The Role of Information & Communication Technology in Elearning Environments: A Systematic Review

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ABSTRACT The role of information and communication technology (ICT) in education continues to serve the development of teaching and learning for most subjects, and the subject of Islamic studies is no exception. However, to date, a systematic literature review (SLR) on the role of ICT for this particular subject is lacking. Therefore, to facilitate the implementation and adoption of ICT, we focus on e-learning for the majority of subjects, including Islamic education and ICT applications, e.g. educational software and the Internet, which are gaining exponential importance with time. This SLR considered research works in the literature that have been published in the temporal range of June 2007 to June 2020. We derived 41 publications from an initial 301 candidate publications, by applying the inclusion and exclusion criteria in two distinct rounds. This rigorous review explored teachers' and students' opinions on the application of technology, and shed light on the challenges to date, as well as the potential opportunities and future research directions. We also performed Tweet analysis in an example of public opinion available on social media, e.g. Twitter, for learning education through ICT-based methods. This study delivers several implications for researchers and practitioners, and provides insight on state-of-the-art. Our findings suggest that ICT-based teaching methods for learning Islamic studies as a research context require more attention. Further empirical investigation is crucial to better understand the impact of ICT practices and use, especially in the context of Islamic studies.

INDEX TERMS E-learning, information and communication technology, islamic education, public opinion, social media analysis, technology, tweet analysis.

I. INTRODUCTION

The primary role of information and communication technology (ICT) in the education system presents opportunities for teachers to upgrade teaching and boost students' overall performance [1]. The application of ICT in education is not limited to transferring knowledge from dedicated teachers to their students; it also allows for the real-time exchange of experience across a network of peers [2]. The impact of ICT in education can be seen to improve both teachers' and learners' capabilities, restructure the curriculum, create opportunities for more significant and comprehensive learning, and enhance teaching and learning skills in general [3].

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This growing dependency on technology has driven educators to reconsider their traditional teaching methods, and invest in the latest technologies and tools. There are various applications, devices and uses to teach and learn from ICT, such *as e-learning,* educational software and the Internet [4]. In terms of distance-based education, e-learning or learning technology remains a widely-used term. It helps both teachers and students provide access to knowledge through supervised activities, chats and discussion forums, and allows the exchange of academic materials. E-learning tools such as Moodle, ATutor, Eliademy, and Forma LMS are employed as open-source learning and management systems [5]. All these tools are widely discussed in the research literature, but there remains a paucity in the literature on teachers' and students' perceptions of e-learning.

Using this as motivation, we discuss the state of the current e-learning literature, with students' and teachers' perceptions through stated opinions towards ICT, and explore the challenges and underlying benefits of using ICT. Perceptions are subjective views, feelings, feedback or opinions of users, such as students and teachers, derived from one's mind, using some instance such as e-learning or learning technology. The analysis of opinions play an vital role in finding the challenges, strengths and weaknesses, and binary positive-negative sentiment associated with any entity, and this in turn helps in the betterment of future systems and policies [6].

Although the application of ICT is becoming a necessity, the adoption of ICT is challenging [7]. Despite the extensive use of ICT, the application remains challenging for teachers and students alike.

A primary gap in the current literature is that ICT investment is still largely developed for science education, and this is demonstrated through extensive research, but for other areas such as Islamic education, this remains limited. It is noted that teaching Islamic education in countries wherein the primary religion is Islam, remains focused on traditional ways of learning [8], although Islamic education is increasingly demonstrating innovative technology. It is evident that 21st century learners are more technology-oriented, and they are using increasingly ubiquitous online learning tools to acquire information [9]. Ever since the emergence of the Web 2.0 in the late 1990s, there has been a wide range of literature available on this subject. Simultaneously, the international Muslim community faces significant challenges in engaging with mainstream education systems. This can be seen as a prominent reason why Islamic schools have been gradually re-emerging [10], although there is no religious barrier in accepting ICT practices in Islamic education. The Quran supports the development of knowledge and the production of scientific thinking methods [11]. Accordingly, we have perceived that learning through scientific methods is purely Halal, and is highly encouraged in Islam. This study elaborates on exploring the relationship between the learning of Islamic education through information technology services and tools. The motivation is (1) to introduce the importance of user's opinions, which encapsulate useful information about learning through e-learning, (2) to shed light on the aspects that may further improve the teaching quality in Islamic institutions, and (3) to facilitate the application of emerging technologies. Therefore, the primary aim of this survey study is to investigate and highlight two related areas of research, namely: (1) students' and teachers' opinions and practices of ICT applications such as e-learning; and (2) the current practices of ICT and e-learning that are tailored for Islamic education.

The main contributions of the paper are as follows:

- Teachers' and students' perceptions toward ICT on e-learning are discussed, and challenges and opportunities are identified.
- Analysis of public opinions on social media (tweets) and future directions for ICT-based methods are discussed.

- Prospective directions for Islamic education teaching through ICT tools are identified.

This paper is organized as follows. Section 2 presents the research questions and the method adopted for conducting this survey. The results are reported in Section 3 and discussed in Section 4. Implications and future directions of the study are outlined in section 5. Finally, Section 6 entails the conclusion of the study.

II. RESEARCH METHOD

This review paper has been followed by the protocol and guidelines [12], [13]. According to this, we have proposed the following research questions.

A. RESEARCH QUESTION

This work aims to investigate teachers' and students' opinions and perceptions toward the use of e-learning and develop an understanding of the necessity of information technology tools used for teaching and learning Islamic education. Based on our research objectives, we have formulated the following research questions (RQ's).

1) (RQ1) WHAT ARE STUDENTS' AND TEACHERS' OPINIONS ON E-LEARNING FOR EDUCATION?

This research question aims to recognize teachers' and students' opinions and perceptions of e-learning for learning and teaching. Besides, we perform analysis of real-time public opinions (or tweets) on ICT tools under #e-learning. The results obtained will help (1) identify useful information, e.g. positive and negative sentiment, challenges, opportunities and motivational factors using ICT-based teaching and learning methods; and (2) bring awareness on the use of user-friendly ICT tools for teaching and learning.

2) (RQ2) WHAT PRACTICES OF INFORMATION TECHNOLOGY ARE ADOPTED FOR LEARNING ISLAMIC EDUCATION?

This research question aims to describe the ICT methods discussed in Islamic education and the learning literature. The findings would help to recognize emerging trends and provide a potential solution to resolve the obstacles for accepting IT resources in Islamic education. It will also increase the focus of research that is not yet well studied.

B. DATA SOURCES

We have followed the systematic literature review (SLR) process by [14], [15], who recommend searching several electronic sources. We have used the prominent well-regarded electronic databases presented in Table1.

C. SEARCH STRING

Based on our proposed research questions, we have derived the following keywords for the search string: "Information technology and Islam", "Information & communication technology practices", "Information &

TABLE 1. Search sources.

Electronic database	ACM Digital Library Springer IEEE Xplore ScienceDirect Taylor and Francis Wiley Google Scholar
Selected items	Journal and conference papers
Search applied on	Full text to find papers within the scope and defined by Search keywords in the title or abstract.
Language	English
Publication period	From January 2007 to 2020

TABLE 2. Papers reviewed and validated.

Database	No.of RP	Round 1		Round 2	
		In	Ex	In	Ex
ACM Digital Library	50	10	40	2	8
IEEE Xplore	25	10	15	2	8
Springer	12	6	6	5	1
Google Scholar	22	20	2	15	5
ScienceDirect	163	57	106	15	42
Wiley	19	4	15	1	3
Taylor and Francis	10	5	5	1	4
Total	301	112	189	41	71

communication technology and Holy Quran", "Information & communication technology and learning of religious education", "Information technology-based learning methods"," Information technology and e-learning"; "e-learning and students/teachers opinions", "e-learning and students/teachers perceptions", "students/teachers opinion/perceptions on ICT", "e-learning adoption", "online learning environments", "e-learning and multimedia", "e-learning and Internet", and "e-learning and education".

D. INCLUSION/EXCLUSION CRITERIA

For the inclusion of relevant studies in the review, the papers' abstracts were inspected, and the following inclusion criteria were extended. Selected papers were (I1) peer-reviewed; (I2) in the English language; (I3) empirical research papers; and (I4) published between January 2007 to 2020. Articles that did not meet the inclusion criteria were excluded from the study. We also filtered out publications that matched any of the exclusion criteria: (E1) papers that do not focus explicitly on information technology such as e-learning; (E2) papers that do not discuss ICT for learning Islamic education; (E3) papers that do not discuss students' and teachers' perceptions or opinions on e-learning; and (E4) 'grey' literature, e.g. working papers, project deliverables, and PhD theses. Therefore, the final selection consisted of 41 studies (see Table 2). Figure 1 shows the flow of the SLR selection process.

No of retrieved papers represents No.of RP
Included represents In
Excluded represents Ex

E. QUALITY ASSESSMENT

This SLR uses the quality assessment to determine the strength of the selected studies. The criteria used by [14], [15] were applied to analyze the quality of the selected studies. Table 3 presents the quality criteria of each selected study
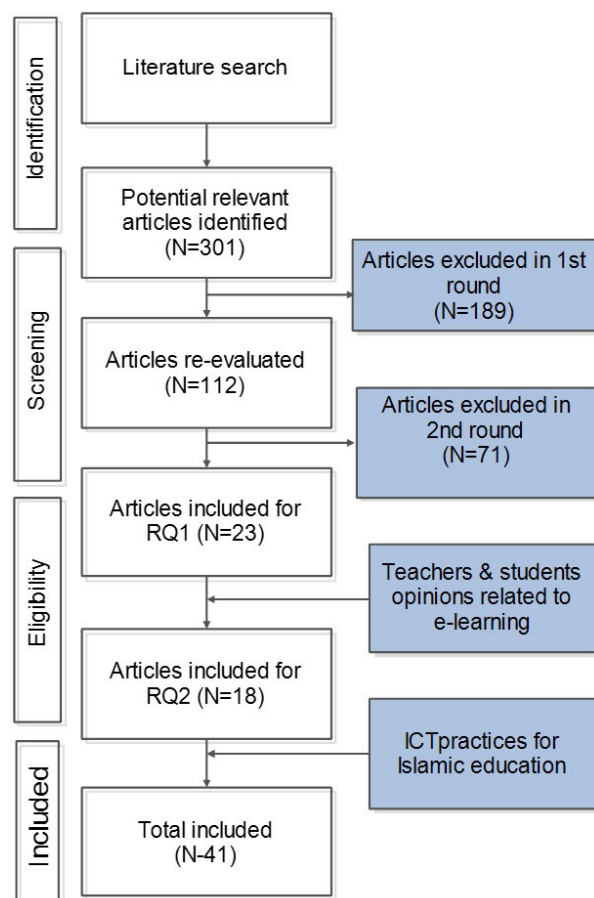

FIGURE 1. The flow of systematic review selection process.

used in this SLR. With the first criterion (C1), the aims and objectives of the conducted research were assessed. This question was answered positively by almost 92% of all the

TABLE 3. Quality assessment.

Criteria	Response grading	Grade obtained
(C1) Is the research aim/objective clearly defined?	Yes = 1/moderately = 0.5/no = 0	92%
(C2) Is the presented approach clearly explained?	Yes = 1/moderately = 0.5/no = 0	87%
(C3) Are the findings clearly stated?	No findings = 0 Over 80% = 1/under 20% = 0/between = 0.5	1%

reviewed publications. The second criterion (C2) was about sufficient information, e.g. if the study presents the appropriate context. Mostly all publications (87%) answered these questions positively. The last question criterion (C3) was to assess if the research outcome was following the proposed research. The quality measures' heuristic scores for (C3) were generated by two experienced researchers, and then validated by an independent reviewer. The normalized scores of the quality assessment are shown in Figure 2.
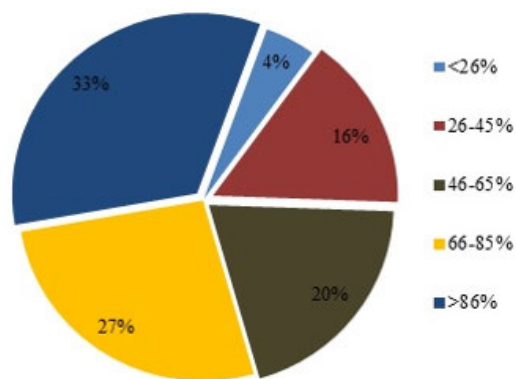

FIGURE 2. Percentage scores of quality for accepted papers.

III. RESULT

A. (RQ1) WHAT ARE STUDENTS' AND TEACHERS' OPINIONS ON E-LEARNING FOR EDUCATION?

Described below is what we have collectively found in the first 23 of the 41 studies included in the review. In the earlier studies, we have responded to RQ1 in terms of two different categories, e.g. (a) students' and teachers' perceptions and opinions about e-learning in learning and teaching (b) and tweets analysis toward e-learning.

1) STUDENTS' AND TEACHERS' PERCEPTIONS AND OR OPINIONS ON E-LEARNING

The impact of innovative technology, such as e-learning on students' and teachers' perceptions, is set continuously apart in the upcoming literature. However, such perceptions

or opinions have proven its ability to deliver useful information across multiple education disciplines. For example, in [16], students' opinions in applied disciplines were compared with students in pure fields. However, no significant differences in terms of students' perceptions of the usefulness of e-learning strategies were noted. According to the study results by [17], science Olympiad teachers have a favorable opinion of e-learning. The findings of the study by [18] suggest that students are generally open to innovation. The perception of students towards e-learning in education is well disposed of. In [19], final year undergraduate hospitality students at three academic institutions in the UK, Switzerland and the UAE focused on capturing their opinions for how they use technology, e.g. e-learning, and then link to sustainability employability. Comparisons were recorded better to understand students' perceptions of e-learning tools for sustainability. Finally, the students' perceptions of digital tools for learning, sustainability and employability were revealed, and the Swiss and UAE groups generally did not support that it enables them to learn more. It is only the UK group who appreciated the value of e-learning. The findings of a survey-based study [20] noted student's opinions and concluded that they are highly motivated to use technology for personal learning needs, and are comfortable in a technology-enhanced learning environment.

Similarly, another study [21] students' perceptions of interactive technology about the consumer behaviour course were recorded. The results of the study showed a positive attitude by students towards interactive technology. The findings of an investigation by [22] suggests that a large percentage of students have very positive perceptions, and the frequency of usage of the e-learning system was high. There was also a large number of students that are in favor of the traditional learning system. The study by [23] recorded student's perceptions toward teachers' online interaction with students' using e-learning. The research surveys 113 business students concerning perceptions and satisfaction with distance education. The survey showed 88% reported a positive e-learning experience, and there is an excellent percentage of recommendation for participation in e-learning courses in the future [24].

The study by [25] discussed that attitude is the central aspect to grab more students towards the use of e-learning, and an investigation by [26] described that resources availability is the critical factor in using e-learning for higher education in the UAE. The students' feedback towards e-learning was positive, as the information they received was relevant and useful [27]. In the study by [28], teachers expressed their opinions that teaching responsibility with implementing ICT for learning is higher, and they appreciate the latest systems. Many Asia-Pacific developing countries, including Vietnam, have prioritized nurse academic development. A survey was conducted to note down Vietnamese nurse experience with distance education for learning, and the results indicate the majority embraced distance education [29].

A study by [30] tested a learning program through e-learning and noted the responses of teachers. The findings

of [31] suggest that perceived compatibility moderates the relationship between e-learning system use and academic performance. However, overall students' responses show that e-learning systems proved a weak influence on academic performance. A study [32] in the Arabian region shows that ease of use is one of the determinants for using e-learning systems. The study by [33] used the PeRSIVA method that combines Kirkpatrick's well-known evaluation methods and the layered evaluation frameworks for e-learning system evaluation. The results showed that students of a postgraduate program gain learning improvements and are satisfied with e-learning. The results by [34] show students' diverse nature from highly interested and not interested towards e-learning. Therefore, it would be necessary to design methodological strategies to promote student participation towards e-learning. A study [35] has adopted and applied the Kano Model to determine students' feedback towards e-learning. It helps to identify their expectations about e-learning courses, and found that flexibility of time and hours, exercises, and mandatory quizzes are important elements to increase the perceived value of e-learning. The study by [36] indicates that students welcome the e-learning system, bringing a revolution in education.

The study by [37] explored the interaction among e-learning students in the context of Moore's distance theory, which also conforms to Islamic teaching in an e-learning environment. For this qualitative research, two selected e-learning students were interviewed as participants. The results show that students perceive the rigorous importance of practicing interaction to enrich learning in a university's e-learning environment. Learners, however, have difficulty interacting due to technology barriers and attitude. These difficulties affect their feeling of well-being [37].

In a subsequent study, 76 students from IAIN Samarinda and STAI Sangatta were sampled. The instruments used were pre-test, post-test, and questionnaires. They conclude that Edmodo based e-learning at PTKI in East Kalimantan is effective for the learning process [38]. The feedback from the Islamic institute on e-learning shows that Edmodo based e-learning at PTKI in East Kalimantan is effective for the learning process [38] A two-sample paired sign test towards pre-test and post-test shows that the Z score is -7.330 with sig. of 0.000. Since sig. of 0.000 < 0.05, indicating it is effective.

The results reveal a positive outcome in students' performance by using e-learning. In light of the discussed literature, it is deduced that digital technologies such as e-learning are helping in the academic sector and have received positive opinions by providing education facilities in so many ways such as affordability and accessibility, but are at the same time challenging. Table 4 is drawn based on the above-discussed literature, and presents the detailed characteristics of discussed studies in response to RQ 1.

Figure 3 shows the distribution of studies in terms of students' and teachers' positive/negative opinions using e-learning. Table 5 presents the teaching and learning

TABLE 4. The study characteristics of the included studies.

Studies	Location	Domain	Audience	Resultant Opinions
[16]	Hong Kong	University	Students	Positive
[17]	Russia	Secondary school	Teachers	Positive
[18]	Romania	University	Students	Positive
[19]	The United Kingdom, Switzerland United Arab Emirates	Undergraduate	Students	Positive / refuting
[20]	United Kingdom	Higher education	Students	Positive / refuting
[21]	United States	University	Students	Positive
[22]	United Kingdom	Higher education	Students	Positive
[23]	Tasmania	Postgraduate	Students	Positive
[24]	United States	Business	Students	Positive
[25]	Saudi Arabia	Higher education	Students	Positive
[26]	United Arab Emirates	Higher education	Students	Positive
[27]	United States	Nursing education	Students	Positive
[28]	Czech Republic	General	Teachers	Positive
[29]	Vietnam	Nursing education	Students	Positive
[30]	Norway	Nursing education	Teachers	Positive
[31]	Finland	Higher education	Students	Positive / refuting
[32]	Saudi Arabia	Higher education	Students	Positive / refuting
[33]	Greece	Higher education	Students	Positive
[34]	Spain	Higher education	Students	Positive / refuting
[35]	Italy	Higher education	Students	Positive / refuting
[36]	India	Higher education	Students	Positive

TABLE 4. *(Continued.)* The study characteristics of the included studies.

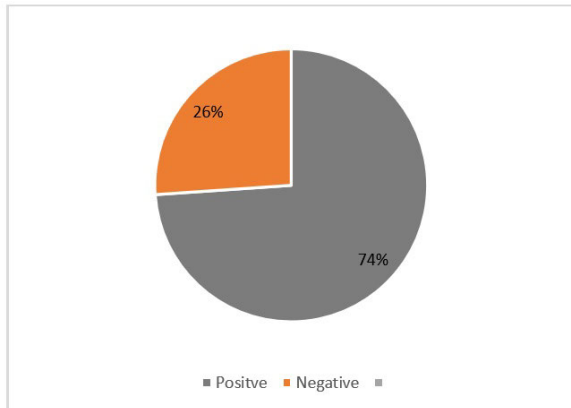|				
[37]	Malaysia	University	Students	Positive
[38]	Indonesia	Islamic Institute	Students	Positive

FIGURE 3. Percentage distribution of studies according to teachers' and students' opinions.

challenges and common motivational factors, e.g. usefulness, affordability, and accessibility using e-learning.

B. THE ANALYSIS OF PUBLIC OPINIONS AVAILABLE ON TWITTER ABOUT E-LEARNING

1) EXAMPLES FROM TWITTER

There are various useful opinions available on social media such as Twitter, Amazon, the blogosphere, etc. that can act as a guideline for e-learning using ICT. Opinion-mining studies have focused on three types of opinions, such as regular, comparative, and suggestive [49]. Based on the opinionated data available on social media (e.g. Twitter) related to e-learning and ICT, it is observed that users' perceptions of ICT are conveyed with significant opinion types. We have found that there are several tweets related to e-learning, and inside e-learning tweets, there are many #tags for IT and ICT related terms. We took the top few tweets and performed manual annotation until we may obtained various review types and concept words related to ICT. This analysis provided an overview that social media is productive towards generating awareness and promoting ICT in e-learning. As discussed above, the public's acceptance and understanding are crucial for successfully implementing ICT for e-learning. Hence, social media data analysis results show that public opinions are a handy tool to create awareness. These opinionated tweets can be analyzed in depth by using sentiment analysis techniques to find the present and future intention related to ICT, and explore new insights.

TABLE 5. A summary table showing the included articles and common opportunities and challenges.

Study	Opportunities			Challenges & areas to Improve
	Usefulness	Affordability	Accessibility	
[17]	✓	×	×	Promote website building
[16]	✓	×	×	Reconsider e-learning strategies
[18]	✓	✓	×	Improve teachers' training
[19]	✓	×	✓	Drive digital learning in sustainable ways
[20]	✓	×	✓	Focus on personal needs
[21]	×	×	✓	More research on students' perceptions of e-learning
[22]	×	×	✓	--
[23]	×	×	×	--
[24]	✓	×	✓	Adequate training & planning of teachers
[25]	✓	×	×	Attitude building of teachers & students
[26]	×	×	✓	Lack of resources
[39]	✓	×	×	--
[40]	✓	×	×	Lack of availability & access to resources
[41]	✓	×	×	Improvement required
[42]	✓	×	×	Lack of resources & training, shortage of time and heavy syllabus
[43]	✓	×	✓	--
[44]	✓	×	×	--
[8]	✓	✓	✓	---
[45]	✓	×	×	--
[46]	✓	×	✓	Lack of awareness & employer inflexibility
[47]	✓	×	✓	Fear of adverse effects
[48]	✓	×	×	--
[27]	✓	×	×	Support for proactivity & risk identification
[28]	✓	×	✓	Responsibility recognition
[29]	✓	✓		Skills development

TABLE 5. *(Continued.)* A summary table showing the included articles and common opportunities and challenges.

[30]	✓	×	✓	Training needs
[31]	✓	×	×	Perceived compatibility
[32]	✓	×	✓	Managerial interventions & controls for better organizational e-learning management
[33]	✓	×	×	Learning improvements
[34]	✓	×	✓	Behavioural patterns
[35]	--	×	✓	The flexibility of time & practice
[36]	✓	×	×	Practice required
[37]	✓	×	×	Lack of resources
[38]	✓	×	×	--

TABLE 6. The analysis of e-learning related tweets.

Frequently used terms for # e-learning & sub-#tags	Domain	Opinion Type	Concept & sentiment words
#eLearning	School	A	Interactive E-learning Strategies Ipad/google Headset displays LMS/amazing
#eLearning	Classroom	A/B/C	Happy/boring Mood/awesome/reminder navigation
#chatbots	school	A/B/C	Training/happy
#MobileLearningApplication	Business/school	A/B	Learning/ok
#onlinecourse	--	A	Easy/interactive
#digitallearning	--	A	Laptop/windows/nice
#MicrosoftEduation	Kinder garden	A/C	Learning app/appreciate
#MIEExpert	kinder garden	A/C	Learning/app/good
#googlesheets	Education/business	C	Learning/difficult
#edtech	Education	C	Formative assessment/recording

2) DATA ACQUISITION TOOLS AND ANALYSIS OF TWEETS

Tweets extraction was performed using the Twitter Importer module NodeXL [50], which captured the latest messages containing energy-related keywords (Table 1). The extracted opinions/tweets were parsed to remove HTML formatting from the text, and then transformed into an XML file that separated the data into records (the opinions) and fields (the data in each tweet). On retrieved data, we label the tweets into multiple classes (A, B and C) based on linguistic constructs using a method that is similar to card sorting [51]. Regular reviews are labelled A, comparative as B, and suggestive reviews as C [52], [53]. The tweets also carry useful concept words and sentiment words [6]. They can be further analyzed for making better policies for the development of ICT. We have picked the top few tweets and excluded 25 tweets with insufficient or no likes on them as likes and helpfulness demonstrate the opinion's value [54], [55]. We have also explained the concept words found in tweets and provided a detailed manual annotation and analysis of tweets explaining the necessary information they may hold about e-learning in Table 6. This information will bring up innovative ideas of research in the field. Figure 4 shows the most frequently used sentiments (negative/positive) in tweets, while Figure 5 presents a word cloud of the most frequently used words against #e-leanring tweets.

C. (RQ2) WHAT PRACTICES OF INFORMATION TECHNOLOGY ARE ADOPTED FOR LEARNING ISLAMIC EDUCATION?

The innovative technology practices in the 21st century drive instructors to develop new learning techniques. It is explained that educational technologies can help students to become critical thinkers while studying Islam [43]. The study

FIGURE 4. Most frequent sentiments retrieved by using keyword e-learning.

FIGURE 5. Word cloud for e-learning experience.

by [39] was conducted to examine the role of information technology, e.g. Islamic websites for teaching and learning Islamic Education. This study's primary center was on six

fundamental parts of the sites for the learning process and instructing, e.g. the suitability of the content, multimedia applications, elements of constructivism, cognitive development, self-learning and flexibility in teaching and learning. The outcomes demonstrate that innovative web tools are helpful for the learning and teaching process in Islamic education. Muslim-majority countries such as Malaysia and Brunei Darussalam are examples of countries embracing innovative technologies. For example, the Ministry of Education in Malaysia has prompted the restructuring of the educational system towards smart schools. A study proposed by [40] accumulated the input from Islamic education instructors and students concerning the emergence of innovative tools to enhance learning and education in smart schools. The advanced techniques and strategies have seen the emergence of a domain for self-learning of the Holy Quran and its sciences across various websites and mobile devices. Different subsystems are emerging together to build up this environment. The study proposed by [41] presented the design and development of one of the subsystems dedicated to teaching and the recitation of the Holy Quran. The effect of using the latest technology tools such as Islamic websites for educating a student at King Faisal University Saudi Arabia was investigated by [42]. In this study, the simple lecture method and teaching students through website-based education are compared.

The latest technology-based teaching methods of the 21st century have changed instruction techniques and learning in advanced education. The study proposed by [43] has tested different teaching methods, and found that for teaching Islamic studies, information technology can be used to help students in building knowledge. The study by [44] aims to evaluate the FAKIH method based on technology in teaching the Quran, based on the user's retrospective. Five students were selected as participants in the study, based primarily on hearing difficulties. The frequency and percentage of repetition of the Quran learning and mastery level of all five students were determined by teacher's journals. Another study by [8] conducted at the Academy of Islamic Studies (API), University of Malaya, has proven the effectiveness of technology in learning Islamic studies. An Interview was directed to review the inspiration for utilizing PowerPoint as a part of Islamic training from students' point of view. A computer-based application referred to as an expert system was proposed by [45] for the recitation of the Quran. The proposed expert system was enabled to recite the Quran with correct and proper pronunciation, under the rules called Tajweed.

Instead of a conventional call to prayer from a nearby mosque, new, often technology-oriented methodologies are being used for managing prayer timings. Engaging in prayer five times a day is one of the five pillars of Islam. The study by [46] shows that innovative technology plays a vital role in religious practices such as prayer, or 'Salat'. According to [47], the 21st Century Brunei Education System, or SPN21 or Sistem Pendidikan Negara Abad 21, introduced

Islamic religious knowledge (IRK) as one of the mandatory subjects for all levels of education, and emphasized the use of ICT for teaching and learning Islamic education. The purpose is to encourage the appropriate and systematic use of ICT to gain a high quality of education.

In a study by [56], the Jakarta Islamic University, Indonesia shows that multimedia learning positively improved pupils' achievement in Dirasah Islamiyah. The results imply that for an effective multimedia implementation, two prerequisites should be followed. First, facilities and equipment must be made available, and second, the contents in the learning materials must be appropriate.

In a subsequent study by [55], a quasi-experiment was conducted on 25 students in an experiment group, and 25 students in a control group. The objective was to compare students' conceptual understanding with flash interactive multimedia, and those not using it. The results revealed that perceived understanding of students using flash interactive multimedia in Islamic Education lessons is higher than that of students treated with conventional learning. Similarly, in the study by [57], the effects and challenges of multimedia are explained. The use of technology, e.g. multimedia, is quite effective. However, a lack of skills and training needs is highlighted for teachers.

A study at a Women's Junior High School in Malang, Indonesia was conducted to determine the impact of e-learning for Islamic education. The study's findings indicate that in terms of student performance, class learning based on an e-learning approach in the experimental class is more successful than learning in the control class [58]. The goal of the study by [59] is to examine the latest technological advancements such as industrial revolution 4.0 and developments in the world of education, as well as the challenges they pose to teachers in Islamic education.

According to the findings of the study by [60], the efficacy of this learning technology advancement increases students' comprehension of the subject matter, because content from teaching materials is discovered and exercised by the students themselves. The results of the qualitative study by [61] revealed that the development of active learning methods through good strategic planning can shape the students' emotional intelligence for Islamic education.

Table 7 explains the details of the innovative tools used for teaching and learning Islamic education in response to RQ2.

IV. DISCUSSION AND PROSPECTS

The geographic position of the authors was illustrated by the review of 41 selected studies as an important feature. It is noted that nearly 1/3 of all contributions come from countries like Malaysia in South Asia. The other countries were second in the contribution, including the United Kingdom, Jordan, Oman and Saudi Arabia. Due to the author's unequal geographic distribution, the empirical evidence recorded by the 37 studies could not be considered generalizable. As most of South Asia's empirical research, it is difficult to predict the similarity in results of learning through IT tools and services,

TABLE 7. The selected studies characteristics using technology to gain Islamic education.

Study	Location	Research focus	Technology tool	Resultant opinions
[39]	Malaysia	Teaching & learning	Website	Positive
[40]	Malaysia	Teachers' & students' views for IT	Computers for smart school	Positive
[41]	Saudi Arabia	Interactive teaching of Holy Quran	e-learning system ehalagat	Positive
[42]	Saudi Arabia	Competence over the traditional system	Website	Positive
[43]	United Kingdom	Knowledge construction	e-Portfolios	Positive
[44]	Malaysia	Hearing the Holy Quran	--	Positive
[8]	Malaysia	Innovative teaching	PowerPoint	Positive
[45]	Jordan	The correct pronunciation of the Holy Quran	Expert system for Tajweed	Positive
[46]	United Kingdom	Prayer alerts	Mobile apps	Positive
[47]	Brunei Darussalam	ICT usage	Computers & other ICT apps	Positive
[48]	Oman	Recite & script Holy Quran verses	Holy Quran braille translator	--
[56]	Indonesia	Effectiveness & efficiency	Multimedia	Positive
[62]	Nigeria	Comparison	Multimedia	Positive
[57]	Nigeria	Effects & challenges	Multimedia	Positive
[58]	Indonesia	Islamic education	e-learning	Positive
[59]	Malaysia	Effect & challenges	Industrial revolution 4.0	Positive
[60]	Indonesia	Effect & challenges	Technology innovation	Positive
[61]	Indonesia	Islamic education	Technology innovation	Positive

beyond South Asian countries. There are differences in public opinions of using IT-based learning methods, attributable to the difference in country-specific culture, literacy rate in

different regions, and accessibility of technology. The utilization of these innovations has recently started to become accepted by teachers of Islamic education.

Therefore, based on the findings in this SLR, we can conclude that many people who belong to different countries are still adopting ICT methods for learning and teaching purposes. Therefore, the findings from various parts of the world other than the Asian region are proposed to be recorded, and the community's realities in each location are considered. In addition, this opens an avenue to perform comparative studies on applying IT-based learning methods across continents for religious education. This review critically examined the selected papers to explain the importance of technology tools for learning Islamic education in the Muslim world. We have found that there are different modes of learning and teaching through ICT such as e-learning, and the students' and teachers' opinions and perceptions on e-learning are mostly supportive [16]–[18], [20], [21], [23]–[25], [27]–[30]. They have a common interest in terms of accessibility and availability, as well as an understanding of the resources. We have also found negative perceptions of reluctance received [19], [31]–[33], [35], [37], primarily due to some challenges, e.g., lack of resources, problems in access, knowledge, training and fear of adversity. These challenges are listed in Table 5.

Moreover, this review study has identified the current practices of ICT tools for learning Islamic studies in response to RQ2, which ensures the effectiveness of ICT-based learning methods in gaining religious knowledge. It is noted that learners using innovative technology outperform those that do not use it. The rise of innovative technology during the past few decades has increased the demand for learning and teaching Islamic education through the latest technology tools. Concerning Islamic websites [39], the results revealed that existing Islamic websites could be used for formal learning and teaching processes of Islamic education at secondary school levels. The smart school project was started to support the Malaysian school's technology-enabled efforts to spread Islamic education through innovative technology [40]. Qualitative methods involving focus groups and one-on-one interviews were used. The result indicate that teachers and students were mindful that computer use was the visible instigator of progress at the smart schools. However, this study also found barriers in implementing this new initiative, such as a lack of computers and computer labs access.

The study related to the computerized teaching of the Holy Quran (CTHQ) developed different subsystems [41]. The subsystems were enabled to guide listeners according to the standards followed by Quranic schools and 'learning circles' at mosques, known in Arabic as 'halagat' (حلقات). This proposed system conveys all fundamental computational tools for learner's recitation flawlessness, following up, and correcting the readers' memorization, electronically. The study by [42] on Islamic websites demonstrated that students have adopted Islamic resources for learning. It is deduced that

students' performance has significantly improved compared to conventional learning methods.

The study results by [43] have proven the effectiveness of e-portfolios for formative assessments. Furthermore, when teaching Islamic and Middle Eastern studies in international politics, a blended teaching method has proven to be more productive than traditional teaching methods. Therefore, it is deduced that the latest technology-based teaching methods are useful in encouraging students to gain critical thinking skills. Such methods effectively support students in enhancing their critical thinking towards understanding the essential issues of the 'strategically important' subject areas. These methods are workable to other areas of Islamic studies and broader social sciences in the UK.

The study [44] for teaching the FIKAH method based upon technology suggests that all five students selected based on hearing difficulties benefited from this method. It was observed that students were able to master hijaiyyah letters, letters and words with diacritics, tajwid knowledge and two-word sentences. Besides, most of them were able to recite the Quran fluently using hand-sings. PowerPoint has proven to be an essential technology for teaching Islamic studies. The outcomes of the study by [8] demonstrated that the dominant part of students in API agree and bolster utilizing PowerPoint in Islamic studies. It is also noted that presentation software, e.g. PowerPoint, is generally welcomed and acknowledged by students. An expert/adaptive system is mainly developed to bring ease for non-Arab Muslims to read the Quran according to the rules of Tajweed [45]. The system was tested and evaluated by experts in the field of Tajweed. The findings were outstanding, as the framework could provide the right recitation for any Holy Quran word, which is quite helpful for non-Arab Muslims and learning the Tajweed rules and also for Arab students studying at universities.

For the technology-oriented call for prayer, the results by [46] revealed that using the technology-based method for follow-ups for prayer is successful. It is noted that different applications on mobile phones indicate prayer times accordingly. The reciting rules of the Quran and script to Braille code are carried by a Markov Algorithm [48]. The double line output (1) Quran reciting rules; and (2) Quran scripts are the resultant output of the work. The use of ICT is encouraged, and has a positive impact on learning Islamic education [47]. It is discussed that schools are required to improve the proper application of e-learning as a learning tool on other topics with the same characteristics as the subject of Islamic education [58]. It is deduced that teachers must be equipped with 21st century science of knowledge and teaching skills, such as psychology, pedagogy, and sociology, without compromising the values and characteristics of traditional Islamic education, which have consistently created outstanding Islamic intellectuals and scholars [59].

The drawback of the learning technology breakthrough is indicated in terms of difficulty of use, because not all students have access to a representative media for applying technology-based learning (online) [60]. In [61], strategic planning including innovative and digital learning is encouraged in Islamic education. We argue that technology has also contributed to the people that are not used to it. Once they have started using technology in academia, they became satisfied and developed positive opinions. The way people interact with the outside world has changed. The gap between those who can access educational institutes has been reduced because of e-learning resources for education. Lately, where there are benefits with technology use, there are also challenges that need be resolved to gain a maximum edge of ICT in academia.

V. IMPLICATIONS

This SLR has several implications for both researchers and practitioners. For researchers, the review shows the direction of analyzing public opinions and recommendations that may provide academics with valuable insights. Analysis of teachers' and students' opinions has uncovered some common concerns and challenges that give clues to better e-learning strategies and in turn improve their professional commitment. The review also highlights a need for further empirical studies incorporating Islamic learning using IT-based tools and services. Currently, there is limited literature available on the Role of IT in Islamic studies. Hence, it is a potential domain for more empirical investigation on information technology implementation for Islamic education represented by learners' diversity. In order to improve the links between global and local knowledge systems, Muslim countries must invest in building scientific and technological capabilities.

Moreover, the experience gained from analysis of students' and teachers' opinions on e-learning technology research provides teachers, students and policymakers with a better understanding of the implications of policies. It is noted that research projects related to opinion mining on e-learning at undergraduate, postgraduate, and postdoctoral levels can be generated for Islamic education learning to promote the research in this area, which is less attentive than other subjects in academia. This survey offers an opportunity for higher education students to take on real-time projects, not only because of the potential for the technology created to enhance quality of life, but also because of learning Islamic studies and a sense of duty to help individuals with certain disabilities or other medical problems. Furthermore, the facilitating tools can be developed to motivate teachers' and students' towards IT tools to gain Islamic knowledge. The teacher training program is one of the implications of this survey to train teachers to adopt technology-based learning instead of conventional learning.

In addition, this survey has provided an analysis that has proven the viability of social media and the significance of tweets and or public opinions in the form of text, videos and pictures to seek information, awareness and help in accepting IT-related tools to teach. Policymakers can analyze public opinions to make better policies for future acceptance and awareness of IT and ICT related tools for learning and

teaching Islamic education in remote places where such tools are not reachable.

VI. CONCLUSION

This paper presented a systematic review of the literature on teachers' and students' opinions on e-learning and learning Islamic studies through ICT-based applications, tools and services. This review work was established by the available guidelines [14] for conducting a literature review. Of the 301 initial papers found in well-known digital research databases, 41 were filtered for review. The quality criteria on these selected papers were then applied and further analyzed and categorized into the following thematic groups based on the research questions: (i) teachers' and students' opinions on e-learning and (ii) adopted IT practices in learning Islamic education. In light of the discussed literature, ICT applications and tools play an important role in academia's learning and training purposes. The importance of innovative technology seems neglected, particularly for Islamic education. It is noted that the teaching of Islam in the establishments of advanced education is still restricted to conceptualization and retention, although the religion emphases on learning and development. There is evidence in the Quran and the Prophet Muhammad's (P.B.U.H) practices that have also contributed to Islamic epistemology and the scientific thinking method's production. The evolution of the Internet has given rise to the Web that has fundamentally helped instructors and learners instruct and learn Islamic education. In Islam, seeking knowledge is encouraged, e.g. modern technology. For example, ICT can promote positive thinking and enhance the ability to innovate and drive for self-improvement.

This review of ICT-based learning methods shows an excessive need to develop ICT/IT-oriented learning methods for Islamic studies. We have identified that many studies focus on the benefits of using ICT tools and services. Very few studies are particularly focused on ICT-based learning for Islamic education. The promising features of ICT-based learning methods such as efficiency, quick access and maximum success in knowledge gain benefit not only regular disciplines, but religious education as well.

This review shows that teaching and learning education through innovative teaching tools instead of traditional style remains to be challenging. Some studies demonstrate that teachers' inspirational states of mind toward innovative teaching tools are related to their experiences. A standout amongst the most widely-recognized reason behind their negative attitudes toward using innovation is their lack of experience in this technology zone. Hence, tutorials and motivation programs for ICT-based learning can remove ICT-based learning deficiencies and improve outcome quality and success rate. Therefore, it can be concluded that practicing ICT-based learning for learning purposes can play a vital role in better performance for the student that may perform poorly using conventional learning styles. The review shows that despite the numerous challenges in actualizing information technology in academia, research also demonstrates that teachers welcome ICT arrangements and trust that the innovation could help improve teaching and learning standards.

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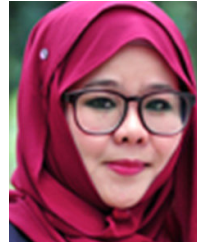
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