

Development of Instrument Soft Skill Assessment in Problem-Based Learning to Improve Students' Collaboration Skills, Communication Skills, and Social Skills

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Abstract: The research aims to produce the instrument soft skill assessment in problem-based learning that are valid, practical, and effective in assessing students' collaboration, communication, and social skills. This research uses the 4-D development model consisting of four stages: define, design, develop, and disseminate. At the define stage, a preliminary study is carried out in the form of a needs analysis and literature study, then the formulation of objectives. At the design stage, product determination is carried out, product design is created and the instrument soft skills assessment is designed. At the development stage, initial field tests are carried out in the form of expert validation, product revisions, main field tests to obtain data on the practicality and effectiveness of the product, then the final product is obtained. At the disseminate stage, product distribution was carried out on a large scale, but this research only reached the development stage due to limited research time. The research sample consists of tenth-grade students at SMA N 1 Padang Cermin, Lampung. Data collection techniques include methods such as self assessment questionnaires and documentation. Data analysis employs qualitative analysis with descriptive percentage for expert practitioner validation, effectiveness, and quantitative analysis using SPSS for effectiveness. The results of this study indicate that the instrument soft skill assessment in problem-based learning to improve students' collaboration, communication, and social skills in high schools are developed with theoretical, practical, and effective feasibility.

Keywords: Collaboration skills; Communication skills; Problem based learning; Social skills; Soft skills assessment

Introduction

21st century competencies are socialized by the Ministry of Education and Culture as 4C, namely creative thinking, critical thinking and problem solving, communication, and collaboration (Arsanti et al., 2021). Collaboration ability is one of the abilities developed in the 21st century (Indrawan et al., 2021). Apart from that, communication is one of the very basic needs of every individual which is obtained through interactions in their social environment (Pramudita et al., 2021).

Communication skills are included in the social skills aspect (Yusuf et al., 2018). Meanwhile, Sari et al. (2022) stated that collaborative learning is also very closely related to students' social and emotional skills. Students' collaboration skills in groups during learning also require the social and emotional skills of the students concerned. Collaboration requires mature behavior from its members, especially when students have different opinions. This of course requires good social skills and managing emotions.

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The 2013 curriculum emphasizes education on developing and equalizing soft skills and hard skills through developing knowledge competencies, skills and attitudes (Tiara & Sari, 2019). An important thing that really needs to be emphasized is the commitment of teachers and students in developing and mastering soft skills competencies in the learning process. As input, there needs to be a policy from institutional leaders to include soft skills as an inseparable part of the curriculum and the need for in-depth studies to follow up on the development of institutions as pioneers in implementing soft skills that are integrated with subjects (Sitanggang, 2020). Efforts are made to build or bring out the skills that each student has, namely by creating a learning model (Sya'bani, 2018). Problem Based Learning (PBL) can be an effective tool for improving students' 21st century skills. Through this learning model, students will be able to learn to think critically, work in teams, and use technology to solve problems. This will help them become better prepared to face the problems of the modern world (Wangid, 2023).

In a limited scope, learning assessment done in order to find out level of success participant educate. Meanwhile, in a broad scope, learning assessment is carried out to determine the level of success and weaknesses of a learning process in achieving the desired educational goals (Umami, 2018). Theacers assess attitude competency through observation, self-assessment, peer assessment evaluation) by students and journals. The instrument used for observation, self-assessment and assessment between students is a checklist or rating scale accompanied by a rubric, while the journal is in the form of teacher notes. Attitude assessment is related to students' attitudes towards learning material, students' attitudes towards teachers/instructors, students' attitudes towards the learning process, and attitudes related to values or norms related to learning materials (Fadlillah, 2014).

Teachers' understanding and knowledge in carrying out and providing students with soft skills needs to be evaluated. Aspects of soft skills evaluation are the soft skills concept and soft skills assessment rubrics. It is very important to carry out soft skills assessments on students so that teachers can manage their learning so that they can easily carry out soft skills assessments (Setiawati & Wijayanti, 2022). According to Kusaeri et al. (2019), teachers' insight in selecting and developing soft skills assessment instruments is still lacking. The assessment process that is often used by theacers today is still limited to daily tests, mid-semester tests and end-of-semester tests as a whole. new limited to emphasizing cognitive and psychomotor aspects (hard skills) without utilizing other types of assessment that are stated in existing regulations, including soft skills assessment.

To measure and assess students' communication, collaboration and social skills in problem-based learning, theacers need straightforward, clear and useful tools that are adapted to the school learning environment. So a needs analysis has been carried out as preliminary research with the results that as many as 48% of theacers do not know how and have not implemented soft skills assessment in their classes. In addition, 84% of soft skills assessment tools those used in classroom learning are government products, and only 20% of theacers develop their own soft skills assessment tools. In implementing soft skills assessment, especially in measuring students' communication, collaboration and social skills, 92% of theacers have difficulty. Regarding the learning process using the problem based learning model, 100% of theacers already know and 84% do it, but 54% of theacers have difficulty learning using the problem based learning model.

Based on existing problems in the field, there is a need for soft skills assessment tools to be available on problem-based learning to improve students' collaboration, communication and social skills. Problem-based learning really supports soft skill development students, but appropriate assessments need to be used to measure it. Paying attention to the reality in schools and as an effort to provide solutions to the problems described above, the important thing to do is develop soft skills assessment tools for Physics learning. Based on the background of this problem, it is necessary to carry out development research entitled Development of Soft Skill Assessment Tools in Problem-Based Learning to Improve Students' Collaboration, Communication, and Social Skills.

Based on the problem formulation, the aim of this development research is to produce product development of soft skills assessment tools for problem-based learning that are theoretically feasible or valid to improve students' collaboration, communication and social skills; produce product development of soft skills assessment tools for practical problem-based learning to improve students' collaboration, communication and social skills; and produce product development for soft skills assessment tools for effective problem-based learning to improve students' collaboration, communication, and social skills.

Method

This research aims to develop a soft skill assessment tool in problem-based learning to improve students' collaboration skills, communication skills, and social skills. The research method employed is a development study based on the 4-D model by Thiagarajan et al. (1974). The 4-D model consists of four stages: Define,

Design, Develop, and Disseminate. The procedure for developing the soft skill assessment tool in problem-based learning to enhance students' collaboration skills, communication skills, and social skills is as follows.

Define Stage

This stage is used to establish and define the needs. In this stage, a needs analysis, literature study, and goal formulation are conducted. The needs analysis uses a questionnaire given to 25 high school teachers to determine the types of assessments that have been implemented, how teachers assess soft skills, and to identify the types of assessments that are suitable for the field conditions. The literature study is used to gather concepts or theories relevant to and supporting the development of the product. This development research aims to develop a soft skill assessment tool in problem-based learning to improve students' collaboration skills, communication skills, and social skills.

Design Stage

In this stage, the design of the soft skill assessment is created. Product design includes determining soft skill assessment indicators, collaboration skills, communication skills, and social skills indicators, as well as determining stages in PBL. The Problem-Based Learning (PBL) stages, collaboration skill indicators, communication skill indicators, and social skill indicators are all included in the product, which will be used as teaching materials in the form of a soft skill assessment tool in problem-based learning to enhance students' collaboration skills, communication skills, and social skills.

Develop Stage

Activities in this stage include initial field testing, product revision, and field trials. Initial field testing involves testing the product design on a limited scale, namely expert validation testing. Product revision is used to identify inconsistencies in the product, and then the first product revision is made. The results of the first product revision are referred to as Product II. Once Product II is obtained, field trials are conducted to determine the practicality and effectiveness of the assessment tool developed by examining the improvement of students' collaboration skills, communication skills, and social skills. The stages of development research using the 4D development model can be seen in Figure 1.

This research uses non-test data collection techniques are questionnaires and documentation. The questionnaire in this research was used to analyze the needs of theacers and students, to test theoretical feasibility (expert validation), to test the practicality of responses from theacers and students, and to test the

effectiveness of soft skills assessment tools on problem-based learning to improve collaboration, communication and social skills. Meanwhile, documentation in this research is used to obtain the data needed in the research, such as archives of assessment instruments used by schools in teacher books in preliminary research needs analysis, and data on the number of students for the research sample.

The data analysis technique in this research is the validity and practicality test by calculating scores on a 1-4 Likert scale. Then to test effectiveness by calculating student scores from a 1-4 Likert scale. Apart from that, the effectiveness test was also carried out using the normality test and the Wilcoxon test in the SPSS program.

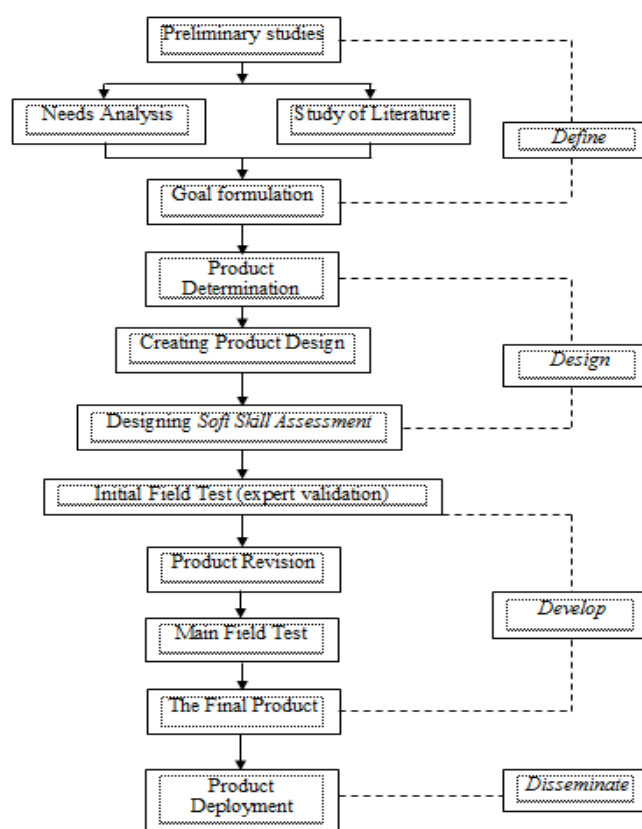


Figure 1. Product development procedures

Result and Discussion

The results of preliminary research are needs analysis which is conducted with do ststudy field. Results analysis need shown in Table 1. The results obtained were that theacers did not know how and had not implemented affective assessment on students; affective assessment tools have not been developed by theacers, and theacers only use affective assessment instrument products from the government in teacher books; theacers have difficulty understanding affective or attitudinal assessment criteria, especially in assessing

skills collaboration, communication skills and social skills of students; problem based learning model has

been used but theacers experience difficulties in implementing it.

Table 1. Results of Needs Analysis

Question	Number of Respondents	Yes (%)	No (%)
Do you apply the 2013 curriculum in classroom learning?	25	100	0
Do you know how to carry out a soft skills assessment ?	25	52	48
Do you carry out soft skills assessments on students in class?	25	12	88
Do you understand how to create the right tools to assess these soft skills?	25	24	76
Do you use soft skills assessment tools in learning in government product classes?	25	84	16
Have you developed your own soft skills assessment tool?	25	20	80
Do you make a grid first before making a soft skills assessment tool?	25	40	60
Is the implementation of the student's soft skills assessment in accordance with the KD?	25	72	28
Do you experience difficulties in the process of creating soft skills assessment tools?	25	84	16
Do you experience difficulties in implementing soft skills assessments, especially in measuring students' collaboration and social skills in class?	25	92	12
Do you know the problem based learning model?	25	100	0
Have you done learning using problem based learning?	25	84	16
Do you experience difficulties in learning using problem based learning?	25	56	44
Do you need assessment tools for problem-based learning to measure students' communication, collaboration and social interactions that are easy, clear, practical and appropriate for learning conditions at school?	25	96	4

The developed instrument soft skills assessment was then subjected to product validity testing. In the validation stage, assessment was conducted by experts, consisting of two physics education master's degree lecturers and one physics education master's degree graduate teacher. Validation testing included evaluation, content, and language validation. The validation test results from the three experts can be seen in Table 2.

Table 2. Validity Test Results

Aspect	Score (%)
Evaluation	80.83
Content	70.00
Language	89.58
Average (%)	80.14

Based on Table 2, the average evaluation validation score is 80.83%, indicating a valid criterion. This suggests that the development of the soft skills assessment tool in problem-based learning to improve students' collaboration skills, communication skills, and social skills is appropriate for evaluation. This soft skills assessment tool has met the criteria for a good instrument, as it includes usage instructions, grids, assessment sheets, and employs rubrics and scoring guidelines. Furthermore, the instrument's grid includes dimensions before proceeding to collaboration skill and social skill indicators linked to tasks.

Furthermore, looking at the content validation, an average score of 70.00% with a valid criterion was

obtained. This indicates that the development of the soft skills assessment tool in problem-based learning to improve students' collaboration skills, communication skills, and social skills is appropriate in terms of content. It aligns with learning outcomes and objectives, and the presented tasks are easily understood. They are suitable for the grade level, and the presented issues are relevant to the local area.

Additionally, looking at language validation, an average score of 89.58% with a highly valid criterion was obtained. This indicates that the development of the soft skills assessment tool in problem-based learning to improve students' collaboration skills, communication skills, and social skills is highly suitable in terms of language. This soft skills assessment tool demonstrates accurate sentence structure, word choice, use of understandable Indonesian language, adherence to PUEBI (Pedoman Umum Ejaan Bahasa Indonesia), and excellent use of terms, symbols, images, or icons, all with proper sourcing.

Gonibala et al. (2019) that the validity questionnaire of the expert assessment is categorized as valid or cannot be reviewed in terms of material, construction or language. Another opinion, in validity tests, there are three types of validity tests, namely construct validity tests, criterion validity tests, and content validity tests. The content validity test is a validity test that measures the extent to which a research instrument can accurately measure the variables that will later be measured. The construct validity test is a validity test that measures the extent to which a research instrument can measure a

construct (the framework of a concept). The criterion validity test is a validity test that carries out tests by comparing the research instrument with other research instruments that have been declared valid (Dewi & Sudaryanto, 2020).

Practicality testing was conducted at SMAN 1 Padang Cermin, Lampung, involving 2 teachers and 35 students. This field trial was conducted in the experimental class to determine the instrument's practicality and effectiveness, by assessing students' collaboration skills, communication skills, and social skills in problem-based learning. The practicality test results based on feedback from teachers can be seen in Table 3.

Table 3. Teachers Response Results

Aspect	Teacher 1	Teacher 2
Attractiveness	11	9
Convenience	15	13
Usefulness	15	14
Total score	41	36
Average	87.50%	

Based on Table 3, the results show that the large group teachers response test for practicality obtained an average score from 2 teachers with a percentage of 87.50%, meeting the highly practical criteria. Furthermore, the results of the student response questionnaire can be seen in Table 4.

Tabel 4. Student Response Results

Aspect	Percentage (%)
Attractiveness	88.21
Convenience	89.28
Usefulness	88.03
Average	88.51

Based on Table 4, the results show that the student response test for practicality obtained an average score from 35 students with a percentage of 88.51%, meeting the highly practical criteria. The results from both teachers and students above prove that the soft skills assessment tool in problem-based learning to improve students' collaboration skills, communication skills, and social skills is highly practical in terms of cover page attractiveness, color scheme, font usage, as well as ease of use, flow, and scoring. Additionally, the instrument is practical in terms of usefulness in completing tasks to enhance learning interest, broaden insights, and assess collaboration skills, communication skills, and social skills.

This is in line with the statements by Aldabbus (2018) and Lestari (2017) that instruments meeting practicality criteria in terms of instrument attractiveness such as cover and images, instrument ease with clear

instructions, and instrument usefulness in enhancing student skills.

Effectiveness testing was conducted to determine the effectiveness of the instrument product in enhancing students' collaboration skills, communication skills, and social skills in problem-based learning. Effectiveness testing was conducted in two stages: the percentage of achievement of collaboration skills and social skills according to indicators, and the paired test output of collaboration skills, communication skills, and social skills using the SPSS program.

Student achievements in collaboration skills in class X at SMAN 1 Padang Cermin were calculated from the results of questionnaire scores given before problem-based learning (Pretest) and after problem-based learning (Post-test), as shown in Table 5.

Table 5. Collaboration Questionnaire Calculation Results

Indicator	Score Percentage (%)	
	Pretest	Post test
Contribution	50.47	96.54
Time Management	48.57	91.66
Research Techniques	51.16	89.64
Average	50.07	92.61

The achievement of collaboration skills from 35 students obtained a percentage score of 50.47% in the pretest and 96.54% in the post-test, showing an increase of 46.07%. In time management, they obtained a percentage score of 48.57% in the pretest and 91.66% in the post-test, experiencing an increase of 43.09%. Additionally, in investigation techniques, they obtained a percentage score of 51.16% in the pretest and 89.64% in the post-test, showing an increase of 38.48%. Collaboration skills for 35 students averaged 92.61% with an excellent criterion after problem-based learning. This indicates an improvement from before problem-based learning, where the average was only 50.07%.

Next, for student achievements in communication skills, they were calculated from the questionnaire scores given before problem-based learning (Pretest) and after problem-based learning (Post-test), as shown in Table 6.

Table 6. Communication Questionnaire Calculation Results

Indicator	Percentage Score (%)	
	Pretest	Post test
Openness	57.65	94.18
Empathy	66.12	98.16
Support	64.01	84.37
Positive attitude	63.49	97.30
Equality	54.48	90.91
Average	61.15	92.98

The achievement of communication skills from 35 students in openness obtained a percentage score of 57.65% in the pretest and 94.18% in the post-test, experiencing an increase of 36.53%. In empathy, they obtained a percentage score of 66.12% in the pretest and 98.16% in the post-test, showing an increase of 32.04%. In support, they obtained a percentage score of 64.01% in the pretest and 84.37% in the post-test, experiencing an increase of 20.36%. In positive attitude, they obtained a percentage score of 63.49% in the pretest and 97.30% in the post-test, showing an increase of 33.81%.

Additionally, in equality, they obtained a percentage score of 55.15% in the pretest and 91.20% in the post-test, experiencing an increase of 36.05%. Communication skills for 35 students averaged 92.98% with an excellent criterion after problem-based learning. This indicates an improvement from before problem-based learning, where the average was only 61.15%. Next, for student achievements in social skills, they were calculated from the questionnaire scores given before problem-based learning (Pretest) and after problem-based learning (Post-test), as shown in Table 7.

Table 7. Social Skills Questionnaire Calculation Results

Indicator	Percentage Score (%)	
	Pretest	Post test
Understanding Differences of Opinion	59.28	92.76
Being a good listener	52.61	88.17
Respecting Differences	53.57	92.67
Average	55.15	91.20

The achievement of social skills from 35 students in the understanding differences indicator obtained a percentage score of 59.28% in the pretest and 92.76% in the post-test, experiencing an increase of 33.48%. In the indicator of being a good listener, they obtained a percentage score of 52.61% in the pretest and 88.17% in the post-test, showing an increase of 35.56%. Additionally, in the indicator of respecting differences, they obtained a percentage score of 53.57% in the pretest and 92.67% in the post-test, experiencing an increase of 39.10%.

Social skills for 35 students averaged 91.20% with an excellent criterion after problem-based learning. This indicates an improvement from before problem-based learning, where the average was only 55.15%. In addition to the questionnaire score, the effectiveness test of this soft skills assessment tool can be seen from the output of the paired test in Table 8.

Table 8. Paired Test Result

Variable	Sig.
Collaboration Skills	0.000
Communication Skills	0.000
Social Skills	0.000

Based on Table 8, the significance value of the collaboration variable is 0.000, which means the Sig. value is less than 0.05, indicating an increase in students' collaboration skills after implementing problem-based learning. This is consistent with Aspridanel (2019), which found that the PBL learning model can improve students' collaboration skills.

Furthermore, the significance value of the communication variable is also 0.000, which means the Sig. value is less than 0.05, indicating an increase in students' communication skills after implementing problem-based learning. This is in line with Nurhayati Abbas's statement that the PBL model is a student-centered learning approach to authentic problems, enabling students to compose themselves, develop higher skills, empower students, and improve interpersonal communication (Rahanra & Runtuboi, 2020). Additionally, the research results of Rasimin et al. (2021) showed that problem-based learning is effective in improving students' communication. This is also supported by Nurhayati et al. (2019) that the use of PBL-based teaching materials can improve students' written and oral communication as well as collaboration skills.

Moreover, the significance value of the social skills variable is 0.000, which means the Sig. value is less than 0.05, indicating an increase in students' social skills after implementing problem-based learning. In line with research conducted by Gunawan & Indrayani (2021) that the problem-based learning model is one of the methods used to improve the quality of learning.

Conclusion

Based on the results of developing a soft skills assessment tool in problem-based learning to improve students' collaboration skills, communication skills, and social skills, it can be concluded that the validity results in terms of evaluation, material, and language are categorized as valid because the average validity results of each validity test meet valid and acceptable criteria. Furthermore, the practicality results in terms of attractiveness, ease, and usefulness based on teachers' and students' responses are categorized as very practical because the average practicality results of each practical test meet practicality criteria. Additionally, the effectiveness results based on the calculation of collaboration skills, communication skills, and social skills questionnaire scores show an improvement from before and after the implementation of problem-based learning. Therefore, all three test results indicate that the soft skills assessment tool product in problem-based learning to improve students' collaboration skills, communication skills, and social skills is valid, practical, and effective.

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Author Contributions

Zahra Maria Ulfa collected, analyzed, interpreted data, and drafted the article. Undang Rosidin collected and analyzed relevant literature reviews. Abdurrahman wrote the discussion section and revised the article.

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Conflicts of Interest

The authors declare no conflict of interest.

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