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The Development of Net-Collaborative Learning Model in Islamic Education: Early Exploration

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Abstract

This study aimed to get an agreement and expert views on the Net-Learning Collaborative Model in Islamic education. This study employs Fuzzy Delphi method using a 7 Likert scale to collect responses of 9 experts in various fields of education at public universities in Malaysia. A total of 18 item questionnaire was given to experts for evaluation. Fuzzy Delphi method was used for data analysis. Data were analysed using triangular fuzzy numbering (triangular fuzzy number) and position (ranking) of each variable is determined using the defuzzification process. The findings show that, response and expert consensus on the Net-Learning collaborative Model in Islamic education are at a good level. The overall findings of the expert consensus agreement exceed 75%, the overall value of the threshold (d)< 0.2 and a α-cut exceeds 0.5. The priority guidelines elements were sorted by priority and were refined by adding and dropping item as recommended by experts.

Keyword: Fuzzy Delphi Method, Collaborative Learning, Islamic Education, Internet Learning

Introduction

Social network application like Facebook, WhatsApp, Telegram, Bips, Tik Tok and Google+ are becoming very famous and dominants media in recent years since they provide people with an easy access and fastest way to share information with persons they know (Liou, Huang, Chen & Huang, 2015). On social media websites, users can post ideas and links, and share and comment on ideas posted by others. This can increase the level of interaction between students (Cheung, Chiu & Lee, 2011). At the same time, the rapid development of mobile devices and wireless networks has further encouraged the use of social networking websites in mobile and ubiquitous environments (Lewis, Pea & Rosen, 2010).

Nowadays, Social networking sites have become common e-learning channels for sharing and shared information (Liou et al., 2015). This platform will help learners develop stronger social links and enable them to exchange ideas, create goods, build identity, and gain input in a timely manner (Greenhow, 2011). For example, social networking platforms have been used to serve as a simulated language learning classroom, given a forum for communicating and entertaining college students (Blattner & Fiori, 2009).

Collaborative Learning

Janssen (2014) defines collaborative learning as a collective exploration of a shared intellectual goal. The most critical priority in collective learning, Johnson & Johnson (2009) say, is the realization of positive social interdependence: the learning results of people are impacted by their own and others' actions, which facilitate the achievement of their shared aim by all the actions they take. Collaborative learning provides the students with a variety of skills to collaborate to achieve their goals. Students are in control of the learning of each other and their own (Khosa & Volet, 2014). Thus, one student's achievement makes all students succeed. Collaborative learning is a student community working to accomplish the problem-solving job that is offered as the need for learning experiences (Ajid et al., 2018). Collaborative learning not only work together, but also include teamwork in some tasks to achieve group success (Coll, Rochera, & de Gispert, 2014). The factors contributing to the success of teamwork is the team bonding exercises, the number of meetings and the importance that people put on the learning process or orientation goals (Ajid et al., 2018).

The group's collaboration practices should be carried out using interactive tools without its member physical sessions. Collaborative resources are typically web-based, and the user can quickly access them. Web based tools will facilitate community coordination practices that do not need to be paid at a high price, they only need to use internet connectivity, and extra hardware is not needed (Yücel & Usluel, 2016). Becker and Cline (2005) provides a variety of collaborative tools such as email, audio conferencing, collaborative presentation software, video conferencing in the Conference room, video desktop conferencing, discussion database, software for document management, electronic white board, group design, schedule and calendar for groups, knowledge management system, personal communication tools, etc.

Network Collaborative Learning

Since the early 1980s, experiments in the conceptualization, design, and delivery of online courses to geographically distributed students have helped develop a new educational approach: collaborative learning through the networks. This method is asynchronous and location-independent and employs a computer-mediated system (Harasim, 1999). Collaborative learning is an interactive, knowledge building process in groups, in contrast to traditional, lesson-based learning. Students participate actively in information generation, access, and organization. They build knowledge by formulating their ideas in words and images and then develop these ideas/concepts as they respond to the answers of other students. The teacher structures study activities carefully, concentrates on specific material and monitors the work of students (Harasim, 1999).

In recent years, several studies have stressed how important collaborative learning is to develop self-efficiency, to increase learning motivation or active learning attitudes and to improve learning outcomes, as has been proving an effective method of teaching (Moon, Jang & Kim, 2011). Collaborative learning may take place on social networking networks and enable people to collaborate towards a common goal (Cheung et al., 2011). Therefore, the purpose of this study is to add collective collaboration techniques (net learning) to an atmosphere of learning to improve interactions between peers, thus effectively enhancing students' learning achievements and motivation.

Islam and E Learning

When it comes to globalisation in the field of education, it is both a problem and a source of optimism for educators since the need to raise educational quality standards will become even more pressing. As a result, in this instance, it is critical for an educator to learn the right teaching tactics and methodologies, particularly when it comes to Islamic education. Islamic education has an important role in developing the ethics and morals of the people and the nation to build pious and committed people. Theoretically, Islamic education strives to mould the personality of Muslims by instilling devotion and growing faith, as well as training youngsters to become Muslims who are devout, knowledgeable, skilful, and creative to attain safety on earth and in the afterlife (Mansir & Karim, 2020).

With the arrival of the digital age or the period of the industrial revolution 4.0, there must be both good and bad consequences in the educational sector. Particularly in relation to Islamic education learning, which is likewise undergoing continual development and change (Amirudin, 2019). Given the benefits of e-learning in education, there is a growing desire to include Islamic character education into the practise of e-learning in Islamic educational sectors. According to Memon (2011), it is critical for Islamic instructors to manage Islamic education that conforms to the globalised world by including character education into the curriculum. Therefore, based on these aspects discussed, Islam education is no exception in implementing learning sessions in a new environment. The need for online learning, Islamic education needs a paradigm shift in arranging the context of education with the current situation of more internet learning. However, the current trend of learning sessions is general and sometimes not in accordance with Islamic methods. Therefore, this study will build a framework of net learning model to be a reference for Islamic educators in conducting their learning that follow the methods required in Islam.

Research Aim

This study aims to develop the Net-collaborative learning model based on expert consensus.

Methodology

This research employs the Multi Research Method technique pioneered by Richie and Klein (2007). Design and Development Research is well established as one of the research approaches used by many researchers in development studies focusing on the construction of designs, models, structures, and many more that can be tailored to the goals and motives of the research. However, since the researcher did not have much time to finish the analysis, he made several changes to conform to it.

Essentially, this analysis has two main phases. The first step involves the researcher highlighting related literature to construct the main structures and things required in the formation of the Net-collaborative model structure. The researcher then moved on to step 2, which included the use of the Fuzzy Delphi Method, which is based on expert consensus. The Fuzzy Delphi Method is a method for reaching a consensus on what to construct. The researcher distributes an expert consent assessment instrument to the built structure of the model. The Net-collaborative model is developed with expert agreement until the data are analysed.

Sampling

Purposive sampling is used in this analysis. Since the researcher needs to reach a consensus on something established, this approach is ideally adapted. Purposive sampling is the most appropriate approach in FDM, according to Hasson, Keeney, and McKenna (2000). Meanwhile, 9 experts participated in this research. Table 2 lists the experts who have agreed to participate. These experts were chosen based on their knowledge and qualifications. If the experts participating in this analysis are all the same, the number of professionals required is between 5 and 10. When there is a degree of uniformity, the minimum number of Delphi experts ranges from 10 to 15 individuals (Ziglio & Adler, 1996).

Table 1:
Expert List

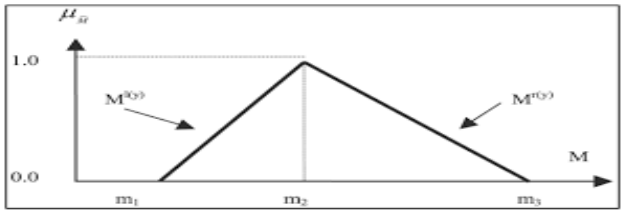
Expert	Field of expertise	Institution
2 Professor	Multimedia	Public university
3 Senior Lecturer	Technology in education	2 Public University 1 Private university
4 Teacher	Islamic Study teacher	Public School

Expert Criteria

Experts, as defined by Booker & Mc Namara (2004), are persons who have achieved their qualifications, training, experience, professional membership, and peer recognition by hard work and dedication (Nikolopoulos, 2004; Perera, Drew & Johnson, 2012). An expert, according to (Cantrill, Sibbald & Buetow, 1996; Mullen, 2003), is anybody with expertise and understanding in a certain area or field. In the Fuzzy Delphi research, expert selection is an essential factor to consider. In cases when expert selection is done incorrectly and based on specific criteria, issues including legitimacy, validity, and dependability of the study' conclusions might be challenged (Mustapha & Darusalam, 2017). Delphi or Fuzzy Delphi methods rely heavily on expert selection and accuracy to determine the quality, accuracy, and trustworthiness of the answers they provide. For the meaning, accuracy, and quality of Delphi results to be achieved (Dalkey & Helmer, 1963; Linstone & Turoff, 2002), study issues and survey questions must be consistent with the importance and knowledge of the experts participating. The experts engaged in the study, according to Kaynak & Macauley (1984), must represent or have expertise of the topic or issue under investigation. According to a set of extremely stringent criteria, the researcher chooses experts with at least seven years of experience and experts who are correct in their field of expertise and in relation to the study.

Fuzzy Delphi Step

Step	Formulation
1. Expert selection	• A total of 11 experts were included in this report. A panel of experts was assembled to assess the significance of the assessment parameters on the factors to be evaluated using linguistic variables. and definitions of potential problems with the piece, and so on.
2. Determining linguistic scale	• This procedure entails translating all linguistic variables into the counting of fuzzy triangles (triangular fuzzy numbers). This move also includes the addition of fuzzy numbers to the translation of linguistic variables

	(Hsieh, Lu and Tzeng, 2004). The Triangular Fuzzy Number represents the values m1, m2, and m3 and is written as follows (m1, m2, m3). The value of m1 represents the smallest possible value, the value of m2 represents a rational value, and the value of m3 represents the highest possible value. While Triangular Fuzzy Number is used to generate Fuzzy Scale for the purpose of converting linguistic variables into fuzzy numbers.  Figure 1: Triangular fuzzy number
3. The Determination of Linguistic Variables and Average Responses	• Once the researcher gain input from the specified expert, the researcher must convert all measurement findings to Fuzzy scales. This is often recognised as the acknowledgment of each answer (Benitez, Martin & Roman, 2007).
4. The determination of threshold value "d"	• The threshold value is crucial in determining the degree of agreement among experts (Thomaidis, Nikitakos & Dounias, 2006). The distances for each fuzzy integer m = (m1, m2, m3) and n = (m1, m2, m3) are determined using the formula: $d(\tilde{m},\tilde{n}) = \sqrt{\frac{1}{3}[(m1-n1)^2 + (m2-n2)^2 + (m3-n3)^2]}$
5. Identify the alpha cut aggregate level of fuzzy assessment	• If an expert consensus is reached, a fuzzy number is assigned to each piece (Mustapha & Darussalam, 2017). The below is the approach for calculating and measuring fuzzy values: (1) 4 (m1 + 2m2 + m3) Amax
6. Defuzzification process	• This process uses the formula Amax = (1)⁄4 (a1 + 2am + a3). If the researcher uses Average Fuzzy Numbers or average response, the resulting score number is a number that is in the range 0 to 1 (Ridhuan et al., 2014). In this process, there are three formulas namely: i. A = 1/3 * (m1 + m2 + m3), or; ii. A = 1/4 * (m1 + 2m2 + m3), or; iii. A = 1/6 * (m1 + 4m2 + m3). A-cut value = median value for '0' and '1', where α-cut = (0 + 1) / 2 = 0.5. If the resulting A value is less than the α-cut value = 0.5, the item will be rejected because it does not indicate an expert agreement. According to Bojdanova (2006) the alpha cut value should exceed 0.5. It is supported by Tang & Wu (2010) who stated that the α-cut value should be more than 0.5.
7. Ranking process	• The positioning process is carried out by means of defining elements based upon values of defuzzification based on expert agreement that the element with

	highest importance is the most important place for decision (Fortemps & Roubens, 1996)

Instrumentation

The researcher built the Fuzzy Delphi research instrument from the existing study literature. According to Skulmowski, Hartman & Krahn (2007), researchers can construct questionnaire elements based on literature, pilot studies and experience. Accordingly, Mustapha & Darussalam (2017) state that while creating questions for the Fuzzy Delphi approach based on research highlights, expert interviews and focus group techniques. Furthermore, Okoli and Pawlowski (2004) state that the development of items and content elements for research should begin with a literature review relevant to the area of study.

As a result, researchers used published work/literature to compile the net-learning models elements. Next, a 7-point scale is used to construct a list of expert questions. The 7-point scale was used because the more scales used, the more exact and precise the results were (Chen, Hsu & Chang, 2011). To make it easier for specialists to respond to the questionnaire, the researcher has replaced the Fuzzy value in Table 4 with a scale value of 1 to 7 as shown:

Table 3:
Fuzzy scale

Item	Fuzzy number
Strongly disagree	(0.0, 0.0, 0.1)
Disagree	(0.0, 0.1, 0.3)
Somewhat Disagree	(0.1, 0.3, 0.5)
Neutral	(0,3, 0.5, 0.7)
Somewhat agree	(0.5, 0.7, 0.9)
Agree	(0.7, 0.9, 1.0
Strongly agree	(0.9, 1.0, 1.0)

The Model Elements

Based on the highlights of literature made by researchers, listed the important elements in net-collaborative learning model based on literary review. Then the researchers will get the validity and consensus of the expert, whether this element is suitable to be included in this model using the Fuzzy Delphi method.

Table 4:
Model elements

Construct	Elements
Cognitive Characteristics	• General aptitudes toward technologies • Functional literacy • Visual literacy • Computer literacy • Prior content knowledge
Personality characteristics	• Practice of good caharacters in line and befits with their role • Attitude toward content • know the differentiate between good and bad • Practiced genuine personality, trustworthy and honesty • Having a high appreciation of religion.
Social characteristics	• Attitude toward collaboration • Keeping religious boundaries in association on the internet • Polite relationship with other individuals within religious boundaries • Social interaction with prudence and courtesy
Physical characteristics	• Visual ability • Auditory ability • Tactile ability • Courtesy of physical interaction

Finding & Discussion

An expert consensus on elements or recommendations for net-collaborative Learning formulation will be presented in this section. Fuzzy Delphi questions were administered to 9 experts in the respective disciplines, and the results were compiled using the information they provided in response. The research's findings are as follows:

Table 5:
The analysis result

Results	Item1	Item2	Item3	Item4
Expert1	0.17321	0.01283	0.06415	0.08981
Expert2	0.11547	0.07057	0.12189	0.0834
Expert3	0.11547	0.01283	0.05132	0.0834
Expert4	0.11547	0.01283	0.16679	0.20528
Expert5	0.17321	0.21811	0.05132	0.08346
Expert6	0.23094	0.07057	0.12189	0.02566
Expert7	0.12356	0.01283	0.05132	0.0834
Expert8	0.11547	0.01283	0.05132	0.08981
Expert9	0.11547	0.01283	0.06415	0.02566

Statistics	Item1	Item2	Item3	Item4
Value of the item	0.1283	0.04847	0.08268	0.08554
Value of the “d” construct	0.08625			
Item < 0.2	8	8	9	8
% Of item < 0.2	88%	88%	100%	88%
Average of % consensus	91%			
Defuzzification	0.7000	0.87778	0.78889	0.85556
Ranking	4	1	3	2
Status	Accept	Accept	Accept	Accept

The analysis results show that the darkened threshold value exceeds the threshold value 0.2 (> 0.2) after data processing (see table 5). To put it another way, there are experts whose views don't align or even don't reach consensus on some issues. The average value of all Net-Collaborative Learning construct & elements, on the other hand, shows average threshold value (d) < 0.2, or 0.08625. If the threshold (d) average value is smaller than 0.2, then the item has a high level of expert agreement (Cheng & Lin, 2002; Chang, Hsu & Chang, 2011). Meanwhile, the overall percentage of expert agreement is at a value of 85 percent agreement which is more than (> 75 percent) 91%, means to meet the conditions of expert agreement on this item. In addition, all Alpha-Cut defuzzification values (average of fuzzy response) exceed α-cut => 0.5. According to (Tang & Wu, 2010; Bojdanova, 2006) the alpha cut value should exceed 0.5 and if it is less than 0.5, then it should be dropped.

Table 6:
Construct & elements rank

	Construct	Early construct Rank	New construct rank
Net-Collaborative Learning Model in Islamic education	Cognitive Characteristics	Construct 1 (*CC1, CC2, CC3, CC4, C5*)	Personality characteristics
	Personality characteristics	Construct 2 (*PC1, PC2, PC3, PC4, PC5)*	Physical characteristics
	Social characteristics	Construct 3 (*SC1, SC2, SC3, SC4)*	Social characteristics
	Physical characteristics	Construct 4 (*PCT 1, PCT2, PCT3, PCT4*)	Cognitive Characteristics

The Final Model

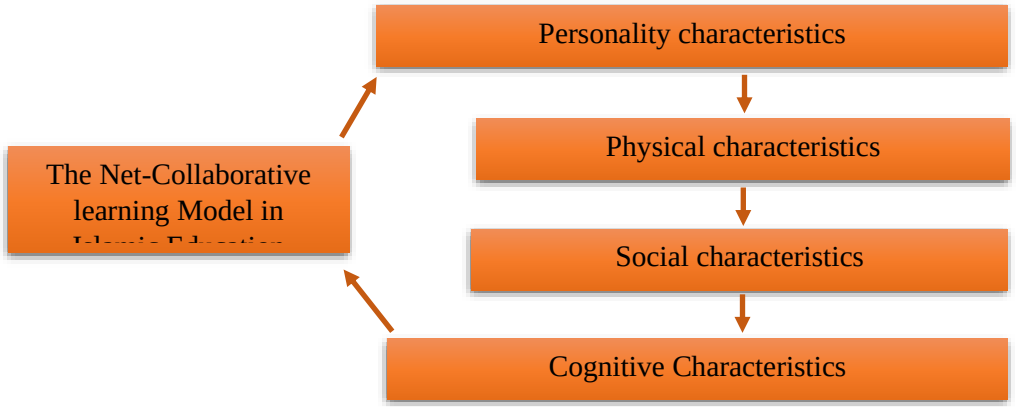


Figure 1: The Net-collaborative learning Model in Islamic education

Conclusion

These models are anchored and collected from the literature then formed with expert consent. This model is formed in 4 main constructs that is Personality characteristics, Physical characteristics, Social characteristics and Cognitive Characteristics. This model is formed because of a combination of net learning model elements with some elements of Islamic education that are adapted to the current context, especially those related to internal learning. Among the things that are important in the context of Islamic education based on online learning are matters related to manners and personal qualities. This matter needs to be given special attention by the educators so that the interaction in the internet learning process is in line with the manners taught in Islam. The online learning process will involve non -face -to -face interaction. Students will be everywhere and not bound by rules and etiquette such as face-to-face interaction. Therefore, the interactions, skills and characters formed need to be in line with the context that Islam requires.

Guideline for the Future Research

This model, formed with certain limitations. There may be several other constructs that can be formed as constructs that can describe internet learning in an Islamic context. Perhaps future researchers can extract model elements based on highlights from the Quran and Hadith. Apart from that, it can be formed from the point of view of renowned scholars in Islam who are more experts in the context of education as well as can be integrated in the modern

context. In addition, this study focuses on the Fuzzy Delphi method in the model development process. Future researchers could use other more rigorous methods in building models such as ISM and AHP.

References

Adler, M., & Ziglio, E. (1996). *Gazing into the Oracle: The Delphi method and its application to social policy and public health*: Jessica Kingsley Publisher

Amirudin, N. (2019). Problematika pembelajaran pendidikan agama Islam di era digital. *In Prosiding Seminar Nasional Prodi PAI UMP* (pp. 181–192). Pendidikan Agama Islam Universitas Muhammadiyah Purwokerto

Bodjanova, S. (2006). Median alpha-levels of a fuzzy number. *Fuzzy Sets and Systems*, 157(7), 879–891. doi: 10.1016/j.fss.2005.10.015

Becker, J. D., & Cline, M. (2005). Effectiveness of collaborative tool usage for virtual team activities. *AMCIS 2005 Proceedings* (Vol. 3, pp. 1397-1401). Omaha: Association for Information System

Benitez, J. M., Martín, J. C., & Román, C. (2007). Using fuzzy number for measuring quality of service in the hotel industry. *Tourism management*, 28(2), 544-555.

Blattner, G., & Fiori, M. (2009). Facebook in the language classroom: Promises and possibilities. *International Journal of Instructional Technology and Distance Learning*.

Booker, J. M., & McNamara, L. A. (2004). Solving black box computation problems using expert knowledge theory and methods. *Reliability Engineering & System Safety*, 85(1–3), 331–340.

Cantrill, J. A., Sibbald, B., & Buetow, S. (1996). The Delphi and nominal group techniques in health services research. *International Journal of Pharmacy Practice*, 4(2), 67–74.

Chang, P.-L., Hsu, C.-W., & Chang, P.-C. (2011). Fuzzy Delphi method for evaluating hydrogen production technologies. *International Journal of Hydrogen Energy*, 36(21), 14172–14179. doi: 10.1016/j.ijhydene.2011.05.045

Chang, P.-L., Hsu, C.-W., & Chang, P.-C. (2011). Fuzzy Delphi Method for evaluating hydrogen production technologies. *International Journal of Hydrogen Energy*, 36(21), 14172–14179. doi: 10.1016/j.ijhydene.2011.05.045

Cheung, C. M. K., Chiu, P. Y., & Lee, M. K. O. (2011). Online social networks: Why do students use facebook? *Computers in Human Behavior*. https://doi.org/10.1016/j.chb.2010.07.028

Cheng, C. H., & Lin, Y. (2002). Evaluating the best main battle tank using fuzzy decision theory with linguistic criteria evaluation. *European journal of operational research*, 142(1), 174-186.

Coll, C., Rochera, M. J., & De Gispert, I. (2014). Supporting online collaborative learning in small groups: Teacher feedback on learning content, academic task, and social participation. *Computers and Education*. https://doi.org/10.1016/j.compedu.2014.01.015

Dalkey, N., & Helmer, O. (1963). An Experimental Application of the Delphi Method to the Use of Experts. *Management Science*.

Fortemps, P., & Roubens, M. (1996). Ranking and defuzzification methods based on area compensation. *Fuzzy Sets and Systems*. https://doi.org/10.1016/0165-0114(95)00273-1

Greenhow, C. (2011). Online social networks and learning. *On the Horizon*. https://doi.org/10.1108/10748121111107663

Harasim, L. (1999). Framework for online learning: The Virtual-U. *Computer*. https://doi.org/10.1109/2.789750

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing*. https://doi.org/10.1046/j.1365-2648.2000.t01-1-01567.x

Hsieh, T. Y., Lu, S. T., & Tzeng, G. H. (2004). Fuzzy MCDM approach for planning and design tenders selection in public office buildings. *International Journal of Project Management*. https://doi.org/10.1016/j.ijproman.2004.01.002

Kaynak, E., & Macaulay, J. A. (1984). The Delphi technique in the measurement of tourism market potential. *Tourism Management*, 5(2), 87–101.

Janssen, J. (2014). *Opening the black box of collaborative learning: A meta-analysis investigating the antecedents and consequences of collaborative interaction* (Report No. 411-11-632 Commissioned by NWO-PROO and NRO). Utrecht, The Netherlands: University of Utrecht.

Lewis, S., Pea, R., & Rosen, J. (2010). Beyond participation to co-creation of meaning: Mobile social media in generative learning communities. *Social Science Information*. https://doi.org/10.1177/0539018410370726

Liao, Y. W., Huang, Y. M., Chen, H. C., & Huang, S. H. (2015). Exploring the antecedents of collaborative learning performance over social networking sites in a ubiquitous learning context. *Computers in Human Behavior*. https://doi.org/10.1016/j.chb.2014.10.028

Linstone, H. A., & Turoff, M. (2002). *The Delphi Method - Techniques and Applications*. The Delphi method - Techniques and applications

Mansir, F., & Karim, A. (2020). Islamic education learning approaches in shaping students' emotional intelligence in the digital age. *Hayula: Indonesian Journal of Multidisciplinary Islamic Studies*, 4(1), 67-86.

Moon, M. K., Jahng, S. G., & Kim, T. Y. (2011). A computer-assisted learning model based on the digital game exponential reward system. *Turkish Online Journal of Educational Technology*.

Mustapha, R., & Darusalam, G. (2017). *Aplikasi kaedah Fuzzy Delphi dalam Kajian Sians Sosial*. Penerbitan Universiti Malaya. Kuala Lumpur

Mullen, P. M. (2003). Delphi: myths and reality. *Journal of health organization and management*. Vol. 17 No. 1, pp. 37-52. https://doi.org/10.1108/14777260310469319

Nikolopoulos, K. (2004). Elicitation of expert opinions for uncertainty and risk. *International Journal of Forecasting* (Vol. 20).

Okoli, C., & Pawlowski, S. D. (2004). The Delphi method as a research tool: an example, design considerations and applications. *Information & management*, 42(1), 15-29.

Perera, A. H., Drew, C. A., & Johnson, C. J. (2012). *Expert Knowledge and Its Application in Landscape Ecology*. Springer, New York, 1–11. http://doi.org/10.1007/978-1-4614-1034-8

Philip, R. (2000). *New Application for Delphi Technique*, Annual "San Diego" Pfeifer & Company, Vol 2, 191-196

Skulmoski, G. J., & Hartman, F. T. (2007). The Delphi Method for Graduate Research. Journal of *Information Technology Education*, 6(1), 1–21. doi:10.1.1.151.8144

Sforza, V. C., & Ortolano, L. (1984). Delphi forecasts of land use: Transportation interactions. *Journal of Transportation Engineering*. https://doi.org/10.1061/(ASCE)0733-947X(1984)110:3(324)

Tang, C. W., & Wu, C. T. (2010). Obtaining a picture of undergraduate, education quality: A voice from inside the university. *Higher Education*, 60, 269–286

Thomaidis, N. S., Nikitakos, N., & Dounias, G. D. (2006). The evaluation of information technology projects: A fuzzy multicriteria decision-making approach. *International Journal of Information Technology and Decision Making*. https://doi.org/10.1142/S0219622006001897

Yücel, Ü. A. I., & Usluel, Y. K. (2016). Knowledge building and the quantity, content and quality of the interaction and participation of students in an online collaborative learning environment. *Computers and Education*. https://doi.org/10.1016/j.compedu.2016.02.015