Journal of Theoretical and Applied Information Technology
15th July 2020. Vol.98. No 13

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

THE ENHANCEMENT OF COLLABORATIVE LEARNING THROUGH INTEGRATED KNOWLEDGE MANAGEMENT SYSTEMS: E-LEARNING MODEL

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ABSTRACT

There are still a few educational platforms that apply a Knowledge Management System (KMS) concept in conducting its operational work. In addition, several obstacles associated with e-learning implementation trigger the in-effectiveness of collaborative learning. However, the concept of Knowledge Management (KM) from a Sharia perspective has significant implications for education systems. This research, therefore, explored the relevance of the Learning Management System (LMS), KM theory, and Sharia education perspective on the development of the Integrated Knowledge Management System (IKMS) Framework. The IKMS components and structures are literature reviewed and then qualitatively justified through the focus group discussion which involved some students, lectures, and experts from two Sharia-based Universities in Indonesia. To verify and test the framework, an IKMS-Edu system was developed by focusing on the adoption of a controlling agent system in the online discussion. Herein, filtering and summarization technology was embedded into IKMS-Edu towards a smart controlling agent. This agent adopted the operational work of IKMS-Edu framework leveraging in four constructs activities viz., knowledge creation and knowledge acquisition (construct 1), knowledge organization and knowledge storage (construct 2), knowledge dissemination and knowledge retrieval (construct 3), and knowledge evaluation and feedback (construct 4). To date, the statistical evaluation of the IKMS-Edu system's acceptance is conducted by disseminating the questionnaires. The mean scores revealed 40.45% of the respondents strongly agreed, and 42.18% agreed on the proposed framework and prototype system thus the framework aided in performing the IKMS during the collaborative learning activities. As such, this evidence provides the strong support that IKMS-Edu significantly enhanced the effectiveness of collaborative learning by considering the Sharia values of trust, knowledge, virtue, psychosocial, and civilization development into knowledge management activities.

Keywords: *Knowledge Management System, Learning Management System, E-Learning, Online Discussion, Integrated Knowledge Management*

1. INTRODUCTION

Knowledge is a belief that can be verified and used as an effort to increase the effectiveness of a process or activity [1]. It can be transformed into four SECI models namely Socialization, Externalization, Combination, and Internalization [2]. KM is defined as a collaboration and integration approach towards the process of knowledge creation, sharing, integration, evaluation, and utilization in various forms of intellectual assets [3 and 4]. In terms of system application, KMS is explained as an information system model that is built as a forum for disseminating and integrating knowledge [5 and 6]. KMS can encourage and trigger the development of the KM process within individuals, groups, or both. Recently, KM became a very interesting topic, and its implementation has also been carried out in various well-known organizations. [7] investigated factors that influence knowledge sharing behavior and quality in an academic institution to improve organizational performance. [8] found a model of knowledge management metrics as a performance measurement tool in measuring the success of

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

strategy execution in higher education institutions. [9] reviewed the growth of KM within Small Medium Enterprises (SMEs) that showed the irrelevance of previous KM research on SMEs. Meanwhile, [10] reviewed the value addition of KM to increase the competitive advantages in the banking industries through the application of KM in risk management, customer relationship management/marketing (CRM), performance evaluation, decision support system (DSS), data warehouses, and data mining. Unfortunately, its utilization in education platforms has not been maximized yet [11]. The role of KM in educational fields is principles that contribute to separately activities at administrative, research, education (teaching and learning process), student services, and human resources. The application of KM enhances flexibility in decision making, promotion in teaching, learning processes, access to a scientific resource, the effectiveness of communication networks, the synergy of students and faculty knowledge in improving the research collaboration, and innovative technical solution [12]. [13] explored that KM enforcement can enrich the core curriculum, create the relevancy and currency of student learning assessment and outcome, and predict course scheduling. KM creates the learning communities to become more effective through the process of creating, discovering, transforming, and transferring knowledge resources amongst academe, students, and the environment. Relating to E-learning as well as LMS, [14] pointed out that KM provides the EL users with facilities in managing and filtering the content resources and information. Integration KM in EL triggers the availability of effective tools in transforming the information and knowledge from tacit to explicit and vice versa as the accomplishment of information delivery in the organization.

LMS as one of Computer-Supported Collaborative Learning (CSCL) method has several advantages in terms of time and location, individual learning development, interactive learning, learning media (visual and audio), archiving and synchronizing learning documents, encouraging interests and students'abilities in researching and creating knowledge [15]. Through employing LMS, students and educators could improve their capabilities efficiently following the teaching, evaluating, utilizing, and citing knowledge [16]. LMS supports various learning methods, encourages the formation of collaborative, problem-based, inquiry-based, reflection, and peer to peer learning, as well as sharing various resources and documents. Through the instrumentality of this media, students obtain additional skills especially related to teamwork, online collaboration, communication and negotiation, individual and group reflection, and digital identity management.

The overwhelming versatility of e-learning is since many factors, viz accessibility, advanced learning, ease of use, and cost-effectiveness on account of an opensource application [17]. E-learning provides services to support the formation of collaborative learning amongst students and educators [18 and 19]. The integration of e-learning and KMS platforms is a new novelty that can improve the optimality of computer-supported education. Unfortunately, there is still inadequate research attention concerning the quality of e-learning as well as its obstacles inside the execution process [17]. It is found that infrastructure, user skills, and ineffective achievement of e-learning goals proved to be a dilemma [16]. Meanwhile, the intended objectives are related to the use and management of existing media, material or resources; lack of interaction built-in online classes; utilization of learning evaluations, and the effectiveness of achieving communication and collaboration transform itself into an unsolved problem thus missing the target achievement. The lack of management effectiveness and efficiency leads to the failure of educational institutions from benefitting from the knowledge needed to compete [20]. E-learning and KM education management systems have strong connectivity, especially in encouraging the development process, openness, dynamics, interconnection, distribution, adaptability, user-friendliness, knowledge, and social access [21]. The inclusion of KM in e-learning systems could improve the process of acquiring knowledge and information, dissemination of knowledge within traditional education and training platforms [22], and assessing the knowledge level of learners [23]. This integration becomes crucial especially during the knowledge transformation process from tacit to explicit and vice versa, storing and retrieving KM, and sending knowledge and information between individuals, groups, or organizations [24]. Related to the integration of KM in the e-learning system, [22] learned that integration of the two fields of science above can improve the process of acquiring knowledge and information, disseminating knowledge, education, and training traditionally. The incorporation of KMS, Content Management Systems (CMS), and LMS can enhance the effectiveness and performance of e-learning and KMS. Commonly, the previous concepts of KM and e-learning inclusion were not followed by the real implementation thus it can be specified in technical

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

and practical application support. To date, this research tries to embrace these problems associated.

Generally, the definition of knowledge in the KM literature is always obtained from the western worldview and the ideological traditions of the western community. However, the understanding of Muslim epistemic beliefs is strongly related to the concepts of knowledge, knowledge resources, nature, goals, and methods in acquiring and managing knowledge based on the perspective of Sharia's knowledge, and practices of Khalifas in the way of lives, especially in Muslim education. In the Muslim world, Sharia provides a sustainable solution to any problems and aspects of human life, a complete code of life, a code of culture, and gave clear guidance to be dealt with. Indonesia as the country with the majority population is Muslim through the emergence of Sharia-based Higher Education Institutions in Indonesia and is responsible for the development of studies in integrating science and technology from the views of Sharia perspectives. This encourages the desire of practicing the Muslim environment in consideration of the Sharia point of view and ensures the benefits in the world life and hereafter [25]. Lack of scientific studies on the formulation of Sharia adoption in scientific activities becomes a challenge of this research to obtain a new light of thought out from the understanding of the secular West. The intertwined of West and Sharia concept is believed will enhance the value of KM and e-learning integration as well as filled ineffective goals of such achievement [16]. [26] studied and discovered five KM dimensions that are sourced from Sharia. The proposed concept is related to spiritual, intellectual, moral and ethical, social psychology, civilization, and the construction of human life dimensions under the Sharia education system. [25] introduced the Sharia-based KM thus Sharia invites humans to jointly view and study natural phenomena and revelations revealed as learning. It found that Knowledge Management is strongly influenced by how people formulate and realize the existence of knowledge and guide them to be valuable for the user (user-centric based values).

This research tries to answer the research questions on how's the model of integration KM in e-learning thus adopting Sharia's perspectives towards the effectiveness of collaborative learning. The hypothesis stated that the consideration of the Sharia concept in KM and e-learning integration will enrich and provide the new point of west perspectives on the above integration as well as the enhancement of collaborative learning effectiveness. Specifically, this article explored and used the above dimensions based on the concepts of knowledge, knowledge creation, knowledge management, and management strategies in e-learning platforms from the view perspectives of Sharia [26]. The process of disseminating and retrieving data, information, or knowledge of several related concepts was applied as controlling agents during online discussion. This agent provides the application novelty of the integration model. A case study in two different Sharia universities' environments in Indonesia was made to statistically analyze and evaluate the framework. Besides, the development of a framework and prototype of the IKMS-Edu system can practically increase the effectiveness of the e-learning system that is harmonized with the nature of humanity in Sharia perspectives. This would also influence the roles and responsibilities of educators, moderators/assistants, and students to always improve the quality of the LMS.

2. CONCEPTUAL IKMS-EDU FRAMEWORK

It is found that the integration and adoption of KM and LMS in terms of EL became an alternative way to increase the effectiveness of the learning environment, to enhance skills in decision making, and to link individual and organizational learning [22, 27, and 28]. Several models offered the integration approaches, including technology integration model [29], context-aware integration model [30], knowledge type conversion model [31], knowledge maturing process model [32], InterCog sense-making model [33], adoption model [34], and Assurance of Learning model [35]. Unfortunately, only the Schmidt model implemented the theoretical model in the form of a prototype environment and obtained satisfying feedback from the end-user. The others were just straight to theoretical found thus lack the necessary technical specification and application support [36]. Sharia worldviews employ the conventional knowledge from the source of Sharia sciences based on Qur'an and Hadiths thus identified the learning activities behaviors, enhanced students' knowledge and engagement in learning activities, identified and reviewed the problems, created breakthrough innovations and solutions, combined and incorporated knowledge to be more valuable [37 and 24].

The analysis of interviews was then strength the performed of a theoretical framework on this integration of the Knowledge Management System for education (IKMS-Edu). IKMS-Edu framework was adopting the KM concept from the

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SECI model [38] and KM and EL model integration [34] thus performed by the basic principles of Sharia in five dimensions: faith, knowledge, virtue, psychosocial, and civilization [26]. Sharia defines faith in the human of context as essentially intellectual and spiritual thereby evolving the meaning of life. The Knowledge dimension was transcribed as inculcating faith in minds thus generated the inspiration, motivations, and realization of faith in character and behaviors towards the development of educational endeavors. The virtue dimension was born as the implication of the relationship between God and "man", humanity and universe on forming and nurturing the character and attitudes of man by referee into Sharia parameters viz. *din* (religion), *nafs* (life), intellectual, *nasl* (progeny), *mal* (property) and *ird* (honor). The psycho-social dimension stressed personalized education in the views of the spiritual, intellectual, and physical needs of man. The civilization dimension was related to the creation of morality and awareness-raising among the educational environment.

The formulation of the conceptual IKMS-Edu framework can be depicted in Figure 1. The activities were explained as follows.

2.1 Knowledge Creation and Knowledge Acquisition (Construct 1)

At this stage, IKMS-Edu in the form of online discussion provides services for users to create and acquire new knowledge through the interaction of human to human and machine to machine. IKMS-Edu allows the transformation of knowledge from tacit to explicit and vice versa under retrieving the teaching material, journals, books, syllabus, attachments, or other learning resources that are uploaded and downloaded by lecturers/educators or students. Concurrently, the dimension of faith and knowledge plays a significant rule in influencing the process of knowledge creation and acquisition. The presence of "faith" or "trust" that the new existing knowledge is valid and accountable reflects into the learning activities behaviors including the process of problem identification-hypothesis-methodology-pilot testing. The story of Prophet Ibrahim's journey in the finding of God turns out to be a lesson learn and motivation on how Sharia conducts the educational activities. Sharia also explained that we need to clarify and verify any information provided. Before capturing and acquiring new knowledge, the reviewing of new information and knowledge must be considered by the integration of *Aqli* (Rational) knowledge - Sciences and *Naqli* (Revealed) knowledge - Sharia Sciences [37].

Herein, IKMS-Edu presents a technology agent in filtering and summarization as an automatic mechanism in ensuring the relevant educational resources match the online discussion topics [39]. The summarization was automatically performed as a brief review of relevant comments during the discussion. Finally, the validation and verification would be accomplished by the lectures/educators' team as well as triggers the emergence of new knowledge creation and acquisition. This directly or not encourages the alters of civilization during the collaborative learning within the online discussion and how to face the overload information and knowledge. The users will firstly clarify and filter any digital information before retrieving it as new knowledge. Thus, psychologically and socially communication during online discussion turns out to be more effective and objective.

2.2 Knowledge Organization and Knowledge Storage (Construct 2)

Towards the effectiveness of knowledge organization and storage, IKMS-Edu delivers the repository mechanism of knowledge management in tacit and explicit as well as knowledge classification, catalogs, abstract, summarization, filtering, and indexing which is limited into individuals, groups, or public knowledge bases. These are performed according to classes, meetings, assignments, discussion, and any collaborative activities amongst students and lecturers/educators. This transforms any digital educational activities and tracks the movement of information and knowledge toward the "virtue" and "faith" knowledge. The knowledge bases repository can be used as references and sources of knowledge for the creation of new knowledge and dissemination. Sharia emphasizes all Muslims on the substantial of "*iqro*" or reading, reciting, reflecting, and investigating. This has been stressed frequently in the Sharia thus a Muslim need to increase their knowledge, constantly pursuing more knowledge and treat knowledge to reach the flawless faith to God.

2.3 Knowledge Dissemination and Knowledge Retrieval (Construct 3)

In order to increase the merit of knowledge, dissemination, and retrieval knowledge takes into account the smart mechanism of management control [40]. Herein, IKMS-Edu as agent controlling monitors the online discussion by serving the interactive mechanism with filtering and summarization techniques. This ensures the virtue of

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

knowledge before spreading to the public. The filtering provided the online discussion with a healthy and smart educational environment thus controlled the content of the discussion forum and ensured it followed the topic guideline. It psychosocially performed the motivation of learning activity behaviors amongst the learners in disseminating and retrieving information and knowledge restricted to the trust and virtue knowledge [41 and 42]. Sharia has a holistic view of human development with views education and knowledge as central and takes advantage of it for the benefit of humanity. Sharia encourages the acquisition and communication the knowledge by considering the virtue of truthfulness. However, Sharia teaches truthfulness as the suitability of the outside with the inside, action with intention, speech with conviction, and practice with preaching. Thus, it accomplished Muslim character to reach his God deeds [43]. Ali bin Abi Talib mentioned the positive effect of behaving truthfully in their life. The inspiration from Sharia triggered Muslims to embedded the truthfulness in their soul and practice thus impacts into the civilization of learning activity behaviors.

To date, the online discussion in IKMS-Edu monitored the users' comments including the truthfulness and relevance issues on the proposed topics. The comments whose have significant relevant values from the topic puts forward can actively collaborate during the discussion (as the rule, the relevancy value must be more than 50%). Otherwise, it will be sent to "spam" and invisible comments displayed. The filtering engines put into practice on Winnowing and Jaccard Coefficient method [44]. Herein, the role of the virtue dimension plays a significant part during the exploration of ideas and knowledge along with the online discussion forum. Time management in IKMS-Edu provides a slot for users in making several preparations regarding knowledge dissemination and retrieval. This enhances the individual and group skills in decision making and learning effectiveness [22] and [28], and then psychologically triggers a sense of user's virtue and confidence to collaborate a proper and accountable knowledge during online discussion.

2.4 Knowledge Evaluation and Feedback (Construct 4)

There were several considered aspects in developing e-learning environment viz., technical solution, and the availability of media to communicate and interact amongst the organization members [36]. The interactive comments come from the learners, and then finalizes by the educators initiates the overcomes of new knowledge creation. IKMS-Edu provides this scenario as a communication platform for evaluation and feedback towards the quality of knowledge transfer. Meanwhile, the terminate summarization that conducted by educators bestows the evaluation mechanism on tutor engagement in the class and ensuring the achievements of the target as expectations. This controlling agent offers effective online mentoring for the transformation of knowledge conversation (tacit to tacit/explicit). Thus, the effectiveness of the learning process can be more measurable [36 and 31]. The functionality of IKMS-Edu psychologically and socially affects the user's behavior towards the openness and feedback acceptances from various parties as an improvement. This will bring into collaborative learning effectiveness and civilization. Herein, the mechanism of verification followed a Muslim practice in everyday life encompass recitation, memorization, understanding, and interpretation of information and knowledge spreading. As promoted by Prophet Muhammad as the Muslim leadership style that always opens up the discussion opportunities from his comrade [45].

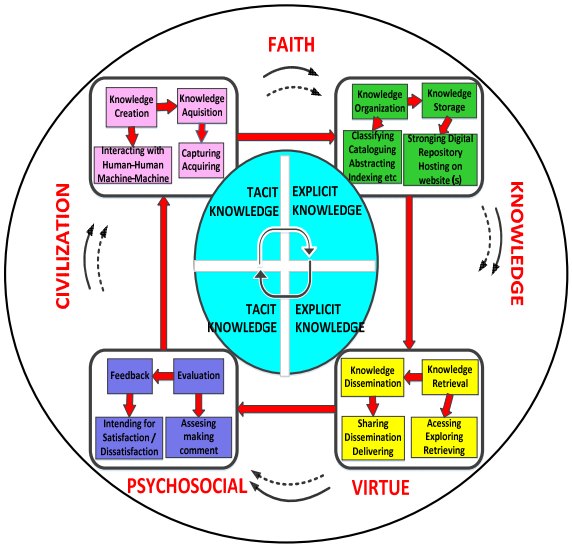

Figure 1: IKMS-Edu framework

3. METHODOLOGY

This article applied a research scheme that consisted of two main stages: exploration stage and confirmation stage [46]. The exploration stage

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explained the investigation of background theory through literature review and interviews which led to the development of the research model and IKMS-Edu framework. It commenced with the observation of relevant issues and problems close to the Sharia worldview, KM, KMS, and e-learning as LMS. A thorough literature study was carried out by considering several frameworks or models in KM, the currents issues on Sharia education and learning management systems, and the conceptual arguments and obstacles that evolved into challenges. Several resources from journals, books, articles, and proceedings were used as supporting sources. This was useful to undertake ahead framework development. UIN Suska Riau and UIN Jakarta universities were selected as pilot studies representing Sharia-Based Universities in Indonesia. To consolidate the conceptual thinking, face to face interviews [47] with two related experts in the fields of e-learning and Sharia perspective on education was conducted. Then, the interview was transcribed into a contact-summary form for further analysis. Content analysis was performed by identifying and calculating the number of certain words or meanings quantitatively which were then categorized to form a conceptual thought [48]. This mixed-method conceptualization enriched the development of the IKMS framework. To verify and ensure the validity of the data collection, the triangulation method was performed [47] by conducting the focus group discussion which involved some students, lectures, and experts from both Universities. This method brings the focus understanding from multiple perspectives thus increase the rate of certainty and neutrality in making the research finding more valid, reliable, and generalizable. Next, the IKMS-Edu framework was transcribed into a prototype software development. The mechanism of the framework, as well as knowledge creation, knowledge acquisition, knowledge integration, knowledge transfer, knowledge organization, knowledge retrieval, feedback, and evaluation, were analyzed and designed in the development of the IKMS-Edu application. This transformation process became the main topic during the focus group discussion session on how the technical support on the integration of KMS and EL in this IKMS-Edu platform. By focusing on the online discussion forum, this IKMS-Edu application provided information retrieval techniques towards the controlling agents in addition to Sharia education perspectives.

Simultaneously to validate the IKMS-Edu framework and application, the confirmation stage was conducted by virtue of software testing. Black Box and User Acceptance Test (UAT) were implemented. The UAT developed a questionnaire as a survey instrument that disseminated into two different Sharia-Based University environments (UIN Suska Riau and UIN Jakarta). These were statistically supervised to evaluate and improve the IKMS-Edu framework and software development. As for the reliability test, 50 respondents were involved in the preliminary survey. Furthermore, the questionnaires were distributed to 178 respondents in total, twenty respondents from lectures, and the rest came up from students. These two case studies were statistically analyzed using SPSS Descriptive Statistics in allowing the quality perceives of respondents on the operational of IKMS-Edu framework into the proposed technology. A scenario in setting online discussion was organized to show KM process activities. The summarization of activities in the methodology can be depicted in Figure 2.

4. RESULTS AND DISCUSSION

There were two significant outputs as a new novelty of this research, including a conceptual framework of IKMS-Edu and a design of IKMS-Edu application.

3.1 A Design of Prototype IKMS-Edu Application

Based on the IKMS-Edu framework in Figure 1, an IKMS-Edu system prototype was designed through the scenario formatted as seen in Figure 3.

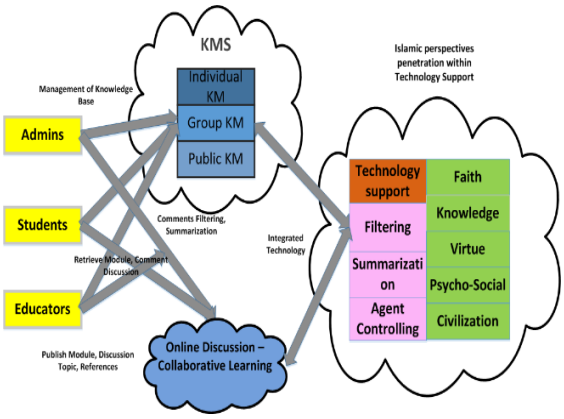

Figure 3: Scenario of IKMS-Edu

IKMS-Edu has three users who are classified as admin, students, and educators which functions include the login process, managing student data, managing lecturer data, managing group data (groups), managing material data, managing discussion data, and managing tasks. Educators

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

perform material management activities, management, and control of the discussion process, task management, and class groups. Students can download some materials, conduct online discussions, and interact with the assignments and instructions commended by the educators. The entire activities are connected and embedded into KMS that formed either as an individual, group, or public knowledge base. To show the penetration of Sharia perspectives on technology support, the mechanism of filtering and summarization during the discussion is introduced as shown in Figure 4 and Figure 5 respectively.

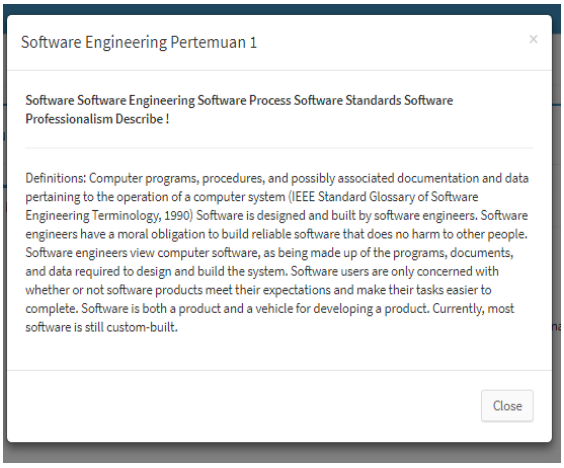

Figure 5: The summarization of student's discussion page

3.2 IKMS-Edu Framework and System Prototype Testing

Tests were carried out through the construction of the IKMS-Edu prototype system. The scenario was performed by an application user through various functions in teaching material, assignments, or discussion forums. Subsequently, the user was asked to assess the IKMS-Edu application concerning functionality, usability, and acceptance of application and framework through the questionnaire dissemination. The questionnaire was created using 5 Likert scales to measure the performance level of each variable in the framework. It consisted of twelve questions, including three variables: Q1, Q2, and Q3 in Construct 1 (Knowledge Creation and Knowledge Acquisition); three variables: Q4, Q5, and Q6 in Construct 2 (Knowledge Organization and Knowledge Storage); and three variables: Q7, Q8, and Q9 in Construct 3 (Feedback and Evaluation); and three variables: Q10, Q11, and Q12 in Construct 4 (Knowledge Dissemination and Retrieval Knowledge). The questionnaires were distributed to lecturers and students in two case studies and statistically analyzed using SPSS Descriptive Statistics. Detail of respondents describes in Figures 6 and 7.

As for the reliability test, fifty respondents were involved in the preliminary survey. it is found that the Cronbach's alphas for all the variables in the framework are at a high level 0.907 (around 0.7 and above), and the mean scores show the high level of agreement from respondents. This information is depicted in Table 1. The standardized alpha (less than 0.907) indicates that the respondents' response is positive and the variables in the questionnaire are valid and reliable than can be accepted to proceed for the survey.

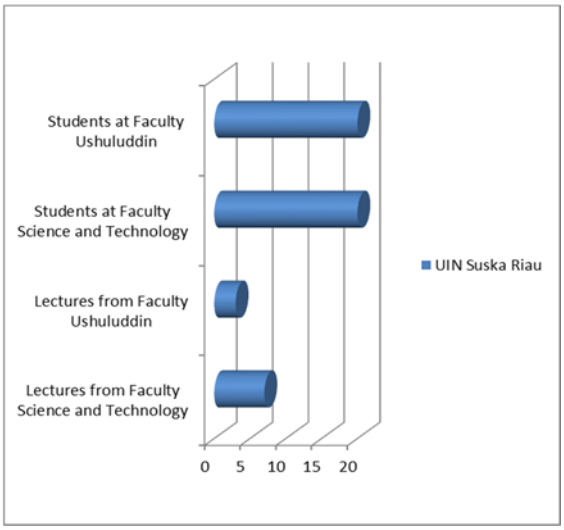

Figure 6: Respondents Demographic in Preliminary Survey

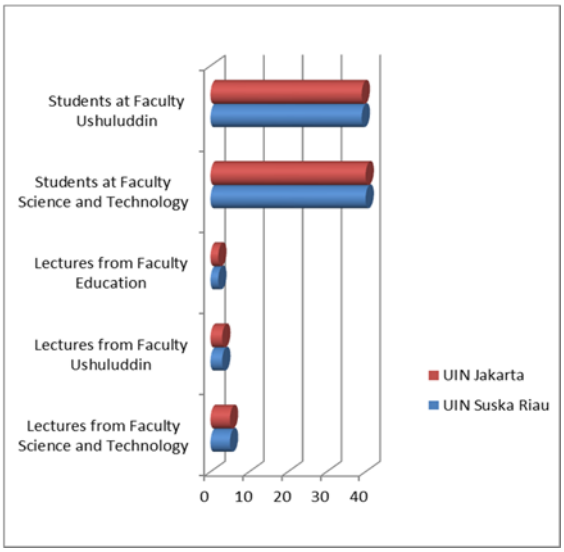

Figure 7: Respondents Demographic

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

The detailed analysis of the survey was explained as follows.

Q1: IKMS-Edu help in getting new knowledge

Based on the answers from 178 respondents, 45.5% of respondents remarked that IKMS-Edu was "very helpful" in getting new knowledge, 38.2% of respondents pointed out"helped" for IKMS-Edu usability, 14.0% of respondents declared IKMS-Edu was "quite helpful", and the rest (1.1%) insisted IKMS-Edu was "less and not helpful" in gaining new knowledge

Q2: IKMS-Edu help in filtering the right and appropriate knowledge

For Q2, 42.1% of respondents remarked that IKMS-Edu was"very helpful" in filtering the right and appropriate knowledge through filtering and summarization mechanism, 40.4% of respondents pointed out "helped" for IKMS-Edu usability in knowledge filtering, 13.5% of respondents declared IKMS-Edu was "quite helpful", 2.2% of respondents mentioned that IKMS-Edu was "less helpful" for them, and 1.7% of respondents insisted "not helpful" in knowledge filtering.

Q3: IKMS-Edu motivates finding the relevant knowledge

The respondents 44.4% remarked that IKMS-Edu was "very motivating" them in finding the relevant and accountable knowledge, 39.9% of respondents pointed out "helpful" on motivating them to find suitable knowledge, 12.9% of respondents declared IKMS-Edu was "quite helpful" in motivating the knowledge discovery, 2.2% of respondents mentioned that IKMS-Edu was "less helpful", and the rest (0.6%) insisted IKMS-Edu was "not helpful" in students encouragement.

Q4: IKMS-Edu helps in storing new and previous knowledge

For Q4, 38.2% of respondents remarked that IKMS-Eduwas "very helpful" in storing new and existing knowledge, 47.2% of respondents pointed out "helpful", 11, 8% of respondents declared IKMS-Edu was "quite helpful" for students in a knowledge repository, 1.7% respondents mentioned that IKMS-Edu was"less helpful", and only 0.6% respondent insisted IKMS-Edu was"not helpful" in the knowledge repository.

Q5: IKMS-Edu helps in making the justified knowledge

The majority of respondents stated that IKMS-Edu can help them in justifying knowledge. It found 37.1% of respondents pointed out "very helpful", 45.5% declared "helpful", 14.6% mentioned that IKMS-Edu was "quite helpful" in making the justified knowledge, and the rest insisted "less helpful" for the functionality of IKMS-Edu during the process of knowledge justification.

Q6: IKMS-Edu helps in improving knowledge

For Q6, 50.6% of respondents remarked that IKMS-Edu was greatly helpful for them in increasing new knowledge; 37.1% stated it was "helpful"; 11.8% pointed out "quite helpful", and the rest insisted "less helpful" of IKMS-Edu functionality towards the increasing of knowledge.

Q7: IKMS-Edu helps in evaluating knowledge

It found 82% of respondents remarked that IKMS-Edu provided the services towards the knowledge evaluation. This was retrieved from 34.3% of respondents stated it was "very helpful", 48.3% of respondents pointed out "helpful"; 15.7% declared it was "quite helpful", and the rest insisted "not helpful" within the evaluation of knowledge.

Q8: IKMS-Edu helps in providing appropriate knowledge recommendations

The majority of respondents remarked that IKMS-Edu can assist in delivering the recommendations of appropriate knowledge. It found 78.6% of respondents stated that IKMS-Edu was greatly helpful for them; 36.5% of respondents pointed out "very helpful", 42.1% of respondents declared "helpful", 19.7% respondents stated that it was "quite helpful", and the rest insisted the "less helpful" of IKMS-Edu in bringing the knowledge recommendations.

Q9: IKMS-Edu offers the disclosure of user feedback and evaluation

The survey found that IKMS-Edu was 42.7% "very helpful" in evolving user feedback and evaluation. Meanwhile, 38.2% remarked "helped", 15.2% declared the "quite helpful" of IKMS in getting user feedback and evaluation, and the rest insisted "not helpful" of this application.

Q10: IKMS-Edu helps in identifying users behavior during the collaborative learning

It found 76.4% of respondents remarked that IKMS-Edu leads to bringing to light of users' behavior during the knowledge transaction. Meanwhile, 32% stated it was "very helpful"; 44.4% of respondents pointed out "helpful"; 20.8% of respondents stated "quite helpful", and the rest found it was not helpful at all.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Q11. IKMS-Edu helps in overcoming problems arise within the collaborative learning

For Q11, 80.9% of respondents remarked that IKMS-Edu provides services in conquering the emergence of problems as well as conflicts or un-focused discussion during collaborative learning. Meanwhile, 30.9% respondents pointed out that IKMS-Edu was "very helpful", 50.0% respondents declared "help"; 15.7% respondents stated the "quite helpful" of this application, and the rest insisted that IKMS-Edu functionally "not helpful" in overcoming the problems arise in an online discussion.

Q12: IKMS-Edu helps in knowledge sharing

It found that IKMS-Edu was 51.1% "very helpful" in developing the knowledge sharing environment amongst the users. It also remarked 34.8% of respondents quoted on "helpful" towards the acceptance of this application. Meanwhile, 12.4% of respondents pointed out it was "quite helpful", and the rest stated for "not helpful".

The summary of the survey findings can be seen in Figure 8.

This research was aimed to develop an integration of the KM and e-learning model by including the significant role of Sharia as the advancement of West views of the knowledge process during the learning session. Five dimensions of Sharia, including faith, knowledge, virtue, psychosocial, and civilization have been successfully increased the practical values of knowledge process transformation and activities thus showed the smart interaction of human and machine as well as individual, groups, and public knowledge towards the effectiveness of collaborative learning. The application of the Sharia perspective in this model reveals the users in getting qualify, improvement, justification, appropriate recommendation, user feedback and evaluation, user behavior identification, overcoming problems, and knowledge management repository. Thus, the individual and group skills involved in the online discussion will psychologically enhance, effective, accountable, and more confident in the direction of knowledge process activities [22 and 28]. This research proved that the Sharia-based KM introduced by [25] performed the e-learning in user-centric based values of knowledge. The lack of scientific reviews on it was overcome by the West perspectives on the SECI model [38], KM, and e-learning integration approaches [29-32, and 36]. The proposed automatic filtering and summarization technology as controlling agents in online discussions complement the operational model thus it is not only presented conceptually in nature as previous work [36]. Hence, the real conceptual execution can be directly practiced and give benefits to the users. The user acceptance survey on the prototype system testing showed the beneficial impact of this model in reinforcing the knowledge process life cycle during collaborative learning.

4. CONCLUSION AND FURTHER RESEARCH

This research has successfully investigated KMS components and structures from the views of Sharia perspectives. As a novelty, the IKMS-Edu framework and prototype system have been effectively developed and statistically attempted in enhancing the effectiveness of collaborative learning. The agent technology embedded into IKMS-Edu as well as the mechanism of filtering and summarization has been favorably created the KM process activities including knowledge creation and acquisition, knowledge organization and storage, knowledge dissemination and retrieval, and knowledge evaluation and feedback in forms of constructs development. The employment of Sharia perspectives that get across into KM activities is influencing the formation of faith, knowledge, virtue, psychosocial, and civilization amongst the users. Thus, collaborative learning during the online discussion forum becomes more effective. In nutshell, automatic filtering and summarization push the lecturers/educators to indirectly monitor, verify, and justify the trust and acceptable knowledge and information sharing along with the discussion. The summarization schema provides the lectures/educators from getting feedback as an evaluation of their knowledge capability towards the integrity and quality of knowledge as well as the virtuous cycle. Meanwhile, the filtering schema has successfully forced the user in finding the relevant information and knowledge, and stay focus on discussion topics. This encourages the formation of a psychosocial and civilization environment in collaborative learning activities to be more transparent, value-added, and accommodate the trust and virtue of knowledge. The filtering mechanism also serves the users' repository knowledge management based on clustering or discussion index. Practically, this proposed IKMS agent technology delivers the enhancement of e-learning

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

system platforms through the new features and functionality embedded.

For further research, the mechanism of filtering which allows the emergence of hierarchy comments, as well as the enlargement of discussion, should be considered. A supported query technique is needed in ensuring the relevancy of comments based on the reference topic. This also comes about in the summarization engines. Moreover, the development of automatic performance measurement to measure the knowledge sharing behavior both students and lecturers during the online discussion turn out to be our following research. Therefore, the effectiveness of collaborative learning can be increased.

ACKNOWLEDGEMENT:

We would like to thank the financial support from the Universitas Islam Negeri Sultan Syarif Kasim Riau (UIN Suska Riau), Indonesia, and Direktorat Jendral Pendidikan Tinggi Keagamaan Islam, Ministry of the Religion Indonesia Republic for their assistance in this research. This paper acknowledges the support of the grant no. SP DIPA-025.04.2.4241sr/2018. This work also supported the contribution of Faculty Science and Technology, and Faculty Ushuluddin in Universitas Islam Negeri Sultan Syarif Kasim Riau (UIN Suska Riau) and Faculty Science and Technology and Faculty Ushuluddin in Universitas Islam Negeri Jakarta (UIN Jakarta), Indonesia. Many thanks for your cooperation and support.

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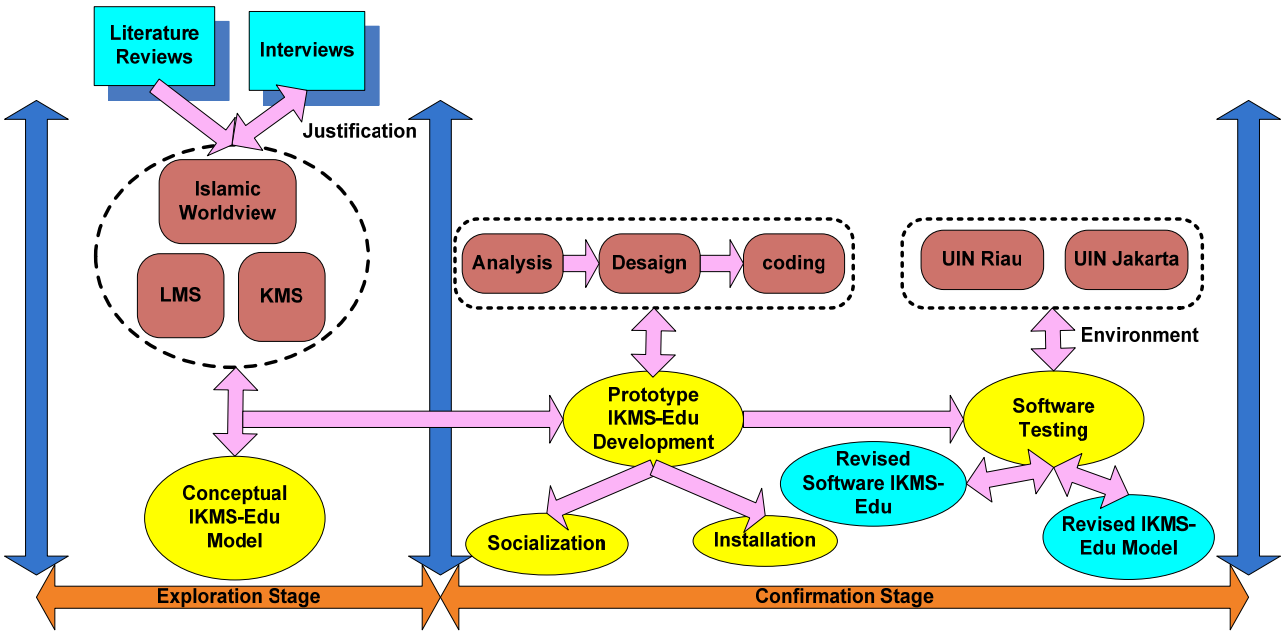

Figure 2: Research Scheme

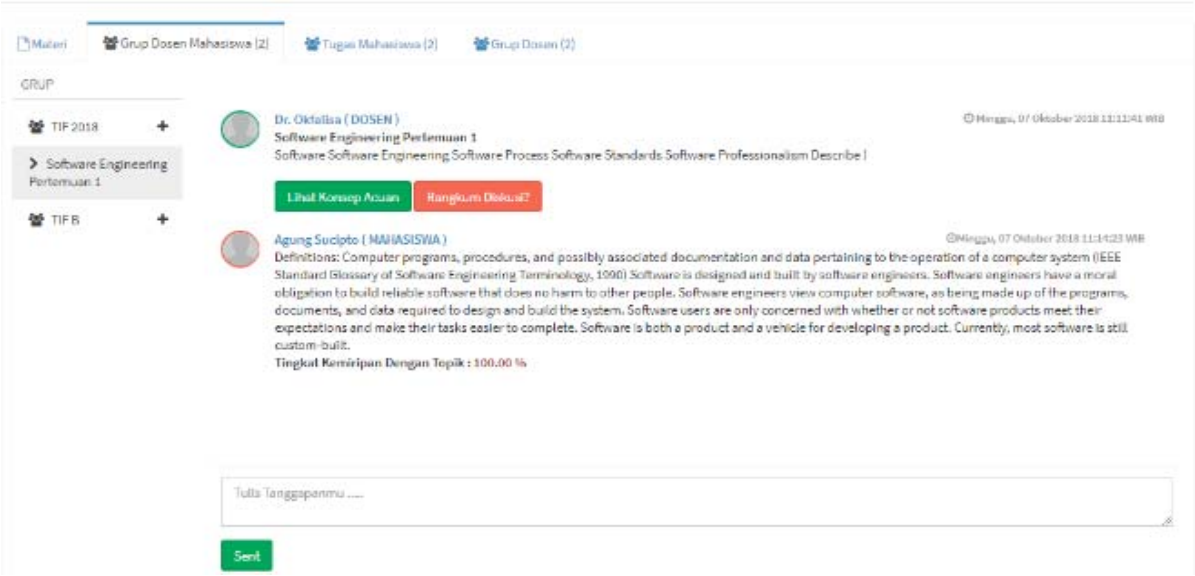

Figure 4: Students Comments Filtering Page With 100% Relevancy

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Table 1. Reliability Testing From Preliminary Survey

No.	Construct	No. of Indicators	Mean Score	Correlation	Standardized Alpha
1	Construct 1	3			
	Q1		47.30	0.684	0.897
	Q2		47.36	0.736	0.895
	Q3		47.38	0.494	0.906
2	Construct 2	3			
	Q4		47.36	0.670	0.899
	Q5		47.58	0.643	0.899
	Q6		47.18	0.677	0.898
3	Construct 3	3			
	Q7		47.54	0.699	0.897
	Q8		47.42	0.617	0.901
	Q9		47.34	0.574	0.903
4	Construct 4	3			
	Q10		47.60	0.493	0.906
	Q11		47.46	0.637	0.900
	Q12		47.18	0.713	0.896

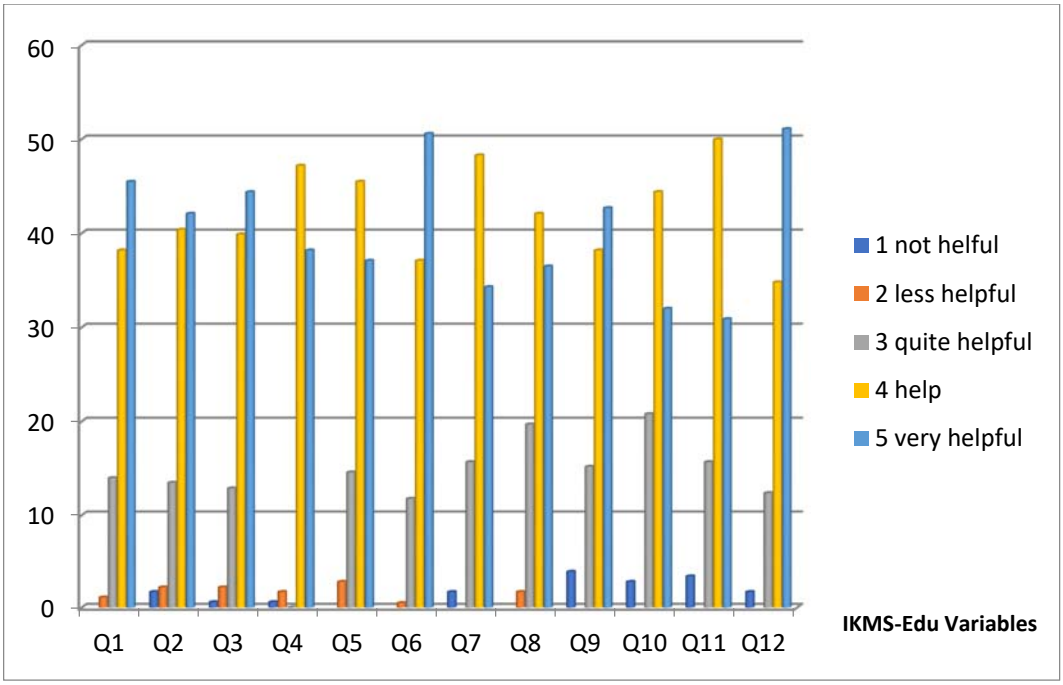

Figure 8: Graphics Performance Of IKMS-EDU Variable