Delphi: Exploring Online Teaching Key Essential Skills for 21st Century Teachers

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ABSTRACT
The rapid digital development has transformed education resulting in new teaching methods and styles to adapt to this change. Online teaching has been continuously emerging in this 21st-century era. There have been several studies explaining the skills required for a teacher to be successful in online teaching. However, limited studies investigate the degree of importance of those key essential online teaching skills. This study aimed to explore the necessary online teaching skills by conducting a Delphi study with a panel comprising ten teachers from different subjects. Among the presented six competencies with 47 skill items mentioned in the previous literature study, the panelists selected and ranked 18 skill items as the most crucial for online teaching success. The skill competencies to be the most important respectively are 1) Content, 2) Pedagogy, 3) Design, 4) Communication, 5) Technology, and 6) Management.

Keywords: Delphi study, skills for online teachers, teacher skills, online teaching, online teaching skills.

1. INTRODUCTION

The rapid development of information technology and communication has significantly transformed education into a new shape to adapt to this adjustment into the 'anytime and anywhere learning' era [1]. Therefore, new teaching skills and assessment methods have emerged. One of the shapes of learning that has emerged and continuously growing is online learning. Online learning is a new form of distance learning, and technological inputs are constantly improving it [2]. Responding to the new formats of learning, degrees and certificates now can be earned through this type of platform (Allen & Seaman; Siemens & Matheos, as cited in Albrahim, [3]).

Since the COVID-19 virus outbreak in Indonesia in 2020, schools in Indonesia are shifting from traditional teaching to online teaching due to the government instruction as mentioned in the Circular Letter No. 4 Year 2020 by the Minister of Culture and Education for students to stay at home and study online. The shifting has caused many challenges for teachers to teach in a new way of teaching and transform traditional content to online teaching [4]. In addition, the COVID-19 and megatrends implications such as globalisation, technological progress, population ageing, migration, climate change demand people's adaptability as it is becoming more vital as they face increasingly diversified problems and exploit emerging opportunities and these megatrends and COVID-19 are transforming the skills needed to thrive at work [5].

Developing relevant skills is essential to reduce skills imbalances since it can cause a mismatch in demand and supply, leading to 'skill shortages' [5]. It is stated that skill shortages cause emerging challenges for employers in finding workers with the required skills, for instance, in Indonesia (Jakarta) reported that 10-15% of employers facing challenges finding workers with the right skills because 'the intensify of skills use at work matters for workers, firms and countries. For workers, higher skills use at work is associated with higher wages and higher job satisfaction. Within firms, better skills use is associated with higher productivity and lower staff turnover. Higher labour productivity, in turn, is associated with more inclusive economic growth at the country level [5]. The gap is claimed to be one of the direct effects of the education planning that is not oriented to the reality in society [6]. So it is essential to

be aware of the skills required to be mastered by online teachers to effectively execute their roles (Paloff & Pratt; Scobey in Albrahim [3]). Since the number of literature has displayed an abundance of skills required to teach online [3], [4], the purpose of this research is to provide the skills necessary in online teaching by ranking them based on the priority using the widely known Delphi method.

Delphi method is widely known as the structured communication applied to achieve a consensus among experts [7]. Skulmoski, Hartman, & Krahn [8] stated that 'the Delphi method is an iterative process used to collect and distill the judgements of experts using a series of questionnaires interspersed with feedback'. It is also known for being effective in forecasting things in many fields with varied sample sizes [8]. From the explanation above, the research question proposed in this study is 'what are the skills necessary for online teachers of 21st century based on their priority rank?'

2. METHOD

This research equipped a Delphi study to find the consensus for the key essential skills required for online teaching. Selecting research participants of the Delphi study is one of the critical components since the base of the output of Delphi is the expert opinion [8]. Skulmoski, et al. [8] stated that there are requirements for the participants to be selected as the panellist, one of them is that the panellist is required to be knowledgeable and experienced. According to that, they suggested the purposive sampling is necessary to represent the general population. Therefore, the panellists that were selected in this research have at least 5 years-experience or above in teaching.

The optimum number of panellists in the Delphi study is 6-12 (Hogarth; Mitchell in Tellefson et al. [10]), but for the different fields of experts, it is said that the required number of the panellists was 5-10 (Clayton in Tellefson et al. [10]). Therefore, ten senior high school teachers from different subjects with >5 years-experience of teaching were selected to be the panellists of this Delphi study.

Table 1. Profile of Panellists

Gender	Male 7, Female 3
Experience	>5 – 18 years of teaching experience
Age (years)	27 – 38
Education	Bachelor degree graduate 7, Master degree graduate 3
Subject taught	Geography, physics, Arabic, Islamic studies, Bahasa, IT, Physical Education, Biology, Sociology, History
School level	Upper Secondary

There are three rounds of Delphi conducted in this research [11], [7]. Since this study was conducted in three weeks, from May 1st to May 22nd, each round was performed a week long. The first round of Delphi is to pare down the skills for online teaching of 47 skills provided from the previously researched literature by Albrahim [3]. The selected list of skills in the first round of Delphi was ranked by the panellists based on the priority in the second and third rounds to reach the desired consensus. In the round 2 and 3 Delphi the consensus was measured using Kendall's coefficient of concordance (*W*).

$$W = \frac{12S}{n^2(n^2-n)} \qquad (1)$$

Where: S = the sum of squared deviations,
  m = the number of judges/raters,
  n = the total number of objects being ranked

Using *W* can help the research find the realistic determination of whether any consensus has been reached [11]. The value of *W* ranges from 0-1, with 0 indicating no consensus and 1 indicating perfect consensus, value 0.5 suggests moderate consensus while value 0.7 and above is an ideal target for Delphi consensus [12]. The level of the agreement refers to the table below [11].

Table 2. Interpretation of Kendall's *W*

W	Interpretation	Confidence in Ranks
0.1	Very weak agreement	None
0.3	Weak agreement	Low
0.5	Moderate agreement	Fair
0.7	Strong agreement	High
0.9	Unusually strong agreement	Very High

To confirm validity, at the end of each round, the panellists were asked to give descriptions aimed to understand their reasons in choosing those skills to be the most important [12].

3. FINDINGS

After conducting 3 rounds of Delphi, the 18 skills of 47 skills chosen to be the most important and ranked by the panellists meet only the moderate consensus in the round 2 Delphi with 0.6 value, so the Delphi round was continued to the third round. In Round 3, the new list of skills was created following the descriptions by the panellists and re-ranked based on the result of the Delphi round 2.

3.1. Delphi Round 1

The first thing that has to be done in the Delphi study is developing the research questions derived in a

number of ways, and one of them is through a reviewed literature [8]. In Yeoh [12], seeding and brainstorming were performed to find the initial skills to be processed in the Delphi study. In this study, the resource of the online teaching skills was taken from the literature research specifically to review the necessary skills for online teaching by Albrahim [3]. In Albrahim's [3] literature research, six competencies are found to be more frequently displayed in the literature. There is pedagogy, content, design, technology, management, institutional skills, and social and communication.

Albrahim [3] then broke down the competencies into a list of skills containing 47 skills. The list of skills then was delivered to the panellist to select the 20 most important skills. This action was performed in order to narrow down the list of 47 skills to a more controllable number [11]. From this round, 18 skills were voted above the average (>50%). The skill items that failed to receive more than 50% vote by the panellist were removed. From table 3, it can be seen that there are 18 skills total from every competency. The maximum vote from the panellist was 80%, and the minimum vote was 60%.

3.2. Delphi Round 2 and 3

In the second round of Delphi, the panellists were asked to rank the previous 18 selected skills in round one. This round aimed to rank the 18 skills based on the degree of priority as the most important skills in online teaching. Respond 10 out of 10 were obtained. To ensure the validity in this round, the panellists were requested to present the description to state the reasoning of the ranking itself since reaching consensus in Delphi studies is said to be often improved by the feedback given by the panellists [12]. Using SPSS 23, Kendall's W measured the ranking to evaluate the level of agreement among the panellists.

The result of Delphi round 2 has reached Kendall W value of 0.60, showing a moderate to a strong level of agreement. The iterative study was needed to seek the desired level of agreement, so the Delphi round 3 was performed. The rank list resulted from the Delphi round 2, then enhanced by the comment descriptions presented by the panellists. The list then was given to the panellists to be re-ranked and given another feedback. The value of 0.7 has been reached in the Delphi round 3, which suggests a strong level of agreement. It is suggested in Yeoh [12] that some of the studies suggest two-round minimums in Delphi to allow feedback and revision. Since the desired level of agreement is retained in the last two rounds of Delphi, the study has stopped in round 3 Delphi.

Table 3. Delphi Round 2 and 3 Mean and Kendall's W Results

No	Skills	Skill Competencies	Mean Rank	
			Round 1	Round 2
1	Motivating students and showing enthusiasm and interest	Pedagogy	3.9	3.9
2	Promoting group interaction, collaboration and teamwork		14.4	13.9
3	Designing and implementing appropriate instructional strategies, as well as classroom assessment and student engagement techniques		3.2	3.2
4	Linking the subject and content with scientific, social, cultural and any other relevant phenomena	Content	4.5	4.5
5	Understanding and applying instructional design principles, models and theories	Design	5.8	5.5
6	Using students' previous feedback to develop and design new courses and assess the course design quality by using quality assurance tools and instruments, such as the Quality Matters Rubric.		10.2	13.3
7	Accessing various technological resources and tools, such as email, Internet browsers, LMSs, text and video chat applications, and productivity software and applications	Technology	8.6	4.9
8	Being alert to the latest updates and renovations of educational technology and software.		9	6.7
9	Understanding the learning and teaching capabilities and limitations of these tools		12.1	13.9
10	Being aware of the technical potential of, and procedures used to create, e-content, such as e- books and instructional videos		12	15.8
11	Managing the course time and applying time-saving techniques	Management and	10.8	13.3
12	Establishing and declaring rules and regulations for participation,		8.1	6.7

No	Skills	Skill Competencies	Mean Rank	
			Round 1	Round 2
	submission of assignments, timeliness, sending and seeking feedback, and communication protocols	Institutional		
13	Complying with legal, ethical, and copyright issues and standards		11.7	14.2
14	Using sufficient and commonly understandable language	Communication	10.5	5.8
15	Emphasizing the important points using font colours and effects		13.5	15.2
16	Maintaining a warm, friendly, and inviting collegial atmosphere		10	11.6
17	Creating and developing respectful relationships and a sense of community among the learners		9.8	5.7
18	Showing sensitivity and empathy when communicating online		12.9	12.9
Kendall's *W*			0.60	0.73

Each of the competency mean rank was then calculated to form an average number to see the competency's rank based on the degree of importance according to the mean. Table 3shows the final rank of online teaching competency.

Table 4. Importance of skill competency

Rank	Competency	Average Mean
1	Content	4.5
2	Pedagogy	7.0
3	Design	9.4
4	Communication	10.2
5	Technology	10.3
6	Management	11.4

4. DISCUSSION

The panellists suggested that the skill competency necessary for online teachers based on the top priority rank, respectively from the highest to the lowest rank respectively are 1) content, 2) pedagogy, 3) design, 4) communication, 5) technology, and 6) management. Even though technology skill was given rank 5th by the panellist Baran and Correia [13] suggested that 'treating technology separate from pedagogy and content within a particular online teaching setting may not be enough to equip faculty with the knowledge and skills necessary for effective online teaching.' Equipping technology, pedagogy and content skills comprehensively enable teachers to provide possible technology tools to promote pedagogical tasks, for instance, enhancing collaboration and fostering reflection, also understanding the use of technology may help them represent the course content in promoting successful online teaching practice [13].

On the other hand, a notable comment from one of the panellists proposed a different perspective showing that technology, pedagogy and content are to be seen separately *'it is important to master the basics of teaching first and use the right strategy and way of communicating whether the teaching is online or offline*

for a successful learning. Once those competencies are mastered then an online teacher can then move to the development of technical and practical things in teaching such as management and technology competencies'. Consequently, it is crucially vital for faculty members to understand the dialectical relationship between technology and content (in this case; technology, content and pedagogy) and the ways in which they afford and constrain each other (Mishra & Koehler in Abdous [14]).

Design skill applies in the classroom through the syllabus design; it is the backbone for online courses. A well-design syllabus provides students with a roadmap for an engaging and successful learning experience [15]. Providing an online course with a clear structure containing clear learning objectives, guidelines and completion area is necessary to promote an effective learning experience. In addition, the panellist stated that '*being able to understand and apply learning designs, models and theories is essential to conduct the learning process.*'

It is also necessary to interact in the online class with the students during the learning process, applying communication skills. A panellist explained that '*communication skills can keep students engaged throughout class session.*' She/he also added that '*it is important to create relationship between students because without closeness and supporting environment, learning will be stagnant, no matter how cutting-edge the technology is.*' She/he is added that '*communication skills can keep students engaged throughout class session.*' Thus, interaction is critical to overcoming the feeling of isolation and lack of motivation among participants of online learning (Bernard et al.; Mullins-Dove in Abdous [14]). Whilst, management skill was said by one of the panellists to be also crucial to enable teachers to achieve the learning goals and objectives in the teaching duration time given by the faculty and also fulfil the administrative requirements.

5. CONCLUSIONS

Much literature has shown skills for online teachers, but only a few studies research these skills according to the degree of importance. Conducting the broadly known Delphi method, this study focused on finding the online teaching skills for 21st-century teachers based on its priority rank. The result of the study showed the skills rank respectively from highest to lowest: 1) content, 2) pedagogy, 3) design, 4) communication, 5) technology, and 6) management. There have been several common perspectives and also some contradictions between literature experts and the panellists. Nevertheless, the skills above must be learned and practiced comprehensively with the exact amount of proportion based on the degree of importance. Further research conducted following this research may continue to analyse the skills in Table 2 and 3 that are mostly practiced in online class settings.

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