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Trigonometric Learning Design with the *Sibaliparriq* Concept as a Learning Model

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Abstract. This study aims to determine how the process and results of trigonometric learning designs that utilize *sibaliparriq* values as a learning model. This type of research is RnD (Research and Development) research which refers to the Dick and Carey development model with the procedure using the Mc Kenney cycle, which includes three stages, namely preliminary design, prototyping phase and assessment phase. The trigonometric learning design has been designed and validated and revised according to expert advice. The subjects of this study were students of Al Asyariah Mandar University, who took trigonometry courses. The trial results show that the design is effective and practical, namely (i) the average value obtained by students on the trigonometric learning outcome test is in the high category is 61,76. Students who complete the mastery are 29 out of 34 students or 85.29%. (ii) lecturers in implementing learning in accordance with the semester learning plan and are in the very high category. (iii) students are more active in learning. (iv) students generally respond very positively to learning. Thus, the trigonometric learning design process and results utilize the value of sibaliparriq as a learning model for quality Al Asyariah Mandar University students, namely meeting the criteria of validity, practicality, and effectiveness.

Keyword: trigonometry, *sibaliparriq*, learning design, Dick and Carey development

1. Introduction

One of the main problems in learning trigonometry subjects at Al Asyariah Mandar University is students' low absorption. Empirically, based on the results of research analysis [1] on the short trigonometric learning outcomes, it is due to the teacher-centered learning process so that students become passive. Lecturers prefer to apply this model because it does not require practical tools and materials. It is enough to explain the concepts in textbooks or other references. This problem can found in teaching and learning activities in class. Therefore it is necessary to design effective and efficient learning. Designing effective and efficient learning must adapt to students' situations, environments, conditions, and characteristics. One option is to apply religious values and local wisdom in the learning process. The concept of *sibaliparriq* is the value of local knowledge of the Mandar community in West Sulawesi, not only in the household environment. Still, it has become a culture adhered to by the Mandar community in social, cultural, economic, political, and educational aspects [2],[3].

No matter how primitive a culture may be, nothing does not contain mathematical elements [4]. Mathematics is one of the aspects that shape student personality [5],[6]. Student personality formation can be done by applying local wisdom values that are connected to trigonometric courses. *Sibaliparriq* in Mandar community life means helping each other, working together, or working together in society. Sibaliparriq can apply in the learning process because this concept is in line with cooperative learning. One important element in fundamental cooperative learning is positive interpendency where each member of the group shares with each other to achieve group success [7].

The Mandar community, like other communities, has local wisdom that grows and develops in the community. The study of the local wisdom of the Mandar tribe has provided a deep picture and wisdom for building the character of the nation's generation [4]. One example of the way of life adopted by the Mandar tribe is *sibaliparriq*. *Sibaliparriq* is an idiom that comes from the syllable si, which means mutual, then Bali means to answer, and parriq means difficult. Thus, *sibaliparriq* means helping each other in everything both materially and spiritually, both in social, cultural, economic, political, and educational aspects [2],[3].

The meaning of *sibaliparriq*, including: (1) Brotherhood *(palluluareang)*, sibaliparriq inevitably arises from a sense of brotherhood to others [2],[3]. The basis of the concept of *sibaliparriq* that all human beings are brothers. S*ibaliparriq*, in its existence, is a pillar of the self-practice of *Amandaran*, which is still owned by 'To Mandar.' (2) Compassion (*siasayanggi*), the most profound meaning of *sibaliparriq* is affection (*siasayangngi*) found in the household and society. (3) Concern (*siamanaoang pa'mai*) sibaliparriq also cannot be denied that it was born from a sense of care (sense of solidarity) to others. They could not take to see the *parri* (distress) experienced by their siblings. (4) sincere (*sukku' mattulung*), the important meaning of *sibaliparriq* is sincerity in helping his siblings' *parri* (problem).

The four meanings of *sibaliparriq* could potentially become becomes the basis for applying the learning model to the trigonometric course. The learning model with the concept of *sibaliparriq* is a conceptual framework or pattern that describes a systematic procedure for organizing trigonometric learning experiences. This model is based on the Mandar culture to achieve learning goals and guidelines for lecturers to plan and carry out trigonometric teaching and learning activities.

Through the learning design of the *sibaliparriq* model, it is hoped that students will know the values of mandar culture, increase motivation and learning outcomes. Learning design is a linear process that begins with determining needs, then developing a trigonometric learning plan to respond to these needs. The trigonometric learning design tried out, and finally, an evaluation process carries out to determine the valid, practical, and effective results of the drafted design. Or in other words, learning design emphasizes designing learning programs to help student learning. Several research results on the application of cultural values in mathematics learning concluded (1) deductive-axiomatic mindset related to the values of honesty, (2) universality in mathematics related to the value of politeness, (3) non-contradiction related to dependence, and (4) the value in the mathematical agreement is related to the value of loyalty [7]. In 2010 the application of a culture-based conceptual model resulted in five stages (initial activities, exploration, elaboration, confirmation and final activities) in developing basic competencies and local wisdom values[8].

The learning design is developed by referring to the Dick & Carey model development flow. The components of the instructional system development model according to Dick & Carey [9] are (1) identifying learning objectives, (2) analyzing learning, (3) inputting behavior and student characteristics, (4) formulating performance goals, (5) developing standard reference assessment items, (6) developing a learning strategy, (7) developing and selecting learning materials, (8) designing and conducting formative assessments, (9) revising learning and (10) conducting summative assessments.

Several studies have produced learning models that were born from the study of social philosophy of society and the values of ancestral upbringing [4], [10], [11], [12], [13], therefore the aim of this study is to produce a trigonometric learning design that utilizes the value of *sibaliparriq* as

a learning model, where the value of sibaliparriq is the values embraced by the Mandar community in West Sulawesi.

2. Methods

2.1. Research, Method and Data Collection

This research is learning design development research. This research's design flow is a modification of the Mc Kenney cycle with the Dick & Carey Model, which is presented in Figure 1.
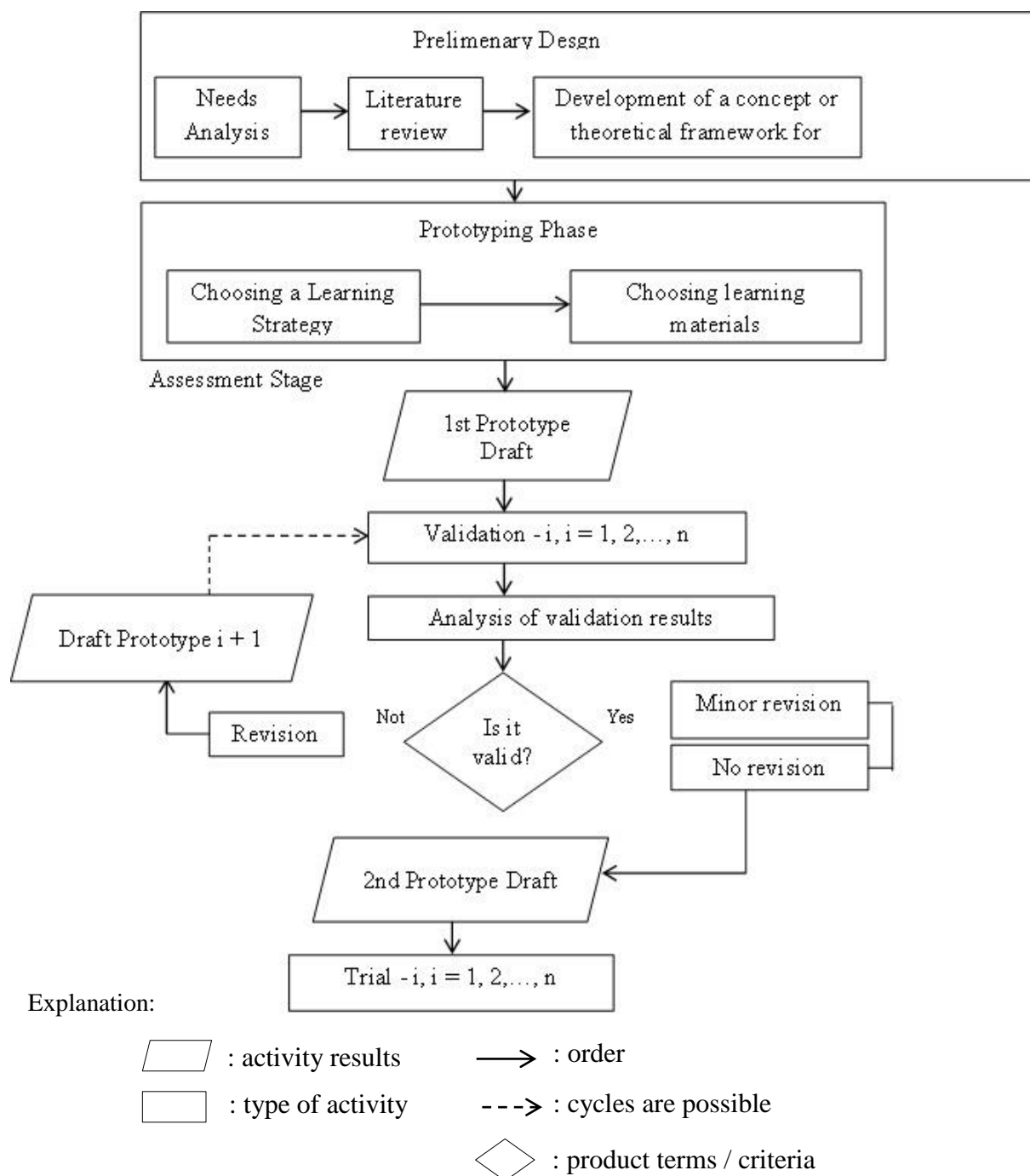

Figure 1. Flowchart of Trigonometric Learning Design Research

The research instruments were (1) validation sheets of learning design, (2) observation sheets of lecturer ability in learning management, (3) observation sheets of student activities, (4) student response questionnaire, and (5) test of trigonometric learning outcomes.

The quantitative data obtained from the learning outcomes test were analyzed with descriptive statistics, while the qualitative data obtained from the validation sheets, observations, and questionnaires. The results of data analysis are directed to answer "how are the processes and results of the development of trigonometric learning designs with the concept of sibaliparriq as a good quality learning model, which meets the criteria of validity, practicality and effectiveness?".

2.2. Analysis of the validity of the learning design data

The validation sheet results of the two validators are calculated the average value of V from V1 (first validator) and V2 (second validator), at least in the Valid category. The validity category's determination refers to Bloom's theory [14], which is present in Table 1

Table 1. Validation Categories

Average V	Categories
$4,5 \leq \bar{V} \leq 5$	Very Valid
$3,5 \leq V < 4,5$	Valid
$2,5 \leq \bar{V} < 3,5$	Enough Valid
$1,5 \leq \bar{V} < 2,5$	Less Valid
$0 \leq \bar{V} < 1,5$	Invalid

2.3. Analysis of the practicality of learning design data

Analysis of the practicality of learning design data refers to assessing lecturers' ability to learn, using qualitative analysis of the observer's assessment results. The average value of Lecturer Activities (LA) determines at each meeting from the observer's results. The criteria used are at least in the "high" category. The determination of the category of the lecturer's ability to manage learning is present in table 2 below.

Table 2. Lecturer Activity Categories

KD Average Score	Category
$3,5 < LA \leq 4$	Very high
$2,5 < LA \leq 3,5$	High
$1,5 < LA \leq 2,5$	Moderate
$0 \leq LA \leq 1,5$	Low

2.4. Data analysis on the effectiveness of learning designs

Analysis of the effectiveness of trigonometric learning designs that utilize the sibaliparriq value includes three components of effectiveness:

1) Student learning outcomes, the score criteria are set at a minimum of 75 or equivalent to B's grade.
2) Student response data counted the number of students who gave positive responses, while the categories were 1 = very negative, 2 = negative, 3 = positive, and 4 = very positive. The criteria set were that at least 50% of students gave a positive response to at least 70% of the number of question/statement items in each aspect.
3) Student activity, the criteria used is the value of Student Activity (SA), at least in the "active" category. The categories of student activity are present in table 3 below.

Table 3. Student Activity Categories

AM Average Rating	Category
$3,5 < SA \leq 4$	Very active
$2,5 < SA \leq 3,5$	Active
$1,5 < SA \leq 2,5$	Enough Active
$0 \leq SA \leq 1,5$	Not active

3. Result and Discussion

3.1 The results of the data analysis on the validity of the learning design

The data analysis results of the trigonometric learning design's validity using the *sibaliparriq* value as a learning model are present in table 4.

Table 4. Results of Data Analysis of the Validity of Trigonometric Learning Designs

Source	Average Score	Criteria
Design Books	3,8	Valid
Semester Implementation Plan	4,5	Very Valid
Trigonometric Learning Outcomes Test	4	Valid
Lecturer observation sheet	4,5	Very Valid
Student observation sheet	4,5	Very Valid
Student Response Questionnaire	4,5	Very Valid
Student Work Sheet	4	Valid

Based on table 4, it is obtained that the products, devices and instruments that have been validated by experts are declared valid and can be tested.

3.2 The results of data analysis of the practicality of learning design

The results of data analysis of the practicality of trigonometric learning designs that utilize *sibaliparriq* values are briefly present in table 5 below.

Table 5. Results of the Analysis of Practicality

Activity Description	Average Value	Category
Phase 1: The lecturer checks student attendance and conveys the expected final ability after studying trigonometry. The lecturer shows the function of trigonometry in people's lives by offering the attitude of *siasayanggi* (affection) an*d siamanaoang pa'mai* (caring).	4	Very high
Phase 2: the lecturer links Al-Quran verses with trigonometric material through textbooks, power points, and student assignments, showing the attitude of *siasayangngi* (affection), *siamanaoang pa'mai* (care) and *sukku'mattulung* (sincere).	4	Very high
Phase 3: the lecturer divides students into groups to discuss the trigonometric material in the textbook and solve the student assignment sheet's problems by showing a *pallulluareang* (brotherhood) attitude.	4	Very high
Phase 4: the lecturer guides groups of students who have difficulty solving the problems on the student assignment sheet and directs students to actively discuss, by showing an attitude of *siasayangngi* (affection), *siamanaoang pa'mai* (caring), and *sukku'mattulung* (sincere).	3,5	High
Phase 5: the lecturer allows students to present the results of the discussion and completion of student assignment sheet questions in front of other groups and ask the other groups to respond by showing an attitude of *siasayangngi* (affection), *siamanaoang pa'mai* (caring), and *sukku'mattulung* (sincere).	3,5	High
Phase 6: giving awards to the correct group of students who have completed the questions and who have been active in the discussion, by showing the attitude of *siasayangngi* (affection), *siamanaoang pa'mai*	4	Very high

(caring), *pallulluareang* (brotherhood), and *sukku'mattulung* (sincere).

Based on table 5, it can conclude that the lecturer manages learning according to the learning design that has been designed.

3.3 The results of data analysis on the effectiveness of the learning design

The results of data analysis on the effectiveness of trigonometric learning designs that utilize the *sibaliparriq* value consist of three assessments, including:

1) Trigonometric learning outcome data are presented in table 6 below.

Table 6. Results of Trigonometric Learning Outcome Test Analysis

Value	Category	Frequency	Percentage (%)
91 – 100	Very High / A	8	23,53
75 – 90	Height / B	21	61,76
60 – 74	Medium / C	5	14,71
40 – 59	Low / D	0	0
0 – 39	Very Low / E	0	0

Based on table 6, it is obtained that the average value of student learning outcomes is in the high category. This is in line with the results of research conducted by [4], [10] the application of cultural values has the potential to increase the motivation and achievement of students. The results of the analysis of learning outcomes completeness are present in table 7 below.

Table 7. Completeness of Learning Outcomes

Value	Category	Frequency	Percentage (%)
$75 \leq$ value ≤ 100	Completed	29	85,29
$0 \leq$ value < 75	Not complete	5	14,71

Based on table 7 it can be neglected that the sibaliparriq model is effective on student learning outcomes, this is in line with Vygotsky's theory [15] that learning carried out in groups can support the cognitive development of students.

2) Student response data are briefly presented in table 8 below.

Table 8. Results of Student Response Data Analysis

Aspect	Category			
	Very Positive	Positive	Negative	Very Negative
Student responses to the application of sibaliparriq values as a learning model.	85%	15%	0	0
Student responses to trigonometric textbooks.	90%	10%	0	0
Student responses to student assignments.	95%	5%	0	0

Based on table 8, it can conclude that the students' response to the trigonometric learning design sdwsethat utilizes the *sibaliparriq* values as a learning model gives a very positive response.

3) Student activity data in the trigonometric learning process utilizes *sibaliparriq* values as a learning model observed in 6 learning phases. From the observations, most aspects can carry out with very active and active student activities.

4. Conclusion

Based on the study results, the trigonometric learning design process utilizes the value of *sibaliparriq* as a learning model for Al Asyariah Mandar University students with quality, namely meeting the criteria of validity, practicality, and effectiveness.

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