

Module Validation via Delphi Techniques: One Consensus and Unanimity

Siti Salina Mustakim, Adi Atmoko, Yusuf Hanafi, Toto Nusanoro

Universitas Negeri Malang, Indonesia
Corresponding Author Email: siti.salina.pasca@um.ac.id

Tham Jia Hao
Universiti Putra Malaysia

To Link this Article: <http://dx.doi.org/10.6007/IJARPED/v12-i4/20132>

DOI:10.6007/IJARPED/v12-i4/20132

Published Online: 24 December 2023

Abstract

The Delphi techniques are widely utilized as a research approach to reach a consensus among a group of experts. When validating a module, this approach employs a judgment to prove the validity of the content item. The objective of this study is to reach a consensus on the development of the 3Q Module for enhancing Reading, Writing, and Arithmetic Skills among Bajau elementary school pupils. In the first round, participants were given a structured questionnaire based on a 3Q Module item. The 3Q Module is revised in the second round depending on the replies and comments of the participants. Participants were asked to score the classified questions from both rounds on a scale of 1 to 5, with 1 representing "Strongly Disagree" and 5 representing "Strongly Agree." On rounds one and two, the experts' consensus data were analysed using the median and interquartile range. As a result of applying two rounds of Delphi techniques, the 3Q Module reached the consensus.

Keywords: Delphi Techniques, Module Validation, Module Development, Expert Consensus

Introduction

Delphi Technique is a structured communication method that aims to gather and synthesize opinions and judgments from a panel of experts on a particular topic. It is commonly used in fields such as forecasting, decision-making, and policy development. It also involves a series of rounds of anonymous questionnaires, followed by feedback and discussion. In each round, the experts are asked to provide their opinions on a particular issue or topic. The results of each round are analyzed and used to develop a new set of questions for the next round. Through this iterative process, the Delphi Technique aims to achieve a convergence of opinion and a consensus among the panel of experts. It can be used to explore complex issues and to identify potential solutions or strategies.

While the Delphi Technique may involve some degree of system operation analysis and discussion, its primary focus is on synthesizing and analyzing the opinions and judgments of a

panel of experts. Its goal is to provide a reliable and valid means of gathering and synthesizing expert opinions, rather than to produce a specific system operation analysis or discussion. The Delphi Techniques is a communication framework that aims to produce a system operation analysis and discussion (Green, 2014). It is a qualitative method used to elicit expert opinion without the cost of face-to-face engagement, when knowledge about the actual problem is limited (Giannarou & Zarvas, 2014). The Delphi technique is extensively used to obtain information from participants in a specific area of expertise. This technique relies on judgement to show reliability until a consensus is reached. The Delphi technique is a method of obtaining and synthesizing expert opinions through a series of questionnaires or surveys. The process relies on the judgement of the experts to provide their opinions on a particular topic or problem, and then aggregates and analyzes those opinions to reach a consensus or agreement. The technique is designed to reduce bias and increase the accuracy of predictions or recommendations by leveraging the collective expertise of a group of experts. The process of consensus-building helps to improve the reliability and validity of the results obtained through the Delphi technique.

In educational contexts, Delphi studies have proven beneficial in defining guidelines, standards, and identifying trends. The Delphi Technique can help educators build curricula and learning experiences that will better prepare students for future professions. These studies will be beneficial in establishing curriculum needs, training and staffing requirements, and for recruiting objectives when combined with others grounded research (Green, 2014). By gathering and synthesizing expert opinions, the technique can help educators to develop a better understanding of the skills and knowledge required in various professions and industries, as well as identify emerging trends and best practices.

For example, the Delphi technique can be used to develop standards for academic programs, such as identifying the knowledge, skills, and competencies that students should possess upon completion of a degree program. It can also be used to develop guidelines for curriculum development, such as identifying the most effective teaching methods and learning experiences for a particular subject or topic. Furthermore, the Delphi technique can help educators to identify emerging trends and skills required in the workforce. This can inform the development of new courses or programs that better prepare students for future professions. The technique can also help to ensure that curricula and learning experiences remain relevant and up to date in rapidly evolving industries and fields.

The importance and necessity of achieving consensus opinion in the Delphi procedure make it become the most preferred consensus method. It can be used for evaluating clinical, educational, and policy issues (Gordon, 2005). According to Helmer (2002), this process is appropriate in determining teacher competency, curriculum or lesson material, and the direction of a specified objective as an educational system. It might give a new perspective and aspect than traditional research methods such as surveys and questionnaires.

In this research, Delphi techniques is utilized due to its importance in assisting researchers in to gather more extensive and in-depth data. The Delphi technique is mostly used to investigate topics or issues that lack adequate prior knowledge to be referred by the researcher. As a result, gathering feedback and opinions from a panel of experts is the best approach to obtain reliable and adequate data for a limited time and circumstances (Irdayanti

et al., 2015). It involves three resources that will influence the ultimate output of the Delphi process, which are gathered from a group of selected experts. The three main resources that influence the ultimate output of the Delphi process are (1) expertise of the selected experts: The Delphi process relies on the expertise of the selected experts to provide informed opinions on the topic being studied. The quality and relevance of the opinions provided by the experts will ultimately influence the output of the process, (2) quality of the communication and feedback mechanisms: The Delphi process relies on effective communication and feedback mechanisms between the researchers and the selected experts. The quality and clarity of the questionnaires or surveys, as well as the feedback provided to the experts on their responses, can impact the quality and accuracy of the output of the process, and (3) structure and design of the Delphi process: The structure and design of the Delphi process can also influence the ultimate output. Factors such as the number of rounds, the method of aggregating responses, and the criteria for reaching consensus can all impact the final results of the process.

The quality of the expertise of the selected experts, the communication and feedback mechanisms, and the structure and design of the Delphi process all play a critical role in determining the ultimate output of the process. To ensure the best possible output, it is important to carefully select a diverse group of experts, use effective communication and feedback mechanisms, and design the Delphi process to meet the specific needs of the study.

Each expert contributed three resources: knowledge, suggestions, and speculation. Knowledge is an important resource in making a decision since it may be utilised as a foundation for providing appropriate suggestions and information. With knowledge, speculation may be developed such that it can be utilised as a source of information to make decisions, despite its low status. The argument and consensus established by the group of experts will be more precise and adequate for predicting future expansion as a result of the three resources (Helmer, 2002).

A Delphi technique study is an interactive and iterative process that can run as many rounds as necessary to reach a consensus among panel of experts (Cyphert & Gant, 1970). The number of rounds is varied and is determined by the research's goal. For most research, two or three Delphi iterations are adequate (Delbeq et al., 1975). The instruments used in the process are questionnaires that demand input from an expert panel for several rounds. The first round's question usually draws the attention of the expert panel to the questions, problems, or issues that need to be addressed and stimulates comments or suggestions (Issac & Michael, 1995). The replies from the first round are utilized to develop the questionnaire for the second round. During following rounds, a panel of experts will reassess the replies they provided in previous rounds. The statistical interpretations of the expert panel's viewpoints and comments drawn from the open-ended questions in the questionnaires make up the summaries. The iterative nature of the Delphi study's following rounds is critical for achieving consensus (Nworie, 2011). Central tendency measures are utilised to illustrate and determine the consensus. Individuals who express differing opinions from the rest of the panel may be requested to give explanations for their differing opinions in order to clarify their stances (Green, 2014).

The Delphi approach depends on the opinions of a panel of experts to establish the level of consensus, future directions, or a plan of action. Therefore, the expert panelists engaged should be experienced experts who can provide an educated view or expert opinion on matters in their respective fields (Nworie, 2011). They should be someone who has mastered the field and can respond quickly on the topic at hand (Helmer, 2002). Adler and Ziglio (1996) proposed the expert panelists that selected should fulfilled the below four requirements: (1) Have knowledge and experience in the topics being investigated; (2) Participation capability and willingness; (3) Sufficient time to take part in the Delphi Process; and (4) Ability to communicate effectively.

There is no disagreement on the panel's size. The number of experts on a panel might range from a few to hundreds. A nominating procedure was used to identify the experts (Latif et.al, 2017). It may be preferable to begin the Delphi procedure with a high number of panelists. However, it is difficult to predict how many panelists will be willing to participate until the study is completed. When it comes to long-term commitment, attrition may be a huge concern (Nworie, 2011). Adler and Ziglio (1996) proposed that 10-15 experts are enough for small size panel. The number of experts engaged in a Delphi study is usually decided by the number of experts necessary to establish a representative pooling of judgments and the researchers' capacity to analyse information (Latif et.al, 2017). Even a group of four panelists can effectively engage in Delphi research under the correct circumstances (Brockhoff, 1975).

Delphi techniques in this study is utilized to create a simple, enjoyable learning module that will support the pupils' development in the three RWA skills: reading, writing, and arithmetic. The lesson plan can advance students' academic interests and promote personal growth. The enjoyable exercises in this module's learning activities can promote student involvement and enhance their creativity and communication abilities. Aiming to lower the high school dropout rate, the module will be implemented. The interactions between the concerned pupils and teachers might be enhanced by the learning activities. Teachers inspire their pupils to investigate and engage with the idea of learning by doing by acting as facilitators. The designed module can encourage pupils to master these subjects, which can boost the school's academic performance. The instructors and school administration will benefit from having a better understanding of the most effective pedagogy for teaching the group of pupils during the implementation and evaluation processes. Based on the data gathered and analysis performed, the module designed is intended to meet the educational needs of the pupils. This useful module can be applied in a variety of schools, which is pertinent. As a result, it can also aid in reducing the district's and state's high dropout rate and curriculum performance. It is important to incorporate learning activities that are connected with the development of 21st century skills, such as the capacity for critical and creative thought, general skills, the capacity for conflict resolution, and social skills.

Methodology

The primary aim of this study is to describe how the two-round Delphi approach was used to reach a consensus on the development of the 3Q Module for enhancing Reading, Writing, and Arithmetic Skills among Bajau elementary school pupils.

The Delphi procedure can be iterated multiple times until a consensus is reached among the panel of experts. However, the number of iterations required can vary depending on the

complexity of the topic being studied and the level of agreement or disagreement among the experts.

In the case of the development of the 3Q Module for enhancing Reading, Writing, and Arithmetic Skills among Bajau primary school students, the researcher decided to use a two-round approach to validate the module using the Delphi technique. This approach involves presenting the experts with a set of items or questions, collecting their responses, and then refining the items based on their feedback before presenting them with a revised set of items for further review.

One of the advantages of using the Delphi approach is that it allows the panel of experts to focus on scoring, amending, and commenting on the items presented without the distractions that can come with more typical face-to-face meetings. This can lead to a more focused and efficient process and can also help to reduce potential biases or influences that may arise from personal interactions among the experts.

The Delphi technique can be a useful tool for validating the development of educational modules and programs and can help to ensure that they meet the needs and requirements of experts in the field. The approach can also help to promote consensus-building and collaboration among experts, leading to a more robust and effective final product.

In this study, eight experts from five different institutions who met the specific qualification and expertise are selected to be involved in the Delphi process. The expert panels were free and unbiased to provide comments on the issues. The Delphi process can be iterated continuously until consensus has been reached.

The researchers utilized two rounds of Delphi techniques to validate the development of the 3Q Module for enhancing Reading, Writing, and Arithmetic Skills among Bajau primary school students in this module validation process. In this study, the researcher utilized Lateh's (2017) formula as a guideline to determine the consensus of each item, as indicated in Table 1.

Table 1

Level of Consensus among the Experts according to Interquartile Range (IQR) Score

Interquartile Range (IQR) Score	Level of Consensus
0.00 – 1.00	High
1.01 – 1.99	Medium
≥ 2.00	Low

The items are divided into seven categories: (1) Objectives of the 3Q Module, (2) Content of 3Q Module, (3) Learning Activities of 3Q Modules, (4) Evaluation Activities of 3Q Module, (5) Sequence of 3Q Module, (6) Graphic Presentation of 3Q Module, and (7) Consistency of 3Q Module. The expert panel is permitted to offer input on the module and questionnaire.

Findings

Table 2 presents the results of the two rounds of the Delphi technique. The Mean and Median values can provide an indication of the central tendency of the responses, while the Interquartile Range can provide an indication of the degree of agreement or disagreement among the panel of experts. A smaller Interquartile Range typically indicates a higher level of agreement among the experts.

The consensus level can also be used to determine the level of agreement or disagreement among the experts. Consensus can be defined as the point at which a high percentage of the panel of experts agree on a particular item or category. The specific threshold for consensus can vary depending on the study but is typically set at around 70-80% agreement among the panel of experts.

The use of the Delphi technique and the presentation of results in Table 2 can help to ensure that the learning module developed for enhancing reading, writing, and arithmetic skills among Bajau primary school students is of high quality and meets the needs of experts in the field. The input and feedback provided by the expert panel can also help to improve the overall effectiveness and impact of the module.

Table 2

Consensus in module development through two round Delphi technique

Item	Round of Delphi					
	Round 1			Round 2		
	Mean	Median	IQR	Mean	Median	IQR
Statement 1	3	3	1	4.8	5	0.5
Statement 2	3	3	1	4.6	5	1
Statement 3	3	3	1.5	4.6	5	1
Statement 4	3	3	1.5	4.6	5	1
Statement 5	2.6	3	2	3.8	4	0.5
Statement 6	3.8	4	1.5	4.8	5	0.5
Statement 7	2.8	3	1.5	4	4	1
Statement 8	3.4	3	1	3.8	4	0.5
Statement 9	3.4	3	1	4	4	1
Statement 10	3	3	1.5	4.4	4	1
Statement 11	3	3	2	4.2	4	0.5
Statement 12	4.2	4	1.5	4.6	5	1
Statement 13	4.4	5	1.5	4.4	4	1
Statement 14	4.4	4	1	4.6	5	1
Statement 15	3.8	4	1.5	4.4	4	1
Statement 16	4.4	4	1	4.4	4	1
Statement 17	3.8	4	1.5	4	4	1
Statement 18	3.6	4	1.5	4.6	5	1
Statement 19	4	4	1.5	4.6	5	1
Statement 20	3.6	4	1.5	4.8	5	0.5
Statement 21	4	4	1.5	4.8	5	0.5
Statement 22	4.4	4	1	4.8	5	0.5
Statement 23	4.4	4	1	4.8	5	0.5
Statement 24	4.4	5	1.5	4.8	5	0.5
Statement 25	4.2	4	1.5	4.6	5	1

Table 2 show the median, mean and interquartile range for two round of Delphi process. There are two statements have low consensus during the first round which were Statements 5 and 11. While 15 statements show medium consensus which were Statements 3, 4, 6, 7, 10, 12, 13, 15, 17, 18, 19, 29, 21, 24 and 25. Based on the comments and responses provided by panelists in round one, the module is revised. During round two, all 25 statements reached the high level of consensus among 8 expert panelists with 0.5 and 1 interquartile range score. The median score of the 25 statements is above 4. In conclusion, all the 8 expert panelists agree that the development of the 3Q Module is efficient in enhancing Reading, Writing, and Arithmetic Skills among Bajau elementary school pupils.

Discussion

It is a valid approach to use Delphi techniques to collect data from participants in a field of expertise. The Delphi process is a structured communication technique that aims to reach a consensus among a group of experts on a specific topic. By using multiple rounds of data collection and analysis, the researcher can refine the research questions and obtain more accurate and reliable results. In this study, the researcher used two rounds of Delphi techniques to validate the 3Q module. The use of multiple rounds of data collection is a common practice in the Delphi process, and it allows for iterative refinement of the research questions and consensus building among the experts.

The researcher used multiple communication channels, including WhatsApp, email, and Zoom meetings, to collect data from the participants. This approach can help ensure that the participants can participate in the survey in a way that is convenient and accessible for them.

With the use of Delphi techniques and multiple rounds of data collection and analysis can help ensure that the research results are accurate and reliable, and that the conclusions reached are based on a consensus among a group of experts in the field.

After two rounds of Delphi, researchers discovered that the 3Q module was agreed upon by all eight experts and got good feedback. All twenty-five statements had an interquartile range score of less than or equal to 1. It indicates that there was a high level of consensus. In other words, all expert responses on a scale of 4 or above, indicating agree or strong agreement.

The content of the module is very important. It should show the course's guidance and expectation. The syllabus will outline what you will be learning and what is expected of you (Mustakim, et. al., 2020). Based on the results, the experts do agree that the objectives of 3Q Module able to measure the foundation of the course and emphasize the most important concepts in the course. The level of consensus is high for the content of 3Q Module where the experts strongly agree the 3Q Module is interesting and enrich the basic reading, writing and arithmetic skills of Bajau pupils.

The learning activities of 3Q Module can help to develop the creative thinking and communication skills of Bajau pupils. Assessment is a curriculum process in implementing a curriculum (Tham, et. al., 2020). The experts agreed that the assessment activities in this module can cater to individual differences and diverse intelligences. Experts' panelist also strongly agrees that the graphic of 3Q Module is interesting and suitable for elementary pupils. Fun elements in the curriculum are very helpful in attracting the attention of pupils and

encourage them to go to school (Tham et. al., 2021). The lessons are arranged in chronological order and the arrangement of the module is interesting. The features of fun learning are the same in every chapter.

In the context of the 3Q Module, assessment would involve evaluating the extent to which the learning activities have helped to develop the creative thinking and communication skills of Bajau pupils. This could involve assessing the students' ability to think critically and come up with innovative ideas, as well as their ability to communicate their ideas effectively to others. Assessment is an important part of any curriculum process, as it provides a way to evaluate the effectiveness of the learning activities and determine if the intended learning outcomes have been achieved. This can help to identify areas where students may be struggling and allow for adjustments to be made to the curriculum to better meet the needs of the students.

Assessment is an important part of the curriculum process, as it helps to ensure that the learning objectives are being met and that students are developing the skills and knowledge that they need to succeed. In the case of the 3Q Module, assessment would be essential to determine whether the learning activities are effectively developing the creative thinking and communication skills of Bajau pupils.

Conclusion

The Delphi method is a widely used data collection methodology that is particularly effective for achieving consensus among a group of experts. Its applications extend to a wide range of fields and topics, including educational research, healthcare, and business.

However, before initiating a Delphi study, it is important to carefully select the expert panelists who will be providing input and feedback. These panelists should possess relevant knowledge and expertise in the field or topic being studied and should represent a range of perspectives and backgrounds. The size of the panel can vary depending on the scope and complexity of the study but should typically include at least 10-15 experts.

In addition to panel selection, it is also important to establish clear time frames and deadlines for completing the Delphi study. This can help to ensure that the study progresses smoothly and efficiently and can also help to minimize any potential delays or disruptions.

The Delphi technique can be a valuable tool for validating and improving the quality of educational modules and programs. By involving a panel of experts in the validation process, the Delphi method can help to ensure that the module meets the needs and requirements of experts in the field and can also help to promote collaboration and consensus-building among experts.

As a conclusion, 3Q Module has meet the consensus by using two rounds Delphi techniques. The 3Q Module is validated and found suitable in enhancing Reading, Writing, and Arithmetic Skills among Bajau elementary school pupils. By using two rounds of the Delphi technique, the expert panel was able to provide input and feedback on the module, leading to a consensus on its suitability and effectiveness. The use of the Delphi technique to validate the module can help to ensure that it meets the needs and requirements of experts in the field and can also help to promote collaboration and consensus-building among experts. Overall, the validation

of the 3Q Module using the Delphi technique represents an important step towards improving the quality of education for Bajau elementary school pupils.

Acknowledgement

Siti Salina Mustakim holds the position of Adjunct Professor at the School of Graduate Studies, Universitas Negeri Malang, Indonesia, concurrently serving as a lecturer at Universiti Putra Malaysia. For inquiries, she can also be contacted via email at mssalina@upm.edu.my.

References

- Adler, M, & Ziglio, E. (1996). *Gazing into the Oracle: The Delphi Method and its Application to Social Policy and Public Health*. Jessica Kingsley: United Kingdom.
- Brockhoff, K. (1975). The performance of Forecasting Groups in Computer Dialog and Face-to-face Discussion. *The Delphi Method: Techniques and Applications*. Addison-Wesley: United State
- Cyphert, F. R., & Gant, W. L. (1970). The Delphi Technique: A Tool for Collecting Opinions in Teacher Education. *Phi Delta Kappa*, 21, 417-425.
- Giannarou, L. and Zervas, E. (2014). Using Delphi Technique to Build Consensus in Practice. *International Journal of Business Science and Applied Management*, 9(2), 66-82.
- Gordon, T. J. (2005). The Delphi Method. *The Mellennium Project: Futures Research Methodology*, 3, 1–29.
- Green, R. A. (2014). The Delphi Technique in Educational Research. *SAGE Open*, 4(2), 1–8.
- Hasson, F., Keeney, S., & McKenna, H. (2000). Research Guidelines for the Delphi Survey Technique, *Journal of Advanced Nursing*, 32(4), 1008-1015.
- Helmer, O. (2002). *The Delphi Method: Techniques and Applications*. Addison-Wesley: Boston.
- Irdayanti, M. N., Ramlee, M., & Abdullah, Y. (2015). Delphi Technique: Enhancing in Technical and Vocational Education. *Journal of Technical Education and Training (JTET)*, 7(2), 12–23.
- Issac, S., & Michael, W. (1995). *Handbook in Research and Evaluation*. Educational and Industrial Testing Services: San Diego.
- Lateh, N., Yaacob, S. E., & Rejab, S. N. (2017). Applying the Fuzzy Delphi Method (FDM) to Analyze the Expert Consensus Values for Instrument of Shariah-Compliant Gold Investment. *Pertanika Journal Social Sciences & Humanities*, 25(S), 165-178.
- Latif, R. L., Dahlan, A., Mulud, Z. A., & Mat Nor, M. Z. (2017). The Delphi Technique as a Method to Obtain Consensus in Health Care Education Research. *Education in Medicine Journal*, 9(3), 89-102.
- Mustakim, S. S., Tham, J. H., Minghat, A. D. & Zulkarnain, I. I. (2020). Using Evaluation Models to Access Behaviours' Development in Moral Education. *International Journal of Psychosocial Rehabilitation*, 24(8), 8649-8660.
- Nworie, J. (2011). Using the Delphi Technique in Educational Technology Research. *TechTrends*, 55(5), 24-30.
- Tham, J. H., Mustakim, S. S., Minghat, A. D., Rahim, A. H. A. & Enio M. S. K. (2021). Despair – Destiny - Dearth: A Retrospective Sea Bajau Labyrinth Education Review. *Linguistica Antverpiensia*, 2021(2), 615-625.
- Tham, J. H., Mustakim, S. S., Thilagavathy, Minghat, A. D., Suhid, A., Manaf, U. K. A. & Tam, S. Y. (2020). An Evaluation of Moral Education's Capabilitis in Enriching Student's Moral Behavior. *International Journal of Advanced Science and Technology*, 29(7), 357-365.