties, the findings in this study as the final design/model are as follows:

1. Practice activities carried out in each part of the work have a time lag for preparing the report. This is done so that memory is still fresh when the practice is not closed with activities and other work experience;
2. The enrichment steps from experience based on practical activities are carried out by presenting each student working group in front of the group, which is related to the analysis of the material provided in the form of modules, worksheets, troubleshooting, and practice

manuals strengthening the skills of the graduates can be achieved;

3. Thus, a final model is prepared and ready to be implemented in the block practice as an effort to increase the mastery of the expected skills;
4. A management model of block system practice learning has been prepared by considering the advantages and eliminating its shortcomings to improve the skills of graduates.

The management model for implementing apperception block learning systems is feasible to be used in practical learning trials in compositions including:

1. The basic needs of block practice, all elements that exist in the needs of block practice turned out to have a meaningful percentage of benefits between (80.2% to 89.4%), categorized very feasible;
2. The formulation of the objectives of the block practice, obtained from all existing elements, has a mean range between (87.3% to 90.5%), categorized very feasible;
3. Designing a block practice program, there are eight elements in the formulation of block practice program design, and have a mean range of the percentage of feasibility (83.1% to 86.7%) the interpretation of feasibility includes a very feasible category;
4. The implementation of the block practice program, all the elements in the formulation of the implementation of the block practice program have an average percentage of eligibility (77.2% to 85.8%) which means that it is very good and can be used in learning automotive practices;
5. Block program practice evaluation. Having a large range of average percentages (86.0% to 91.5%) which means that the formulation of management evaluation of the prepared block learning model is very feasible or very good to be implemented.

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