The conceptual framework of blended learning integrated soft skills in mathematics

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Abstract. This study aims to produce a conceptual framework of blended learning integrated soft skills in mathematics learning as a reference for lecturers in designing learning. This research uses a logical, rational and theoretical approach. The conceptual framework is theoretically supported by literature review, relevant research, and preliminary research by conducting a level 1 needs analysis, namely an assessment of knowledge and skills against knowledge and skills gaps in designing blended learning integrated soft skills. The results obtained are a conceptual framework of blended learning integrated soft skills consisting of 5 procedures, namely: (1) formulating learning outcomes; (2) map and organize learning materials; (3) designing synchronous and asynchronous learning activities; (4) formulate the steps of learning activities with the framework of community of inquiry integrated soft skills; and (5) designing assessment strategies.

1 Introduction

Blended learning is present and future learning that needs to be mastered by lecturers. Blended learning is learning that combines face-to-face learning patterns and online learning where online learning does not replace face-to-face classes but complements and builds content to increase knowledge, but must pay attention to the important point, namely choosing and determining the right approach, namely synchronous and asynchronous approaches in order to achieve the set learning objectives [1]-[4] . Some past research [3]-[9] n applying blended learning, there is a major problem faced by lecturers, namely how to present learning that can stimulate students actively to learn in order to master certain knowledge, skills or attitudes.

The learning process in higher education should pay attention to the prerequisite elements that are important to achieve the learning experience. first, Higher education consistently sees students as an important part of supporting collaborative learning. In online learning, the asynchronous nature of online communication and the potential for disconnection cause attention to be focused on students. To support this perspective, there is a need for a framework that identifies both social and cognitive dimensions in online and face-to-face learning. In addition, second, learning in higher education emphasizes more on

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aspects of skills and abilities to solve problems so that students are required not only to have hard skills but also soft skills. Soft Skills are a person's skills in relating to others (including himself) [10], [6]. Furthermore, Dave Berthhall revealed that soft skills are personal and interpersonal behaviors that can develop and maximize human performance (through training, teamwork development, initiative, other decision making) [12]. The development of students' soft skills both intrapersonally and interpersonal skills in their learning in higher education is very necessary so that after graduation they can face the challenges of a dynamic global world of work. For this reason, the integration of soft skills development into the curriculum and learning process in higher education must get priority.

In designing blended learning, lecturers often experience difficulties in terms not only of lack of knowledge and skills, but because of the traditional learning mindset that has become a daily job. Moreover, in integrating soft skills in the learning process while still paying attention to the dimensions of teaching, social and cognitive presence for educational purposes. Therefore, the purpose of this study is to develop a conceptual framework that becomes a guide or guideline in designing blended learning integrated soft skills that present teaching, social and cognitive aspects in a good learning process and in accordance with the characteristics of learning outcomes in the course.

2 Methods

Development of a conceptual framework for blended learning containing soft skills by combining logical, rational and theoretical approaches [13]. The conceptual framework was developed theoretically based on literature review, relevant research results and preliminary research. Preliminary research is the first stage in the Plomp model preliminary study to find out the needs of lecturers in designing learning as one of the basic considerations in designing *blended learning designs* integrated *with soft skills* in mathematics learning in tertiary institutions [14]. The focus in this research is to develop a conceptual framework for blended learning design integrated with soft skills which is used as a reference for lecturers in designing learning. As for how to collect data by conducting observations and questionnaires to lecturers about learning in the 21st century and about knowledge and skills gaps in designing *blended learning* integrated with *soft skills* in mathematics learning. Data analysis technique by conducting level 1 needs analysis according to Gupta [15], namely knowledge and skills assessment. This needs analysis is carried out by comparing the ideal conditions, namely the knowledge and skills of lecturers in designing *blended learning* integrated with *soft skills* in mathematics learning in tertiary institutions starting from knowledge about *blended* learning, formulating learning outcomes, mapping and organizing material, designing learning activities, the skills to present teaching, social and cognitive as well as the integration of *soft skills* in the learning process.

3 Results And Discussion

3.1 Results

Survey data on lecturers related to knowledge and skills gaps in designing blended learning integrated soft skills are described in Table 1 as follows.

Table 1. Knowledge and Skills Gaps in Designing Blended Learning Integrated Soft Skills

No	Ideal Condition	Actual Condition	Need
1.	Reference or guide in designing blended learning	96% of respondents cited the importance of specific guidelines in designing blended learning	Development of blended learning design as a refinement of existing guidelines
2.	Knowledge of blended learning	70% of respondents do not have sufficient knowledge about blended learning	Operational limitations on blended learning
3.	Have integrated skills and knowledge in formulating learning outcomes in accordance with the criteria for formulating good and correct learning outcomes	74% of responses did not have sufficient knowledge and skills about the skills to formulate learning outcomes in accordance with the criteria for formulating good and correct learning outcomes	Criteria for formulating learning outcomes in accordance with the criteria for formulating learning outcomes based on integrated abilities
4.	Have adequate knowledge skills in mapping and organizing subject matter accordance with learning outcomes	59% of respondents do not have adequate knowledge and skills in mapping and organizing subject matter according to learning outcomes	Criteria, guides and examples map and organize subject matter according to learning outcomes
5.	Have knowledge and skills to designing asynchronous and synchronous learning activities in accordance with learning outcomes	74% do not have sufficient knowledge and skills in design asynchronous and synchronous learning activities	Criteria, guides, and examples of designing asynchronous and synchronous learning activities according to learning outcomes
6.	Have knowledge and skills to presenting teaching, social and cognitive in the learning process	78% do not have sufficient knowledge and skills in presenting teaching, social and cognitive in the learning process	Criteria, guidelines and examples in formulating learning activities to present teaching, social, and cognitive in the learning process
7.	Have knowledge and skills to improve the integration of student's soft skills in the learning process	78% do not have sufficient knowledge and skills to integrate soft skills in the learning process	Criteria, guidelines and examples in integrating soft skills in the learning process
8.	Have knowledge and skills in designing appropriate formative evaluations in accordance learning objectives	70% do not have sufficient knowledge and skills to design appropriate formative evaluations in accordance with learning objectives	Criteria, guidelines and examples for designing appropriate formative evaluations according to learning objectives

Based on Table 1 above, it is concluded that in general, the design of blended learning integrated soft skills is a need as a reference for lecturers in designing blended learning integrated soft skills in higher education in accordance with the courses they teach. The

needs of each component of the design include: (1) guidelines and criteria in formulating learning outcomes in accordance with good and correct criteria; (2) guidelines and criteria in mapping and organizing subject matter in accordance with learning outcomes; (3) guidelines and criteria in designing asynchronous and synchronous learning activities in accordance with learning outcomes; (4) guidelines and criteria in formulating learning activities to present teaching, social, and cognitive in the learning process; (5) guidelines and criteria for integrating soft skills in the learning process; and (6) guidelines and criteria in designing appropriate assessments in accordance with learning objectives.

The result of developing a conceptual framework in this study is to create a design as a guide for lecturers in designing blended learning integrated soft skills in universities. The main key in designing blended learning designs is the formulation of learning outcomes and mapping and organizing learning materials based on these learning outcomes. The next step is to select and determine the activities carried out both synchronously and asynchronously. After that, align learning activities with the Community of Inquiry framework integrated soft skills that have been set. Lecturers need to learn the activities that need to be done on cognitive presence, teaching presence, and social presence. The final step is to design an assessment strategy to obtain authentic assessments. So the researcher created a blended learning design structure integrated with soft skills which can be seen in Figure 1 as follows.

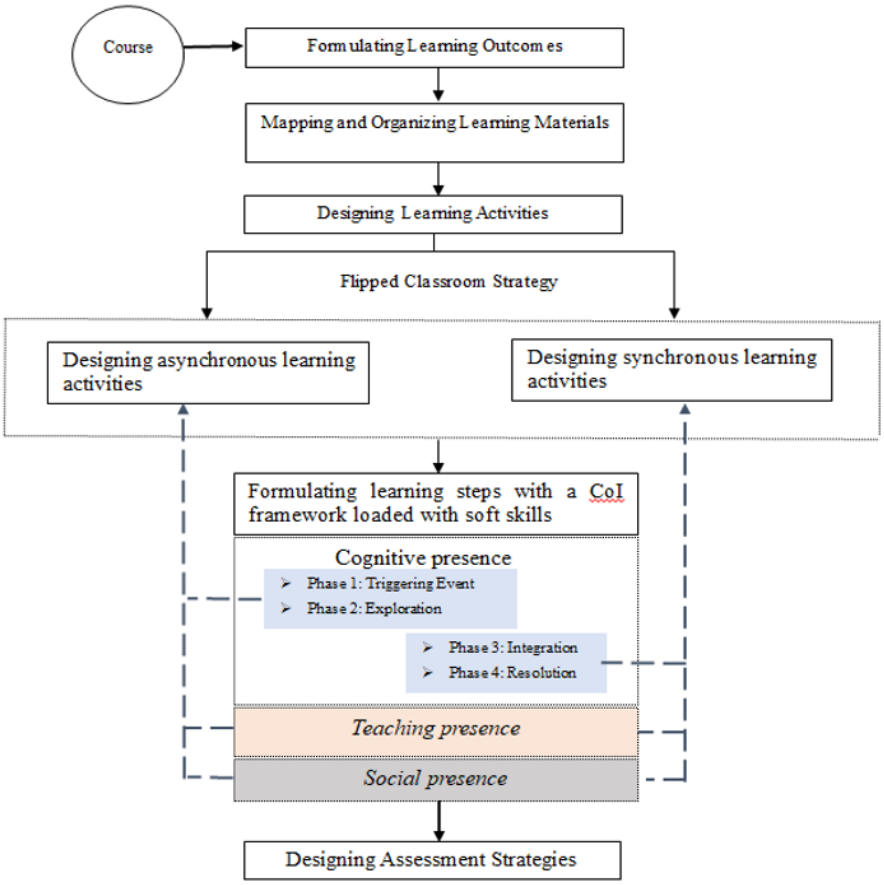

Fig. 1. Soft Skills Integrated Blended Learning Design

Figure 1 is a *blended learning* design integrated *with soft skills* that describes a work procedure that has clear components and is related to each other. There are five work procedures for *blended learning* design integrated *soft skills* as follows.

3.1.1 Formulate learning outcomes

The first step in designing blended learning is to formulate learning outcomes. The learning outcomes referred to here are the learning outcomes of courses or often called courses learning outcomes. Learning outcomes are grouped into two categories, namely final learning outcomes and intermediate learning outcomes (learning suboutcomes). This means that one final learning outcome, consisting of more than one intermediate learning achievement (learning suboutcomes). In compiling learning outcomes, there are 3 structures that need to be considered or called the anatomy of learning outcomes, including: (1) abilities, which can be demonstrated by students expressed in the form of verbs that describe cognitive processes; (2) learning materials, which contain disciplinary knowledge or knowledge learned by students and can be demonstrated by students; (3) context, in the context and scope that the ability is capable of demonstrated by students at the end of learning.

3.1.2 Map and organize learning materials

The second step is to map and organize the learning material. Mapping and organizing learning materials is an effort to determine and group learning materials into subjects, sub-subjects, and subject matter in accordance with predetermined learning outcomes and indicators.

1) Design synchronous and asynchronous learning activities

The third step is to design synchronous and asynchronous learning activities [16]. The approaches applied in this guide are the synchronous approach and the asynchronous approach. In the developed design, the strategy used is flipped classroom so that first it will apply an asynchronous approach and then a synchronous approach. Referring to learning outcomes in order for the learning process to run well, it is necessary to determine and design learning activities.

Table 2. Synchronous Learning Activities

Asynchronous Learning	
Asynchronous Standalone	**Collaborative Asynchronous**
▪ Searching material ▪ Study teaching materials in various digital media formats ▪ Simulation/practice ▪ Exercise ▪ Role play ▪ Work on task ▪ Online test/assessment	▪ Participation in discussions through online discussion forums ▪ Work on individual/group assignments through online assignments ▪ E-mail ▪ Mailinglist ▪ Blogs ▪ Wiki

Table 3. Synchronous Learning Activities

Synchronous Learning	
Live Sync	**Synchronous Maya**
▪ Lectures ▪ Discussion ▪ Practice ▪ Workshops ▪ Seminar ▪ Lab practice ▪ Individual/group projects	▪ virtual classroom ▪ Video conference ▪ Audio conference ▪ Web-based seminars (webinar)

2) Formulate learning steps with the Community of Inquiry framework integrated soft skills

The fourth step is to formulate learning steps with the Community of Inquiry framework integrated with soft skills. Blended learning learning activities by integrating the Community of Inquiry framework in the learning process that pay attention to 3 aspects namely social presence, cognitive and teaching which will be implemented both synchronous and asynchronous learning by applying soft skills in it. The application of soft skills in the learning process in general soft skills are divided into two categories, namely intrapersonal skills and interpersonal skills. Intrapersonal skills are a person's skills to manage himself which includes independence, creativity, time management, critical thinking, and problem solving while interpersonal skills are the skills to interact effectively with others which include group work, oral communication and self-actualization. In this guide the soft skills that will be integrated into the learning process are divided into 6 namely collaboration, oral communication, self-actualization, independence, time management, and creative and critical thinking skills in solving problems (implemented in LKM). For this reason, lecturers need to design and know the activities carried out to apply these 6 soft skills into the learning process. On creative and critical thinking skills in solving problems, the steps for writing higher-order thinking questions are presented. Therefore, this step presents the activities carried out in implementing the Community of Inquiry framework , namely cognitive presence, social presence, and teaching presence as well as a blended learning flow guide integrated with soft skills. The following is a schematic of the integrated blended learning syntax for soft skills.

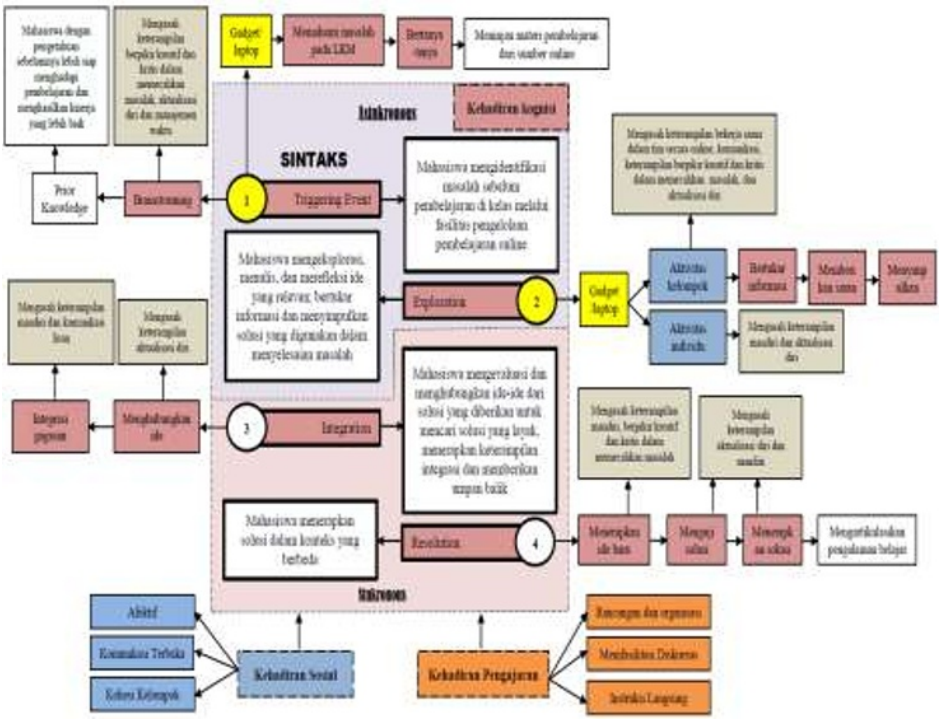

Fig. 2. Scheme of Blended Learning with CoI Integrated Soft Skills Framework

3) Designing an assessment strategy

The fifth step is to design an assessment strategy. Assessment is an important part of the learning cycle that also includes outcomes, strategies, and content. This is part of the planning process and should be related to all other aspects of the learning experience in question. The educator must know and understand his own philosophy about teaching and learning to select materials, activities and assessments coherently. The assessment activities and process will reflect the values of the educator. The assessment technique used is authentic assessment. The application of authentic assessment strategies to online learning environments can serve as a prominent factor in differentiating face-to-face and online assessment strategies. Authentic assessment gives students the opportunity to make connections with prior knowledge and to build connections between their own learning and real-life situations. In self-directed asynchronous learning, assessment can be carried out in the form of objective tests and collaborative asynchronous learning, assessment in the form of non-objective tests. Authentic assessment is carried out to assess students' self-assessment starting from the beginning to the end of the learning process which includes aspects of cognitive assessment, attitudes and skills. Presented rubrics of cognitive, affective, psychomotor, and soft skills assessments both intrapersonal skills and interpersonal skills.

Table 4. Assessment Techniques and Instruments

Assessment	Technique	Instrument	Information
Attitude	Observation	Rubric	Assessment of the attitude domain is carried out through observation which emphasizes the aspects of confidence, discipline and responsibility in the learning process both synchronously and

			asynchronously
Psychomotor	Observation, participation		Assessment of the psychomotor domain through observation and participation in online discussion forums
Cognitive Knowledge	Performance, written test, oral test	Rubric	Assessment of the domain of knowledge through various written tests and oral tests can technically be carried out directly or indirectly.
Soft Skills	Observation	Rubric	Assessment of soft skills through observation that emphasizes aspects of independence, collaboration, oral communication, self-actualization, time management and creative and critical thinking skills in solving problems

3.2 Discussion

The result of developing a conceptual framework in this study is to create a design as a guide for lecturers in designing blended learning integrated soft skills in universities. According to Nurdin which was adopted from the book Basic Principles of Curriculum and Instruction by Ralp W. Tyler in the higher education curriculum, there are four main components, namely what learning outcomes or competencies will be mastered by students, what is planned to be conveyed to students so that they can achieve these learning achievements or competencies, how to convey them to students so that learning outcomes have been formulated can be mastered well by students, and how to find out whether the learning outcomes or compotency have been mastered by students or not [17]. According to Gustafson, Kent & Branch as a guide, models should describe a simple representation of the forms, processes, and functions of physical phenomena and more complex ideas [16]. The model must also show the main elements and their structures that are interrelated with each other. The success of blended learning certainly depends on the provision of good online learning infrastructure and scenarios on how to make online learning materials and activities get priority as important as face-to-face learning [18].

Researchers develop a blended learning design structure integrated with soft skills that describes a work procedure that has clear components and is related to each other. There are five work procedures for blended learning design integrated soft skills. The first procedure is to formulate learning outcomes. In line with the results of the study So & Bonk (2010) recommends that learning objectives as the main reference in designing blended learning to determine what combinations are relevant, when online and face-to-face learning is carried out, how integration can achieve these learning objectives [1]. So that the learning objectives in this case are learning outcomes to be the main basis that will determine the next steps. Learning outcomes are abilities obtained through internalization of knowledge, attitudes, skills, competence and accumulated work experience [17]. Compiling learning outcomes must meet 3 structures that need to be considered, namely ability, learning material and context. The learning outcomes of the course must be observable, measurable and assessable, more specific to the course and can be demonstrated by students at each stage of learning [19].

The second procedure is to map and organize the learning material. This is an effort to determine and group learning material into subjects, sub-subjects, and subject matter in accordance with learning outcomes and indicators that have been determined. The principle

of developing learning objects that should be small fragments and adjusted to the sequence [20]. Mapping and organizing learning materials is an effort to determine and group learning materials into subjects and *learning points* accordance with predetermined learning outcomes [16], [21]. According to Arbaugh, Bangert, and Cleveland-Innes learning design is influenced by the subject matter taught [22]. So choosing which learning activities are carried out synchronously and asynchronously thirst is done by referring to the subjects taught.

The third procedure is to design synchronous and asynchronous learning activities. Ideally, an effective e-learning program should include both asynchronous and synchronous learning activities [23]. The combination of synchronous and asynchronous learning according to Hastie, Hung, Chen and Kinshuk based on research provides evidence that the combination of synchronous and asynchronous learning improves the quality of student-student and student-lecturer interaction, encourages expansion and increased student engagement and can improve learning outcomes [22]. Based on questions from in blended learning that in designing blended learning about what, why and how. So that the learning outcomes of a course must determine what learning activities are most appropriate, when synchronous and asynchronous learning are used and what is the basis that underlies the selection of the two learning approaches. The determination of selection criteria and determination of synchronous and asynchronous learning activities refers to the work of Anderson (2010) which combines the cones of experience of Edger Dale (1969) and adds the concept of learning modalities according to Smaldino (2008) and the taxonomy of learning objectives according to Bloom Kratwhol revision and quadrants of learning settings [24].

The fourth procedure is to formulate learning activities within the *Community of Inquiry framework* integrated with *soft skills. The Community of Inquiry (CoI)* framework developed by Garrison, Anderson and Archer as a learning community that focuses on free *inquiry* where participants gain a complete learning experience which includes the concepts discussed and the *inquiry process* in question is based on an educational perspective constructivist collaborative, integration on the reconstruction of personal experience and social collaboration [25]. In the CoI framework there are the presence or aspects presented by the participants in the *inquiry process* . The presence is modeled in a CoI framework that describes the aspects presented by the participants in which collaborative and constructive learning occurs [26]. There are three presences namely social presence, cognitive and teaching. In implementing these three presences in learning, of course there are activities that can be carried out by lecturers according to each category for the three attendances. This refers to the results of research conducted by Kasiyah [27]. The application of *soft skills* in the learning process, namely there are 6 *soft skills* which are then designed for activities carried out in the learning process including collaboration, oral communication, self-actualization, independence, time management, and creative and critical thinking skills in solving problems. Activities carried out to apply *soft skills* in the learning process refer to previous research results [22]-[28] which can then be seen in the next section on the results of the development of a *blended learning design* integrated *with soft skills* in mathematics learning in tertiary institutions in the procedure section in formulating learning activities with the *Community of Inquiry framework* integrated *with soft skills.*

The fifth procedure is to design an assessment strategy. Teaching and learning activities essentially begin with planning, accompanied by implementation and end with assessment so that assessment is an integral part of a teaching and learning activity and also at the same time is one of the main components of the curriculum [17]. Assessment is the collection, *review* , and systematic use of information about the learning process carried out with the aim of enhancing student learning and development [29]. For assessment to work, it is important that lecturers have a sense of direction and purpose about the information they

wish to collect including identifying goals, making choices about how to organize for assessment, articulating goals and objectives for learning, and developing meaningful assessment plans. Assessment of student learning processes and outcomes must comply with the assessment principles of SN-Dikti which include educative, authentic, accountable, and transparent [19]. Assessments are carried out using authentic assessments to assess students' self-assessment starting from the beginning to the end of the learning process which includes aspects of cognitive assessment, attitudes, skills, and *soft skills* . The assessment technique refers to the assessment rubric instrument for the four aspects of the assessment.

4 Conclusion

The results of this study are to produce a conceptual framework for blended learning integrated with soft skills in mathematics learning which consists of 5 procedures, namely (1) formulating learning outcomes; (2) mapping and organizing learning materials; (3) designing synchronous and asynchronous learning activities; (4) formulate learning activity steps with a community of inquiry framework integrated with soft skills; and (5) designing an assessment strategy. Suggestions for further research that the design framework can still be developed further depending on the conditions and situations in the teaching environment and for implementation purposes it is expected that educational practitioners can develop supporting document documents such as learning modules that are in accordance with the components of each blended learning design framework integrated soft skills.

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