

PROFILE OF STUDENTS AT THE FACULTY OF ISLAMIC RELIGION, UNIVERSITAS MUHAMMADIYAH SUMATERA UTARA IN ISLAMIC ASTRONOMY COURSES

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Abstract: The Faculty of Islamic Studies at the Muhammadiyah University of North Sumatra has a course in Islamic Astronomy taught in the seventh semester. This research aims to determine students' knowledge about astronomy before attending the lecture, students' responses to the practice of making a Qibla compass, and students' opinions on studying astronomy. From the research results, most FAI UMSU students knew about Islamic Astronomy before taking this course, even though astronomy had never been studied formally at the school level. Calculations in determining the Qibla direction using spherical trigonometry are considered easy because students are assisted by using a calculator. Making a Qibla compass in lectures is considered easy to make and easy to use in determining the direction of the Qibla. Practical time spent studying astronomy should be increased so that students can enjoy astronomy courses. Students think everyone, especially Muslims, must study astronomy because astronomy teaches about times of worship.

Keywords: Islamic Astronomy, Qibla Direction, Qibla Compass

Introduction

Islamic Astronomy is a science that studies the circulation of celestial bodies for the benefit of humans, especially Muslims, in determining times of worship (Rakhmadi, 2016). Islamic astronomy and astronomy are the same thing, both discussing celestial bodies. Although Islamic astronomy is seen as more dominant in the religious domain, astronomy covers all aspects of celestial bodies without limits (Qulub, 2018). Because Islamic Astronomy focuses on determining times of worship, not all celestial bodies are used as objects of study. Only celestial bodies related to worship times are discussed, namely the Earth, Moon, and Sun, and this is only limited to position (Maskufa, 2013).

Islamic Astronomy and astronomy still need to be improved or have yet to be introduced, especially in Indonesia (Pulingkareng et al., 2021). Until now, there are no special astronomy subjects in schools in Indonesia. Astronomy material is usually used as an intersection of subjects such as Physics and Geography (Elzulfiah et al., 2015). Islamic universities and boarding schools usually study and develop Islamic astronomy (Qulub, 2018).

Even though there are no special lessons at school, public interest in astronomy and astronomy in Indonesia is increasing. It can be seen from the increasing number of schools and universities building observatories (Akrim, 2020). An observatory is a special place to observe and document celestial objects (Qorib, 2019). Apart from that, departments related to astronomy

and astronomy are also starting to be established at various universities. One of them is UMSU, which has an Islamic Astronomy Study Program.

Islamic Astronomy is one of the mandatory courses at the Faculty of Islamic Religion, Universitas Muhammadiyah Sumatera Utara (FAI UMSU). This course is a characteristic of FAI UMSU compared with the Faculty of Islamic Religion at other Islamic-based universities in North Sumatra (Pasaribu, 2020). Apart from students of the Islamic astronomy study program, FAI students who can take the Islamic astronomy course are seventh-semester students. The material studied is related to the calendar, prayer times, Qibla direction, determining the beginning of the month, and eclipses. During the lecture, FAI UMSU students also practiced making a Qibla compass.

Qibla direction is one of the materials in the Islamic astronomy course. The direction of the Qibla is the direction used by Muslims in worship, especially prayer. The Qibla of Muslims is the Kaaba in the city of Mecca. The obligation to face the Qibla during prayer applies not only to Muslims in the city of Mecca but to all Muslims worldwide without exception (Butar-Butar & Setiawan, 2018). The direction of the Qibla can be determined by observing the Sun and calculating the position on the Earth's surface (Jaya, 2018). The process of measuring the direction of the Qibla is currently easier with the increasing development of tools that can be used to measure the direction of the Qibla, such as the Qibla compass, theodolite, istwa'aini and, mizwalla (Laksana & Syarif, 2022).

Based on the description above, researchers are interested in researching the profile of FAI UMSU students in the Islamic astronomy course, especially in the Qibla direction material. Researchers want to know students' knowledge about astronomy before attending lectures, students' responses to the practice of making a Qibla compass, and students' opinions about studying astronomy.

Literature Review

Astronomy is one of the oldest sciences. Islamic astronomy began to develop in Indonesia long before it became independent. The development of astronomy in Indonesia is divided into two periods, namely when Islam entered Indonesia and the period of the twentieth century. When Islam entered Indonesia, the development of astronomy was marked by the modification of the Saka calendar into the Javanese Islamic calendar, which was similar to the Hijri calendar. In the twentieth century, the development of astronomy was marked by the influx of astronomical books from Islamic countries in the Middle East. These books make astronomical calculations more accurate (Maghfuri, 2022). Islamic astronomy is currently developing with more and more observatories throughout Indonesia, such as the Bosscha Observatory in Lembang, the Imah Noong Observatory in Lembang, the UMSU Islamic astronomy Observatory in Medan, the Assalam Observatory in Surakarta, the Ahmad Dahlan University Observatory in Yogyakarta (Raisal, 2023). Currently, several universities are opening study programs concentrating on astronomy. Among them are UIN Walisongo Semarang, IAIN Lhokseumawe Aceh, UIN Mataram, UIN Sunan Ampel Surabaya, UIN Alauddin Makassar, and Muhammadiyah University of North Sumatra (Awwalany et al., 2023). Islamic astronomy is a mandatory subject at FAI UMSU. It is because it is the vision of FAI UMSU, which wants to build national civilization by developing Islamic sciences and technology. Studying astronomy is considered to be able to develop Islamic sciences and technology because astronomy is a legacy of classical science that applies modern technology today (Pasaribu, 2020). Islamic astronomy courses study theories and calculations related to Islamic worship. One of the calculations studied in the Falak science course is the calculation used to determine the direction of the Qibla.

The problem of the Qibla is nothing but a problem of direction, namely the direction of the Kaaba from every place on the surface of the Earth. Therefore, measuring the direction of the Qibla is knowing and determining which direction the Kaaba is seen from somewhere on the surface of the Earth (Butar-Butar & Setiawan, 2018). The method often used to determine the Qibla direction in Indonesia is to determine the west direction as the Qibla direction, align it with the road layout, and measure roughly based on the Qibla direction from the nearest mosque (Muthmainnah et al., 2019). These methods have low accuracy, so many mosques have a qibla direction that deviates from what it should be. Three methods can be used to measure the direction of the Qibla more accurately, namely using the shadow of the Qibla, observing when the Sun is directly above the Kaaba, and using geographic north (Tim Majelis Tarjih dan Tajdid PP Muhammadiyah, 2009). The direction of the Qibla on the Earth's surface can be calculated using the mathematical equation of spherical trigonometry. Calculating the Qibla using spherical trigonometry requires three points on the Earth's globe: the point at the North Pole, at the Kaaba, and where we want to find the direction of the Qibla (Jaya, 2018). The equation used to calculate the Qibla direction is as follows.

$$X = \arctan \left(\frac{\sin(\lambda_x - \lambda_k)}{\tan \phi_k \cos \phi_x - \sin \phi_x \cos(\lambda_x - \lambda_k)} \right) \quad (1)$$

Where x is the Qibla angle of the city we want to find, Q is the longitude of the location, Q is the longitude of the Kaaba, Q is the latitude of the Kaaba, and Q is the latitude of the location (Wahyuni et al., 2023). The process of measuring the direction of the Qibla is currently easier with the increasing development of tools that can be used to measure the direction of the Qibla, such as the Qibla compass, theodolite, istwa'aini, and mizwalla (Laksana & Syarif, 2022).

Method

This research is descriptive research with a quantitative approach. Data collection techniques in research use non-test techniques with a Likert scale questionnaire. The Likert scale measures the attitudes, opinions, and perceptions of a person or group of people about social phenomena (Sugiyono, 2013). The Likert scale guidelines for the questionnaire are 1) strongly agree, 2) agree, 3) disagree, 4) disagree, and 5) strongly disagree. The questionnaires were given to students using Google Forms and contained the following questions.

1. You already know about Islamic astronomy before taking this course.
2. Calculating the Qibla direction using spherical trigonometry is easy.
3. Making a Qibla compass is very easy.
4. Qibla compass is easy to use.
5. You enjoy studying Islamic astronomy.
6. Everyone, especially Muslims, must study the Islamic astronomy.

The sampling technique uses purposive sampling. Purposive sampling is a technique for determining samples with consideration (Pohan et al., 2022). The considerations used are students who are taking the Islamic astronomy course. The subjects of this research were seventh-semester FAI UMSU students taking the Islamic Astronomy course. The number of respondents was 55 students, consisting of men and women. The total distribution can be seen in Table 1.

Table 1. Total distribution of respondents

Study Program	Male	Female	Total
Islamic education	17	31	48
Sharia Business Management	-	7	7
Total	17	38	55

Result and Discussion

1. You already know about Islamic astronomy before taking this course.

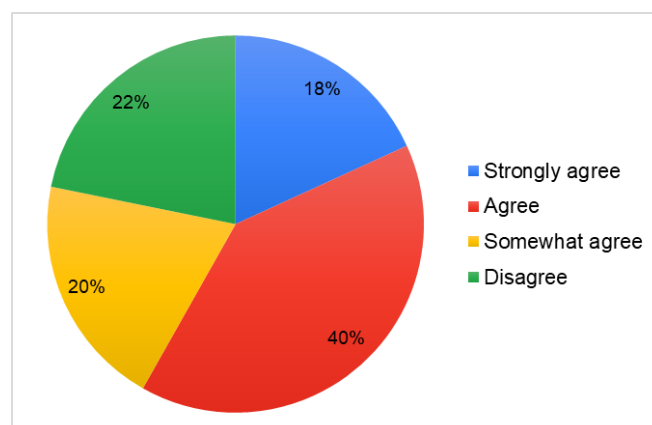


Figure 1. Diagram of students' knowledge about Islamic astronomy before taking the Islamic astronomy course

Figure 1 shows a diagram of students' knowledge about Islamic astronomy before taking the Islamic astronomy course. As we previously knew, Islamic astronomy or astronomy is not a particular subject at formal school. The increasing development of information technology means that students can obtain information about Islamic astronomy in various ways, such as online access. We can see from Figure 1 that only 20% of students did not know about Islamic astronomy before taking this course. Meanwhile, other students already know about Islamic astronomy, although at different levels. Apart from the internet, students can also find astronomy information from nearby observatories. The Falak Science Observatory at the Muhammadiyah University of North Sumatra (OIF UMSU), located on the 7th floor of the UMSU Postgraduate building, can provide knowledge about Islamic astronomy in North Sumatra. It is because OIF UMSU regularly receives visits from school students, university students, and the public. Apart from that, OIF UMSU also provides community service by measuring the Qibla direction for mosques, offices, fields, etc. (Qorib et al., 2019).

2. Calculating the Qibla direction using spherical trigonometry is easy.

Most students stated that calculating the Qibla direction using spherical trigonometry was easy. It can be seen in Figure 2. There were 20% of respondents who strongly agreed and 57% who agreed. Calculating the direction of the Qibla using spherical trigonometry using equation 1. When calculating the direction of the Qibla, students are assisted by using a calculator. Students must only enter their data into the calculator for the desired results. Only 7% of respondents stated that calculating the Qibla direction using spherical trigonometry took a lot of work. Spherical trigonometry is used to determine the direction of the Qibla using the center of the Earth. It causes spherical trigonometry to become the most precise and accurate theoretical framework for determining the current direction of Qibla (Ahmad et al., 2020).

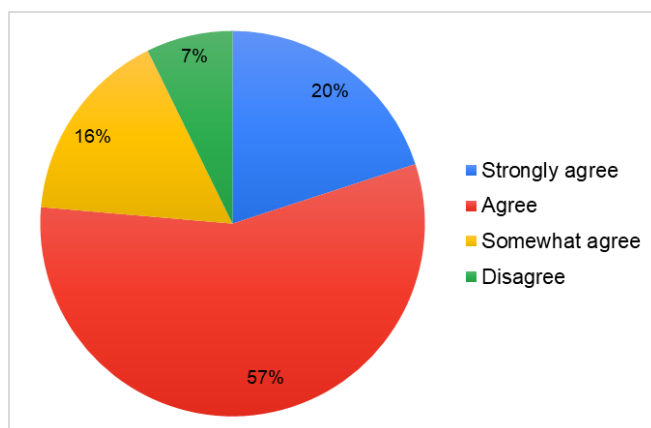


Figure 2. Student responses regarding the ease of calculating Qibla direction using spherical trigonometry.

3. Making a Qibla compass is very easy.

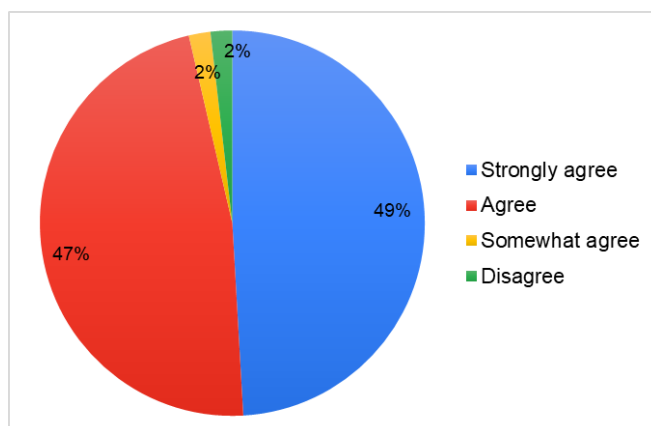


Figure 3. Student responses regarding the ease of making a Qibla compass.

Most students stated that making a Qibla compass is easy, as seen in Figure 3. A Qibla compass can be made with simple materials such as paper, pencil, ruler arc, thread, and compass. The student made Qibla compass can be seen in Figure 4. Increasing technological developments have resulted in the Qibla compass being built into a smartphone application (Safitri, 2022; Sriani & Ukhti, 2022).

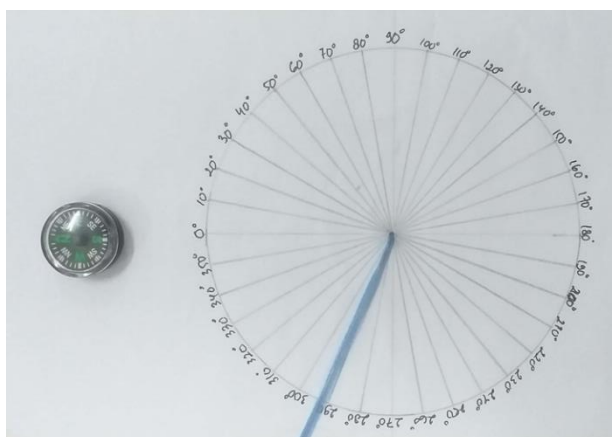


Figure 4. Qibla compass made by students.

4. Qibla compass is easy to use.

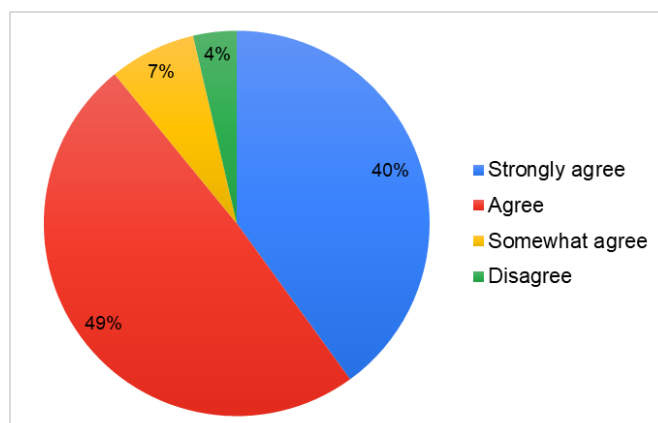


Figure 5. Student responses regarding the ease of using a qibla compass.

Qibla compass provides information to users regarding the direction of the Kaaba. It is used simply by adjusting the compass needle to the north, then using the thread to the angle that corresponds to the Qibla direction angle obtained by calculation. Most students think the Qibla compass is easy to use, as seen in Figure 5. The compass used still refers to the Earth's magnetic field, so the level of accuracy is greatly influenced by the pressure of the Earth's magnetic field (Safitri, 2022). Objects made of metal should not be placed close to the Qibla compass when it is in use. Therefore, it is best to use a Qibla compass in an open area (Sriani & Ukhti, 2022).

5. You enjoy studying Islamic Astronomy.

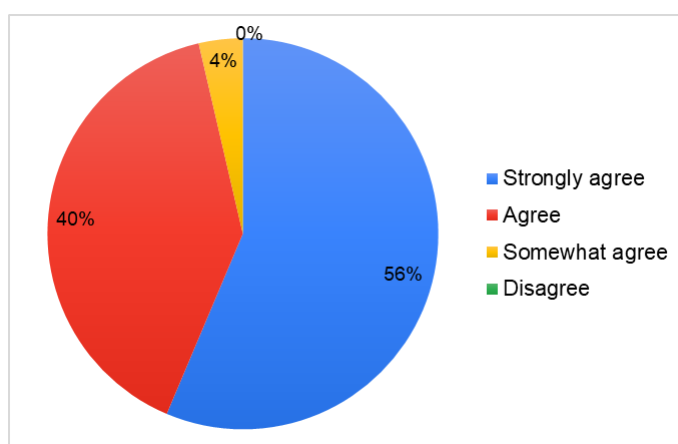


Figure 6. Student responses regarding the enjoyment of studying astronomy.

Most students think studying astronomy is something fun, as seen in Figure 6. Learning astronomy is a new insight for students because not all students know about astronomy before attending this lecture. Calculations in astronomy can be an obstacle for students whose understanding of mathematics could be better. Therefore, learning astronomy should increase practical time so that students can enjoy this course (Pasaribu, 2020). The practice of making a Qibla compass is one example, as seen in Figure 7.



Figure 7. Students practice making a Qibla compass.

6. Everyone, especially Muslims, must study the Islamic astronomy.

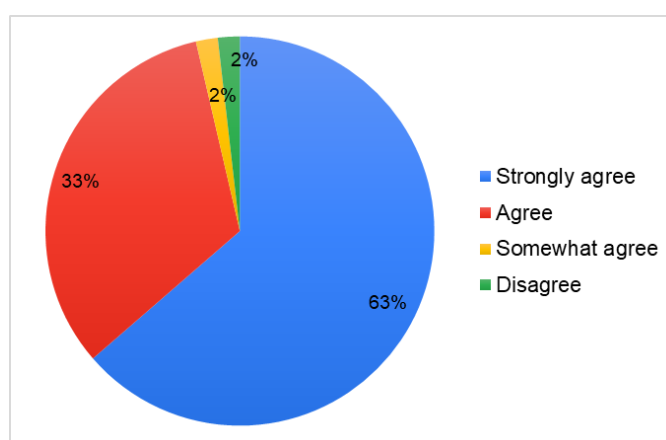


Figure 8. Student responses regarding Islamic astronomy must be studied by everyone.

Most students think that astronomy should be studied by everyone, especially Muslims, as seen in Figure 8. Islamic astronomy teaches about the calendar, Qibla direction, prayer times, determining the beginning of the Hijri month, and eclipses. In Indonesia, in particular, there are often differences in determining the start of the Hijriah month. Differences and debates between the methods of reckoning and rukyah routinely occur in Indonesia, especially before fasting and holidays (Raisa, 2018). Therefore, studying astronomy is essential for everyday life. Moreover, currently, astronomy is supported by various kinds of easy and cheap software. So, Muslims should rise to study astronomy so that they can master technology and civilization (Dartim, 2016).

Conclusion

From the research results, most FAI UMSU students knew about astronomy before taking the Islamic astronomy course, even though they never thought Islamic astronomy had never been studied formally at the school level. Calculations in determining the Qibla direction using spherical trigonometry are considered easy because students are assisted by using a calculator. Students must only enter their data into the calculator for the desired results. Making a Qibla compass in lectures is considered easy to make and easy to use in determining the direction of the Qibla. Learning astronomy should increase practical time so that students can enjoy this course. Students think that everyone, especially Muslims, must study Islamic astronomy, because it teaches about times of worship.

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