

SOLVING THE STUDENTS WRITING SKILL WITH TECHNOLOGY ASSISTANT: THE FUZZY DELPHI APPROACH

Nor Arifah Che Wahab¹
Abdul Rasid Jamian²

¹Faculty Of Languages And Communication, Universiti Pendidikan Sultan Idris (UPSI), Malaysia,
(E-mail: norarifahcw@gmail.com)

²Faculty Of Languages And Communication, Universiti Pendidikan Sultan Idris (UPSI), Malaysia,
(Email: rasid.jamian@fbk.upsi.edu.my)

Article history

Received date : 19-9-2023
Revised date : 25-9-2023
Accepted date : 29-10-2023
Published date : 14-11-2023

To cite this document:

Che Wahab, N. A., & Jamian, A. R. (2023). Solving The Students Writing Skill With Technology Assistant: The Fuzzy Delphi Approach. *Journal of islamic, social, economics and Development (JISED)*, 8 (58), 243 – 255.

Abstract: *The development of strong writing skills in primary school students is essential for their academic success and future opportunities. Writing skills play a vital role in primary school students' academic success and future opportunities as they enable them to effectively communicate, express their thoughts and ideas, and demonstrate their understanding of various subjects. This study aims at getting expert consensus and opinions on elements of writing skills problem solutions based on technology. This study uses 7 expert scale to gather input from 7 experts in different education fields in Malaysia using Fuzzy Delphi process. The assessment received a total of 8 key construct of the questionnaire. The Fuzzy Delphi method Logic Software (FUDELO) has been used for data analysis. The data were analysed using a triangle fuzzy number and a ranking of the defuzzification process with each construct elements. The results of the study and the consensus of the experts show that the Agreement's value is in a good level. This shows that elements of writing skills solutions have been well-received by experts. The elements agreed upon by the experts in consensus are arranged in order of ranking process.*

Keywords: *Fuzzy Delphi, Writing skill, technology*

Introduction

In order to succeed academically, students must develop strong writing skills (Kristyanawati et al., 2019). This includes the ability to effectively communicate ideas, organize thoughts, and properly cite sources to avoid plagiarism. Furthermore, writing skills are not only crucial for academic success but also for future career prospects. Therefore, it is essential for high school students to receive proper instruction and resources to improve their writing skills and meet the demands of higher education and beyond. Additionally, writing skills are not only important for academic success but also for personal expression and effective communication in various aspects of life. Writing skills are a fundamental aspect of academic success, as they enable students to effectively communicate ideas, express themselves, and demonstrate their understanding of subject matter (Passero et al., 2019).

According to the American National Commission on Writing, writing research has been the most underfunded field of study among reading, writing, and mathematics (NCW, 2003). The ability to put thoughts on paper is a modern necessity, not only for kids to take part in the literacy processes (Yamaç, Öztürk & Mutlu, 2020) but also for adults to take part in social life (Clark & Dugdale, 2009). Students grow as writers because of the time spent putting pen to paper. their command of the written word, their facility with language, and their aptitude for learning (Indrisano & Paratore, 2005; Newell). The research team of MacArthur, Graham, and Fitzgerald (2006). Most research on writing training and writing ability relies on conventional worksheets that need writing using a pencil and paper. Methods and techniques from the past, such as handwriting, spelling, and sentence structure these studies focus solely on the usual classroom setting and paragraphs and writing strategies typical forms of written expression.

The rapid evolution of the internet and digital technologies in recent years has resulted in several shifts in the ways in which material is created and disseminated (Bromley, 2006; Peterson-Karlan, 2011). New forms of writing and new places to write have emerged as a result of the rise of the internet and other digital technologies (MacArthur, 2006), Composing multimedia texts (Cordero, Nussbaum, Ibaseta, Otaza, & Chiuminatto, 2018), writing digital books (Baker & Lastrapes, 2019), composing cooperative online texts (Liu, Liu, Chen, Lin, & Chen, 2011), wiki writing (Pifarre & Li, 2012), blogging (McGrail & Davis, 2011), and virtual literacy have replaced the traditional notion of solitary Change, Liao, and Chan (2019). New social practices, abilities, techniques, and dispositions are required for writing and creating content in digital environments (Leu, Slomp, Zawilinski, & Corrigan, 2016).

Writing skill and technology

Technological proficiency has become increasingly important. Proficiency in technology enables individuals to leverage various digital tools and platforms to enhance their writing skills, such as word processing software for drafting and editing, online collaboration tools for peer feedback, and grammar and plagiarism-checking apps for ensuring accuracy (Njiku, 2023). Furthermore, being tech-savvy allows writers to adapt their writing style and format to different digital platforms, such as blogs, social media platforms, and online publications, reaching a wider audience and increasing their impact (Nazir et al., 2023). By integrating technology into the writing process, individuals can improve efficiency, productivity, and creativity in their written communication.

Technology's pervasive presence in the modern classroom has changed the very nature of language instruction and acquisition. For instance, with the use of the web, students can acquire access to authentic content, participate in a virtual immersion classroom via video conference, and legitimate their aim all while expressing their voice and presenting a positive picture of themselves (Blake, 2013). Students can benefit from technological advancements since they facilitate tasks such as writing assignments, researching topics, communicating with classmates and professors, and even designing classrooms that feel more like their original habitats. Students can be inspired to learn more when technology is integrated into the educational setting. It is argued that students' growth of positive attitudes was facilitated by their exposure to technology in the classroom.

Therefore, it follows that students' strategy utilization would be influenced by the accessibility of technology. However, students' technological practices are shaped by their own technological competencies and affordances (Egbert, 2018). In turn, pupils' technological competence varies widely, even when they have access to the same equipment or the same

technology. In addition, students may be aware that a certain piece of technology can be used to aid in their education, but opt not to utilize it (Bikowski & Casal, 2018). Despite its potential to improve education, technology is not without its own set of considerations. It's up to both students and instructors to make good use of it. Referring to this description, we see the role of technology is very important in solving the problem of writing skills among students. Considering that today's world is exposed to technology skills and its maximum use, then our study will try to suggest some things that can be used in solving writing skills problems by using technology.

Student writing skill issues in Malaysia

Students, especially those born after 1995 (Generation Z), are heavy users of technology in today's culture. These students are considered "digital natives," which implies they grew up with computers and other digital technologies. daily routines. Popular social media platforms include Facebook, Instagram, and Twitter. widespread application in the realms of interpersonal communication and share their thoughts and feelings (Dolot, 2018). This is the spot where most of the writing is done as well. More In order to better instruct students in the art of composition, educators are incorporating the use of social media into the classroom. Using Web 2.0 applications like Facebook and Wikipedia, students can practice their writing and receive constructive criticism from their instructors (Yamat, 2012). completely new and (Yunus, Nordin, Salehi, Sun, & Embi, 2013a) and flat. The use of technology in the classroom has its While the use of English in the classroom may inspire pupils to be more engaged, have no internet connection and cannot afford a computer or mobile device. The expanding international information and communication technology's ability to meet the need for adaptable, creative instruction (also known as "information and communication technologies") can be used in conjunction with more conventional students writing.

In order to identify any disparities in the early writing of the children, Thomas et al. (2020) state that it is crucial to examine children's early writing skills, particularly for those who have been recognized as at-risk for later literacy issues. In keeping with this goal, from 2009 until 2019, a screening program called Literacy and Numeracy Screening (LINUS) will be implemented in Malaysian schools to identify and assist kids with literacy and numeracy challenges in Malay, English, and other languages. Teachers would be able to keep track of their students' progress in reading and numeracy, as well as the results of any interventions, with the help of LINUS. Schools were given the opportunity to address problems on their own without having to rely on a predetermined software package or module, hence the program was ultimately scrapped (Bungga, 2018). These days, teachers often forget to keep a running record of students' performance level in the basic skills gained in a mixed-ability classroom where there is no formal program to address the issue of struggling learners. Teachers are aware of the problem of underachieving children, but they lack data indicating the scope of the issue and the degree to which students have fallen behind.

Based on this problem, we can conclude that the aspect of writing skills among students in Malaysia is still unsatisfactory and needs to be solved. This study to some extent only provides some solutions that can be taken by using technology. This study will propose an initial model of how to integrate technological aspects in solving the problem of writing skills among school students in Malaysia.

Literature Review

Students who want to develop their writing skills must not only learn to put their thoughts and ideas into words, but also learn to use various techniques for doing so effectively (Winardi, 2020). In keeping with Brown's (2000) contention that writing requires students to generate ideas, organize them in a logical fashion, use appropriate references and rhetorical conventions to put together a cohesive written text, revise text to avoid ambiguity, edit for the use of appropriate grammar, and finally produce the written product. Planning, drafting, rewriting, and editing are the four primary steps of the writing process, as stated by Richards and Renandya (2002). Students are encouraged to put their thoughts down on paper as part of a planning process. The drafting stage is where the learner begins to compile their thoughts. After receiving comments, students can use the revision step to make any necessary changes to their work. Finalizing a draft means making sure it is written correctly in terms of spelling, punctuation, diction, grammar, and sentence structure.

Learning how to write well is often the most difficult aspect of school. Teachers' perspectives on students' writing assignments are likely to vary widely. Writing processes in directed paragraph writing can be difficult for students of both native and non-native languages (Majid and Stapa, 2017). Collaborating via social media platforms, which results in digitally kept information like discussions that students can update, catalog, and share with others, has been shown to have positive effects in addressing this problem (Bailey et al., 2017). Facebook was used as a scaffold in a study that found rural secondary school pupils liked utilizing the platform because it helped them learn more effectively and enhanced both their writing process and their writing outcomes. The content analysis on the written essays by participants also indicated an increase improvement within the target group (Majid and Stapa, 2017).

Study aims

This study aims to propose a guideline in solving the problem of writing skills based on expert opinion.

Methodology

The Multi Research Method strategy proposed by Richie & Klein (2014) serves as the backbone of this research. Prototypes, models, frameworks, and many others can be tailored to the objectives and purposes of the study, making design and development research a well-known research method utilized by many researchers in development studies. However, the researcher adapted several aspects of the study because she did not have a lot of time to do it as originally planned. The initial part of this study involves the researcher reviewing the existing literature and producing a list of the most important concepts and materials that will be used to shape the students' problem-solving writing abilities in light of technological considerations. The researcher then moved on to step two, which involved the use of the consensus-based Fuzzy Delphi Method. The Fuzzy Delphi Method is a structured approach of reaching consensus while creating something. After the framework has been built, the researcher will give out evaluation instruments for expert consensus. After collecting data, the researcher uses Fudelo 1.0 (Fuzzy Delphi Logic software) to analyze it. After the data has been analyzed, solutions are formulated with the help experts.

Sampling

This study involves purposive sampling. Since the researcher needs consensus in order to develop anything, this strategy is ideal. For FDM, purposive sampling is recommended by Hasson, Keeney, and McKenna (2000). Seven experts participated in this study. The

collaborating experts are described in Table 1. The knowledge and skill sets of these specialists were taken into account when making this selection. If the experts participating are consistent, then only 7 will do for this study. According to Adler and Ziglio (1996) many issues, including access to experts and time constraints, are considered by researchers prior to beginning data collection. Accordingly, the researcher has access to a total of only seven experts.

Table 1: Experts list

Expert list	Total experts	Filed of expertise	Institution
IT Lecturer	3	Computer sciences & Multimedia	Public university
School teacher	2	Language teacher	Public primary school
IT expert	2	Multimedia in teaching	Private consultant

Experts criteria

Experts are persons who have been trained, have done practice, and have acquired knowledge via experience (Booker & Mc Namara, 2004). Experts are typically recognized for their knowledge, expertise, professional standing, and reputation among their peers (Nikolopoulos, 2004). Experts are those who have extensive training and understanding in their respective fields (Cantrill, Sibbald, & Buetow, 1996; Mullen, 2003). In a Fuzzy Delphi analysis, expert choice is a crucial factor to take into account. Issues such as correctness, validity and reliability of the analytical results and conclusions may be contested where expert selection is made erroneously and on the basis of particular factors (Mustapha & Darusalam, 2017). Whether using the traditional Delphi approach or the more recent Fuzzy Delphi, selecting the right experts is crucial to ensuring reliable, valid outcomes. In order to get Delphi's wisdom, precision, and quality (Dalkey & Helmer, 1963; Linstone, 2002), one must follow a number of steps. On the basis of very tight selection criteria, the researcher selects experts with 7 years of experience and above, and experts who are exactly right with their field of competence and with reference to the study.

Research Instrument

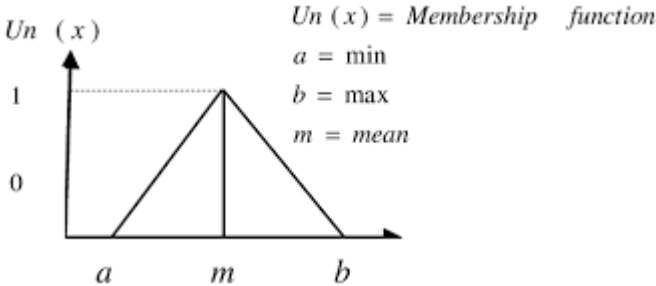
Based on this literature review, the researcher created a testing framework for Fuzzy Delphi. Questions for a survey can be based on previous research, pilot studies, or even your own observations, as suggested by Skulmowski, Hartman, and Krahn (2007). Meanwhile, Mustapha and Darussalam (2017) claimed that Fuzzy Delphi questions were designed using research points, expert interviews, and focus group techniques. In addition, a literature review should accompany the process of creating items and the other parts of a sample (Okoli and Pawlowski, 2004). Following this, a set of seven-point scale expert questions is constructed. A seven-point scale was used because more granularity is associated with higher quality data (Chen, Hsu, & Chang, 2011). The researcher place value between 1 to 7 to replace the Fuzzy value as given in Table 2 for the following 7-point linguistic scale to make it much easier for the experts to answer the questionnaire.

Table 2: Fuzzy scale

Item	Fuzzy number
Strongly Disagree	(0.0, 0.0, 0.1)
Disagree	(0.0, 0.1, 0.3)
Somewhat Disagree	(0.0,0.3, 0.5)
Neither agree or disagree	(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)

Fuzzy Delphi Step

Table 3: Fuzzy step

Step	Formulation
1. Expert selection	Seven experts were employed for this analysis. A panel of specialists was convened to weigh in on how much weight linguistic elements should provide the evaluation criteria. Detailed explanations of any problems that the product may have.
2. Determining linguistic scale	All linguistic variables are transformed into the triangular fuzzy numbers used in this procedure. This stage also incorporates the addition of fuzzy numbers to the conversion of linguistic variables (Hsieh, Lu, & Tzeng, 2004). The values m_1 , m_2 , and m_3 make up a triangular fuzzy number, which is represented by the notation (m_1, m_2, m_3) . The value of m_1 indicates the least value, the value of m_2 represents the fair value and the value of m_3 represents the maximum value. To achieve the goal of translating linguistic variables into fuzzy numbers, the Triangular Fuzzy Number is employed to generate the Fuzzy Scale. The Fuzzy scale has an uneven number of categories. See Figure 1 for an explanation.
	
3. The Determination of Linguistic Variables and Average Responses	All measurement findings must be converted to Fuzzy scales once the researcher has received comments from the designated expert. Recognizing each response is a part of this process (Benitez, Martin, & Roman, 2007).
4. The determination of threshold value "d"	Determining the level of consensus among specialists relies heavily on the threshold value (Thomaidis, Nikitakos, & Dounias, 2006). Each fuzzy number $m = (m_1, m_2, m_3)$ and each fuzzy number $n = (n_1, n_2, n_3)$ have their distances calculated using the formula:

$$d(\bar{m}, \bar{n}) = \sqrt{\frac{1}{3}[(m_1 - n_1)^2 + (m_2 - n_2)^2 + (m_3 - n_3)^2]}$$

5. Find the threshold aggregate alpha for fuzzy evaluation

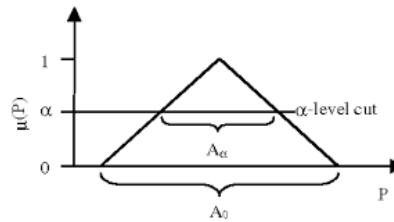
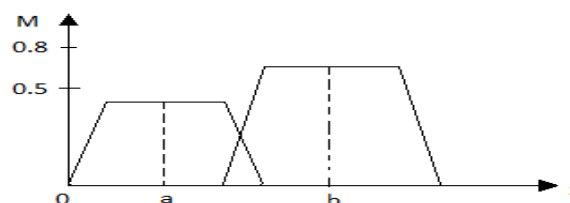


Figure 2. Fuzzy number, its support and α -cut

If experts can agree, fuzzy numbers will be assigned to each item (Mustapha & Darusalam, 2017). The procedure for calculating and assessing fuzzy values is: Maximum Allowable Area = $14(m_1m_3)$

6. Defuzzification process

In this procedure, A_{max} is calculated as follows: $A_{max} = (1/4)(a_1 + 2a_m + a_3)$. Average Fuzzy Numbers, often known as the average response, provide a score between zero and one (Ridhuan et al., 2014). There are three different equations that can be used to describe the output of this procedure: (i) $A = 1/3 * (m_1 + m_2 + m_3)$, (ii) $A = 1/4 * (m_1 + 2m_2 + m_3)$, and (iii) $A = 1/6 * (m_1 + 4m_2 + m_3)$. Median value for '0' and '1' corresponds to the α -cut value of 0.5, where α -cut = $(0 + 1) / 2 = 0.5$. The item will be deemed insufficient evidence of expert agreement if the resulting A value is less than the α -cut value = 0.5. The alpha cut value should be more than 0.5, as stated by Bojdanova (2006). According to Sun et al (2010) the α -cut value needs to be more than 0.5.



7. Ranking

In the positioning process, the most significant location determines the element with the highest defuzzification value based on expert consensus (Fortemps & Roubens, 1996).

Finding

At this stage, the researcher shapes the parts of writing skill solutions using a literature review approach. After conducting research based on carefully reviewed literature, the researcher compiles the findings and presents them for peer review. The following are the components of the investigation:

Table 4: The solution

Elements/solutions	Descriptions
Word Processing Software	<i>Make word processing programs like Microsoft Word and Google Docs accessible to pupils. These programs provide for simple text formatting, spelling and grammar checks, and straightforward document revisions. Students can benefit from practicing their typing abilities and avoiding the stress of handwriting by having them type their assignments.</i>
Educational Apps and Websites	<i>Numerous apps and websites have been developed to help elementary school kids strengthen their writing abilities. ABCmouse, Raz-Kids, and Starfall are just a few of the most well-known ones. Students may have fun as they learn with the help of these platforms, which feature interactive courses, writing prompts, and games.</i>
Online Writing Communities	<i>Students can benefit from posting their work in online forums or communities where they can obtain constructive criticism from their peers and connect with other aspiring authors. This goal is well-served by platforms like Wattpad and Young Writers' Society.</i>
Storytelling Apps	<i>here are apps like Storybird that allow students to create and illustrate their own stories. These platforms can help develop creativity, storytelling skills, and visual literacy, which are essential for effective writing.</i>
Audio Recording and Transcription	<i>Use voice recognition software or apps to allow students to speak their thoughts or stories, which can then be transcribed into text. This can be especially helpful for students who struggle with handwriting or typing but have valuable ideas to express.</i>
Blogging	<i>Create a classroom blog where students can publish their writing, such as stories, book reviews, or essays. Blogging can motivate students to write regularly and receive feedback from a wider audience.</i>
Digital Note-Taking	<i>Introduce students to digital note-taking tools like Evernote or OneNote. These tools can help students organize their thoughts and research for writing assignments.</i>
Electronic Books and E-readers	<i>Encourage students to read e-books on tablets or e-readers. This can foster a love for reading and expose them to different writing styles, which can in turn improve their writing skills.</i>

Experts' agreement on certain criteria for improving students' writing skills will form the basis of the research presented here. The data was gathered using 7 sets of Fuzzy Delphi questionnaires that were distributed to 7 experts.

Table 5: Result of expert consensus

	item1	item2	item3	item4	item5	item6	item7	item8
Expert1	0.049	0.025	0.074	0.190	0.008	0.017	0.017	0.091
Expert2	0.297	0.091	0.330	0.099	0.049	0.017	0.017	0.033
Expert3	0.049	0.025	0.074	0.190	0.049	0.017	0.017	0.033
Expert4	0.066	0.025	0.017	0.041	0.239	0.017	0.041	0.033
Expert5	0.049	0.082	0.074	0.041	0.049	0.017	0.017	0.091
Expert6	0.107	0.091	0.074	0.099	0.049	0.041	0.017	0.033
Expert7	0.107	0.025	0.017	0.099	0.049	0.041	0.041	0.313
Value of the item	0.10369	0.05184	0.09426	0.1084	0.0707	0.02357	0.02357	0.08955
Value of the "d" construct					*0.0707			
Item < 0.2	6	7	6	7	6	7	7	6
% of item < 0.2	85%	100%	85%	100%	85%	100%	100%	85%
Average of % consensus					**92%			
Defuzzification	***0.814	0.857	0.871	0.829	0.914	0.929	0.971	0.843
Ranking	***8	5	4	7	3	2	1	6
Status	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept

*Average value of "d" construct < 0.2.

**Average percentage of consensus

*** Alpha Cut (defuzzification)

The value of the darkened threshold passes the 0.2 (> 0.2) threshold following the data review (reference to Table 5). This indicates that there is a lack of agreement among experts on some topics. But average of (d) values 0.070 is the median value below which almost all items fall. If the median threshold value (d) is smaller than 0.2, there is broad agreement among experts on the topic. (Cheng and Lin 2002; Chang and Hsu 2011). Meanwhile, the expert agreement's total share is greater than or equal to 92%, meeting the agreement's standards on this issue. In addition, the average of the fuzzy responses, as calculated by Alpha-Cut defuzzification, is greater than 0.5. The alpha cut value should be greater than 0.5, as recommended by (Tang & Wu, 2010; Bojdanova, 2006). The results of this study demonstrate strong consensus across experts in writing skills solution as proposed by the researcher. Table 5 displays the relative priority (ranking) of the subjects on which experts have reached a consensus.

Table 6: Previous ranking & new rank after fuzzy evaluation

Elements/solutions	Old Rank	***New rank
Word Processing Software	1	8
Educational Apps and Websites	2	5
Online Writing Communities	3	4
Storytelling Apps	4	7
Audio Recording and Transcription	5	3
Blogging	6	2
Digital Note-Taking	7	1
Electronic Books and E-readers	8	6

Table 6 shows the new rank after Fuzzy delphi analysis. Old rank indicates the initial elements after being found from the literature highlights. Meanwhile the new rank is a new ranking after getting the consensus of the experts and then leading to the final decision and also the final decision based on the agreement of the experts (see figure 1) below.

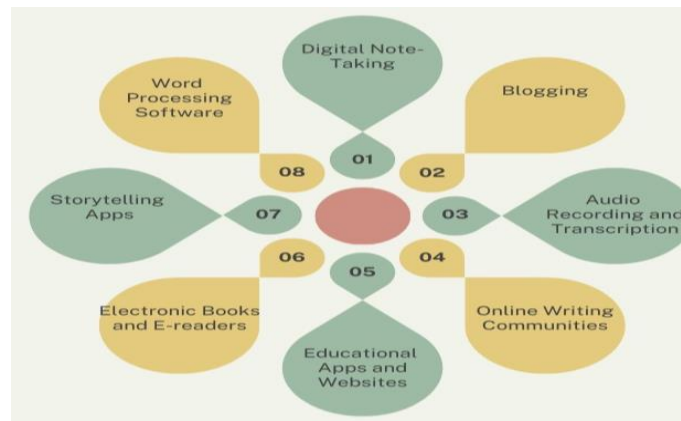


Figure 1: Writing skills solution for students in primary school

Conclusion

In conclusion, establishing good writing abilities among students is of crucial importance for their academic and personal progress. Writing well helps people in many ways, including communication, thinking critically, being creative, and expressing themselves. These abilities are crucial for achieving academic and professional success as well as personal happiness. To foster strong writing skills in students, it is essential to provide a well-rounded approach that includes a mix of traditional writing techniques and modern technology. Traditional methods, such as handwriting and in-person feedback, help build a strong foundation, while technology offers exciting opportunities for engagement and improvement. Balancing these approaches can cater to the diverse needs and preferences of students.

Furthermore, writing is a lifelong skill that goes beyond the classroom. It empowers students to articulate their thoughts effectively, share their ideas with the world, and make meaningful contributions to society. As educators, parents, and mentors, we should continue to encourage and support students in their journey to become proficient writers, recognizing that this skill is an investment in their future success and personal development.

We can emphasize here, the novelty of this study is the production of proposals for solving the issue of writing skills among students (see figure 1). Furthermore these recommendations are integrated with expert consensus. Therefore, we feel that the recommendations we have given in this study will be of great benefit to those who will use them later.

In conclusion, technology has revolutionized the field of technical writing, providing new tools and opportunities for students to improve their writing skills. By integrating writing into technical courses and employing pedagogies aimed at improving technical writing, students can develop the necessary skills for successful professional careers (Long & Graven, 2023). Additionally, the use of technology in teaching and learning has been found to enhance students' engagement, creativity, and critical thinking skills (Long & Graven, 2023). Furthermore, the incorporation of technology in the classroom can greatly enhance students' ability to research, organize, and present information effectively.

The use of technology in writing has shown great potential for enhancing students' skills and abilities (Singh et al., 2022). It has made writing more efficient, accessible, and collaborative. It has also opened up new avenues for creativity and expression in writing, allowing students to explore different mediums and formats (Sung et al., 2021). In conclusion, the integration of technology into writing instruction offers numerous benefits for students, including improved writing quality and quantity.

Limitation and further research

This study cannot escape from its own limitations. First, this proposal is more focused on students in primary and secondary schools. But it may be different depending on the level of higher education students are in. Future researchers can do research focusing on students in higher education. Second, we are only more focused in the context of the environment in Malaysia, but in other places the situation may be different. Future researchers can look in a larger context and focus on other countries. Future research can develop a specific model, module and guideline that can be used as a specific reference for target groups such as teachers, instructors and educational consultants in particular.

References

- Adler, M., & Ziglio, E. (1996). *Gazing into the oracle: The Delphi method and its application to social policy and public health*. Jessica Kingsley Publishers.
- Baker, S. F., & Lastrapes, R. E. (2019). The writing performance of elementary students using a digital writing application: Results of a teacher–librarian collaboration. *Interactive Technology and Smart Education*, 16(4), 343-362.
- Bailey, D., Park, I., & Haji, S. A. (2017). An investigation of Facebook for language learning: Better understanding perceptions and participation. *Call-Ej*, 18(2), 14-30.
- 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.
- Bikowski, D., & Casal, E. (2018). *Interactive digital textbooks and engagement: A learning strategies framework*.
- Blake, R. J. (2013). *Brave new digital classroom: Technology and foreign language learning*. Georgetown University Press.
- Bromley, K. (2012). *The future of reading and writing*. (Eds.) J. Cassidy, S. Grote-Garcia, E. Martinez, & R. Garcia. *What's hot in literacy*, 4-9.
- Brown, H. D. (2000). *Principles of language learning and teaching* (Vol. 4). New York: longman.
- 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, Y. C., Lin, C. Y., Hsu, C. M., Lin, H. C., Chen, Y. H., Lee-Chen, G. J., ... & Hsieh-Li, H. M. (2011). Neuroprotective effects of granulocyte-colony stimulating factor in a novel transgenic mouse model of SCA17. *Journal of neurochemistry*, 118(2), 288-303.
- Clark, C., & Dugdale, G. (2009). *Young People's Writing: Attitudes, Behaviour and the Role of Technology*. National Literacy Trust.
- Cordero, K., Nussbaum, M., Ibaseta, V., Otaíza, M. J., & Chiuminatto, P. (2018). Read, write, touch: Co-construction and multiliteracies in a third-grade digital writing exercise. *Journal of Computer Assisted Learning*, 34(2), 162-173.
- Dalkey, N., & Helmer, O. (1963). *An Experimental Application of the Delphi Method to the*

- Use of Experts. Management Science.
- Dolot, A. (2018). The characteristics of generation z. e-mentor, 74, 44–50. Williams, K., Page, R., Petrosky, A., & Hernandez, E.(2010). Multi-Generational Marketing: Descriptions, Characteristics, Lifestyles, and Attitudes. *Journal of Applied Business and Economics*.
- Egbert, J. O. Y. (2018). CALL (Computer-Assisted Language Learning) Methodology. *The TESOL encyclopedia of English language teaching*, 1-6.
- Fortemps, P., & Roubens, M. (1996). Ranking and defuzzification methods based on area compensation. *Fuzzy sets and systems*, 82(3), 319-330.
- Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of advanced nursing*, 32(4), 1008-1015.
- 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*, 22(7), 573-584.
- Indrisano, R., & Paratore, J. R. (2005). *Learning to Write, Writing to Learn: Theory and Research in Practice*. International Reading Association, Headquarters Office, 800 Barksdale Rd., PO Box 8139, Newark, DE 19714-8139.
- Kristyanawati, M. D., Suwandi, S., & Rohmadi, M. (2019). Improvement of Exposition Text Writing Motivation and Skills Through the Application of the Problem Based Learning Model. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 2(2), 278-287.
- Leu, D. J., Slomp, D., Zawilinski, L., & Corrigan, J. A. (2016). Writing research through a new literacies lens. *Handbook of writing research*, 2, 41-53.
- Liu, C. C., Liu, K. P., Chen, W. H., Lin, C. P., & Chen, G. D. (2011). Collaborative storytelling experiences in social media: Influence of peer-assistance mechanisms. *Computers & Education*, 57(2), 1544-1556.
- Turoff, M., & Linstone, H. A. (2002). The Delphi method-techniques and applications.
- 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 & Decision Making*, 5(01), 89-122.
- Majid, A. H. A., & Stapa, S. H. (2017). The use of scaffolding technique via Facebook in improving descriptive writing among ESL learners. *3L, Language, Linguistics, Literature*, 23(4).
- McGrail, E., & Davis, A. (2011). The influence of classroom blogging on elementary student writing. *Journal of Research in Childhood Education*, 25(4), 415-437.
- MacArthur, C. A. (2006). The effects of new technologies on writing and writing processes. *Handbook of writing research*, 248-262.
- 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*, 17(1), 37-52.
- Nazir, S., Khadim, S., Asadullah, M. A., & Syed, N. (2023). Exploring the influence of artificial intelligence technology on consumer repurchase intention: The mediation and moderation approach. *Technology in Society*, 72, 102190.
- Njiku, J. (2023). Assessing the development of mathematics teachers TPACK through an observation rubric. *Education and Information Technologies*, 1-24.
- Nikolopoulos, T. P., Dyar, D., Archbold, S., & O'Donoghue, G. M. (2004). Development of spoken language grammar following cochlear implantation in prelingually deaf children. *Archives of Otolaryngology–Head & Neck Surgery*, 130(5), 629-633.
- 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.
- Passero, Guilherme, Rafael Ferreira, and Rudimar Luís Scaranto Dazzi. "Off-topic essay detection: A comparative study on the portuguese language." *Revista Brasileira de Informática na Educação* 27, no. 03 (2019): 177-190.
- Peterson-Karlan, G. R. (2011). Technology to support writing by students with learning and academic disabilities: Recent research trends and findings. *Assistive Technology Outcomes and Benefits*, 7(1), 39-62.
- Pifarré, M., & Li, L. (2012). Teaching how to learn with a wiki in primary education: What classroom interaction can tell us. *Learning, Culture and Social Interaction*, 1(2), 102-113.
- Richards, J. C., & Renandya, W. A. (Eds.). (2002). *Methodology in language teaching: An anthology of current practice*. Cambridge university press.
- Richey, R. C., & Klein, J. D. (2014). *Design and development research: Methods, strategies, and issues*. Routledge.
- Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007). The Delphi method for graduate research. *Journal of Information Technology Education: Research*, 6(1), 1-21.
- Sun, W., Chen, H., Tang, H., & Wu, D. (2010, December). Unsupervised image change detection based on 2-D fuzzy entropy. In *2010 International Conference on Computational Intelligence and Security* (pp. 248-252). IEEE.
- Winardi, Y. K. (2020). IMPROVING STUDENTS' WRITING SKILL USING A MOBILE LEARNING APPLICATION. *Jurnal Basis*, 7(2), 281-290.
- Yamaç, A., Öztürk, E., & Mutlu, N. (2020). Effect of digital writing instruction with tablets on primary school students' writing performance and writing knowledge. *Computers & Education*, 157, 103981.
- Yamat, H. (2012). Developing identity in diversity: A second language acquisition experience. *GEMA Online Journal of Language Studies*, 12(2).
- Yunus, M. M., Nordin, N., Salehi, H., Embi, M. A., & Salehi, Z. (2013). The use of information and communication technology (ICT) in teaching ESL writing skills. *English language teaching*, 6(7), 1-8.