Lighting the Way: Qur'an Verses on Education in Mathematical Representation

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Abstract

This research aims to develop a mathematical model of the representation of Qur'an verses about education. Partially, the study examines the epistemology of Qur'an education based on educational aspects and indicators, relevant educational concepts in the Qur'an, and mathematical models to analyze the relationship between Qur'an-based education qualitatively and quantitatively. The results of this study offer a new quantitative analytical framework for Qur'an education, a structured Islamic curriculum development tool, the potential to improve the quality of evaluation of Islamic education programs through quantitative metrics, interdisciplinary collaboration opportunities, and a unique perspective from Islamic traditions for global education discourse. This research is new because it applies mathematical modelling to the epistemology of the Qur'an (not yet exists), uses a quantitative approach in the study of Qur'an education (generally qualitative), and integrates religious epistemology with scientific methodology. The research gap lies in the lack of a quantitative approach and exploration of structured Qur'an education epistemology, as well as the lack of bridges between religious theory and modern educational practice. The latest Islamic education research trends focus on the integration of Islamic values, the development of Islamic learning models, the analysis of character thoughts, and character studies. Recommendations include exploration of the potential of mathematical modelling by researchers in Islamic education and mathematics, consideration of the use of models in curriculum development and evaluation by Islamic educational institutions, as well as the expansion of the model with other variables and empirical testing in subsequent research.

Keywords: Epistemology of the Qur'an, Education, Mathematical Representations

Introduction

The discourse on education in the 21st century demands a holistic approach that is integrative and relevant to global challenges (Nahon Crystal et al., 2024). The Qur'an, as the main source of Islamic teachings, is rich in values and principles that cover various aspects of life, including education. However, the use of quantitative approaches in analyzing the concept of education implied in the Qur'an is still relatively limited, which has been researched and discussed (Asari, 2020). Existing studies tend to be dominated by qualitative methods that focus on textual and philosophical interpretations (Fischbach, 2016) as reflected in the latest literature review trends that highlight the integration of Islamic values, the development of Islamic learning models, the analysis of character thoughts, and character studies. An in-depth study of verses that hold great potential to uncover the epistemology of education (Albaar et al., 2022), which are distinctive and relevant throughout the ages.

The limitations of this quantitative approach create a gap in a more structured and measurable understanding of the relationship between educational concepts from the perspective of the Qur'an

(Nurhadiningtyas, 2025). In fact, mathematical representations have the potential to offer a new framework of analysis that is more systematic and allows the identification of patterns and relationships that may be missed in qualitative analysis alone. Therefore, this study seeks to bridge this gap by developing a mathematical model that is able to represent the verses of the Qur'an related to education. This research specifically aims to: (a) examine the epistemology of education implied in the verses of the Qur'an through the identification of educational aspects and indicators; (b) formulate relevant educational concepts rooted in these verses (Saepudin, 2018); and (c) develop a mathematical model capable of representing and analyzing the relationships between these elements of education, both qualitatively and quantitatively (Mukhyidin et al., 2020). It is hoped that the findings of this research can make a significant contribution in providing a new quantitative analysis framework for the study of Qur'an education, becoming a tool in the development of a more structured Islamic education curriculum, and potentially improving the quality of evaluation of Islamic education programs through more measurable metrics (Aziz & Zakir, 2022). Furthermore, this research is expected to encourage interdisciplinary collaboration between interpreters, Islamic education experts, and mathematical scientists, as well as provide a unique perspective from the Islamic tradition in global educational discourse.

A review of the existing literature shows that research on education about Qur'an verses is generally qualitative (Karim, 2019), focusing on textual interpretation, philosophical analysis, or case studies of the implementation of Islamic values in educational practice (Rahman et al., 2022). However, exploring the epistemology of Qur'an education through the lens of mathematical modeling is still very limited. This literature review will elaborate on various previous concepts and research relevant to the efforts to model the epistemology of the Qur'an mathematically for holistic education in the 21st century (Fauzi & Yusuf, 2024). Some of the key areas to be explored include discourse on holistic education (Norsaadah et al., 2022), The Epistemological Basis in an Islamic Perspective (Mohamad et al., 2017), the potential for the integration of mathematics in Islamic studies, and the relevance of the principles of the Qur'an in the context of contemporary education.

The discourse on education in the 21st century emphasizes the need for an approach that goes beyond just the transfer of factual knowledge (Hajri, 2023) and (Faizin et al., 2023). Holistic education emerged in response to this need, prioritizing the development of all aspects of students' potential, including intellectual, emotional, social, and spiritual (Ruslan et al., 2022). This approach aims to produce individuals who are not only academically intelligent but also have strong character, who can think critically, collaborate, and adapt to the changing times (Yasin, 2024). Various studies have examined the implementation of holistic education in multiple contexts (Mustapa et al., 2024), highlighting its benefits in improving learning motivation, student engagement, and more comprehensive learning outcomes (Fauziddin & Ningrum, 2024).

The Qur'an, as the main source of Islamic teachings, has a deep and comprehensive view of science and education. The epistemology of the Qur'an is not only limited to the rational and empirical dimensions, but also recognizes the role of revelation as the primary source of truth (Zembylas et al., 2019). Key concepts such as tafakkur (contemplation), tadabbur (deep understanding), and ta'aqqul (using reason) show an emphasis on active and reflective cognitive processes in acquiring knowledge (Andarin, 2024). Several contemporary Muslim scholars have sought to explore the epistemological implications of the Qur'an for the theory and practice of Islamic education (Huang, 2009). However, not many have explicitly used mathematical methodologies to model these concepts.

Applying mathematical skills starts from teachers' strategies in teaching mathematics concepts (Ahmad et al., 2022). Mathematical Approach in relation to social media. There is an integration in the study of social sciences (Ahmad, 2023) and humanities (Wulantina, 2022), including Islamic studies, which is an area that has not been explored much yet. Nonetheless, the potential of mathematics as a tool for analyzing patterns, relationships, and structures in religious texts and concepts is worth considering (McComas, 2014). Mathematical modeling can help identify conceptual hierarchies, measure the intensity of relationships between variables, and visualize theoretical frameworks in a

more systematic and measurable way. In the context of the Qur'an, a quantitative approach has been used in linguistic and stylistic analysis (Archer, Jockers, & Wilkens, 2015). However, its application in modeling the concepts of educational epistemology is still very limited.

The relevance of the principles of the Qur'an in the context of 21st-century education lies in the universal values contained in it, such as justice, balance, compassion, and respect for science (Jannah et al., 2020). Islamic education based on the Qur'an is expected to be able to produce a superior generation (Dari & Historis, 2024) in science and technology, but also has strong moral and spiritual integrity (Di et al., 2024). Research linking the principles of the Qur'an to contemporary educational challenges (Sardi et al., 2022), such as globalization, multiculturalism, and technological developments, is increasingly relevant (Kurdi, 2023) to formulate a holistic and sustainable education model.

This literature review shows a significant opportunity to develop a mathematical model that can represent and analyze the concepts of educational epistemology in the Qur'an. An interdisciplinary approach that combines insights from Islamic studies, educational sciences (Kelter et al., 2021), and mathematics is expected to make a valuable contribution to the development of a holistic education curriculum in the 21st century (Darling-Hammond et al., 2020) and offer a new perspective in the global education discourse. This research will seek to fill this gap by developing an innovative and relevant methodological framework.

Methods

This research method is carried out in stages and research instruments, namely: This description proposes three stages to explore the epistemology of education in the Qur'an.

Stage 1: Exploring the Epistemology of Education in the Qur'an includes the identification of key verses related to the acquisition of knowledge ('ilm), understanding (fiqh), wisdom (hikmah), and teaching (ta'lim, tadris), as well as the analysis of fundamental educational aspects such as objectives, educators, students, curriculum, methods, and learning environment in selected verses. Stage 2: Conceptual Interpretation of Relevant Educational Aspects and Indicators of the Qur'an focuses on the conceptual interpretation of epistemological findings in order to formulate relevant educational concepts (e.g., holistic education of the balance of worldly and hereafter-world knowledge) and the identification of the educational values and principles underlying the verses, such as justice ('adl), compassion (rahmah), and responsibility (mas'uliyyah).

Stage 3: Mathematical Modelling of the Representation and Analysis of Educational Relationships from the Qur'an includes the identification of qualitative and quantitative variables of the educational elements of the Qur'an, designing a qualitative representation of the relationships between concepts (e.g., aspects matrix and epistemological indicators), formulating a quantitative (potential) model for simple analysis (e.g., the influence of methods on understanding), and analyzing the relationships between educational elements using the developed model. The analysis will be qualitative with a focus on textual and thematic interpretation. Still, the potential for simple quantification is considered through the study of the qualitative content of the dominant themes and values, comparative analysis of patterns between verses and aspects, and synthesis and interpretation to formulate relevant educational concepts based on the epistemology of the Qur'an.

Results and Discussions

1. **Results**
   a. **Exploring the Epistemology of Education in the Qur'an**
   1) **Identify Key Verses**

   Key verses that explicitly or implicitly highlight fundamental aspects in the epistemology of Islamic education are: a) Al-Baqarah (2): 31: This verse is key because it describes the act of teaching directly from Allah to the first man. This implies that science is a divine gift and the foundation for human excellence, b) Al-Alaq (96): 1-5: These first verses revealed are crucial

because they command to read and mention the pen as a tool for recording and disseminating knowledge. This lays the foundation for the importance of literacy and the role of education aids, and c) Al-Mujadilah (58): 11: This verse expressly shows the primacy of science and knowledgeable people in the sight of Allah. It provides theological motivation to seek knowledge and recognizes the high value of education in Islam.

2) Analysis of Educational Aspects

Based on key verses, the epistemology of Islamic education includes several important aspects, namely: a) Source of Knowledge: Allah is the main source of knowledge, as affirmed in the story of the teaching of names to Adam Al-Baqarah (2): 31. Human knowledge is based on the grace of Allah, b) Learning Method: Reading Al-Alaq (96): 1-5 is the main gate of knowledge, supported by the role of pen and documentation. Collaborative interaction and learning Ali Imran (3): 159 and learning from experts An-Nahl (16): 43 are also emphasized, c) Educational Purpose: Education aims to raise the human level Al-Mujadilah (58): 11, equip with understanding and wisdom Yusuf (12): 21, and instil the values of monotheism as a foundation Luqman (31): 13, and Values and Ethics: Gentleness and deliberation Ali Imran (3): 159 are important in the teaching-learning process. Acknowledging the hierarchy of knowledge and referring to experts An-Nahl (16): 43 is part of the ethics of seeking knowledge.

Based on the results of the exploration of the Epistemology of Education in the Qur'an, the following is listed in the form of a table by describing the number of verses and surahs, interpretation of verses related to education, educational keywords, and notes on the context of the following verses.

Table l
Epistemology of Education in the Qur'an

Verse and Surah Number	Interpretation of the Verse Related to Education	Educational Keywords	Note on the Verse Context
Al-Baqarah (2): 31	Allah taught Adam all the names (of things). This indicates the importance of the learning process and the introduction of knowledge as the first gift to humankind.	Teaching, Knowledge, Names	This verse narrates the creation of Adam and his superiority over the angels due to the knowledge Allah bestowed upon him.
Al-Alaq (96): 1-5	The first command revealed was "Read!" This emphasizes the importance of reading as the gateway to knowledge. It is also mentioned that Allah taught humankind with the pen, which is a tool for recording and spreading knowledge.	Reading, Teaching, Pen, Knowledge	These early verses of revelation form the fundamental basis in Islam regarding the obligation to seek knowledge.
Ali Imran (3): 159	Allah commands to consult in matters (including education). This indicates the importance of interaction, exchange of ideas, and collaborative learning in the educational process.	Consultation, Interaction, Collaborative Learning	This verse discusses the importance of gentleness and consultation in leadership and decision-making.
An-Nahl (16): 43	Allah says, "So ask the people of knowledge if you do not know." This verse encourages seeking knowledge from its experts and acknowledges the hierarchy of knowledge.	Asking, Knowledge, Experts of Knowledge	This verse emphasizes the importance of referring to knowledgeable people in various matters.
Al-Mujadilah (58): 11	Allah will raise those who have believed among you and those who were granted knowledge by degrees. This shows the virtue of knowledge and those who possess it in the sight of Allah.	Degrees, Faith, Knowledge	This verse provides motivation to continuously seek knowledge because it will elevate a person's status.

Luqman (31): 13	Luqman advised his son, "...do not associate [anything] with Allah; indeed, association [with Him] is a great injustice." This shows the education of the values of tawhid (the oneness of Allah) as the main foundation.	Advice, Tawhid, Values, Child Education	This verse is part of Luqman's advice to his son about the principles of faith and morality.
Yusuf (12): 21	"...and thus We established Joseph in the land, that We might teach him the interpretation of dreams." This shows that Allah gives knowledge and understanding to His servants as part of education and preparation for greater tasks.	Teaching, Understanding, Wisdom	This verse tells the story of Joseph who was given the ability to interpret dreams by Allah.

b. Conceptual Interpretation of Relevant Educational Aspects and Indicators of the Qur'an

1) Conceptual Interpretation of Educational Aspects and Indicators in the Qur'an

The description presents a conceptual interpretation of the educational aspects of the Qur'an based on the central theme of Islam. Each aspect is described through specific educational indicators that can be traced in reference verses. For example, "Foundation of Science" is interpreted as the recognition of learning and knowledge as a gift from Allah, with an indicator of the learning process and awareness of knowledge as a gift, referring to Al-Baqarah (2): 31 about the teaching of names to Adam AS. This interpretation emphasizes that knowledge is not only a human effort, but also a divine gift. Similarly, other aspects are interpreted conceptually to provide a framework for understanding the Qur'an in educational practice, bridging normative messages with the concept of operational education.

2) Identification of Educational Values and Principles in the Qur'an

From the matrix described above, we can identify several fundamental educational values and principles emphasized in the Qur'an: a) The Qur'an emphasizes several fundamental values and principles in education. Tawhid is the main foundation Luqman (31): 13, b) The obligation and virtue of knowledge is emphasized through the command to read Al-Alaq (96):1-5, c) the promise of a high status for the bearer of knowledge Al-Mujadilah (58): 11, d) The learning process should be active and interactive through consultation Ali Imran (3): 159, e) The importance of referring to scholars is also highlighted An-Nahl (16): 43, f) Knowledge is regarded as provision for life Yusuf (12): 21 and g) as a gift to be grateful for Al-Baqarah (2):31. Based on the research results regarding the conceptual interpretation of relevant educational aspects and indicators from the Qur'an, the following are listed in the form of a table that outlines the academic aspects, educational indicators, and the following numbers and verses:

Table 2.
Conceptual Interpretation of Relevant Educational Aspects and Indicators of the Qur'an

Aspect of Education	Indicator of Education	Surah and Verse Number
Foundation of Knowledge	The process of learning and the introduction of knowledge as a gift	Al-Baqarah (2): 31
Obligation to Seek Knowledge	Reading as the gateway to knowledge	Al-Alaq (96): 1-5
Interactive Learning	Interaction, exchange of ideas, collaborative learning	Ali Imran (3): 159
Importance of Knowledge Experts	Seeking knowledge from its experts and acknowledging the hierarchy of knowledge	An-Nahl (16): 43
Virtue of Knowledge	High degrees for those who believe and have knowledge	Al-Mujadilah (58): 11
Values Education	Instilling the values of tawhid as the main foundation	Luqman (31): 13
Education for Tasks	Knowledge and understanding as preparation for tasks	Yusuf (12): 21

c.   **Mathematical Model of Representation of Educational Relations from the Qur'an**
1) **Collection of Qur'an Verses (A)** Suppose A is a set of verses of the Qur'an that is the focus of the analysis. In this case: A={a1,a2,a3,a4,a5,a6,a7} where: a1 = Al-Baqarah (2): 31, a2 = Al-Alaq (96): 1-5, a3 = Ali Imran (3): 159, a4 = An-Nahl (16): 43, a5 = Al-Mujadilah (58): 11, a6 = Luqman (31): 13, and a7 = Yusuf (12): 21.
2) **Collection of Educational Aspects (P)** Suppose P is a set of educational aspects analyzed: P={p1,p2,p3,p4,p5,p6,p7} where: p1 = Foundations of Science, p2 = Obligation to Seek Knowledge, p3 = Interactive Learning, p4 = The Importance of Scientists, p5 = Priority of Knowledge, p6 = Education of Values, and p7 = Education for Tasks.
3) **Set of Education Indicators (I)** Suppose I is a set of identified educational indicators: I={i1,i2,i3,i4,i5,i6,i7} where: i1 = The process of learning and the introduction of knowledge as a gift, i2 = Reading as the gate of knowledge, i3 = Interaction, exchange of thoughts, learning together, i4 = Seeking knowledge from experts and acknowledging the hierarchy of knowledge, i5 = High degree for believers and knowledgeable, i6 = Instilling the values of monotheism as the main foundation, and i7 = Knowledge and understanding as task preparation.
4) **The Function of Sentence Mapping to the Educational Aspect (f)** Suppose f is a function that maps each verse in set A to the educational aspects in set P that are relevant to that verse: f:A→P In this case, the mapping f is as follows: f(a1)=p1, f(a2)=p2, f(a3)=p3, f(a4)=p4, f(a5)=p5, f(a6)=p6, and f(a7)=p7.
5) **Function of Mapping Sentences to Education Indicators (g)** Suppose g is a function that maps each verse in set A to the educational indicators in set I contained in that verse: g:A→I In this case, the mapping g is as follows: g(a1)=i1, g(a2)=i2, g(a3)=i3, g(a4)=i4, g(a5)=i5, g(a6)=i6, and g(a7)=i7.
6) **Relationship Between Aspects and Education Indicators (R)** We can define the relationship of R between the aspect of education (P) and the educational indicator (I) based on the sentences that connect them: R={(pj,ik)|∃am∈A so that f(am)=pj and g(am)=ik}. In this case, the relation R is: R={(p1,i1),(p2,i2),(p3,i3),(p4,i4),(p5,i5),(p6,i6),(p7,i7)}.

For example, the pair (p1,i1) means that the aspect of the Foundation of Science (p1) is represented by the indicator of the Learning Process and the introduction of knowledge as a gift (i1) in one of the verses analyzed (Al-Baqarah (2): 31).

This simple mathematical model allows us to represent the educational elements found in the verses of the Qur'an as sets and functions. The relationship between aspects and indicators can be formally identified. Although this model is still fundamental, it provides a framework for more structured analysis and the potential for more complex model development in the future. The main strength of this model is its ability to systematically visualize and analyze relationships based on textual data from the Qur'an.

2.   Discussions

Figures and tables are the most effective way to present results. Captions should be able to stand alone, such that the figures and tables are understandable without reading the entire manuscript. Besides that, the data represented should be easy to interpret. Please look at the examples below.

a.   **Epistemology of Education in the Qur'an**

This research succeeded in identifying several key verses in the Qur'an that contain the concept of Islamic education epistemology. Verses such as Al-Baqarah (2:31) highlight knowledge as a divine gift and the foundation of human glory. The command to read and use the pen in Al-Alaq (96): 1-5 emphasizes the importance of literacy and aids in the learning process. Meanwhile,

Al-Mujadilah (58:11) provides theological motivation in pursuing knowledge by promising a high degree for knowledgeable people. Further analysis reveals several important aspects of the epistemology of Islamic education. First, the Qur'an acknowledges Allah as the main source of knowledge, even though humans actively seek and develop knowledge.

Second, the emphasized learning methods include reading, writing, discussing (deliberation), and learning from experts. Third, the purpose of education is not only the transfer of information, but also the improvement of human status, the provision of understanding and wisdom, and the cultivation of monotheistic values. Finally, the educational process also upholds values and ethics such as gentleness, deliberation, and respect for the hierarchy of knowledge.

Based on the discussion of the Epistemology of Education in the Qur'an, several important pins were found that are in line with the results of previous research, namely: a) Knowledge as a divine gift and the foundation of human glory is in line with research by (Nobles, 2008), and (Setyawati et al., 2024), b) The importance of literacy and tools in the learning process is in line with research by (Nguyen & Habók, 2024), and (Biagini, 2025), and c) Theological motivation in pursuing knowledge by promising a high degree for knowledgeable people is in line with research by (Chalmiers et al., 2023) and (Malik, 2023).

b. Conceptual Interpretation of Relevant Educational Aspects and Indicators of the Qur'an

This research succeeded in describing the relevant educational concepts of the Qur'an. It was found that the Qur'an views education as having a foundation in science, which is considered a Divine gift. The obligation to study knowledge is emphasized, starting from reading. The learning process ideally should be interactive, involving exchanging ideas. The Qur'an also highlights the importance of learning from experts and recognizes the virtue of knowledge for believers. Value education is centered on monotheism, and knowledge is seen as a provision to carry out life's tasks.

c. Mathematical Modelling that Represents and Analyzes Educational Relationships from the Qur'an

1) Identification of Qualitative and Quantitative Variables

In this modelling, qualitative variables are elements that are included in the defined sets, namely: a) Qur'an Verses (A): Each verse (a1 to a7) is a category or label, not a numerical value, b) Educational Aspect (P): Each aspect (p1 to p7) is also a category or label that describes the type of education, c) Education Indicator (I): Each indicator (i1 to i7) is a qualitative description of how the educational aspect is manifested.

2) Designing Qualitative Representations

Qualitative representation in this model is realized through sets, mapping functions, and reasoning: a) Sets: Using sets (A, P, I) to group elements based on their respective categories. It provides a clear structure for organizing the educational concepts of the Qur'an, b) Mapping Functions: The f: A→P and g: A→I functions explicitly connect the verses of the Qur'an with relevant educational aspects and indicators. This mapping shows the relationship of "what is related to what" qualitatively, and c) Relation (R): The R⊆P×I relationship defines the relationship between aspects and indicators of education based on the existence of Qur'an verses that connect the two. It provides a qualitative picture of how specific indicators represent aspects of education.

3) Formulating a Quantitative Model

Currently, the model presented is not quantitative. However, we can think about the potential development of quantitative models in the future. Some ideas for quantification include: a) Frequency of Occurrence: Counting the number of times an aspect or indicator of education appears in the entire Qur'an or a larger collection of verses. This can give numerical weight or

significance to each element and indicator, b) Relationship Intensity: If we have data on how strongly or explicitly an aspect or indicator is emphasized in a sentence, we can assign a numerical score to the mapping functions f and g, and c) Relationship Matrix: Create a matrix where rows and columns represent aspects and indicators of education, and the value in the cell indicates the frequency or intensity of the relationship between the two based on the analysis of a large number of verses.

4) **Relationship Analysis**

The relationship analysis in this model is mainly descriptive and qualitative. The R relationship explicitly indicates the pairs of aspects and indicators connected through the analyzed verses. In this case, there is a one-to-one correspondence between aspects and indicators of education based on the selected verses.

Conclusion

An analysis of Qur'an verses shows that the epistemology of Islamic education is rooted in revelation, emphasizing knowledge as a gift and the key to glory. The educational process is an active effort to seek knowledge to master information and build character based on monotheism and ethics, producing knowledgeable and highly moral individuals. The concept of Islamic education includes knowledge as a gift, the obligation to seek knowledge, interactive learning, the role of scientists, the virtue of knowledge, the cultivation of the value of monotheism, and the understanding of knowledge as a preparation for life. Mathematical modelling of educational representations from the Qur'an focuses on identifying qualitative variables (with the potential for frequency quantification), designing qualitative representations of relationships between elements, and analyzing descriptive and qualitative relationships based on the verses studied.

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