

Analysis of the Design Needs and Development of the AR-Kahf Module for Learning Arabic Syntax in the Quran

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DOI Link: <http://dx.doi.org/10.6007/IJARPED/v14-i3/26179>

Published Online: 16 August 2025

Abstract

The teaching and learning (TnL) of the Arabic language can be diversified through more innovative, interactive, and effective methods. One such approach is the implementation of Augmented Reality (AR) technology, which has emerged as a significant tool in modern educational settings. This study examines students' perspectives on the necessity of developing the AR-Kahf module for learning Arabic syntax within the Quranic framework. The study employs a Design and Development Research approach, utilizing questionnaire instruments to gather data on the need for technology-based learning materials, challenges in conventional learning approaches, students' inclination toward innovation in course instruction, and the necessity of interactive AR applications. A total of 184 undergraduate students from the Arabic Language Studies program at UniSZA, who were enrolled in the Ibn Hisham Syntax Text Study Course, served as respondents for the questionnaire. The collected quantitative data were analyzed using the Statistical Package for Social Science (SPSS) to obtain mean values and standard deviations. The results indicate that students perceive the development of the AR-Kahf module as necessary. This module should be established as an alternative pedagogical approach for teaching Arabic syntax in the Quran, integrating interactive and visual elements to enhance students' comprehension and engagement with the complex sentence structures.

Keywords: Module Development, Augmented Reality (Ar) Technology, Arabic Syntax, Visual, Interactive.

Introduction

Language expertise is a vital aspect of understanding the Quran and the Prophet SAW's Hadith. It can be argued that understanding its meaning, whether overtly or implicitly -- is difficult without comprehending the language from diverse perspectives. According to Salleh et al. (2022), the Arabic language encompasses a wide range of disciplines and branches of knowledge due to its vast vocabulary, numerous sentence construction styles, broad scope of understanding, and great literary worth. He also argued that everyone with a basic understanding of syntax will understand that each analysis has certain meanings. Therefore,

syntax is the basis for understanding the meaning of verses in the Quran and the grammatical structure and word order in verses of the Quran play an important role in determining the exact meaning. Without a good understanding of syntax, a person may misinterpret or not understand the true meaning of a verse.

The teaching and learning (TnL) of Arabic syntax in the present day still continues using conventional or traditional methods; namely teacher-centered learning, although it is undeniable that some learning methods also utilise modern technology in TnL activities. This is not to say that we reject the benefits of traditional TnL activities. However, learning methods in this era can be diverse, especially since the information included in knowledge is quite broad and often not targeted, particularly for non-native speakers. According to Norma (2021), while some teachers have effectively shifted from traditional to student-centered teaching techniques, they have yet to shape students' growth. This is because teachers lack positive attitudes and professionalism when it comes to understanding essential knowledge and teaching (Aman & Zulkifli, 2024). Therefore, the use of technology-based learning modules plays a significant role in student-centered TnL methods to ensure that every teaching, learning or training activity is carried out in a planned manner and based on clear guidelines to achieve the set objectives. This need is not only limited to educational institutions such as schools and universities, but is also an important aspect in any organisation that plans to implement a programme systematically and effectively. With the advent of 21st Century Learning (PAK-21) and the difficulties students face in mastering new information -- more inventive, creative, and adaptable teaching strategies must be expanded with the help of research and expertise that demonstrates their efficacy.

Beginning with this problem, students' beliefs that learning Arabic syntax is challenging and tedious can be dispelled by combining traditional teaching methods with the most recent advances in technology. One of the most pressing needs of contemporary society is the employment of technology in education. To meet the difficult issues of the twenty-first century, educational systems all over the world are actively embracing digital and communication tools (Abdullah, 2019). One of the technologies that is gaining increasing attention in the field of education is Augmented Reality (AR). According to a study by Daud et al. (2020), students' problems in understanding theory and knowledge, especially those involving visualisation skills -- can be overcome by using AR as a learning medium. Therefore, AR technology needs to be expanded in education due to its potential as an interactive method that increases student motivation and enriches their learning experience (Samad, 2023). Students who must first concentrate and exercise critical thought during a teacher's lectures may eventually find it simpler to comprehend and retain material when it is condensed and delivered in an engaging manner.

The application of AR in learning Arabic syntax is an alternative method that aims to attract students' interest in learning it as well as facilitate understanding based on the advantages that exist in the method. With the help of this resource, educators and learners can now quickly create their own MAR (Mobile Augmented Reality) learning modules and engage with digital objects in a variety of formats, including text, images, audio, video, and 3D or 2D objects, at any time and from any location, including in formal or informal learning settings. Because AR technology offers interactive and visual components that might improve students' comprehension of sentence structure, it may provide an alternative method for

teaching and learning Arabic syntax. AR technology allows syntactic elements such as subjects, predicates and objects, types of words and selected stories to be visualised in three or two dimensions, thus helping students understand more clearly the position and function of each sentence component. This approach not only improves the level of student understanding, but also makes teaching and learning more interesting and effective, especially for students who show a tendency towards a visual learning style.

Therefore, this study attempts to highlight an alternative solution through the development of an Arabic syntax learning module using AR technology which aims to attract students' interest in learning language proficiency and even as a platform to improve understanding based on the advantages of the method. This study intends to determine the necessity of developing a module dubbed AR-Kahf for studying Arabic syntax in the Quran, based on a number of concerns that the researcher has investigated. This stage is the first step in gathering data regarding the suitability of creating an AR-Kahf module for studying Quranic Arabic grammar.

Methodology

Research Design

The needs analysis for this study becomes the first phase in the module development study based on the Design and Development (DDR) approach (Richey & Klein, 2007) before the module design phase is carried out.

During the Needs Analysis stage of this study, a questionnaire was employed as a research tool to determine the necessity of developing the AR-Kahf module in light of the opinions of the students. 184 students who have completed UniSZA's Ibn Hisham Syntax Text Study course participated in this section of the survey. To gather their opinions on the necessity of creating this module, 60 of these individuals represented second-year students, 60 represented third-year students, and the remaining 64 represented fourth-year students.

This study focuses on the Ibn Hisham Syntax Text Study Course which is a mandatory course in the Bachelor's Degree in Arabic Language Studies, UniSZA. This course is offered in the sixth semester of the study programme. The sampling in this study is in the form of purposive sampling -- which is selecting samples based on the researcher's knowledge and is believed to provide information on the research questions. The number of respondents in this phase is 184 students who have taken the Ibn Hisham Syntax Text Study Course at UniSZA. This number represents all students from various years from the Bachelor' Degree in Arabic Language Studies. Data was collected to obtain their views regarding the need to develop this module.

A questionnaire was the tool employed in this study's initial phase. Students' opinions on the necessity of the AR-Kahf module for learning Arabic syntax in the Quran at UniSZA were gathered through the distribution of a set of Needs Analysis questionnaires. A structured questionnaire that was adapted from the AR module design and technology research questionnaire instrument was employed. There were five aspects focused on, namely part A consisting of demographic information, parts B, C, D and E were questions containing 5 likert scales, namely (1) Very Infrequently (2) Infrequently (3) Uncertain (4) Frequently (5) Very Frequently and (1) Strongly Disagree (2) Disagree (3) Uncertain (4) Agree (5) Strongly Agree

which involved the use of technology-based learning support materials, issues with conventional learning approaches, tendencies to use innovations in course learning and the need for interactive AR usability.

Data analysis of the Needs Analysis phase focused the findings of a set of questionnaires from 184 students from the Bachelor's Degree in Arabic Studies, UniSZA. Data analysis employs Statistical Package for Social Science (SPSS) software. The analysis conducted is descriptive involving mean and standard deviation. The results of the descriptive analysis are used to determine the level of need for interactive AR modules for learning Arabic syntax in the Quran according to student perceptions. The mean score and standard deviation are analysed to obtain the level of student agreement. The mean score table is from Nunnally and Bernstein (1994), as indicated in Table 1.

Table 1

Mean Interpretation Value

Mean Score	Interpretation
1.00 – 2.00	Low
2.01 – 3.00	Moderate
3.01 – 4.00	Moderately High
4.01 – 5.00	High

Source: Nunnally and Bernstein (1994)

Research Findings

This section contains an analysis of the items to obtain respondents' feedback on the use of learning materials. Table 2 shows the mean score, standard deviation and interpretation for each item in this aspect.

Table 2

Use of Technology-Based Learning Materials

	B: Use of Technology-Based Learning Materials	Mean	SD	Interpretation
B1	I use reference materials by accessing digital learning resources (e.g. electronic journals, educational websites or learning applications).	4.29	.645	High
B2	I use technology-based learning support materials to help with additional understanding in a subject.	4.32	.723	High
B3	I refer to technology-based learning notes or modules provided by the lecturer before the learning session.	4.12	.821	High
B4	I always use technology-based learning support materials with the guidance of the lecturer.	4.23	.655	High
B5	I use digital devices (computers, tablets, smartphones) to assist in learning.	4.61	.552	High
B6	I use learning videos or online lectures to review the topics studied.	4.20	.808	High
B7	I use online exercises or quizzes as learning materials to test my level on a topic.	3.98	.967	Moderately High
B8	I use simulations, educational games, or other interactive technologies in learning.	3.81	1.057	Moderately High

B9	I use learning materials that offer interactive learning experiences.	4.06	.831	High
B10	I have used AR-based learning applications or modules that allow me to see 3D objects to understand a concept.	3.39	1.228	Moderately High
Average		3.795	.486	Moderately High

Based on Table 2 above, the interpretation of the data shows that the aspect of using technology-based learning materials among students is at a Moderately High level, with an overall mean value of 3.795 and a standard deviation of .486. This shows that students use technology-based learning materials that support their learning at a Moderately High level. The use of technology-based learning materials that recorded the highest mean score was the “use of digital devices such as computers, tablets, smartphones” (M= 4.61, SD= .552) followed by the “use of technology-based support materials to assist with additional understanding in a subject” (M= 4.32, SD= .723), the “use of reference materials by accessing digital learning resources” (for example electronic journals, educational websites or learning applications) (M= 4.29, SD= .645), the “use of technology-based learning support materials with the guidance of lecturers” (M= 4.23, SD= .655), the “use of learning videos or online lectures to revise topics learned” (M= 4.20, SD= .808), the “use of technology-based learning notes or modules provided by lecturers before the learning session” (M= 4.12, SD= .821) and the “use of learning materials that offer interactive learning experiences” (M= 4.06, SD= .831).

There are several items that show a Moderately High level, namely the “use of online exercises or quizzes as learning materials to test the level of a topic” with value (M= 3.98, SD= .967), followed by the “use of simulations, educational games, or other interactive technologies in learning” with value (M= 3.81, SD= 1.057). Next, the “use of AR-based learning applications or modules that allow viewing 3D objects to understand a concept” scored a score (M= 3.39, SD = 1.228). All items scored mean values at High and Moderately High levels only.

Issues and Challenges of Approaches towards Conventional Learning

This section aims to obtain respondent feedback on issues and problems with approaches to conventional learning faced by students by analysing the items as in Table 3. Table 3 shows the mean score, standard deviation and interpretation of each relevant item.

Table 3

Issues and Challenges of Approaches Towards Conventional Learning

	C: Issues and Challenges of Approaches Towards Conventional Learning	Mean	SD	Interpretation
C1	I am only exposed to conventional teaching approaches (only guided by lecturer explanations) which are boring and do not help understanding.	2.72	1.265	Moderate
C2	I have difficulty connecting with lecturers and friends outside of lecture hours.	2.72	1.230	Moderate
C3	I have limited time to delve into topics during lectures.	3.30	1.193	Moderately High
C4	I often have difficulty understanding complex concepts.	3.41	1.170	Moderately High
C5	I feel a lack of examples and explanations to understand a topic.	3.47	1.111	Moderately High
C6	I feel a lack of electronic materials on the Internet.	2.96	1.258	Moderate
C7	I have difficulty with the high cost of additional physical reference materials.	3.27	1.254	Moderately High
C8	I rarely have access to interactive learning materials.	2.81	1.238	Moderate
C9	I do not have digital and interactive learning materials.	2.56	1.249	Moderate
C10	I often face time constraints when trying to understand a subject in a short period of time.	3.34	1.194	Moderately High
	Average	2.754	.818	Moderate

Table 3 shows the interpretation of data on issues and problems of approaches to conventional learning faced by students. The issues and problems expressed were generally at a Moderate level with a mean score of 2.754 and a standard deviation of .818. The item that recorded the highest mean score and a Moderately High interpretation level was the item "lack of examples and explanations to understand a topic", which was 3.47 with a standard deviation of 1.111. Next, the problem of "difficulty understanding complex concepts" received a mean score of 3.41 and a standard deviation of 1.170 followed by the item "time constraints when wanting to understand a subject in a short period of time" with a mean score of 3.34 and a standard deviation of 1.194, the item "limited time to delve into the topic during lectures" (M = 3.30, SD = 1.193), the item "difficulty with the high cost of additional physical reference materials" (M = 3.27, SD = 1.254). Other items that were at a Moderate level were "lack of electronic materials on the Internet" with a value of (M= 2.96, SD= 1.258), "rarely have access to interactive learning materials" with a value of (M= 2.81, SD= 1.238), "experience difficulty in communicating with lecturers and friends outside of lecture hours" with a value of (M= 2.72, SD= 1.230), "only exposed to conventional teaching approaches (only guided by lecturer explanations) which are boring and less helpful for understanding" with a value of (M= 2.72, SD= 1.265), "do not have digital and interactive learning materials" with a value of (M= 2.56, SD= 1.249).

Tendencies in Using Ar-Based Technology Innovation in Course Learning

This section contains an item analysis to obtain respondents' feedback on their tendency to use AR-based technological innovations in course learning. Table 4 shows the mean score, standard deviation and interpretation for each item in this aspect.

Table 4

Tendencies in the Use of AR-Based Technology Innovation in Course Learning

	D: Tendencies in the Use of AR-Based Technology Innovation in Course Learning	Mean	SD	Interpretation
D1	I like learning that applies technology like AR.	4.18	.731	High
D2	I find it easier to understand a concept through digital and interactive materials in the form of AR modules.	4.14	.783	High
D3	I like using express reference materials like AR modules to help understand a subject.	4.15	.795	High
D4	I like coloured notes in AR modules to help with course learning.	4.28	.691	High
D5	I like picture notes in AR modules to help with course learning.	4.33	.655	High
D6	I like reading information that has interesting graphics like AR modules.	4.36	.672	High
D7	I like learning if AR modules have elements like videos, quizzes, or simulations.	4.36	.704	High
D8	I like AR modules if the information is explained with the help of 3D or 2D images.	4.30	.750	High
D9	I like AR elements as learning aids that make it easier to learn a course.	4.38	.642	High
	Average	3.460	.493	Moderately High

Based on Table 4 above, the interpretation of the data shows that the student tendency towards the use of AR-based technological innovations in course learning is at a Moderately High level with an overall mean score of 3.460 and a standard deviation of .493. This shows that students tend to use AR-based technological innovations in learning at a Moderately-High level. All items recorded a mean score of a High level and the item that recorded the highest mean value was "liking AR elements as learning aids that facilitate course learning" with a value of (M= 4.38, SD= .642) followed by the item "likes learning if AR modules have elements such as videos, quizzes, or simulations" with a value of (M= 4.36, SD= .704). Next, the items "liking reading information that has interesting graphics such as AR modules" with a value of (M= 4.36, SD= .672), "like pictorial notes in AR modules to help with course learning" with a value of (M= 4.33, SD = .655), "like AR modules if the information is explained with the help of 3D or 2D images" with a value of (M= 4.30, SD = .750), "like coloured notes in AR modules to help with course learning" with a value of (M= 4.28, SD= .691), "like learning that applies technology such as AR" with a value of (M= 4.18, SD= .731), "like using express reference materials such as AR modules to help with understanding a technology subject" with a value of (M= 4.15, SD= .795) and "it is easier to understand a concept through digital and interactive materials in the form of AR modules" with a value of (M= 4.14, SD= .783).

The Needs for Interactive AR Use

This section analyses the items to obtain respondents' feedback on the needs for interactive AR use. Table 5 shows the mean score, standard deviation and interpretation for each relevant item.

Table 5

The Needs for Interactive AR Use

	E: The Needs for Interactive AR Use	Mean	SD	Interpretation
E1	I believe that interactive AR makes information easier to understand.	4.39	.669	High
E2	I believe that interactive AR makes information more informative and interesting.	4.42	.631	High
E3	I believe that interactive AR can increase creative thinking.	4.42	.640	High
E4	I believe that interactive AR can simplify complex learning concepts.	4.43	.623	High
E5	I believe that interactive AR helps students remember concepts easily.	4.42	.631	High
E6	I believe that interactive AR improves focus in learning.	4.34	.691	High
E7	I believe that AR-assisted learning can increase my motivation to learn.	4.43	.623	High
E8	I believe that interactive AR motivates students to study more diligently.	4.41	.639	High
E9	I believe that interactive AR motivates students to study more diligently.	4.39	.626	High
E10	I believe that interactive AR makes learning more enjoyable.	4.44	.683	High
E11	I believe that learning through interactive AR is more effective.	4.39	.677	High
	Average	4.045	.527	High

Based on Table 5 above, the interpretation of the data shows that students' perceptions of the need to use interactive AR in learning are at a High level with an overall mean score of 4.045 and a standard deviation of .527. This result shows that students who "believe that interactive AR should be used as a learning material" is at a High level. All items recorded a High mean score. The item that recorded the highest mean value was "interactive AR makes learning more enjoyable" with a value of (M= 4.44, SD= .683) followed by the item "interactive AR can facilitate complex learning concepts" with a value of (M= 4.43, SD= .623). Next, two items recorded a mean value of 4.42, namely "interactive AR makes information more informative and interesting" (SD= .631) and "interactive AR can increase creative thinking" (SD= .640) followed by the item "interactive AR motivates students to study more diligently" with a value of (M= 4.41, SD= .639). In addition, there were three items that recorded a mean value of 4.39, namely "interactive AR makes information easier to understand" (SD= .669), "interactive AR motivates students to study more diligently" (SD= .626), "learning through interactive AR is more effective" (SD= .677) and "interactive AR increases focus in learning" with a value of (M= 4.34, SD= .691).

Discussions

An interactive teaching module based on design and development research (DDR) can be used as a method to construct the desired module after a review of the literature and prior scholarly perspectives. 184 students from the Bachelor's Degree in Arabic Language Studies at UniSZA who had completed the Ibn Hisham Syntax Text Study course participated in the Needs Analysis phase. A questionnaire was used to gather data, and the Statistical Package for Social Science (SPSS) version 27 programme was used to analyse the data and determine the mean values and standard deviations. The objective of this phase was to determine the needs of the students in order to design interactive teaching modules. The descriptive analysis's findings demonstrated that students used technology-based learning resources at a moderately high frequency. Using digital devices like computers, tablets, cellphones, and others to aid in learning was the most common learning resource employed by students. In order to effectively make the use of information technology and, when used properly, aid in increasing the quality of learning, such gadgets have become essential in TnL nowadays. This is supported by a study by Razali and Khalid (2021) which states that the use of mobile devices can help the teaching and learning process become more flexible and effective through the use of technology such as mobile applications. Moreover, metacognitive skills in solving problems in a subject can be developed. The use of technology-based learning support materials to assist in additional understanding in a subject also recorded a high mean score. One example of learning support materials is using AR technology such as a study conducted by Daud et al. (2020) who believe that students experience problems in understanding theory and knowledge, especially those involving visualisation skills, can be overcome by using AR as a learning support medium. Both of these items recorded the highest mean score of two and clearly indicate a need to develop a learning module that can help students and lecturers access information more interactively and effectively.

In addition, the issues and problems that arise for conventional learning approaches are also a factor in the need to develop this module. According to the results, the majority of students concur that they have difficulty grasping complicated concepts and feel that there lack sufficient illustrations or explanations to grasp a subject. If the presentation approach fails to meet the goal of giving students comprehension, the absence of examples, explanations, and complicated concepts in a topic will become more challenging, making students easily bored and less interested in studying. Because it can condense complex information and present it with visually appealing 3D or 2D images in the real environment, this AR technology has features that can satisfy one of the interactive TnL techniques. According to a study by Daud et al. (2020), students' problems in understanding theory and knowledge, especially those involving visualisation skills, can be overcome by using AR as a learning medium. AR technology needs to be expanded in education because of its potential as an interactive method that increases student motivation and enriches their learning experience (Samad, 2023). Therefore, other issues and problems faced by students such as time constraints when trying to understand a subject in a short period of time, the high cost of additional physical reference materials, the lack of electronic materials on the Internet, rarely having access to interactive learning materials, difficulty in communicating with lecturers and friends outside of lecture hours and only being exposed to conventional teaching approaches (only based on lecturer explanations) which are boring and do not help understanding, are significant reasons for the production of innovative, simple, flexible and interactive technology-based learning support materials.

Next, for the results of the analysis related to the tendency of using AR-based technology innovations in course learning, the data shows that students are interested in AR elements as learning aids that facilitate course learning. Despite being the most comprehensive primary source of information, textbooks' content and presentation style are less engaging, which may render students feel bored and cause them to ignore the crucial information in favour of simply reading the lengthy sentences. This causes students to need an interactive learning module such as AR technology to overcome all these issues. AlNajdi (2022) stated that teaching aids must be effective, easy to use, able to increase student interest and as reference material by students that can be easily accessed. Improving the use of AR among Malaysian teachers requires clear, easy-to-follow instructions that are tailored to their current needs (Sofaruddin et al., 2016). According to the findings, students are more likely to be drawn to AR modules that include vivid and graphical notes, information with eye-catching images, and references, in addition to other aspects like interactive audio explanations, technology applications, and visualisations. AR technology has all of these characteristics. These days, augmented reality (AR) applications mixed with text, graphics, video, and audio can be superimposed on students' surroundings in real time to enhance their learning (Mukayah & Din, 2021).

Furthermore, students think that interactive AR apps are essential for the creation of Arabic syntactic learning modules in the Quran, according to the results of the analysis of the needs to interactive AR. According to them, AR enhances the enjoyment of studying. This coincides with Fitria's study (2023), the use of Augmented Reality (AR) technology in learning makes the learning experience more focused and interactive, thus increasing the rate of information processing among students. Students also believe that AR-assisted learning can increase motivation to learn and can facilitate complex learning concepts. According to a study by Nurbekova and Baigusheva (2020), there is a need for AR-based digital educational resources since they can enhance the learning process in a number of manners, such as by making learning materials more engaging and simpler to comprehend, enhancing the visual clarity of learning content, and aiding in the explanation of theoretical concepts. Additionally, interactive AR can improve students' ability to think creatively, make information more engaging and informative, encourage them to study harder, make information easier to understand, and help them focus so they can more effectively assimilate all of the information they are given.

As for the learning activity elements and module evaluation, all elements were agreed by the experts with a 98% agreement percentage for both components. Activities are an important element in a module to attract student's interest and add value in understanding the topic more deeply. Assessment also plays an important role as an indicator of a students' understanding.

Conclusion

In conclusion, the integration of technology in the teaching and learning process has become an important requirement in the field of education. Technology functions as a teaching aid (ABM) that has the potential to increase student interest, stimulate active learning and create a more conducive learning environment both inside and outside the classroom or lecture. Therefore, the use of technology should be utilised by all educators covering various subjects

or subjects. This becomes more significant in the context of teaching subjects that are less interesting or considered difficult to understand by students, such as Arabic syntax.

Based on this Needs Analysis study, the findings show that students are more likely to choose technology-based learning methods when learning Arabic syntax compared to conventional methods. In this regard, the majority of respondents agreed with the proposal to develop an Arabic syntax learning module in the Quran based on Augmented Reality (AR) technology or its abbreviation AR-Kahf. According to the study, students can better grasp the role and placement of each sentence structure component by using augmented reality (AR) technology to explore syntactic elements like subjects, predicates, and objects, word types, and selected stories in two or three dimensions. Particularly for students who lean toward a visual learning style, this method not only raises the level of student comprehension but also makes the teaching and learning process more engaging and successful.

Therefore, the integration of technology into the teaching and learning process has become an essential requirement in contemporary education, serving as an instructional medium capable of enhancing learner engagement, stimulating active participation, and fostering a more conducive learning environment, particularly for subjects perceived as challenging such as Arabic syntax. Findings from this needs analysis reveal a strong preference among students for technology-mediated approaches over conventional methods, with the majority supporting the development of the *Arabic Syntax in the Quran* learning module based on Augmented Reality (AR) technology, hereafter referred to as AR-Kahf. By enabling learners to visualise and interact with syntactic components such as subjects, predicates, objects, word classes, and selected Quranic narratives in 2D 3D formats, this approach facilitates deeper comprehension and sustained interest, particularly among visually oriented learners.

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