A scoping review of applying the Delphi method based on how the COVID-19 pandemic impacted conducting research

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Abstract
South Africa and the world had been adversely affected by the Coronavirus pandemic. It became nearly impossible to host face-to-face interviews for data collection as meeting in person increased the risk of infections. It was difficult to gain direct access to conduct research, as companies, schools, and researchers resorted to working virtually. Therefore, the Delphi method was crucial to ensure continuity and progress in the academic world. It is not concerned with demographics and allows the study's outcome to be validated and verified with expert reviews, making it a more suitable method during the COVID-19 pandemic. The purpose of the study is to provide evidence of the use of the Delphi method to add value to research and replace face-to-face interviews based on the impact and restriction of COVID-19 pandemic. The study conducted a scoping review to identify articles that used the Delphi method to reach a consensus due to the COVID-19 restrictions and unavailability of face-to-face interviews with participants. The articles were identified in the Web of Science, Scopus, and IEEE Xplore databases as well as Google search engines. Only five articles out of 89449 publications were found appropriate for the purpose of this paper.

Keywords: COVID-19 pandemic, Delphi method, conducting research

Introduction

The first case of COVID-19 emerged in Wuhan, China, in December 2019 (Wu, Zhao, Yu, Chen, Wang, Song, Hu, Tao, Tian, and Pei, 2020). The virus was spreading so rapidly and causing high mortality and morbidity rates that the World Health Organization (WHO) declared a global pandemic on March 11, 2020 (WHO, 2020). In the wake of the COVID-19 outbreak, most countries in the world faced a lockdown. South Africa, for example, quickly responded by imposing a strict lockdown and announcing a plan based on an "alert level" approach. In five stages, this plan gradually reopened the economy and social life for the subsequent months (Stiegler and Bouchard, 2020). In addition, a global public health campaign was launched in the absence of a cure to prevent the spread of the virus by encouraging physical distancing, frequent handwashing, following respiratory hygiene, seeking medical care early, avoiding face touching, and following advice given by health authorities (Khan, 2020).

There have been serious setbacks in every area of life, and the academic world was no exception. van Schalkwyk (2021) notes that the lockdown impacted academic research in cases where they were dependent on laboratory work or planned to conduct clinical trials or field research, thereby delaying or redesigning research where possible. This forced academics to rethink their purpose and methodology to lead the resumption of their academic, research, and development activities as many qualitative research techniques such as observation, interviews, focus group discussions, and community studies require direct personal interaction with people which have become unviable because of the COVID-19 pandemic (Rajhans, Rege, Memon, and Shinde, 2020). This study advocates the Delphi Method as a research approach/strategy for conducting qualitative and quantitative research. A method that primarily involves collecting data without face-to-face contact. The rest of the study is structured as follows: the methodology, followed by the literature review, the discussion of the results and finally the conclusion.

Methodology

Scoping reviews provide a comprehensive overview of a broad topic (Colquhoun, Levac, O'Brien, Straus, Tricco, Perrier, Kastner, and Moher, 2014; Peterson, Pearce, Ferguson, and Langford, 2016). It is an information overview that aims to address exploratory research rather than a systematic review that answers specific questions (Peterson et al., 2016). In a scoping review, definitions are often clarified using different methodologies, which is not the case with a systematic review (Munn, Peters, Stern, Tufanaru, McArthur, and Aromataris, 2018). This paper conducted a scoping review to examine the application of the Delphi method by various scholars to achieve a specific goal. In identifying relevant sources for the research topic, the following databases were used: Web of Science, IEEE Xplore, and ScienceDirect using the search terms "Delphi method", and "application of the Delphi method due to COVID-19". In addition, the Google search engine was utilised to manually search for other publications on the web that included discussions on the Delphi methods. The search range was from 2020 – 2021 and was undertaken in September 2021. The database search identified 89385 relevant articles describing the Delphi method. As a result of the screening process, 29817 eligible articles were identified. Fifty-nine thousand six hundred thirty-two records were excluded based on foreign language, abstract and citation ranking. Furthermore, 29812 records were excluded based on the focus of the article and duplicated articles. As a result, only five were deemed eligible for the study (see Figure 1).

Seven (7) supervisors and co-supervisors for Masters and Doctoral students, with more than 10 years of experience, from five South African universities were selected by convenience and through purposeful sampling. This was to find out if their students were impacted by the effects of the COVID-19 pandemic in completing their degrees. For the qualitative data collection, an excel spreadsheet was used to document the data from the interviews and was analyzed subjectively to determine what were the eminating themes from these interviews. Based on the themes identified, they were linked with descriptive statistics in the figures and the interview feedback was provided with inverted commas which was then linked to the literature and the findings.

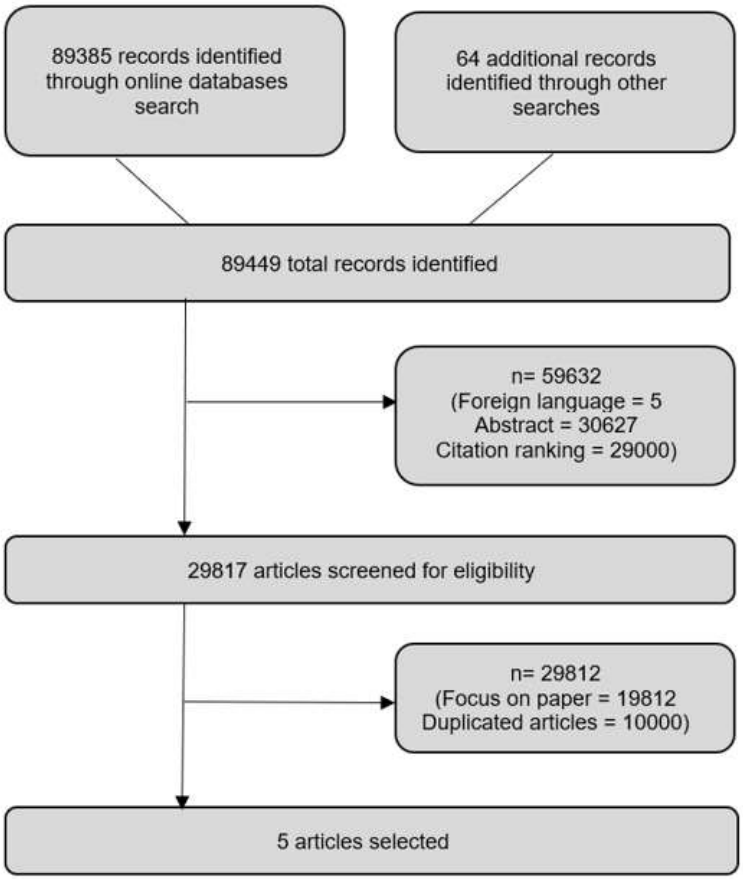

Figure 8:Record Selection Process Flow Diagram as adapted from (Moher, Liberati, Tetzlaff, Altman, and Group, 2010)

Literature Review

COVID-19 has globally impacted societies, economies and health, education, and politics (Hamrouni, Sharif, Sharif, Hassanein, and Abduelkarem, 2022). Research methods were discouraged, especially when it came to data collection. Consequently, researchers faced challenges and new opportunities. Teti, Schatz, and Liebenberg (2020) describes the pandemic as an event that disrupts social order. Many studies exploring education and digital learning rely on a few traditional study formats such as large-scale surveys, semi-structured interviews, focus group discussions, and questionnaires (Lupton, 2021). At the same time, social distancing measures and public health mandates prevented such investigations, leading research projects to use other forms of data collection, such as phone or internet-based data collection (Lobe, Morgan, and Hoffman, 2020). Even with the COVID-19 threat, research must continue. Data collection and research methods must be modified and improved in both quantitative and qualitative research to meet this need. Therefore, researchers accustomed to working in or with communities to collect data had to develop methods that avoided face-to-face interactions by using digital or non-digital means that achieve similar goals.

To collect quantitative data, Torrentira (2020) suggests using online tools through subscriptions (personal or institutional), using Google forms as a free and conventional platform, and using QR codes to generate electronic survey questionnaires. For qualitative research, data collection can be done using diaries and reflections from participants in place of direct observation. Interviews may be conducted via telephone or mobile phone, and focus group discussions can be conducted via videoconferencing

(Torrentira, 2020). Traxler and Smith (2020) posits the Delphi method as a valuable approach that researchers can employ to gather data during COVID-19 and to address trustworthiness or validity and credibility of their data. The Delphi method is a well-known method for determining a shared opinion among subject matter experts in order to provide an answer to a question being investigated (David and Roberta, 2020). It allows for reflection among participants, who can modify and reconsider their thoughts in light of the anonymized perspectives of others. The opinions are collected from the group of experts that are not physically assembled, normally through questionnaires (David and Roberta, 2020). The experts provide their responses in two or more rounds. Each round, the facilitator provides an anonymized summary of the experts' rationales from the previous round, along with the reasons behind them (Belton, Wright, Sissons, Bolger, Crawford, Hamlin, Taylor Browne Lūka, and Vasilichi, 2021). Results are determined by the mean or median scores of the final rounds after a consensus is reached based on a predetermined stopping criterion (e.g., number of rounds, consensus achieved, stability of results) (Belton et al., 2021).

Studies that applied the Delphi method during the COVID-19 pandemic

In Table 1, articles that used different types of the Delphi method to pursue a study due to the COVID-19 pandemic are presented. Several rounds occurred in each study as presented in the articles to reach a consensus. It took two rounds for two studies, three rounds for one study and four rounds for the other two to achieve a consensus. This confirmed suggestions that a consensus can be achieved between 2 to 4 rounds (Yeh, Van Hoof, and Fischer, 2016; Alarabiat and Ramos, 2019). The expert panels reached consensus that identified, evaluated, and validated the various authors' research objectives. Mummaneni, Burke, Chan, Sosa, Lobo, Mummaneni, Antrum, Berven, Conte, and Doernberg (2020) used video conferencing to facilitate feedback and emails to disseminate and receive feedback on the finalized protocols and checklists.

The Delphi method made it possible to access participants during COVID-19 through expert reviews without the need to meet in person (Eibensteiner, Ritschl, Ariceta, Jankauskiene, Klaus, Paglialonga, Edefonti, Ranchin, Schmitt, and Shroff, 2020; Fisher, Erasmus, and Viljoen, 2020; Mummaneni et al., 2020; Rajhans et al., 2020; Arifin, 2021).

Table 1 – Delphi method articles due to COVID-19

Article Title	Purpose	Delphi Type	Number of Rounds	Number of Panels	Consenus	Outcome
Consensus-based perioperative protocols during the COVID-19 pandemic.	To develop protocols necessary to optimise care for COVID patients to minimise the burden on hospital resources during the COVID-19 pandemic.	Modified	2	1	Frequency of agreement	A framework that minimises the strain that urgent/emergent invasive procedures and surgeries place on hospital resources during the pandemic
Adopting a modified Delphi	To derive a holistic competency	Modified; e-Delphi	4	1	Frequency of agreement	A framework that provided a strong foundation for

Article Title	Purpose	Delphi Type	Number of Rounds	Number of Panels	Consenus	Outcome
technique for revisiting the curriculum: a useful approach during the COVID-19 pandemic.	matrix for an optometry program for transformation of the program to competency-based education.					redesigning pedagogy and assessment methodology during the COVID-19 crisis
Applying Modified e-Delphi Technique: Guideline for HR Researchers and Practitioners for Developing Competency Profiles During COVID-19 Pandemic.	To develop a step-by-step guideline for developing an employee competency profile	Modified; e-Delphi	2	N/A	Frequency of agreement	The article narrated a methodological procedure that follows the restrictions and social distancing norms imposed during the COVID-19 outbreak using e-Delphi. The author points out that this method has proved to be more practical when considering experiences during the COVID-19 pandemic.
Rapid response in the COVID-19 pandemic: a Delphi study from the European Pediatric Dialysis Working Group.	The objective of this study was to rapidly gather expert knowledge and experience to guide the care of children with chronic kidney disease during the COVID-19 pandemic	Multi-center Delphi	4	N/A	Descriptive statistics	Thirteen COVID-19 specific topics of particular need for guidance were identified
Adaptation of the Delphi Technique for Electronic Application in the Food Industry.	This article reports on a successful electronic application of a classic Delphi procedure involving South African food industry specialists, reflecting on the local context and optimising their expertise to	Classical Delphi	3	1	Qualatitative coding	In this article, the authors promote the use of the Delphi technique in electronic format for multiple reasons, namely possible wide application, affordability, and speed of the process

Article Title	Purpose	Delphi Type	Number of Rounds	Number of Panels	Consenus	Outcome
	elicit a context-specific definition for Food Literacy with all the associated dimensions.					

Discussion

This section presents a summary of the literature findings. This section is important as it provides evidence of the use of the Delphi method and a practical approach to add value to research and replace face-to-face interviews, considering the restrictions that were placed by the COVID-19 regulations.

Table 2 – Summary of the Successful Delphi Articles due to COVID-19

No	Article	Why Delphi	Author
1	Consensus-based perioperative protocols during the COVID-19 pandemic.	The authors developed a framework consisting of protocols used to guide perioperative care at University of California and Western US (UCSF) using a modified Delphi method due to the lack of data and time during a pandemic to create evidence-based guidelines for triaging invasive procedures.	(Mummaneni et al., 2020)
2	Adopting a modified Delphi technique for revisiting the curriculum: a useful approach during the COVID-19 pandemic.	Following social distancing norms imposed during the outbreak of COVID-19, the author presents a suitable, feasible, and scientific method for rapid transition in academia.	(Rajhans et al., 2020)
3	Applying Modified e-Delphi Technique: Guideline for HR Researchers and Practitioners for Developing Competency Profiles During COVID-19 Pandemic.	This article narrates a methodological procedure that follows the restrictions and social distancing norms imposed during the COVID-19 outbreak using a platform known as e-Delphi.	(Arifin, 2021)
4	Rapid response in the COVID-19 pandemic: a Delphi study from the European Pediatric Dialysis Working Group.	The modified Delphi approach is practical in responding to the COVID-19 situation, where researchers and practitioners, especially in HR, face data collecting barriers.	(Eibensteiner et al., 2020)
5	Adaptation of the Delphi Technique for Electronic Application in the Food Industry.	Delphi provides the ideal way to share the experiences and insights gained during the COVID-19.	(Fisher et al., 2020)

As observed in Table 2, these studies confirm the Delphi method design and its flexibility to the diversity of research and, more recently, surrounding circumstances. Because of its flexibility, the authors have tailored their research to accommodate the challenges that have been imposed by the COVID-19 pandemic, especially in conducting research the traditional way that is conducting face-to-face interviews, case studies, and observations. Thus, this study cements the Delphi method as a suitable approach to conducting research during the COVID-19 pandemic.

According to Hedding, Greve, Breetzke, Nel, and Van Vuuren (2020); Donohue, Lee, Simpson, and Vacek (2021) some students were having an even harder time trying to complete their degrees during the COVID-19 pandemic. These experiences ranged from feeling abandoned to finding ways to manage the disruptions of their dissertation and thesis progress. Below are some of the fraustrations experienced by Doctoral and Masters students on how the COVID-19 pandemic impacted their studies.

- Availability of potential participants in their study was limited because the targeted population was high school leaders who were preoccupied with preparations for return plans.
- Research proposals were difficult to plan because they required significant travel to many places, and there was uncertainty about when/if those places would be safe. Timelines were difficult to establish during the COVID-19 pandemic.
- Some students were delayed because they could not start their data collection or had to put it on hold.
- Some of the researchers changed their data collection plans, requiring additional time for designing, writing up, evaluating, and implementing, thus extending the timelines of many of the studies.
- One approach was to move data collection online for researchers who had already collected data.
- Lockdowns, site closures, and the increased risk to participants made it impossible to conduct face-to-face experiments with human subjects, observations, interviews, and focus groups.
- Observations and interviews could not be done in organizations or schools, and the whole project relied on that data.
- The time required for making changes to research designs was problematic from the student's perspective who was trying to complete a project.

Further, due to the COVID-19 restrictions and the lack of access to possible participants, more students at South African universities opted to use the Delphi method in their studies. This finding was obtained by interviewing seven supervisors or co-supervisors from five South African universities who all indicated that at least two to three of their Masters and Doctorate students who had to complete their studies were forced to apply the Delphi technique. This technique was applied to either evaluate or finalize their developed models or frameworks as their final deliverables. Some students did manage to collect data traditionally, while most relied on the Delphi method to maintain the continuity and quality of the study. During the interviews, it was found that those who managed to collect data traditionally either through case studies or to get a representable quantitative sample had already started this process prior COVID-19 (before March 2020). Those who planned data collection during 2021 reverted to using expert reviews through the Delphi technique.

As one supervisor indicated: "*Two of my Masters' students and one PhD changed their research protocols for ethical purposes to apply the Delphi technique as there was no other option*". Another supervisor from another university also maintained that: "*We did try to get access to participants by either mailing them or telephonically accessing them, but it was a fruitless exercise as they either did not have access to stable Internet connections (especially in rural areas), or they indicated their unavailability via online platforms*". As indicated by another supervisor: "*Their Masters student successfully contacted the participants and was awaiting approval from the district manager;*

however, as the COVID-19 cases were rising, they were unavailable". To maintain anonymity and privacy, none of the students' or supervisors' personal information can be disclosed.

Conclusion

This research explored and presented articles that successfully implemented the Delphi method during the COVID-19 pandemic to carry out research even with the COVID-19 restrictions implemented. Furthermore, the research identified particpants who's academic studies were interrupted by the COVID-19 pandemic and had to adapt their research methododology to the Delphi method to complete their studies. The authors advocate the Delphi method as one of the best alternatives available for researchers, institutions, and academics to use as we lived in a world of COVID-19 disruptions and lockdown situations. The Delphi method is thus more suitable for identifying, verifying, and validating the study's outcome in situations where face-to-face access to participants is not possible and participants are based in different locations.

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