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TORY OF ENUMERATION RULES WITH IS  
LAMIC VALUES**

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WORD COUNT

**5902 Words**

CHARACTER COUNT

**31766 Characters**

PAGE COUNT

**9 Pages**

FILE SIZE

**4.2MB**

SUBMISSION DATE

**Oct 19, 2022 1:36 PM GMT+7**

REPORT DATE

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## THE HYPOTHETICAL LEARNING TRAJECTORY OF ENUMERATION RULES WITH ISLAMIC VALUES

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**Abstract.** A context with Islamic values can be used as a starting point in learning mathematics. The challenge is how teachers can deliver, formulate, and connect the mathematical content and the Islamic values in the learning activities. One of the learning approaches that can solve that challenge is Realistic Mathematics Education (RME) by implementing context as one of the activities. This study aims to design the hypothetical learning trajectories (HLT) for supporting students in learning the rule of enumeration with the RME approach based on Islamic values. This study uses design research (DR) methods in a qualitative approach form. There are three phases in DR, namely preliminary design, experimental design, and retrospective analysis. The HLT is developed in the preliminary design phase and will then be tested on students in further research. The study result is the HLT of enumeration rules on data content with RME based on Islamic seen from the perspective of the four emerging modeling levels. At the first level – the 'situational level' – students explore the realistic context of determining the possible route to the mosque. The second level is the 'referential level' where the selection rules are used as a starting point for learning the concept of probability. At the third level – the 'general level' – students use diagrams to generalize the possible outcomes of an experiment and develop an understanding of multiplication rules. Finally, students develop their informal knowledge at the 'formal level' into formal concepts of multiplication rules.

Keywords: Design Research, Realistic Mathematics Education, Multiplication Rules

### I. INTRODUCTION

Mathematics learning which includes the study of permutations and combinations of starting points can be started from the surrounding context or situation. The concepts of permutations and combinations in mathematics learning are counting rules whose practice is very essential for human activities in everyday life. By using the concept of this counting rule, humans can mention the number of ways or the number of events that may occur. In Islam, it is also stated that "So that He may know that the Messengers have conveyed the messages of their Lord, while (actually) His knowledge covers what is in them, and He counts everything one by one." Jin 72:28". Even Abdussakir [1] stated that in the Qur'an there are lessons about 38 different numbers, so it cannot be denied that the Qur'an talks about mathematics, mostly about numbers. Thus, the rules of enumeration or the rules of enumeration are very important to be taught to students related to Islamic values in them.

It is time for all teachers to start designing each lesson, including the rules of enumeration, to integrate Islamic values. By doing this, the researcher hopes to develop good character for students. The process of fostering and developing the character of students has good opportunities through education. Educators can apply it by conveying teaching methods based on noble character. Researchers call it education that combines faith, shari'a, and morals in learning. These values are then integrated into the learning process in schools [2].

Education in schools must be able to develop student values through religious education, educators can do this by aligning the progress of science and technology [3]. This is then reinforced by the opinion of Abdussakir [4] which states that Islam does not separate science and religion. The decline in morals and the lack of religious values urge the need for reform in education [5,6]. However, this dream has not been realized. Mathematics learning is usually carried out as a single subject, excluding Islamic values. As a result, mathematics learning becomes rigid, seems complicated,

alienated from the realities of life, and in the end tends to become a subject that students avoid. Mathematics is less able to provide the cultivation of both character and Islamic values. On the other hand, mathematics learning achievement tends to be low [7].

The fact that Indonesian students' mathematics achievement is low can be seen in the results of the Third International Mathematics and Science Study (TIMSS) and the International Program for Students Assessment (PISA). In TIMSS, Indonesia's second-grade junior high school students are ranked 34th out of 38 countries, while in PISA 2015, we are ranked 63rd out of 70 countries [8]. Students' ability to solve and interpret problems in various situations is still relatively low. This fact is a significant concern for all parties. Therefore, we need to work on improving the situation. One of the actions that can be taken by teachers is to improve learning patterns and the quality of learning.

Johnson [9] and Hadi [8] said that when students find the meaning of learning mathematics in school, they will understand and remember what they have learned. Contextual learning allows students to connect learning in school with real contexts in everyday life. Contextual knowledge extends their context. This is because providing new experiences for students can encourage their minds to make new relationships. As a result, students can find and construct meaning on their own.

Appropriate learning strategies and methods are needed to develop students' thinking skills. It is based on an orientation to the reform of technical and mathematical skills education [10, 11]. The reform is based on developing problem-solving skills in everyday life. This may be achieved through Realistic Mathematics Education (RME) learning which underlies the learning activities of everyday life [12]. Students not only idly accept concepts from educators but students carry out an activity in the form of rediscovering concepts from activities that students do themselves [13]. Therefore, related to the needs and experiences of students related to statistics with daily life, RME is one of the considerations as an approach in learning so that students can interpret each activity.

Realistic Mathematics Education (RME) is a theory of mathematics learning developed by Dutch education practitioner, Hans Freudenthal, since 1973. The rationale or idea is the assumption that mathematics is a human activity [12]. This means that through mathematics students do not just sit idly by accepting concepts from educators but students carry out an activity in the form of rediscovering concepts from activities that students do themselves. In addition, this RME learning focuses on applying students' informal solutions and their interpretation through real problems [13]. Real-world problems are very important in RME, and that means students are offered problems that they can visualize [14]. Problems that students can solve by visualizing them will require students' pedagogic skills.

The process of designing a series of learning activities starting with experience-based activities in this study was inspired by the five principles of realistic mathematics education defined by Treffers [15], namely: Using Context

(Phenomenological exploration), Using Models for Progressive Mathematization (Using models and symbols for progressive mathematization), Utilization of Student Construction Results (Using students' own construction), Interactivity (Interactivity), and Intertwined.

One of the contexts used in RME in Indonesia is culture [16]. Kuntowijoyo [17] states that religion and culture are two things that interact and influence each other to form symbols, and content/values. Previously it was explained that religion and culture gave meaning to certain mathematical symbols. Especially when the context of speech enters the realm of religion [1], an Islamic value-based context that students often do in everyday life, this means that it can also be used in RME with the principle of real context not meaning concrete, physical, and tangible, but also covering what that the student's mind can imagine.

According to Basya [18] Islamic mathematics is mathematics that uses the Qur'an and the Sunnah of the prophet as postulates. Basya also added that in Islamic mathematics we do not need to prove a data that comes from Allah and His messenger even though later in the course of Islamic mathematics it seems to prove the truth. This is also contained in the word of Allah SWT which reads "This Book (Al Quran) has no doubt about it; guidance for those who are pious (Surah Al Baqarah 2:2). So that in learning mathematics the Islamic values that are associated are values that are believed and there is no doubt in them.

Mathematics learning that is integrated with Islamic nuances is mathematics learning which in the learning process is associated with Islamic values [19]. The same thing was also expressed by Salafudin [7], that learning mathematics with Islamic values is learning that is carried out by providing Islamic values in each lesson, both in the form of material and in sample questions. So that learning mathematics that contains Islamic values is mathematics learning that is substituted for Islamic values in it. Salafudin also added that the values integrated into mathematics learning include: (1) *aqidah* values, namely values related to matters that the heart must believe in truth, reassure the soul, and become beliefs that are not mixed with doubt; (2) *Shari'ah* values, namely values related to a way of life determined by Allah SWT as a guide in carrying out life in the world to lead to the afterlife, including worship, *mu'amalah*, *manaat*, *jinayat*, and *siyasa*; and (3) *Moral* values, namely values related to the state of a person's soul that encourages him to take actions without first going through thoughts and considerations, including morals towards God, towards fellow humans, towards the environment, and towards animals. Based on the explanation above, researchers are interested in conducting research that aims to design students' learning trajectories about the concept of counting rules through the Realistic Mathematics Education (RME) approach that contains Islamic values.

## II. METHODS

This study uses design research as a research method. The research design consists of five characteristics, namely interventionist, process-oriented, reflective components,

cyclic characters, and theory-oriented [20, 21]. There are three stages in this research, namely: preliminary design, experimental design, and retrospective analysis. The instruments in this study were written test question sheets, interview guide sheets, and field notes. While the analytical techniques used in this study, namely data reduction, data presentation, and drawing conclusions.

This study is the first stage of the design research, the preliminary design. During the initial design phase, researchers prepare the learning activity through a literature review. From the literature, researchers received data about students' difficulties in learning probability including enumeration. Based on the review, researchers formulated activities into learning procedures and expected students and teacher's responses, called hypothetical learning trajectory.

### III. RESULTS AND DISCUSSION

Researchers designed learning in the form of HLT to see the implementation of learning using the RME approach. In HLT there are learning steps that must be carried out by teachers in carrying out learning. Through HLT, researchers can make guesses about the answers that may be given by students. Bakker [22] suggests that the hypothetical learning trajectory (HLT) is the relationship between instructional theory and concrete teaching and learning. The concrete form of HLT consists of three components, namely learning objectives for students, a series of learning activities to encourage student learning, and presumed student learning in which the teacher anticipates student development and thinking.

The purpose of this study is to support students' understanding of the rules of enumeration in data content. Based on the literature on the mathematics curriculum in high school, the concept of understanding the rules of enumeration, and the use of models in teaching the concept of counting rules, the initial LT is described which includes learning objectives, a series of activities, and the alleged thinking of students in understanding the rules of enumeration. This initial HLT is useful for researchers and teachers as a guide in designing teaching materials. An overview of HLT in this study is presented in Table I.

TABLE I  
THE INITIAL HLT

Type of Activities	Learning Activities	Learning Objectives	Enumeration Concept
Model of	Activity 1: Exploring A Map for Going to Mosque	Students are able to understand the introduction of enumeration of an event	Enumeration
	1. Seeking the virtue/mes sage of ayah about enumeration in Muslim life and		

- hadist about going to mosque
- 2. exploring the map to determine routes for going to mosque

Activity 2:  
Finding the Route for Friday Prayer

- 1. Seeking the virtue of hadist shahih of going and returning from praying in the mosque with different paths
- 2. Finding the possible routes by exploring the map to determine routes for Friday prayer

Model of

Model For

Activity 3:  
Designing Your Own Map  
Sub-Activity 1  
Students find the solution in more formal way. They draw a diagram and the roads are represented as connecting line  
Sub-Activity 2  
Students grasp the conclusion:  
To find the number of ways of doing something, multiply the number of choices available at each stage (multiple rule)

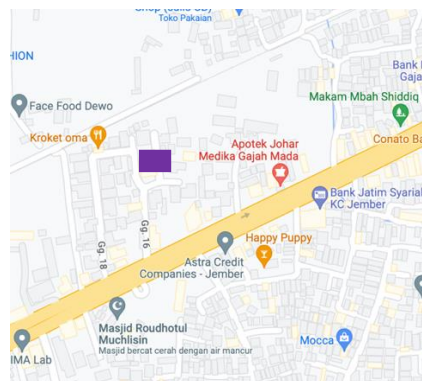
Students are able to determine the possible routes of two consecutive events. We still hope that students find the enumeration in informal ways by showing and listing the possible route on the map.

Students are able to determine the possible routes and expressing them more formally through the use of diagram and multiplication rules.

Listing the possible way

The use of diagram

Formal Knowledge      Activity 4:      Students are      Formal form  
Students find      the number of      able to solve      of  
ways of doing      problem of      multiplication  
something by      determining      rule  
multiplying the      the possible      “The number  
number of      routes by      of possible  
choices      employing the      outcomes from  
available at      multiplication      experiment A  
each stage      rules.      1 followed by  
(multiple rule)           experiment A  
           2 until  
           experiment Ak  
           is  $n_1 \times n_2 \times \dots$   
            $\times n_k$ ”



To be able to pray Idul Fitri at the Roudlotul Muhlisin Mosque, how many different routes can Tio take?

The conjecture of activities contains students' thinking and teacher's responses will be described in Table II.

A. Exploring a Map for Going to Mosque

In the first activity, student activities begin with seeking the virtue/message of ayah about enumeration in Muslim life and hadist about going to mosque. Then, students read a worksheet to explore a map. The students then give their solution on their worksheet.

Informal knowledge: Students are asked to count possible route for going to mosque. Learning Objectives: Students are able to understand the introduction of enumeration of an event. Initially, students are asked to seek the virtue/message of ayah and hadist below,

لِيَعْلَمَ أَنْ قَدْ أَبْلَغُوا رَسُولَاتِ رَبِّهِمْ وَأَحَاطَ بِمَا لَدَيْهِمْ  
وَأَحْصَى كُلَّ شَيْءٍ عَدَدًا

"to ensure that the messengers fully deliver the messages of their Lord—though He 'already' knows all about them, and He counts everything one by one." (Surat al-Jinn: 28)" – “sedangkan (sebenarnya) ilmu-Nya meliputi apa yang ada pada mereka, dan Dia menghitung segala sesuatu satu per satu” (in Bahasa).

From Abu Hurairah radhiyallahu 'anhu, the Prophet sallallahu 'alaihi wa sallam said,

صَدَقَةُ الصَّلَاةِ إِلَى تَمْشِيهَا خَطْوَةٌ وَكُلُّ

"Every step you take to pray is a charity." (HR. Muslim, no. 1009).

Students are asked a question below to seek the Islamic messages on the hadits provided.

1. According to the hadith above, what is the virtue of going to the mosque?
2. If you go to the mosque closest to your house with different routes, do you think you will get the same virtue?

The class activities constitute enumeration carried out, namely:

Every Idul Fitri, Tio and his family carry out the sunnah of Idul Fitri prayer at Masjid Roudlotul Muhlisin. Pay attention to the location of the mosque from Tio's house (purple square) on the following map.

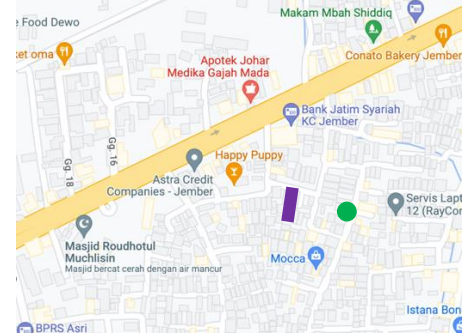
TABLE III  
CONJECTURE OF ACTIVITY 1

No	Activity	Prediction of students' responses	Teacher's responses
1	Seeking the virtue of ayah QS Al Jin: 28	Students know the virtue of the ayah  Students do not know the virtue of the ayah	Teacher gives reinforcement about the tafsir/interpretation that in Muslim life, there are many activities or events related to enumeration. Teacher tells students the interpretation of the ayah "and He counts everything one by one", it can be interpreted that every event has its own calculation. But keep in mind that "while (actually) His knowledge covers what is in them (humans)", then the calculations carried out by humans are entirely God's will in determining the incident.
2	Seeking the virtue of hadist shahih Muslim No. 1009	Students mention the virtue of going to the mosque  Students do not mention the virtue of going to the mosque	Teacher gives elaboration about the good messages on the hadist and gives another hadist HR Muslim No 6666 Teacher guides students to find out the good messages on the hadist

3	Students exploring the map to determine routes for going to mosque	Students draw the possible routes on map  Students list the possible routes one by one	Teacher asks students may they have different way to find the route. Teacher asks questions and discuss other case: How do you think you can find out the number of possible routes can Rika take to pray Idul Fitri? (Rika's house: green circle).  Teacher invites students to explore their difficulties
		Students cannot find the route	

mosque they know; Samir plans to pick up Andre first and walk together to the mosque.

Show the route Samir can take from his house to Andre's house and then to the mosque!



The conjecture of students' thinking and teacher's reactions can be seen on Table III.

TABLE IIIII  
CONJECTURE OF ACTIVITY II

No	Activity	Prediction of students' responses	Teacher's responses
1	Seeking the virtue of hadist shahih Muslim No. 663	Students mention the rewards (pahala) going and returning from praying in the mosque with different paths  Students do not mention the reward (pahala) going and returning from praying in the mosque with different paths	Teacher gives elaboration about the good messages on the hadist  Teacher guides students to find out the good messages on the hadist
2	Students finding the possible routes by exploring the map to determine routes for Friday prayer	Students draw the possible routes on map with two consecutive events  Students list the possible routes of two consecutive events one by one into  Students cannot find the routes	Teacher asks students to explain their drawing.  Teacher asks students may they have different way to find the route.  Teacher invites students to explore their difficulties by listing possible routes and asking further question: "How many Samir travel routes do you get?"

**B. Activity 2: Finding the Route for Friday Prayer**

In the second activity, students explore a map again to find the different possible routes for two consecutive events. Unlike the previous activity only one event happens. Students' activities begin with seeking the message of hadist shahih about going to mosque and return home with different path. Then, students get a worksheet and give their solution. Finally, students are asked to present their work in front of the class for discussion.

The second activity aims to support students' understanding of determining the possible routes of two consecutive events. We still hope that students find the enumeration in informal ways by showing and listing the possible route on the map.

The seeking messages of hadits is provided below.

لَا وَكَانَ مِنْهُ الْمَسْجِدَ مِنْ أَبْعَدَ رَجُلًا أَعْلَمَ لَا رَجُلٌ كَانَ قَالَ كَعْبُ بْنُ أَبِي عَن  
الطَّلَمَاءِ فِي تَرْكِبِهِ حَمَارًا اسْتَنْزَيْتَ لَوْ لَهُ قُلْتُ أَوْ لَهُ فَقِيلَ - قَالَ - صَلَاةٌ تُحْطِنُهُ  
يُكْتَبُ أَنْ أَرِيدَ إِلَى الْمَسْجِدِ جَنَّبَ إِلَى مَنْزِلِي أَنْ يَسْرُنِي مَا قَالَ . الرَّمْضَانَ وَفِي  
- اللَّهُ رَسُولٌ فَقَالَ . أَهْلِي إِلَى رَجَعْتُ إِذَا وَرَجَوَعِي الْمَسْجِدَ إِلَى مَمَشَائِ لِي  
« كَلُّهُ ذَلِكَ لَكَ اللَّهُ جَمَعَ قَدْ » - وسلم عليه الله صلى

"There used to be a person whom I didn't know anyone who was far from the mosque apart from him. But he never missed the prayer. Then someone said to him or I said to him myself, "How about you buy a donkey to ride when it's dark and when the ground is hot." The man then replied, "I am not happy if my house is next to the mosque. I want to record for me my steps towards the mosque and my steps when I return to my family." The Prophet sallallaahu 'alaihi wa sallam said, "Verily Allah has recorded for you all." (HR. Muslim, no. 663)

Students are asked:

1. How did the companions of Rasulullah perform their prayers even though his house was far from the mosque?
2. What are the advantages of going and returning from praying in the mosque with different paths?

The main activity for the 2nd activity is:

One day, Samir and Andre made an appointment to go to Friday prayers together. On the map, Samir's house is represented by a green circle while Andre's house by a purple rectangle. Based on the virtues of going to the

**C. Activity 3: Designing Your Own Map**

In the third activity, students will make their route for finding the possible ways to the mosque with two or more consecutive events happening. Finally, students present their

work in front of the class for discussion. This activity aims to develop students' understanding of determining the possible routes and expressing them more formally through the use of diagram and multiplication rules. Besides, the Islamic value and messages are integrated through the discussion.

1) *Sub-Activity 1*

Next Friday, Samir and Andre will pray Jum'at together at Masjid Al-Huda. The location is farther than the previous masjid so they will ride Samir's motorcycle since Andre doesn't have one. There are 2 ways to go from Samir to Andre's house, while from Andre's house to Masjid Al-Huda there are 4 roads to choose from.

a. What good deeds did Samir do to reflect a good Muslim?

Remember QS Al-Maidah:2

إِنَّ اللَّهَ وَانْفُوا وَالْعُدْوَانَ الْإِثْمَ عَلَى تَعَاوُنُوا وَلَا وَالنَّفْقَى الْبِرَّ عَلَى وَتَعَاوُنُوا الْعَقَابَ شَدِيدُ اللَّهِ

“...And cooperate in righteousness and piety, but do not cooperate in sin and aggression. And fear Allah; indeed, Allah is severe in penalty”.

b. Determine the possible route by drawing your own map! (Hint: draw the roads as the connecting lines)

c. How can you find the number of possible routes Samir take from home to Andre's house and then to Masjid An-Nur? Describe your solution!

2) *Sub-Activity 2*

Based on Sub-Activity 1(b)

a. Please number the roads!

b. How many Samir travel routes do you get?

c. Explain the conclusion you get from roads' number choices on (a) and the total travel routes you get on (b)!

The conjecture of students' thinking and teacher's responses can be seen on Table IV.

TABLE IV  
CONJECTURE OF ACTIVITY III

No	Activity	Prediction of students' responses	Teachers' responses
1	Sub-Activity 1 Students find the solution in more formal way. They draw a diagram and the roads are represented as connecting line	Students can mention a practice for being a good muslim by helping each other  Students can draw a diagram by connecting each	Teachers elaborate the ayat that helping is a noble habit that we must build as a form of concern for fellow human beings. Several ayat in Qur'an also signal that we should make this mutual help a part of our daily life. Teacher asks students to explain their

point (houses and mosque) with lines (roads)

Students draw a diagram with random lines

drawing and gives a praise to students

Teacher guides students by giving a clue such as symboling a house as a square, etc.

2 Sub-Activity 2  
Students grasp the conclusion:  
To find the number of ways of doing something, multiply the number of choices available at each stage (multiple rule)

Students put numbers on the lines they draw and grasp the conclusion of multiplying each number to find the travel routes  
Students put numbers on the lines they draw but they cannot explain any conclusion about multiplying each number to find the travel routes

Teacher gives a praise to students and gives other problem with different numbers.

Teacher invites students to explore their difficulties by giving other problems and seek the pattern about the number.

D. *Activity 4: Do Good Deeds*

In the fourth activity, students will solve some problems related to how do good deeds as a muslim. This activity aims to solve problem of determining the possible routes by employing the multiplication rules. Besides, the Islamic value and messages are integrated through the discussion.

1) *Sub-Activity 1*

The takmir of the Masjid Baiturrahman will make a schedule for the composition of the congregational prayer officers for each week. There are 3 names to become priests, namely Mr. Amir, Ikhsan, and Fadli. Then, among the other takmir members, there are two names assigned to be muazzins, namely Mr. Sulaiman and Rizky. How many ways to choose a pair of imam and muazzin for congregational prayers that can be determined by the takmir?

2) *Sub Activity 2*

One day, Mother told Joni to shop for rice and flour. If Joni was told not only to shop for rice at shop A and flour at shop B, but also to shop C to buy vegetables and to shop D to buy salt. There are 5 roads from home to store A, from store A to store B there are 3 roads, from store B to store C there are 3 roads, and from store C to store D there are 2 roads. How many possible routes of travel can Joni take from home to store A then to store B, store C, and to store D?

In this problem there are several events such as buying rice, buying flour, buying vegetables, and buying salt in one activity (shopping). Although in shopping there are many routes that can be passed, Joni does not need to go through all routes. Just choose one route, Joni will be able to shop for all your needs. This means that although there are many

ways that can be done to help parents in an activity, it does not mean that we have to use all of these methods. However, there is only one way, sometimes we feel burdened, like to refuse, and argue with parents' orders for various reasons. Whereas, students as a child are commanded to do good to their parents as God commands in His word.

وَقَصَىٰ رَبُّكَ أَلاَّ تَعْبُدُوا إِلاَّ إِيَّاهُ وَبِآلِئِدَيْنِ إِحْسَانًا ۖ إِمَّا

يَبْتَغِيَنَّ عِنْدَكَ الْكِبَرَ أَحَدُهُمَا أَوْ كِلَاهُمَا فَلَا تَقُلْ

هُمَا أَفِئَةٌ وَلَا تَبَرَّهُمَا ۗ وَقُلْ لَهُمَا قَوْلًا كَرِيمًا ۝

“And your Lord has commanded that you should not worship other than Him and should do good to your parents as well as possible. if one of them or both of them reach old age in your care, then never say to them the word "Ah" and do not yell at them and say to them a noble word. (Surat al-Isra' 17:23).

The conjecture of students' thinking and teacher's responses can be seen on Table V.

TABLE V  
CONJECTURE OF ACTIVITY IV

No	Activity	Prediction of students' responses	Teachers' responses
1	Sub-Activity 1 Students find the number of ways of doing something by multiplying the number of choices available at each stage (multiple rule)	Students multiply the number of choices available at each stage (multiple rule)	Teacher gives a praise to students and gives other problem with different numbers.
		Students do not multiply the number of choices available at each stage	Teacher invites students to explore their difficulties by giving other problems and seek the pattern about the number.
2	Sub-Activity 2 Students find the number of ways of doing something by multiplying the number of choices available at each stage (multiple rule)	Students multiply the number of choices available at each stage (multiple rule)	Teacher gives a praise to students and gives other problem with different numbers.
		Students do not multiply the number of choices available at each stage	Teacher invites students to explore their difficulties by giving other problems and seek the pattern about the number.

The set's instructional design employs Islamic-realistic context, such as Jum'at prayer. The context was utilized as the framework for this study's design because students expressed positively to learn mathematics using an Islamic context [3]. Additionally, previous study depicted that learning mathematics based Islamic context could effectively improve students' mathematical concept understanding [23]. Observing the issues in mathematics learning practices where students are unable to understand mathematical concepts because they are typically taught practical formulas in schools rather than being fully informed about the idea of enumeration and how they are used in daily life. In contrast, as it is a human activity, mathematics must be connected human life [13]. Therefore, it is crucial to employ contexts in the mathematics learning process, especially in islamic schools [24]

In this design, real context is used as a starting point for learning which it is also successfully applied in this design. Students see map of route to prayer Jum'at in near mosque story to introduce the activity in the set learning design that uses the context of Jum'at prayer of Islamic context. Based on the learning activities used in this design, the RME approach was implemented [8]. In the first activity, student activities begin with seeking the virtue/message of ayah about enumeration in Muslim life and hadist about going to mosque. The aim of the activity was to impose the Islamic value in students' life. Then, students were engaged to use their informal knowledge by exploring a map for counting possible route to go to a certain mosque. In this activity students used the concrete thing such as map to find route. And, in the second activity, namely model of, they still elaborate the listing of the possible way of fing the route of Friday prayer. Next, in the third activity, students enter the mode for which they are employ a diagram or model to determine the possible routes of Friday prayer and expressing them more formally by designing their own map. In the last activity, students were able to solve other Islamic-context based problems by employing the formal form of multiplication rules. As students grasped the idea of enumeration rules in formal way through a series of learning activities, then the hypothetical learning trajectory of the learning could be carried out [8].

The trajectory of the enumeration rule design using the Islamic context is adjusted to the student learning sequences and the competency standards included in the Indonesian education curriculum [25]. According to the curriculum, students must comprehend the idea of use the enumeration rule to determine the probability. It means that students should understand the concepts of addition and multiplication rule, and listing the possible way by using the formal way of multiplication rule.

To support earlier studies employing RME approach and integrating with Islamic values in learning mathematics, this research includes an extra reference in mathematics education. For instance, the context of congregational prayer to learn power and root, ratio and scale, and plane figure [26], the context of Eid Fitri, jama' prayer, and pilgrimage of hajj to learn operation in integers, equality and speed



comparison, and theoretical and empirical chances consecutively [27], doing good deed guided by Qur'an and hadist to learn subtraction, multiplication, and division of integers [2]. As a result, this study adds context studies to be used as a foundation for studying mathematics.

#### IV. CONCLUSIONS

The realistic-Islamic context generated in this study can be used as an alternative way or reference for teachers to design a series of learning activities that support the development of students' conceptual understanding of enumerations, especially multiplication rules. The learning series consists of four activities; exploring a map for going to a mosque, finding the route for Friday prayer, designing your own map, and doing good deeds. This design support students to reconstruct their understanding of multiplication rules to determine the possible way of events. And most importantly, the Islamic context can instill good values and deeds that can be applied in everyday life. Hopefully, this hypothetical learning trajectory is a base for further research to implement it in a teaching experiment, analyze the results using retrospective analysis, and build it into a local teaching theory.

#### ACKNOWLEDGMENT

We would like to thank LPPM Universitas Muhammadiyah Jember for funding dan supporting this research.

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