

Revalidating a Writing Strategy Scale for Undergraduate Students: A Fuzzy Delphi Approach

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ABSTRACT

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The purpose of this study is to get expert consensus and comments on the Writing Strategy Scale for undergraduate students. The general consensus is that students who write in a language other than their mother tongue frequently struggle with coherence, consistency, syntax, and word choice. The Fuzzy Delphi approach is used in this study to collect information from 5 experts from Malaysian public institutions utilising a 7-expert scale. Experts are people who have put in the effort to earn their credentials, training, experience, professional membership, and peer recognition. The questionnaire consists of 29 items on the writing strategies used by undergraduate students. For data analysis, Fuzzy Delphi approach Logic Software (FUDELO) was employed. A triangular fuzzy number and a rating of the defuzzification procedure for each construct element were used to analyse the data. The findings of the study and expert consensus indicate that the Agreement's Value is adequate. This confirms that the Writing Strategy Scale items for undergraduate students were highly regarded by experts. The components that the experts agreed on in consensus are organized in order of importance. Thus, researchers were able to offer a fundamental framework for adopting writing strategies for learners in general and undergraduates specifically.

Contribution/Originality: This study uses a new method of research which is the Fuzzy Delphi Method whereby the researchers adapt the existing framework or

questionnaire to suit the research objectives and run the program based on the received responses from the experts in the related field. This study documents the revalidation of the writing strategy scale for undergraduate students based on the expert consensus.

1. Introduction

Writing is a complex and challenging process for many of us since it requires knowledge of both the language and the subject matter. We need a distinct skill to express our feelings and thoughts including what we hear, think, see, and feel, as well as our nature through a series of words onto papers (Cer, 2019). Writing becomes much more difficult and needs a more focused effort for students who write in a second language especially if they are unfamiliar with the related field of writing. It is generally assumed that when students write in a language other than their mother tongue, they tend to have numerous problems with consistency, cohesion, syntax and word choice.

Writing strategies are important in the development of second language writing. There are many researchers in the field of second language writing that focus on investigating the techniques used by students. Over the last few decades, there has been a fast-developing amount of study regarding second language writing methods. While there are numerous other aspects that impact the development of second language writing, writing strategy appear to be highly essential since it may separate less skillful authors from more skilled authors (Raofi et al. 2017).

1.1. The Aim of The Study

The objective of this study is to employ the Fuzzy Delphi Method to revalidate the writing strategy scale for undergraduate students based on expert consensus.

2. Literature Review

2.1. Writing Strategies

There are psychological and non-psychological strategies that complement the academic writing strategies. The practical strategies such as extensive reading and writing without careful planning might result in frustration and anxiety. According to Ravari and Tan (2019), having a good organizational skill gave the sense of accomplishment and enhanced motivation to write. Additionally, mood management is crucial as writers are bound to experience demotivation and writer-blocked moments during the lengthy process of writing (Ravari & Tan, 2019).

Additionally, those who have low self-esteem might have troubles in expressing their opinion, only after they feel comfortable and confident of themselves, then they are able to reconstruct and regulate their thoughts (Cer & Sahin, 2017). It is important to amend and rewrite the ideas before writing as it may stimulate or be able to ensure organization. Hence, helping learners to be more confident of their ideas (Abedianpour & Omidvari, 2018). Abedianpour and Omidvari (2018) found that there is a significant relationship between brainstorming strategy and the writing performance of the students in Atlas Language Institute in Yasouj, Iran. The majority of students thought brainstorming to be a good method for improving their writing abilities according to the attitudes of the participants toward the effectiveness of brainstorming activities.

However, there are other important factors where the learners need to understand grammar rules in order to construct sentences. Having metalinguistics knowledge will eventually help the learners to understand the concept and relationship in order to make enough reasoning between ideas (Govindarajoo et al., 2022). This is especially important to those who are not native speakers of the language. Their lack of chances to use the language in daily life eventually affects their chances to practice them in writing (Boonyarattanasoontorn, 2017). Moreover, according to Boonyarattanasoontorn (2017) having anxiety and stress when given chances to practice does not help the students to perform in their assessment. Metacognitive strategies eventually help learners to improve their writing skills (Cer, 2019). The learners are unable to write because there are no clear instructions on contextual, stylistics and language (Cer, 2019).

Based on previous study, it was discovered that the undergraduate students in the private university are facing the difficulties in writing and the students use resourcing methods the most when using writing tactics (Boonyarattanasoontorn, 2017). It stated that the one kind of cognitive approach is the resourcing strategy. Furthermore, the "Evaluation Techniques" is the most frequently used by them, a subset of metacognitive strategies for correcting the grammatical elements of writing and lexical faults (Boonyarattanasoontorn, 2017). The self-monitoring checklists served as a subtle reminder to be cautious and to keep attention solely on the new purpose. The self-evaluation technique is beneficial because it enables students to intentionally improve their writing abilities by identifying, fixing, and subsequently avoiding errors. Unfortunately, even though the students who learnt using the self-evaluation technique were able to discover and rectify some errors, not all of them managed to successfully master the techniques (Al-Mwzaiji & Alzubi, 2022).

3. Methodology

The Fuzzy Delphi Method is specifically applied to this study (FDM). This study was chosen because it is a relatively new approach for obtaining expert consent in determining a specific decision. This study has two phases for constructing the questionnaire elements. The first phase required the researchers to conduct a literature review to determine the elements required for the implementation of OLL (see Table 1). After collecting all of the elements, the second phase was employed whereby the researchers designed an expert questionnaire (7 points, for example) which was distributed to five experts with specific expertise and evaluated using the Fuzzy Delphi (FDM) technique.

Table 1: List of experts

Expert	Field of expertise	Institution
3 Senior Lecturers	English Language	Public University in Malaysia
2 Senior Lecturers	Education	

3.1. Sampling procedure

In this study, purposeful sampling has been used. This method is appropriate because the researcher wants to get an expert's opinion on a predetermined subject. In addition, purposive sampling is the most acceptable strategy in the Fuzzy Delphi Method (Hasson, Keeney, & McKenna, 2000). Five experts were chosen to participate in this study. These experts were selected based on their experience and credentials. Table 1 summarizes the

experts who participated whereby the requisite number of professionals involved for the expert consensus is normally between 5 and 10 (Hasson, Keeney, & McKenna, 2000).

3.2. Expert criteria

Experts are defined as individuals who have earned their qualifications, training, experience, professional membership, and peer recognition through dedication and hard work (Perera, Drew & Johnson, 2012). According to Mullen (2003), an expert is an individual who is proficient and knowledgeable in a specific subject or industry. In the Fuzzy Delphi research, expert selection is a crucial aspect to consider. When expert selection is done imprecisely and based on criteria, concerns such as the study's legitimacy, validity, and reliability may be raised (Mustapha & Darusalam, 2017). According to Kaynak and Macauley (1984), the experts involved in the study must represent or be knowledgeable about the particular subject. Based on a set of stringent criteria, the researcher selects experts with at least seven years of experience and experts who are relevant to the study in their field of expertise.

3.3. Fuzzy Delphi Step

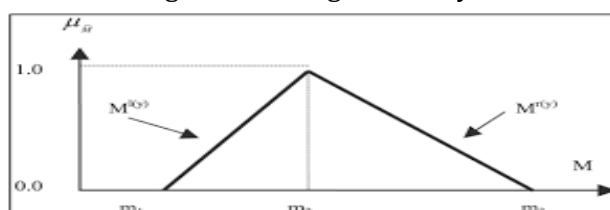
There are multiple steps that need to be accounted for when using Fuzzy Delphi. Table 2 explains the seven steps and formulation that have been used in this study.

Table 2: Fuzzy Delphi step

Step	Formulation
1. Expert selection	A total of 5 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 & Tzeng, 2004). The Triangular Fuzzy Number represents the values m_1 , m_2 , and m_3 and is written as follows (m_1, m_2, m_3) . The value of m_1 represents the smallest possible value, the value of m_2 represents a rational value, and the value of m_3 represents the highest possible value.

While Triangular Fuzzy Number, Figure 1 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 gains input from the specified expert, the researcher must convert all measurement findings to Fuzzy scales. This is often recognized 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 $m = (m_1, m_2, m_3)$ and $n = (n_1, n_2, n_3)$ are determined 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. 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: $(1) \frac{1}{4} (m_1 + 2m_2 + m_3)$ Amax
6. Defuzzification process	This process uses the formula $A_{max} = \frac{1}{4} (a_1 + 2a_m + a_3)$. 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 (Mohd Ridhuan et al., 2014). In this process, there are three formulas namely: i. $A = \frac{1}{3} * (m_1 + m_2 + m_3)$, or; ii. $A = \frac{1}{4} * (m_1 + 2m_2 + m_3)$, or; iii. $A = \frac{1}{6} * (m_1 + 4m_2 + m_3)$. 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 Bodjanova (2006) the alpha cut value should exceed 0.5. It is supported by Tang and 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)

3.4. Instrumentation

The researcher used already published relevant literature to create the Fuzzy Delphi research instrument. Based on literature, preliminary studies, and personal experience, researchers developed questionnaire questions (Skulmoski, Hartman, & Krahn, 2007). In fact, a review of previous research should come first when developing topics and content for research. As a result, they used research literature, expert interviews, and focus group approaches when constructing questions for the Fuzzy Delphi method (Mustapha & Darussalam, 2017). Therefore, researchers compiled the major impact of writing strategy for undergraduate students using published work/literature. Following that, a list of expert questions is created using a 7-point scale (refer to Table 3: Fuzzy Scale). The 7-point scale was adopted because the more scales that were employed, the more accurate and perfect the results were (Chang, Hsu & Chang, 2011). To make it simpler for professionals to reply to the questionnaire, the researchers changed the Fuzzy value in Table 4 with a 1–7 scale value, as shown:

Table 3: Fuzzy scale

Item	Fuzzy number
Extremely unimportant	(0.0, 0.0, 0.1)
Very unimportant	(0.0, 0.1, 0.3)
Unimportant	(0.1, 0.3, 0.5)
Moderately important	(0.3, 0.5, 0.7)
Important	(0.5, 0.7, 0.9)
Very important	(0.7, 0.9, 1.0)
Extremely important	(0.9, 1.0, 1.0)

3.5. The List of Writing Strategy for Undergraduate Students

Researchers highlighted the Writing Strategy for Undergraduate Students based on a literature review. The researchers used the Fuzzy Delphi approach to determine the validity and consensus of the experts on whether this aspect is appropriate for inclusion in this model. Table 4 shows the list of writing strategies for undergraduate students that have been remade based on Table 3, the Fuzzy scale.

Table 4: The List of Writing Strategy for Undergraduate Students

Early item rank	Impact of Writing Strategy for Undergraduate Students
IWS1	I organize my ideas prior to writing.
IWS2	I have my teacher, classmates or other readers in mind as an audience
IWS3	I revise my writing to make sure that it includes everything I want to discuss in my writing.
IWS4	I check my spelling
IWS5	I check my writing to make sure it is grammatically correct.
IWS6	I evaluate and reevaluate the ideas in my essay.
IWS7	I write a lot to develop my writing skills.
IWS8	I monitor and evaluate my progress in writing.
IWS9	I revise and edit an essay two or more times before I hand it in to my teacher.
IWS10	I use memorized grammatical elements such as singular and plural forms, verb tenses, prefixes and suffixes, etc. in my writing.
IWS11	I put newly memorized vocabulary in my sentences.
IWS12	In order to generate ideas for my writing, I usually engage myself in brainstorming.
IWS13	I use different words that have the same meaning.
IWS14	I use my experiences and knowledge in my writing.
IWS15	I try to use effective linking words to ensure a clear and logical relationship between sentences or paragraphs.
IWS16	I translate my thoughts from my mother tongue into English.
IWS17	In order to generate ideas for my writing, I usually discuss the writing topic with a friend or classmate.
IWS18	After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it
IWS19	I try to identify friends or classmates whom I can ask for help in my writing.
IWS20	When I have trouble writing my essay, I try to do it with my classmates or friends.
IWS21	I try to write an essay in class with confidence and ease.
IWS22	I write down my feelings about writing in a language learning diary.
IWS23	I try to relax whenever I feel afraid of writing.
IWS24	I encourage myself to write even when I am afraid of making mistakes.

IWS25	I often work hard to do well in my writing even if I don't like English writing tasks.
IWS26	Even if the writing activities are difficult, I don't give up but try to engage in them.
IWS27	I concentrate as hard as I can when doing a writing task.
IWS28	I put in my best effort in completing writing tasks.
IWS29	I spend a lot of time and energy on writing good English assignments.

4. Result

This section presented expert agreement on aspects of the main impact of Writing strategy for undergraduate students. Fuzzy Delphi questions were presented to five experts in the relevant areas, and the findings were collected based on the responses they supplied. After data processing, the bold threshold value surpasses the threshold value of 0.2 (> 0.2), according to the analysis results (refer [Table 5](#)). To put it in other words, there are experts whose perspectives do not coincide or even agree on some of these issues. The average threshold value (d) 0.2, or 0.07024, for all Impact of Writing Strategy for Undergraduate Students, on the other hand, is below < 0.2 . If the average (d) value is less than 0.2, the item exhibits a high level of expert agreement ([Cheng & Lin, 2002](#); [Chang, Hsu & Chang, 2011](#)). Subsequently, the total percentage of expert agreement is 97 percent, which is higher than (> 75 percent) 97 percent, proving that the item's expert agreement requirements have been satisfied. This can be seen in [Table 6](#) where the list of new item rank is different compared to the early item rank.

Table 5: The analysis result

Statistics	Value of the item	Value of the construct	Item < 0.2	% of item < 0.2	Average of % consensus	Defuzzification	Ranking	Status
Item 1	0.05543		5	100%		0.92	3	Accept
Item 2	0.06466		5	100%		0.84	5	Accept
Item 3	0.05542		5	100%		0.94	2	Accept
Item 4	0.02771		5	100%		0.96	1	Accept
Item 5	0.02771		5	100%		0.96	1	Accept
Item 6	0.04157		5	100%		0.88	4	Accept
Item 7	0.05543		5	100%		0.92	3	Accept
Item 8	0.07852		5	100%		0.84	5	Accept
Item 9	0.08776		5	100%		0.76	9	Accept
Item 10	0.06467		5	100%		0.72	11	Accept
Item 11	0.08314		5	100%		0.62	15	Accept
Item 12	0.08776		4	80%		0.68	13	Accept
Item 13	0.04619		5	100%		0.70	12	Accept
Item 14	0.04619		5	100%		0.70	12	Accept

Item 15	0.08314		4	80%	0.66	14	Accept	
Item 16	0.10623		5	100%	0.72	11	Accept	
Item 17	0.0739		5	100%	0.66	14	Accept	
Item 18	0.10161		5	100%	0.62	15	Accept	
Item 19	0.08314		4	80%	0.66	14	Accept	
Item 20	0.08314		4	80%	0.66	14	Accept	
Item 21	0.04619		5	100%	0.70	12	Accept	
Item 22	0.0739		5	100%	0.54	16	Accept	
Item 23	0.0739		5	100%	0.74	10	Accept	
Item 24	0.0739		5	100%	0.82	6	Accept	
Item 25	0.08314		5	100%	0.78	8	Accept	
Item 26	0.08314		5	100%	0.78	8	Accept	
Item 27	0.07852		5	100%	0.84	5	Accept	
Item 28	0.07852		5	100%	0.84	5	Accept	
Item 29	0.09238	0.07024	5	100%	97 %	0.80	7	Accept

Table 6: The list of Writing Strategy Used by undergraduate students based on expert consensus

Early item rank	New item rank	Writing Strategy Used by Undergraduate Students
IWS1	IWS3	I organize my ideas prior to writing.
IWS 2	IWS5	I have my teacher, classmates or other readers in mind as an audience
IWS 3	IWS2	I revise my writing to make sure that it includes everything I want to discuss in my writing.
IWS4	IWS1	I check my spelling
IWS5	IWS1	I check my writing to make sure it is grammatically correct.
IWS6	IWS4	I evaluate and reevaluate the ideas in my essay.
IWS7	IWS3	I write a lot to develop my writing skills.
IWS8	IWS5	I monitor and evaluate my progress in writing.
IWS9	IWS9	I revise and edit an essay two or more times before I hand it in to my teacher.
IWS10	IWS11	I use memorized grammatical elements such as singular and plural forms, verb tenses, prefixes and suffixes, etc. in my writing.
IWS11	IWS15	I put newly memorized vocabulary in my sentences.
IWS12	IWS13	In order to generate ideas for my writing, I usually engage myself in brainstorming.
IWS13	IWS12	I use different words that have the same meaning.
IWS14	IWS12	I use my experiences and knowledge in my writing.
IWS15	IWS14	I try to use effective linking words to ensure a clear and logical relationship between sentences or paragraphs.
IWS16	IWS11	I translate my thoughts from my mother tongue into English.
IWS17	IWS14	In order to generate ideas for my writing, I usually discuss the writing topic with a friend or classmate.

IWS18	IWS5	After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it
IWS19	IWS14	I try to identify friends or classmates whom I can ask for help in my writing.
IWS20	IWS14	When I have trouble writing my essay, I try to do it with my classmates or friends.
IWS21	IWS12	I try to write an essay in class with confidence and ease.
IWS22	IWS16	I write down my feelings about writing in a language learning diary.
IWS23	IWS10	I try to relax whenever I feel afraid of writing.
IWS24	IWS6	I encourage myself to write even when I am afraid of making mistakes.
IWS25	IWS8	I often work hard to do well in my writing even if I don't like English writing tasks.
IWS26	IWS8	Even if the writing activities are difficult, I don't give up but try to engage in them.
IWS27	IWS5	I concentrate as hard as I can when doing a writing task.
IWS28	IWS5	I put in my best effort in completing writing tasks.
IWS29	IWS7	I spend a lot of time and energy on writing good English assignments.

5. Conclusion

In conclusion, writing is a complicated procedure since it is one of the vital skills required to create the symbols and signs needed in communicating and expressing feelings and thoughts. Expressing what has been heard, thought, seen, experienced and felt can be done through this complex problem-solving activity. Nevertheless, conquering writing skills takes time to develop as it requires cognitive and physical processes. It involves placing knowledge that has been reorganised in the brain into writing. It also entails high-level processing, which involves the transfer, revision, organisation, and evaluation of emotions and thoughts, as well as the well-organized presentation of emotions, thoughts, opinions, and dreams in a compelling manner. Writing, then, is a metacognitive process that calls for being aesthetic, legible, and fluent in the affective aspect rather than solely depending on one's ability to write.

Metacognitive process in writing also involves self-motivation and readiness in the pre- and post-writing phases, and gathering information on a particular topic and arranging, organising, and evaluating this information while considering grammatical rules in the cognitive aspect. Additionally, writing is kinaesthetic because it depends on writing speed, how the pencil is held, motor motions, and self-regulation of the entire process. Undeniably, to reach the desired writing level, one may need to continually practice and a piece of writing may need to be revised numerous times. Based on this scenario, it is necessary to develop a specific guideline to serve as a general direction in teaching writing skills for undergraduate students. This will help educators implement their teaching and learning effectively. Finally, the researchers were able to provide a fundamental guideline for the adoption of writing strategies for undergraduates specifically and other learners generally.

A Fuzzy Delphi method that is specialised in expert consensus is utilised in this study; hence, other methods may be adapted in future research to obtain targeted comprehensive findings such as employing relevant quantitative and qualitative approaches. This research guideline may be used to form a module which can be utilised among instructors in the same field in the future.

Ethics Approval and Consent to Participate

All procedures conducted in this study involving human participants were performed in accordance with the ethical standards. Informed consent was obtained from all participants and information about the study was provided to all respondents. They were invited to contact the researchers if they had any queries.

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Conflict of Interest

We certify that the article is the Authors' and Co-Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This research/manuscript has not been submitted for publication nor has it been published in whole or in part elsewhere. We testify to the fact that all Authors have contributed significantly to the work, validity and legitimacy of the data and its interpretation for submission to MJSSH.

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