# Possible Youth Acceptance and Contributing Factors of Virtual Reality Application for Islamic Content Learning

## Mohd. Fitri Yusoff, Juliana Aida Abu Bakar, Ruzinoor Che Mat

*Abstract: In today's digital world, there are increasing uses of technological applications in various fields; including business, education, military, and others. There are many advantages that have been discovered by the utilisation, especially for virtual reality. One of the current promising uses is in the area of learning and teaching of religious contents particularly Islamic contents. Even though there is amyriad of Islamic content applications, it is still fewer compared to other non-Islamic content learning exposure. However, it is wondered whether the use and acceptance of the technological approach, particularly virtual reality application is related to religious concerns and has a religious impact on the users. Technology acceptance model (TAM) can predict as well as evaluate the effect, but there are other factors that need to be considered for investigating the users' intention and acceptance towards Islamic content applications. The unreligious factors are prominent, but concurrently, certain factors from the Islamic perspective are crucial for Islamic content learning. Therefore, this paper discussed several literatures on the study background and the possible factors for the topic. Finally, this paper proposed the conceptual model of virtual reality application acceptance for Islamic content learning namedi-TAM.*

*Keywords: Virtual Reality; Islamic Content; Learning; Acceptance; Youth*

## I. INTRODUCTION

The diversity and growth of technological apparatuses and tools are transforming the way people learn. As people use these items in everyday life, computer technology is the most developed technology at the time. The technological advancements make a lot of computer and mobile applications emerge to solve various problems from simple to complex ones. [1]states that the technology is a powerful tool that can change a person's attitude, actions, behaviours, and feelings. In learning, technology also tends to promote long-distance learning via Internet technology.

One of the common tools related to technology and learning is e-learning. In the broadest meaning, e-learning can be described as instructions delivered in a variety of electronic media technology approaches such as through the Internet, intranet, CD-ROMs or interactive TV[2]. By using e-learning, learners are able to retrieve and complete various activities in the learning process.

Even though there are still debates on the continuous use of e-learning system[4], in some other ways it seems to be fruitful as learners can set their own pace of learning with the instructions from the instructors or teachers by promoting autonomous and repetitive learning material as well as immediate feedback[2]. Furthermore, the availability and applicability of multimedia technology has strengthen the use of e-learning for learning purposes[5].

Many advantages have been discovered and proved by using the power of technological approaches in those fields. There is a massive exposure to the utilisation of technology in various learning contents such as science, mathematics, history and others, but it seems to be scarce for Islamic content utilisation and not too widely used[6][7].Therefore, one of the current promising uses is in the area of learning and teaching of religious contents, particularly Islamic contents [6].

Previous Islamic contents were developed for numerous age levels such as for adults, elders and children. For example, the contents are related to *Wuduk* (ablution), *Solat* (pray), *Hajj* procedures, *Umrah* procedures, *Zakat*, *Tajwid* and *Quranic* recitation, *Solat*,funeral rites and others. Even though the Islamic applications exist, how those applications affect the Muslim youth whilegaining Islamic knowledge remain inconclusive. As Islam emphasises the worshipping acts of its believers[8][7], no actions in a believer's life are useless but as a way to make the person closer to the creator and have a better understanding about the religion itself[9]. Therefore, it is believed that it is possible to have some internal or religious impact on the learners after using a technological learning approach, for example through the utilisation of virtual reality and multimedia technology..

In doing so, investigating the effect would be crucial. One of the utmost models for investigating a technological approach effect on the users is the technology acceptance model (TAM). TAM has been widely used in many areas for evaluating the users' acceptance towards new or existing approaches of learning. However, one of the most obvious limitations of TAM is that most of the theories related to TAM originated in developed countries such as the United States of America [10]. Previous studies discovered that different cultures give different outcomes when it comes to the behavioural intention. Different cultures respond differently compared to the theories' origins (western countries) and some of them are related to the social influence of the culture [11].

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TAM has practically used to investigate the intentions; nevertheless, there are studies showing the insufficient power of perceived usefulness and perceived ease of use in behavioural intentions, TAM requires extensions and more studies to investigate the effectiveness of those factors [10]. Furthermore, when it comes to religious studies, there is still a lack of investigating factors for acceptance in religious information technology (IT) applications. In fact, there are attempts to investigate important IT factors such as in [12][13] and [14], but more in websites and not in acceptance. There are several models proposed by previous Islamic scholars that are related to motivation from the Islamic perspective. One of them is Taqwa model, which seems to be beneficial in evaluating Islamic content in virtual reality applications.

Hence, as an attempt to understand the related topics for future studies, this paper discusses the background of the focused topics such as youth and technology, virtual reality and learning, persuasion through technology, previous studies on Islamic content learning applications and TAM. Then, this paper discusses possible acceptance factors and contributing factors of virtual reality application for the learning content, which continues with the proposal of an initial conceptual model on the matters called *i*-TAM.

## II. BACKGROUND OF THE STUDY

### Youth and Technology

Starting decades ago, technologies are moving rapidly. In the learning domain, the conventional method that used only chalk and board has evolved towards the use of technology such as a computer, the Internet, intranet and smartphone as the teaching and learning tools[2]. Even though the use of technology in learning does not give a positive impact every time[15], it is well established that somehow the technology use in learning makes learning more attractive, engaging and even contributes towards better performance for the learners[16][17]. In view of technological learning with vast utilisation among the higher and governmental education whether for formal or informal learning; it can be said that most of the technological utilisation is around the age of the youth[18]. Computer technology and smartphones are the common tools that can be used by the youth in their learning process. Referred to as 'digital natives', the current children or youth are surrounded by technology in their daily life[18]. Basically, when discussing computer technology, it actually covers a lot of systems and applications that can be run within the computer apparatus. In using the computer as a tool, while the computer programmes can be myriad[17].For example, the computer can be used to run artificial intelligence system, expert system, multimedia applications, virtual reality, augmented reality, games and so on. Thus, it is not wrong to say that computer technology is the major requirement to run any learning systems and applications. The sophistication of current technology is undeniable.

### Virtual reality and learning

Virtual reality is defined as any 3D systems that permitreal-time interaction, can be visited by users and not compulsory to resemble the real world[19]. [6]describes virtual reality as a technology that allows computer-simulated interaction between users and computer.

In fact, there are numerous definitions of virtual reality, which broadens over time. However, the main idea ofvirtual reality is the illusion of any real world or imagination world that uses 3D objects and environment, and users can interact with the objects and some permitsmanoeuvre in the built environment[20][6]. Virtual reality trainsusers' mind to be in different dimensions, whereby it inspires symbolic interactions within a usual computer application. For that reason, [21]observes that virtual reality requires users' skills and participations to interact with the environment.

Learning by using virtual reality offers unique experience in gathering knowledge and facts, including to attract the youth. One of the benefits is, it enables the users to visualise 3D objects, its environment and the dynamic interaction between them simultaneously[6]. This is the reason why learning with virtual reality offers multiple learning processes to the users[22]. Virtual reality is a powerful human-computer interface[23]. There are several advantages of virtual reality utilisation in learning as specified by[24]:
• Users can view a close-up object
• Users can experience the interactions at their own pace
• Users can truly experience and use virtual reality
• Users can be active participants in the process
• Users can feel a sense of immersion and presence

On the other hand, virtual reality is cost-effective and can be set up only by using minimum apparatuses such as the desktop-based virtual reality[6]. Virtual reality enables learners to interact with the simulated environment. Dynamic interaction and self-manoeuvre give advantages in understanding complex and important procedures in the learning content[25]. In addition, users can experience semi-immersion of the virtual reality environment by using 2D interfaces or fully-immersion by using 3D interfaces. Furthermore, virtual reality training can be used as a standalone training method. It is a useful tool to educate and train individuals in an environment that is not threatening, relaxed and allows users to learn from their mistakes without consequences[26]. There are other technologies for training such as computer-based training, web-based training and many-more. However, virtual reality is still in the first line-up, as it can also facilitate complex or dangerous training procedures. [27]states that in virtual reality, 3D objects can be constructed similarly as the real world objects. This technology offers a high level of interactivity and immersion whether by using high-end or only computer-based apparatuses. Furthermore, virtual reality can be a standalone application as it will not depend on an Internet connection to be run.

### Persuasion through technology

Previous studies have stated that technology be used to persuade people to do the targetedbehaviour. Certain technologies allow behavioural or attitude training for targeted behaviours so that the users can consume positive attitudes or positive outcomes for health, learning memory and so on.

The technology can be designed according to the targeted behaviour. In other words, technology can be utilised to achieve the desired goal from a computer-related programme, application or product.

[1]discusses several strategies that can be referred to design and develop a computer application that has can persuade the users' positivity on their belief, attitudes and behaviours. These strategies are great guides to understand on how to make computer programmes or products have persuasion impacts on the users. Table 1 explains those strategies by their categories.

**Table. 1 Persuasion strategies through technological approach[1]**

| Category | Principle | Explanation |
|---|---|---|
| Persuasive Tools | Reduction | Use the technology to emphasise a complex behaviour by making it simple so that the users are persuaded to perform the behaviour. |
| | Tailoring | The content in the computer application will be persuaded if the content is developed based on the users' preferences, needs, interests and other individual and relevant factors. |
| Persuasive Media: Simulation | Cause and Effect | The simulation in computer application will be able to change the users'behaviour and attitude if they can observe the immediate cause and effects by doing certain habits regularly. |
| | Virtual Rehearsal | Technology can be used to rehearse the determined attitude and behaviour in real life, which can become a habit later on. |
| Persuasive Social Actors | Attractiveness | Attractive computing application can basically attract people so that an attractive application can also be a persuasive tool. |
| | Similarity | A technological application that has similarities with its users (by emphasising the differences in gender, age or others) and cater to their needs will be able to persuade them compared to the applications which are not. |
| Credibility and Computers | Trustworthiness | Computing technology needs to be trustworthy and unbiased to persuade people. |
| | Expertise | An application that incorporates expertise in experience, competence or knowledge will have more power of persuasion. |
| Credibility and WWW | 'Real-World-Feel' | The credibility of a website which highlights its people and organisation for their services will have more persuasion effect on its users. |
| | Responsiveness | A website needs to be very responsive to persuade its users. |
| Persuasion through mobility and connectivity | Mobile Simplicity | A simple and easy mobile application can persuade the users more than a complex one. |
| | Social Learning | The power of persuasion can be increased if people can observe other people's progression in the same environment. |

**Previous exposure of technological application for Islamic content learning**

In the research and academic field, previous studies have shown numerous designs, developments and implementations of Islamic content learning. Even though there is limited exposure of technological utilisation in this type of learning content, there are still researchers and academicians who attempted to look into this matter. Attempts such as investigating and proposing a variety of research ideas can bring light to the technology adaptations for Islamic content employment.

Concerning technology and Islamic content learning, technology has been utilised for much learning content delivery and has also been proven to be very successful for making learning more entertaining and well-conveyed[2][17]. For that reason, there are studies related to the technology used in Islamic content learning. In view of the Islamic learning with content being dry and there are a

lot of facts and rules to remember, technology opportunities can be utilised to make Islamic content delivery more attractive and effective[8]. [28]proposes a design and development of E-Halagat (electronic halagat), which helps learners to recite the Quran in the correct way similarly as in mosques or schools. The most important feature is the system is the system is built for four different types of users; learners, parents, tutors and supervisors in which the learners' groups are divided into two; adult and children. As each learnerhas different capabilities, E-Halagat has been set up within four parameters: the beginning of memorisation, verse length to be memorised, verse length to be revised, and previously-memorised verse review.

As technology encompasses a wide range of fields such as information retrieval, multimedia technology, experts systems and so on, [29]study concentrated on the search and information retrieval in the Quran. Quran has many verses, which are approximately 6236 verses with many stories and keywords behind each verse so the retrieval of specific verses with the correct translation is somehow troublesome. Therefore, they proposed the use of the concept of ontology of the semantic web to facilitate the information search. Generally, the Quran has several different words with similar meaning, for instance, the word for a camel is 'abal, buaaeer orgamal'. By using SPARQL query language, the search algorithm integrates, merges and maps the domain ontologies under the major keyword of the upper ontology.

[30]implements a virtual reality application for Islamic funeral rites as shown in Fig. 1. By adapting several theories and guidelines such as constructivist, cognitive-affective theory of learning and signalling principles, the application helped the learners gained better comprehension of the Islamic funeral rites. The application covered several prominent topics such as the practices for early death, bathing, wrapping, praying and lastly, burying the body.



**Fig. 1 Example of virtual reality application for Islamic funeral rites learning for signalling**

As illustrated in Fig. 2, [6] implements a courseware that covered both multimedia and virtual reality technology for *Hajj* procedural learning. Covering all the essential procedures for performing *Hajj*, the application called V-Hajj enabled the learners to manoeuvre the proceduralsteps such as throwing the *Jamrah*, *Sa'ei* and *Tawaf* by using the virtual reality technology. The walk-through capabilities by using 3D environment mirrored the acts of actual pilgrimage in Mecca is one of the V-Hajj strengths in the application. Besides that, various multimedia elementswere used to explain the procedures in the courseware, such as; for both text and audio instructions, Quranic verses and many more.



**Fig. 2 Example of V-Hajj virtual reality application for learning Hajj procedures, which encompasses both multimedia and virtual reality environment and enables the learners to walkthrough in the environment like the actual acts in Mecca.**

[7] develops an application for sex education learning based on the Islamic perspective as portrayed in Fig. 3. By employing the cognitive theories of multimedia learning and multimedia principles, the application used multimedia technology to convey the sex education learning content. The contents were derived from a well-known book by Abdullah Naseh Ulwan, which emphasised the awareness of behaviour *(adab)* such as behaviour for sleeping, clothing, friendship, worshipping towards Allah and others.

Sex education is common in the western countries so the contents were more tailored to the western countries, which particularly involvedsafe intercourse for avoiding diseases and related matters. However, it is very different from the Islamic perspective and how it deals with the cause and effect of illegal acts in the education.

Instead of investigating the application among the children or youngsters, the application investigated the motivational effects between the parents as the early education of sex education starts from home, which is by the parents.



**Fig. 3 Example of Islamic sex education application developed for understanding the sex education contents from the Islamic perspective.**

Besides standalone applications, there are also Islamic applications that have been commercially used to convey Islamic content. There are several Islamic websites for tajweed learning, Hajj procedures and more. For example, Quran Explorer, which is a well-known Quranic recitation web application for Muslims. The website was founded in 2005 in Florida, the USA by a Muslim community.

Since then, the website has evolved into another knowledge teaching platform such as marital matters, prayer, Hadith and supplications. Quran Explorer has many functions such as translation in seven languages, audio recitations by famous Imams and other functions such as fonts, verses and colours. Fig. 4 shows the example of the application interface.
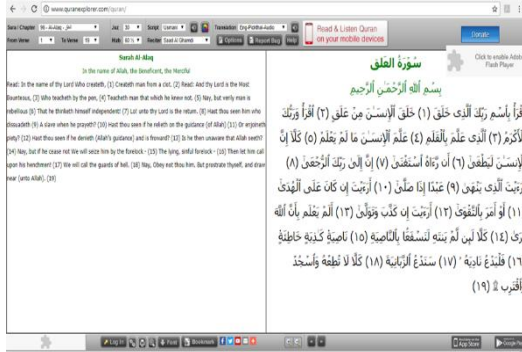


**Fig. 4 Example of web-based Quran application named Quran Explorer for facilitating Quranic recitation and translation for the learners. Besides for laptops, Quran Explorer is also available on mobile application (source: http://www.quranexplorer.com/).**

### TAM and its several enhancements

Technology acceptance model (TAM) is one of the most widely used models in the evaluation process. According to [31], TAM is a model that has a great success in evaluating applications related to information technology (IT). The model is simple and easy to be applied in the evaluation phase. It is a theory that models, explains and predicts users' behaviour (acceptance) of IT. Besides, TAM is developed based on the theory of reasoned action (TRA) as its theoretical foundation. TRA is derived from the social psychology area, which asserts the study of behaviour and attitudes of humans[32][33]. It suggested that a person's behavioural intention is relied on the person's attitude about the behaviour. If a person intends to do the behaviour, then it is likely that the person will do it.

By adapting TRA, TAM provides the basis for predicting the acceptance towards IT [10]. According to [32], perceived usefulness and perceived ease of use factors are the fundamentals needed for evaluating the users' acceptance. TAM refers mainly to those two main factors which are related to the intention to use and system use [10]. Perceived usefulness refers to the degree to which the users believe that using the technology will improve their performance. [32] states that the attributes measure whether the system increases the work performance or not. Meanwhile, perceived ease of use stresses how effortless using the technology will be. It refers to the system whether it is easier to be used, saves energy and has the intention to be used repeatedly.

Generally, both are considered different factors in influencing users' attitude towards the technology use. The perceived ease of use is also hypothesised to influence perceived usefulness and attitude towards technology use. Finally, such attitude towards technology use determines the behavioural intention to use that technology.

Fig. 5 illustrates the original TAM model. It shows how the external factors influence the attitude and intention to use of a user to a system. In summary, TAM has four factors to predict IT system usage, namely perceived usefulness, perceived ease of use, attitude and behavioural intention.
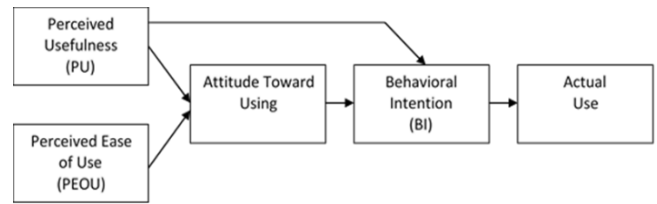


**Fig. 5 The technology acceptance model by [33].**

One of the most well-known TAM extensions from the original TAM is called TAM2 proposed by [34] as depicted in Fig. 6. TAM2 is developed for investigating some of the excluded factors in the original TAM. The new factors are circled into two types of theoretical processes; social influence processes and cognitive instrumental processes. Social influence processes investigate the factors of subjective norm, voluntariness and image, while cognitive instrumental processes investigate four factors,namely job relevance, output quality, result in demonstrability and perceived ease of use.[34] finds that both social influence processes and cognitive instrumental processes have significantly influenced the users' acceptance towards IT system.

One of the most influenced factoris thesubjective norm. Even though the results from the subjective norm use were different, some of them were significant and some were not [10].However, [33]emphasises that the factors of social influences of the behavioural usage are important and need to be investigated widely. Compared to the original TAM, the TAM2 model has been criticised as less parsimonious and more complex [10].
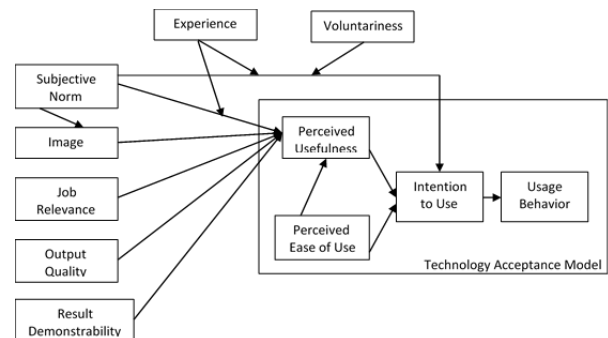


**Fig. 6 Extension of technology acceptance model (TAM2) by [34].**

After extending the version of the original TAM, in 2008, [35] proposes a new version of TAM called TAM3. TAM3 is an integrated model which decomposed and investigated further details of perceived ease of use factors for IT adoption and use. In this new version of TAM, [35] adds several new factors such as computer self-efficacy, perceptions of external control, computer anxiety and computer playfulness for anchor factor as well as objective usability and perceived enjoyment in the adjustment factor as illustrated in Fig. 7.

TAM3 also tested three relationships that have not been tested in previous TAM2 and other studies [10]. Therefore,[35] suggests that "experience will moderate the relationships between (i) perceived ease of use and perceived usefulness, (ii) computer anxiety and perceived ease of use,and (iii) perceived ease of use and behavioural intention".

Basically, TAM3 was proposed to help managerial personnel make decisions related to the implementation of IT in the workplace. For minimising the percentage of adoption failure, TAM3 investigated the aforementioned factors including the existing factors from previous studies on TAM2.
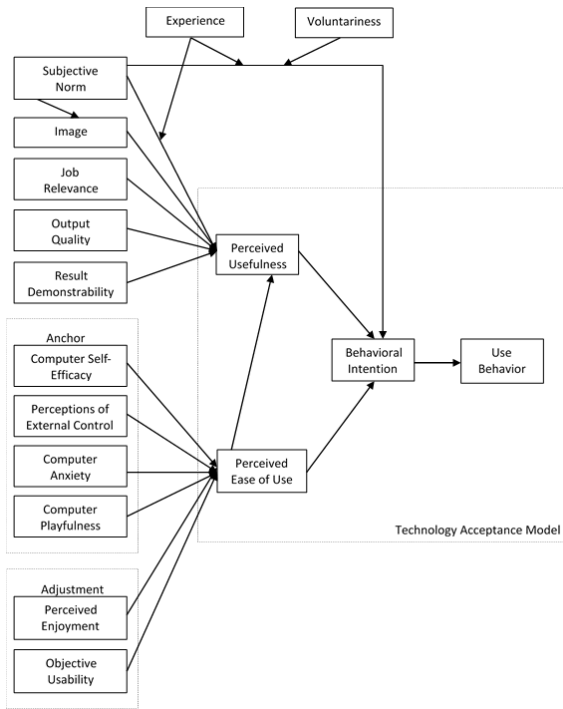


**Fig. 7 Extension of technology acceptance model (TAM3) by [35].**

### III. METHODS

In order to determine possible youth acceptance and contributing factors of Islamic virtual reality application for learning, content analyses were performed by using several keywords such as virtual reality, TAM and Islamic content learning from Google Scholar and open access journal services.

Several inclusion standards of the resources have been adapted from [36]; (a) the main references were related to virtual reality, TAM and Islamic learning content, (b) human learning, not for robots or machines, (c) normal users (youth) without disabilities and (d) English and Malay references were applicable since the focus was Islamic content learning. There were 43 resources used from 1989 to 2016including journals, proceedings and books.

### IV. RESULTS AND DISCUSSIONS

This paper determines possible youth acceptance and contributing factors of Islamic virtual reality application for learning. Basically, the factors of social influences, interactive visual-generated experience, information architecture

and Islamic learning content factors have been merged into TAM and *taqwa* model.

The following discussions lead to the initial proposal of a conceptual model of *i*-TAM. In general, the discussions show how the factors and *taqwa* model factors are relevant to be merged into the proposed initial model, *i*-TAM.

### Behavioural intention and motivation factors from the Islamic perspective

Each individual, particularly a Muslim, has the intention and awareness to follow and practise a good way of life to avoid any mistakes. However, for decades, people tend to refer to well-known western psychologists and theorists such as Sigmund Freud, Carl Rogers, Albert Ellis, Eric Berne and others as a guide in their life or way of thinking. Western theorists tend to simulate techniques, guidelines, solving methods and applications within the socio-psychological points of view of their culture[9]. According to[9], some of the western theorists and psychologists equalised animal behaviours to human behaviours (in the behavioural study) and this is very wrong as a human being is a creature of praise in Islam. The analysis has been limited to only the behavioural aspect even though there are several other factors related to human beings. In fact, there are hundreds of theories and guidelines produced by Islamic scholars such as al-Ta'lim fira'y al-Qabisi' by Ahmad Fu'ad al-Ahwan, Falsafat al-Tarbiya 'inda Ibn Sina by 'Abd al-Rahman al-Naqib[37], Abdullah Naseh Ulwan and many more.

One of the most well-known theorists is Imam Al-Ghazali. Imam Al-Ghazali's real name is Muhamad bin Muhammad bin Muhammad bin Al-Ghazali Al-Tusi. He was born in 450H, equivalent to 1058AD in Khurasan, Parsi. Imam Al-Ghazali was also known as 'Hujjatul Islam' as he is a well-known Islamic scholar and a great thinker of Islamic philosophy and life including in ethics, *fiqh*, *tasawwuf* and many more. One of his major work and renowned book is *Ihya'u Ulumuddin* (The Revival of Religious Sciences). Al-Ghazali emphasised that the reality of human nature existence is based on 'Ar-Roh' (soul) and 'Al-Jasad' (physique).

The existence is no exception for religious relation, in view of Allah SWT creating humans in His mightiness. Al-Ghazali discussed a lot in his books about the nature of human behaviour in relation to Islamic views. He observed that all human behaviours are related to the internal decisions made by an individual, whether an action is needed or not. More importantly, a good role of '*Al-qalb*' (heart) leads to a good behaviour and action[9].

On the other hand, awareness is also important in Islam. Awareness can be defined as 'the knowledge that something exists, or understanding of a situation or subject at the present time based on knowledge or experience'. In fact, for decades, there are many studies related to awareness. Some of them are about technology awareness, innovation awareness, sexual awareness, belief and behavioural awareness, family awareness, health and disease prevention awareness and situational awareness [38].

Even though there are many studies related to awareness, there is one field that is understudied, which is the religious awareness. Muslims need to be aware of doing something in view of the right and wrong rules of Islam. However, as Muslims are faced with many problems (social and individual), they tend to lose their awareness and consideration of many things including knowledge seeking or learning.

Al-Ghazali's philosophy in learning elaborates a lot on the human nature truth and its relation to the religion. He noted that the most important thing in a human is the internal aspect. Internal aspect requires the *al-qalb*(heart), *al-aql*(mind) and *al-ruh*(soul) for a human being to behave positively or negatively. Seeking the knowledge or learning also requires good morals in order to find, learn, understand and practise the knowledge in life. Without good morals, an individual tends to feel lazy, uninterested in learning, and lastly does not understand or even know about knowledge, particularly the knowledge that is important to Muslims and compulsory to be learnt for further comprehension and practise.

"*Al-Ghazali does not deny the possibility that the way to attain true knowledge, the purpose and joy of the Muslim's life – a way chiefly through moral improvement – may also include stages of a systematic study of religious sciences*"[37]8.

On the other hand, motivational aspect is also crucial in learning. There are dozens of motivational theories proposed by previous theorists such as hierarchy of need theory, ARCS motivational theory, expectancy theory, self-determination theory, x and y theory, equity model and more. However, the most obvious things in the theories are they were developed in different cultures and comprehension from the Islamic perspective[39].

As a Muslim, the Islamic perspective is crucial in every aspect of life whether for business, military, marketing as well as for education and learning. The major point in the Islamic perspective is how a matter can turn a Muslim into a pious Muslim and increase worshipping to Allah. Of that matter, over the decades, there are several motivational theories based on the Islamic perspective proposed by Islamic scholars such as *taqwa* model, divine motivation, total motivation theory and others.*Taqwa* model was inspired by Shafiq Falah Alawney, in which he stressed that motivation in Islam is a complex topic that encompasses the real inner motivation and self-awareness within a person[40]. *Taqwa* can be defined as the fear of the creator, Allah, is represented by following all His orders and avoiding any disobedience in life. The motivation of the fear can guide a Muslim to act kindly and endeavour to accomplish all the rightful deeds to gain the creator's pleasure, which relates to the behaviour of a Muslim.

As depicted in Fig. 8, there are four components in the model, namely external or internal stimuli (*iman*), *taqwa*, *tahrid* and *tawbah*[40]. The *iman* refers to the knowledge associated with a matter in which it helps a person to determine a good or evil deed in daily life and acts towards the good one. The *iman* is closely related to the description of the *al-qalb*(heart), *al-aql*(mind) and *al-ruh*(soul) by the Al-Ghazali philosophy [9][41]. *Taqwa* is connected to the fear of the creator while striving to adhere to His orders and avoid any disobedience. *Tahrid* is the feeling of arousal in

which it links to the feeling to gain a high level of rewards for rightful deeds and lastly is *tawbah*, which is repentance.
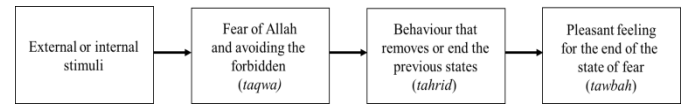


**Fig. 8 Taqwa model for motivation from the Islamic perspective.**

Divine motivation is developed by [42]. The theory consists of three elements, which are faith, religious intention or purposes and determination. In the equation form, the theory can be understood by:

$$MI \text{ (divine motivation)} = I \text{ (faith)} \times N \text{ (religious intentions and purpose)} \times K \text{ (determination)} \tag{1}$$

According to [42], the multiplication indicates the important variables which affect the existence of the divine motivation, whereby if I is zero, the MI will also be zero. In other words, there will be no MI if a matter lacks one aspect of faith, religious intention or purpose and determination.

On the other hand, the total motivation theory is pioneered by [43]. The model combines the materialistic and spiritual components within two layers which are materialistic in the outer layer and spiritual in the inner layer. The two components are interrelated and interdependent to each other. Any materialistic motivation drives such as money, recognition, rewards or others must be in the *halal* or permissible condition in which it is determined by the *iman* (spiritual) of a person.

According to [40],*taqwa* model is a robust model to motivate a Muslim towards good deeds and avoid any bad behaviour. In addition, the *taqwa* word has been emphasised 258 times in the Quran to show its importance in a Muslim life[44].

### Social influence factors in Islamic content learning

Social influences are important to an individual lifestyle[18]. One of the most investigated social influence variables is social norm. Social norm refers to how an individual perceives the others' thoughts and opinions when he or she performs a behaviour[10]. In the earlier technology acceptance model that emerged, even though there are arguments that social influences have no effect on acceptance[33], there are many studies that believe subjective norms are an important variable in technology acceptance[10][45][35][34][46]. According to[11], social influence impacts are differentiated by culture. Culture can be described as a group's social norms, belief and values, which influence the group's lifestyles[10].

### Possible application characteristic factors in Islamic content learning

Previous studies have shown that the characteristic factors of an application were essential in determining the users' behavioural intention and acceptance towards the proposed application. This paper elaborates three characteristic factors which can be important to an Islamic virtual reality application, namely virtual reality characteristics,

multimedia element characteristics and the Islamic content design.

## Interactive visual-generated experience

Experience is one of the utmost feelings brought by virtual reality environment to the users in a learning environment. Virtual reality is able to bring the users new experience, no matter for youth or elders[6]. Previous studies have discovered several virtual reality characteristics which are related to experience. The better the features developed for users, the better experience they will have. [47]identifies that presence is an important virtual reality factor which needs to be directed. Presence can be achieved by promoting the users' sensory interaction; and environmental factors, which also can encourage users' involvement. Presence is a subjective experience and sensation brought by computer-generated environment rather than the actual environment.

[23]describes in their study that virtual reality is I3, which is 'Immersion-Interaction-Imagination'. Immersion can be classified into two types: mental immersion and physical (sensory) immersion. Mental immersion refers to a state of being deeply engaged in a situation, while physical (sensory) immersion is the feeling of being there when the users move which requires visual, auditory and haptic devices to establish the scene. Users interpret the visual, auditory and haptic in information gathering and perform activities, which then the users will be physically immersed in the virtual reality environment.

[48]finds that representational fidelity or realism degree, and immediacy of control are the prominent factors in virtual reality for interaction and learning experience. Representational fidelity or the realism degree is the level of 3D objects or scenarios in the virtual reality environment that seems to be more similar to the real world. The objects, temporal changes for object motions and the whole scene are smooth enough to make the users feel as they are in the real world. Meanwhile, [49]refers to immediacy of controls as the ability of the application to give smooth movement during interaction, enabling the view position and direction, and the ability to pick up, examine and manipulate the objects or scenarios in the environment.

## Information architecture

Until now, the discussion about multimedia technology is never obsolete, rather has been expanded so well because the technology is rapidly innovated day by day. Multimedia is the use of various media elements such as text, graphics, animation, video and audio. Hence, it is crucial to wisely arrange and manage the elements in the layout to prevent any cognitive load as well as distract users' attention[5][47]–[49]. By that reason, there are a dozen studies concerning how to manage multimedia elements in the IT whether computer or mobile.

The interface design of a multimedia technology application is vital[53]. The selection and arrangement of the multimedia elements will determine a learning process outcome. The layout, colour, shapes, background, font, graphics, video as well as audio need to be properly designed so that the learning process is not disturbed by the overuse of information and multimedia elements. The visual aesthetics can evoke positive emotions of a user in which it may also lead to engagement in the system[54].

However, everything needs to be well-organised and fulfil users' limitation of cognitive and preferences. Not only to use attractive and meaningful multimedia elements for conveying learning information, but the consistency of the design throughout an application is also important[50].

## Islamic content design factors

With the advancement of information and multimedia technology, Muslim users are able to acquire and learn knowledge, facts, and information more efficiently and attractively. Therefore, there are studies concerning how the Islamic application is supposed to be looked at. Numerous studies focused on Islamic websites or I-webs[12]. [12]defines I-webs as the websites that the main purpose of existence is to convey Islamic contents and practices, which is another way to promote understanding. Table 2 shows some evaluations and identified features for I-webs.

**Table. 2 The examples of features of Islamic content websites**

| Features | Authors |
|---|---|
| Attractive, information (relevance, reliability), navigation, credibility, community. | [55] |
| Tawhid, sunnah, niyyah, sharia, moral values. | [13] |
| Design (navigability, interactivity, attractiveness), Islamic content (legitimacy, objectivity, authority, relevancy, credibility, reliability, trust) | [56] |
| Design features (usability, navigation, interactivity, accessibility, functionality, attractive, accessibility, functionality, attractiveness, security/privacy), content features (trust, authority, relevancy, reliability, credibility, objectivity, legitimacy), Islamic features (tawhid, sunnah, niyyah, ethics, identity, symbols, software) | [12] |

Whenever a technology devotes to Islamic content as the content, several sensitive issues need to be taken in order to protect the holiness of Islam. Applications or systems that have been developed for Islamic contents need to cover several issues to be accepted by the users[12].

Sometimes, the users may feel insecure and hesitate with the content in application or system whether it carries real and trustworthy information and facts about the Islamic content[57]. Thus, it is important to determine the content features or characteristics in a technology application or system so that it meets the Muslim users' requirements and expectations.

**The initial conceptual model of Islamic TAM (*i*-TAM) proposed for virtual reality application in Islamic content learning**

Based on the literature review, an initial conceptual model for Islamic virtual reality application in learning called *i*-TAM has been developed. The original TAM developed by [33] has been used in the study.

It is possible since the original TAM has been extensively applied in many studies as the base [10][58].

Furthermore, regarding the issues discussed in the study, the previously extended TAM did not fulfil the need of the study since theprevious works discussed the extension in many fields such as in organisations [34], mobile applications [10] and others[58]. Fig. 9 shows the proposed model of *i*-TAM.
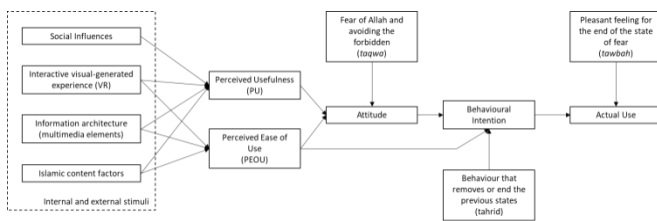


**Fig. 9 The initial proposed model for the study.**

Adapting the Taqwa model, the proposed model started with four proposed factors which are the internal and external stimuli in the Taqwa model. Those stimuli include any matters that provide knowledge to a person whereby the knowledge gives information on how something is right or wrong and good or bad [44]. [58]clarifies that external stimuli can refer to the developed features or characteristics, which are used to emphasise the knowledge transfer and then elicit a feeling of faith towards some matters (internal stimuli). Four factors have been recognised as a helping to obtain knowledge in the Islamic virtual reality application, namely social influences, interactive visual-generated experience, information architecture and Islamic content factors, which will influence the two major beliefs in TAM, perceived usefulness and perceived ease of use.

Social influences consider how surrounding people such as families and friends influence the utilisation[10][33] of the Islamic virtual reality application, and also the encouragement for approaching more to Islam from them [40] by using the application. Interactive visual-generated experience concerns the characteristics of virtual reality required for an application which is applicable for Islamic content, for example representational fidelity and immediacy of control[48]. Meanwhile, information architecture represents the utilisation of the multimedia elements in the application which can be the arrangement, layout and consistency [5][50]. Since the Islamic contents are related to Islam practices, rules and knowledge, thorough adoption of the content in the application is needed. The legitimacy, objectivity, relevancy, reliability, trust and credibility of the content in the application can be major influences on the acceptance and usage [12][56] of a virtual reality application.

Besides, attitude and behavioural intention can be the mediator determinants for the actual use of the Islamic virtual application. As an individual believes that performing a behaviour will lead to positive outcomes, he or she will perform the behaviour with a positive attitude while if the belief turns to negative, he or she will not perform the behaviour [45]. The *taqwa* feeling which concerns the Islamic awareness feeling towards something (e.g., knowledge of the study context) may act as the moderator towards the performing attitude for behavioural intention. The feeling of fear to Allah and retaliation motivate a person to perform behaviours that can achieve all the aforementioned matters[9][40][44]. The performing attitude leads to behavioural intention, and the awareness of the good and bad deeds' rewards for performing or learning Islamic content to increase the knowledge can be a significant moderator of the behavioural intention [40][44].

## V. CONCLUSION

This paper has discussed several topics related to the determination of possible youth acceptance and contributing factors of virtual reality application for Islamic content learning, which covers the topic of virtual reality, TAM and Islamic content learning.

Even though there are innumerable discussions related to technology acceptance in learning, the adoption of Islamic content is far behind other learning contents. Furthermore, there are other factors related to the learners' acceptance and effects of a technological approach such as from the internal and religious points of view. Islam is a worshipping religion which requires all the everyday deeds elicit internal or religious effects on a follower in approaching the creator and the religion itself. Hence, it is essential to determine the factors of technological approach, particularly in virtual reality application that can contribute to the acceptance from the Islamic perspective. The belief of perceived usefulness and perceived ease-of-use were determined by four factors, namely social influences, interactive visual-generated experience, information architecture and Islamic content factors, which are in the form of internal or external stimuli as stated in the *taqwa* model. Meanwhile, the components of *taqwa*, *tahrib* and pleasant feeling of rewards (*tawbah*) from the *taqwa* model have been added as the moderator in the attitude, behavioural intention and the actual usage of the study. The determined factors were depicted in the initial proposed model named as *i*-TAM.

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