Tech. Edu. J. 18 (1) : 249-270, Winter 2024

Technology of Education Journal
(TEJ)
Homepage: jte.sru.ac.ir

ORIGINAL RESEARCH PAPER

Identifying and explaining the skills of academic staff members for virtual education in post-Corona: Providing a conceptual model

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Received: 31 August 2023
Reviewed: 01 November 2023
Revised: 08 December 2023
Accepted: 26 December 2023

KEYWORDS:
Virtual Education
Skills of Faculty Members
Post-Corona
Content Analysis
Fuzzy Delphi

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ABSTRACT

Background and Objectives: The use of digital technology for teaching and learning has been discussed for decades, but now and in the post-Corona era, due to the problems of the COVID-19 pandemic, it has become the focus of many educational institutions. The effect of COVID-19, in a short period, brought about a huge change in the way of education and learning and even completely blocked some educational activities. As a result, education administrators have turned to other alternatives to replace face-to-face or traditional learning. Virtual education is one of the very important and serious programs proposed and carried out by educational institutions in that era, now and in the post-Corona period. The quality of designing and providing virtual education, like face-to-face education, depends on several inputs such as the teacher, learner, technological tools and education design, financial resources system, educational policies, and so on. Among the listed factors, the lecturers of these courses are of special importance. Therefore, according to the change in the teachers' role, their previous skills can no longer be answered, and teachers, in addition to acquiring the necessary skills in the traditional learning environment, need empowerment in various fields, which is the most important step in achieving this important identification. Today, few universities can improve and develop without providing training courses to empower their faculty members, and this is doubly important in the post-Corona period when universities place a lot of emphasis on virtual education. This is because in the Corona and post-Corona period the emphasis on virtual education in higher education and increasing its use, requires special knowledge, skills, and abilities for professors To achieve this, identifying the skills of lecturers in virtual education, it seems essential and paying attention to these skills will lead to the growth of professors and as a result, improve the quality of virtual education. In particular, there is no significant study for the post-Corona period in the context of the research topic, and there is no study on identifying and explaining the teaching skills of teachers for virtual education using the methods of content analysis and fuzzy Delphi. Therefore, the present study aims to identify and explain the skills of academic staff members in virtual education in the post-Corona period in a precise manner using the approaches of content analysis and fuzzy Delphi and presenting a conceptual model.

Materials and Methods: This research is an applied and descriptive research and the combined research methods of interview, content analysis, and fuzzy Delphi were used to collect and analyze information. The statistical population of the research is 20 experts and professors of the Shahid Bahonar University of Kerman. Data were collected through in-depth and semi-structured interviews. Then, all the interviews were analyzed with the method of content analysis, and the skills were extracted and identified. Then, skills were refined and explained in four survey stages using the fuzzy Delphi method.

Findings: In the interview with the experts, two main questions were used to measure the skills and competencies of academic staff members for virtual education in the post-Corona period. The results of the qualitative section included 452 initial codes, which were reduced to 31 main codes and five main categories after data reduction and merging overlapping terms. These five main classes include moral-social, technical-technological, educational-learning, individual-managerial, and supervisory-supportive skills. Then, with a questionnaire, 31 identified skills were examined for refinement and confirmation in four stages. By examining the skills, the experts approved all of them with the fuzzy Delphi approach.

Conclusions: In this study, it was determined that 31 skills are considered for virtual education teachers. In the meantime, we can safely say that 12 skills of social facilitation and appropriate counseling, conflict management, professional and ethical commitment, strategies and applications of learning theories, scholarly and research skills and knowledge sharing, skills to facilitate the teaching process, online lectures, encouraging and motivational skills, administrative and operational organizational skills, maintaining communication with students after completing the course, feedback, and monitoring learning activities, which were approved in the first round of the fuzzy Delphi method, are the most important skills of virtual education. Therefore, more emphasis should be placed on these skills in the post-Corona era in virtual courses.

NUMBER OF REFERENCES
57

NUMBER OF FIGURES
3

NUMBER OF TABLES
5

مقاله پژوهشی

شناسایی و تبیین مهارت های اعضای هیئت علمی جهت آموزش مجازی در دوره پسا کرونا: ارائه یک الگوی مفهومی

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چکیده

پیشینه و اهداف: استفاده از فناوری دیجیتال برای آموزش و یادگیری، دهه ها مورد بحث قرار داشت، امّا اکنون و در دوره پسا کرونا، به دلیل مشکلات دوران همه گیری کوید۱۹، در کانون توجه بسیاری از نهادهای آموزشی قرار گرفته است. تأثیر کوید ۱۹، در کوتاه مدت، شیوه تحصیل و یادگیری را با تحول عظیمی روبروکرد و حتی برخی از فعالیت های آموزشی را کاملا مسدود کرد. در نتیجه متولیان امر آموزش، به جایگزین های دیگری برای یادگیری حضوری یا سنتی روی آوردند. از برنامه های بسیار مهم و جدی که از سمت نهادهای آموزشی و در آن دوران و در حال حاضر و دوره پسا کرونا مطرح و انجام می شود، استفاده از آموزش مجازی است. کیفیت طراحی و ارائه آموزش مجازی مانند آموزش حضوری به دروندادهای متعددی از قبیل مدرس، یادگیرنده، ابزارهای فناورانه و طراحی آموزش، نظام منابع مالی، سیاست های آموزشی و نظایر آن بستگی دارد. از میان عوامل برشمرده، مدرسان این دوره ها دارای اهمیت ویژه ای هستند. بنابراین با توجه به تغییرنقش مدرسان، مهارت های قبلی آنان دیگر نمی تواند پاسخگو باشد و مدرسان علاوه بر کسب مهارت های لازم در محیط یادگیری سنتی، نیازمند توانمندسازی در زمینه های مختلفی هستند که مهم ترین گام در دستیابی به این مهم شناسایی مهارت های مدرسان در زمینه آموزش مجازی است. امروزه کمتر دانشگاهی قادر است بدون ارائه دوره های آموزشی برای توانمندسازی اعضای هیئت علمی خود بهبود و توسعه یابد و این امر در دوره پسا کرونا که دانشگاه ها تاکید بسیاری بر آموزش مجازی دارند، از اهمیت دو چندانی برخوردار است. این بدان دلیل است که در دوره کرونا و پسا کرونا و تاکید بر آموزش مجازی در نظام آموزش عالی و افزایش کاربرد آن نیازمند دانش، مهارت و تواناییهای ویژه ای برای اساتید می باشد، که برای دستیابی به این مهم شناسایی مهارت های مدرسان در آموزش مجازی ضروری به نظر می رسد. توجه به این مهارت ها سبب بالندگی اساتید و در نتیجه بهبود کیفیت آموزش مجازی خواهد شد. به ویژه آن که مطالعه قابل ذکری برای دوره پسا کرونا و در زمنیه موضوع تحقیق مشاهده نشد و بارویکردهای تحلیل محتوا و دلفی فازی مطالعه ای در مورد شناسایی و تبیین مهارت های آموزشی مدرسان جهت آموزش مجازی وجود ندارد. بنابراین هدف مطالعه حاضر، شناسایی و تبیین مهارت های اعضای هیئت علمی در آموزش مجازی در دوره پساکرونا به صورت دقیق و با استفاده از رویکردهای تحلیل محتوا و دلفی فازی و ارائه یک الگوی مفهومی می باشد.

روش‌ها: این پژوهش کاربردی و توصیفی است و برای جمع آوری و تجزیه و تحلیل اطلاعات از روش تحقیق ترکیبی مصاحبه، تحلیل محتوا و دلفی فازی استفاده شده است. جامعه آماری تحقیق جهت مصاحبه، روش تحلیل محتوا و دلفی فازی ۲۰ نفر از خبرگان و اساتید دانشگاه شهید باهنرکرمان می باشند. داده ها با مصاحبه عمیق و نیمه ساختار یافته جمع آوری شد. سپس با روش تحلیل محتوای قراردادی کلیه مصاحبه ها بررسی گردید و مهارت های اعضای هیئت علمی جهت آموزش مجازی در دروه پسا کرونا استخراج و شناسایی شد. سپس در ۴ مرحله نظرسنجی و با استفاده از روش دلفی فازی مهارتها پالایش و تبیین شدند.

یافته‌ها: در مصاحبه با خبرگان با دو سوال اصلی مهارت ها و یا شایستگی های اعضای هیئت علمی جهت آموزش مجازی در پسا کرونا سنجیده شد. نتایج حاصل از بخش کیفی شامل ۴۵۲ کد اولیه بود که بعد از کاهش داده ها و ادغام عبارات همپوشان به ۳۱ کد اصلی و ۵ طبقه اصلی کاهش یافت. این ۵ طبقه اصلی شامل مهارت های اجتماعی-

تاریخ دریافت: ۰۹ شهریور ۱۴۰۲
تاریخ داوری: ۱۰ آبان ۱۴۰۲
تاریخ اصلاح: ۱۷ آذر ۱۴۰۲
تاریخ پذیرش: ۰۵ دی ۱۴۰۲

واژگان کلیدی:
آموزش مجازی
نیازها و مهارت های اعضای هیات علمی
پسا کرونا
تحلیل محتوا
دلفی فازی

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اخلاقی، فنی- فناوری، آموزشی- یادگیری، فردی- مدیریتی، ونظارتی- حمایتی می باشد. سپس با پرسشنامه ۳۱ مهارت شناسایی شده جهت پالایش و تایید و در ۴ مرحله مورد بررسی قرار گرفت. خبرگان با بررسی مهارت ها، همه آن ها را با رویکرد دلفی فازی مورد تایید قرار دادند.

نتیجه‌گیری: در این مطالعه مشخص شد که ۳۱ مهارت برای مدرسین آموزش مجازی مد نظر می باشد که دراین بین می توان گفت که ۱۲ مهارت تسهیلگری اجتماعی و مشاوره مناسب، مدیریت تعارض، تعهدحرفه ای و اخلاقی، راهبردها و کاربردهای نظریه های یادگیری، مهارت دانشوری و پژوهشی، مهارت تسهیل فرایند آموزش، سخنرانی برخط، مهارت تشویقی و انگیزشی، مهارت سازمانی و عملیاتی، حفظ ارتباط با دانشجو پس از اتمام دوره، بازخورد، و نظارت بر فعالیتهای یادگیری، که در همان دور اول روش دلفی فازی تایید شدند، مهم ترین مهارت‌های آموزش مجازی می‌باشد و بنابراین باید براین مهارت ها در دوره های مجازی پسا کرونا تاکید بیشتری گردد.

Introduction

One of the serious needs of life in today's fast-paced era, where the volume and speed of changes and transformations during human life are unprecedented, is to shape educational changes and innovations, especially at the level of education in universities and higher education institutions [1]. Because this is one of the most effective areas that enable us to reduce our distance with global developments [2].

The use of digital technology for teaching and learning has been discussed for decades [3], but now due to the Corona era, it has been at the center of public and political attention [4]. Since January 2020, there has been a sudden crisis in the public health of the world, which has spread from the city of Wuhan in China to the whole world and has become a serious threat to humanity [5]. According to the Center for Disease Control, this has been one of the most important and unpredictable global public health crises in recent times [6]. Due to its high transferability, imminence, and invisibility, the global village faced a great challenge [7]. Corona disease has been a major health concern during the last two years and continues to affect people's daily lives [8]. Governments and public health systems, by declaring a state of emergency, have taken extensive measures to prevent this disease, but the stress caused by this disease, and its psycho-social destructive effects severely affect society in every area, especially since it has faced many problems in the field of education [9]. The emergence of COVID-19 has not only negatively affected health issues, but also stopped many economic, educational, and cultural activities around the world [10-11]. The impact of COVID-19, in the short term, brought a strange and huge change to the way of education and learning and even completely blocked the spread of some educational activities [12]. As a result, the guardians of education turned to other alternatives to replace the face-to-face or traditional learning model [13]. One of the very important and serious programs that were proposed and carried out by educational institutions during this period and after that was to switch to virtual education [14].

It should be noted that virtual education was a turning point in the Corona era, and it passed its test well. Of course, despite the continuity of the disease, attention to virtual education and desired competencies should be continuous. This continuation of the approach in the education system requires government investment and the cost of this action is significant, but currently and considering the long-term effects of these changes and the passing of that very difficult period and stepping into the post-Corona period, the educational systems various try to allocate resources, and in some cases invest using innovative procedures and tools and check various preparations and competencies from infrastructure and structure

to content and teachers. Provide appropriate educational services, provide adequate support, and maintain their readiness [2].

Currently, with the control of the Coronavirus epidemic, as well as opportunities and challenges such as the introduction of information and communication technologies, and increasing access to technology in higher education, universities facing an increase in demand for education, the need for economic activities to provide new resources, and the application of information technology to provide education services in the global market, which already existed, has caused universities to reconsider their traditional roles and create new educational structures [15-19].

The result of this structural change is the creation of a new model of the teaching-learning system under the name of virtual education. In a general definition, virtual education is the use of network technology (for example, the Internet) to design, deliver lessons, and implement the educational environment to realize and continue learning [20]. Also, Kamalian and Fazel in their definition of virtual education, which seems to be more comprehensive than other definitions, considers virtual education to consist of four dimensions. They state that virtual education can be both an individual activity and a group activity. At the same time, in addition to these two dimensions (i.e. individual and group study), virtual education is both continuous (simultaneous communication) (communication with learning resources and with people simultaneously and in a real way) and discrete (asynchronous communication) (with the use of educational CDs that have already been prepared or through educational materials that have already been downloaded from the Internet [21]. In fact, virtual education consists of two broad sets (Information Technology) and (Education and Research) [22].

This method of education is considered an important tool in higher education in the digital age and has caused the creation of a learner-based learning environment, flexibility in learning methods, and the introduction of changes in the teaching-learning process in the higher education system [23]. In fact, virtual education, by applying the latest achievements of the era of information and communication technology, has created new approaches [24], and has provided clear horizons in the field of higher education [25].

The quality of designing and providing virtual education, like face-to-face education, depends on several inputs such as the teacher, the learner, technological tools, education design, financial resources system, educational policies, and so on [26-27]. Among the listed factors, the lecturers of these courses are of special importance [28].

Based on the constructivist approach in the teaching-learning process, the role of the lecturer has changed from a mere speaker in a traditional classroom environment, whose task is only to convey the message to students through educational media, to a guide of learning activities [29]. In fact, the instructor guarantees the quality of virtual learning by managing motivation, supporting students, and helping them to understand the content [30]. Therefore, according to the change in the teacher's role, his previous skills can no longer be answered, and teachers, in addition to acquiring the necessary skills in the traditional learning environment, need empowerment in various fields, which is the most important step in achieving this important identification. The skills of lecturers and faculty members are in the field of virtual education [31] and it is currently in the post-Corona period .Today, few universities can improve and develop without providing training courses to empower their faculty members, and this is doubly important

now that universities place a lot of emphasis on virtual education and this is the reason that in the period of Corona and post-Corona, and the emphasis on virtual education in the higher education system, and increasing its use, requires special knowledge, skills, and abilities for teachers, who, to achieve this, identify the skills of teachers in virtual education seem necessary, and paying attention to these abilities will lead to the growth of teachers, and as a result, the quality of virtual education will improve.

The post-coronavirus situation shows that virtual education has become one of the infrastructures of universities. Continuation of this process causes ambiguities and the lack of accurate and correct conclusions about the skills needed by teachers for virtual education, and it may confuse those involved in the educational system regarding these skills in the educational system. Therefore, the best way to achieve these skills is a deep study with new approaches such as content analysis and fuzzy Delphi. According to what was mentioned, it seems necessary to use these approaches to identify and explain the skills of faculty members for virtual education and to achieve a comprehensive conceptual model in post-coronavirus conditions.

Considering the topic and goals considered, this research is important from three theoretical, practical, and methodological perspectives. From a theoretical point of view, the current study seeks to help identify and explain the skills of faculty members for virtual education, and the theoretical knowledge obtained from this study is theoretically more important than the findings of other studies. From the practical aspect, if in this research the skills of academic staff members for virtual education are identified and explained in the current and post-corona period, it can be done by familiarizing teachers, managers, and stakeholders with the mentioned concepts, and accordingly, The effects of quality virtual learning courses, and using the skills of teachers, on the cognitive, academic and motivational processes of learners, provided the space for increasing the better performance of the beneficiaries of virtual education. In terms of methodology, according to the few studies in the field of identifying and explaining the skills of academic staff members for virtual education, no comprehensive research has been done with content analysis and fuzzy Delphi methods in relation to the subject.

Therefore, the present study aims to identify and explain the skills of academic staff members in virtual education in the post-Corona era in a precise manner using modern approaches of content analysis and fuzzy Delphi and presenting a conceptual model.

Review of the Related Literature

Nikoubakht et al. have defined virtual education as the method of presenting content through digital devices such as computers and mobile phones to improve learning [1]. Unlike face-to-face training in the classroom, in virtual training, everything is easily available, for example, the color of the screen or checking the correctness and accuracy of the content can be done easily [8]. Although many advantages have been mentioned for this educational method such as educational flexibility and student-centered learning [4], improving communication skills between professors and students through daily interactions, improving learning through social interactions within the network such as group discussion and disseminating different information [2]. But other studies have also mentioned challenges and disadvantages: such as being time-consuming, expensive to prepare programs, dependence on the Internet, technical and

financial support problems for program preparation and implementation [32], lack of managerial and supervisory skills, limitations in technical and communication infrastructures, lack of full compatibility of the content provided with existing needs, limitations and damage to social communication skills [7] and low quality of learning and lack of use of trained teachers in the field of virtual education [5].

Several studies have been conducted in the field of professional skills of faculty members, and most of these researches have investigated learning skills in non-virtual learning environments. For example, in one study, it was shown that the most important skills of faculty members are educational skills related to knowledge, skill information, motivation, incentives, and learning environment, and non-educational skills include operational administrative skills and support skills [33]. Kwek and Cheung have proposed in their research that an essential part of teachers' professional development, is knowing how students learn and how to organize an online course to achieve maximum learning. They also emphasize that teachers need coaching and support skills to teach effectively using technology. In fact, in addition to being aware of technical and operational aspects, teachers need to acquire the necessary knowledge in the field of pedagogical skills [34]. Simon emphasizes that an effective internship program should be a combination of different resources such as people, educational materials, and technology; so that the teachers can share their knowledge and expertise as well as their success and failure stories [35]. Levinsen believes that the teacher in the context of e-learning needs technical, educational and communication skills [36]. In this context, Gilzene has listed 11 roles for instructors of virtual education courses in his research, which include technology-savvy educational designer instructor, technician, facilitator, performer, supporter, editor, librarian, evaluation specialist, and graphic designer [37]. The research results of Bornet et al. show that in the e-learning environment, the professional skills of teachers include technical skills, educational competence, and communication skills [12]. Amundsen suggests that faculty development in a general sense is any intervention that aims to provide the necessary opportunities for faculty members to improve their scholarly roles as research scientists as educational researchers, and as teachers [38].

In Gao et al.'s study, two categories of skills were identified for faculty in virtual education. Soft skills, such as student participation, motivating students, enhancing critical thinking, curriculum design, classroom management, crisis management, time management, creating a learning community, creating discussion and dialogue forms, and technical skills such as using technology in general, creating content Interactive using multimedia tools, expressions of learning system management, using tools to create teaching opportunities [39].

Hajizadeh and his colleagues state that the necessary characteristics for faculty members of the virtual education and learning system include management and encouragement, interaction, support for students, electronic skills and commitment, positive attitude, and facilitation [40]. The results of Sedeghpour and Mirzaei's research show that for the development and implementation of high-quality virtual education courses, there is a skill for teachers' preparation in all social, cultural, economic, and educational dimensions [41]. The results of the research of Daneshwar and Mehr Mohammadi show that the necessary qualifications of virtual education teachers are pedagogical qualifications, technological

qualifications, and the combined qualifications of pedagogic knowledge and technology, which according to the growth and development of electronic education and the increased of electronic learning environments, there is a need to prepare teachers to acquire the above qualifications [42]. In their study, Pourjamshidi and FarDanesh mentioned the factors affecting the interaction between the teacher and the learner in the web-based educational environment, including technical and instrumental skills, communication skills, commitment and order, scientific mastery, motivation and attitude in the field of virtual education [43]. Mehralian and Maghami consider the competencies of an electronic teacher to include 16 components in 8 dimensions social, moral, managerial, individual, teaching skills, supervision, educational commitment, and technology [44].

In general, the review of the research literature indicates that although several studies have been conducted on the skills of teachers for virtual education, but each of these studies has addressed specific aspects and a comprehensive and sufficient study with a qualitative and quantitative approach has not been conducted. In particular, there is no significant study for the post-corona period and in the context of the research topic, and there is no study on identifying and explaining the skills teachers have for virtual education using the methods of content analysis and fuzzy Delphi. In this sense, researchers are trying to examine and explain this issue carefully and accurately.

Method

Since this study seeks to identify and explain the skills of faculty members, and provide a conceptual model for virtual education and present a new plan of information, it is considered applied research. Also, based on the research plan and in terms of data collection, the current research is descriptive research and the combined research methods of interview, content analysis, and fuzzy Delphi were used to collect information. In this research, the contractual content analysis method was used to extract the skills of virtual education from interviews with experts, and the fuzzy Delphi method was used to refine and explain these skills.

The conventional content analysis method is often suitable when the existing theory or research texts and research literature about that phenomenon are limited. In this method, classes and codes flow from the heart of the data. In the mentioned method, the information collected through written texts or interviews and pre-existing theories had no place [45].

Participants

The participants were selected by purposive sampling method. In this method, the researcher used research participants who had rich experience with the research topic. The criteria for entering the study included having the academic rank of assistant professor and above, and teaching experience of at least 8 years, as well as teaching experience during the Corona period and in virtual form. So that the teacher, through the experience of face-to-face training, can accurately and fully express his experiences of the skills of virtual training and the difference between it and face-to-face training. The participants were experienced faculty members of the Shahid Bahonar University of Kerman. It was tried to select experts from both sexes, different scientific ranks, and different fields with different teaching experiences so that the maximum variety of sampling is observed.

Instruments

Data collection was done using semi-structured interviews with open questions. The interviews started with some general questions. Sample interview question: “Please describe your experience of a day of class virtually. In your opinion, what skills should a teacher have for virtual education? What are the competencies of virtual education teachers? Based on the responses of the participants, further follow-up questions in this area such as explain a little more. Please give an example of this, it was asked. The duration of the interviews was 20 to 60 minutes, with an average of 40 minutes. The number of participants was determined based on data saturation. So, after 17 interviews, a new class was not formed, but to be sure, three more interviews were conducted and the final number of participants was 20 people.

Data Analysis

Data analysis was done using conventional content analysis with Graneheim and Lundman method. First, the entire interview text was carefully read to immerse in the data and reach a general understanding. After that, the target text was read several times. Then the semantic units were specified and the primary codes were formed, and these codes were placed in subclasses and classes according to relationships, similarities, and differences [46].
To ensure the accuracy and scientific accuracy of the presented materials, the four criteria of Lincoln and Goba, which include reliability, validity, transferability, and verifiability, were used.

Validity: For this purpose, the researchers tried to communicate with the data and experts over a long period of time, to ensure that the researchers' perceptions are exactly what the participants understood. By collecting valid information and verifying the information from the participants, the researchers tried to increase the validity of their research.

Reliability: For data verifiability, the analyzed interviews were provided to three lecturers who participated in the study. Then, an experienced person who had research experience in the field of virtual education and qualitative research methodology was requested to study the extracted codes and themes from the interviews.

Transferability: The researchers tried to help in the evaluation and applicability of the research in other fields by providing sufficient and detailed explanations about the characteristics of the participants, steps, and work methods

Verifiability: The researchers tried to show evidence for the emergence of the results from the data by keeping the documents related to the different stages of the research. They also used the approval of professors and experts in this department. Also, the statistical population of the research in the fuzzy Delphi section includes 20 experts who were selected for conventional content analysis. They refined the skills extracted from the interviews [47].

The present research questionnaire has been designed, aiming at obtaining the experts’ opinions about the amount of their agreement with competencies and skills. Therefore, the experts have expressed their amount of agreement through verbal variables such as very low, low, medium, high, and very high. Since the different characteristics of individuals influence their mental interpretations of qualitative variables, so defining the scope of qualitative variables, the experts have answered questions with the same mentality. These variables have been defined considering Table 1 and Fig. 1 in the shape of triangular fuzzy numbers.

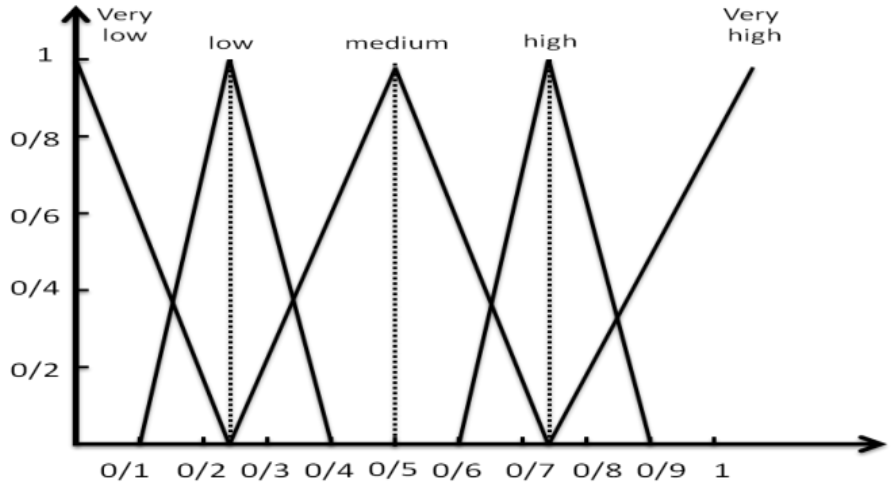

Fig. 1: Triangular fuzzy number of verbal variables

Table 1: Triangular fuzzy number of verbal variables

Verbal variables	Determined fuzzy number	Triangular fuzzy number
Very high	(1,0.25,0)	0.9375
High	(0.75,0.15,0.15)	0.75
Medium	(0.5,0.25,0.25)	0.5
Low	(0.25,0.15,0.15)	0.25
Very low	(0,0,0.25)	0.0625

In above table, the determined fuzzy numbers have been calculated by using Minkowski's formula as following:

Formula (1):

$$x = \mathrm{m} + \frac{\beta - \alpha}{4}$$

With regard to the proposed options and linguistic variables defined in the questionnaire, the results of the investigation of responses presented in Table 3 have been provided. Regarding the results of this table, the fuzzy average of each factor has been calculated according to the following equations.

Formula 2:

$$A_i=(a_1^{(i)}, a_2^{(i)}, a_3^{(i)}), \quad i=1,2,3,\ldots,n$$

Formula 3:

$$A_{ave}=(m_1,m_2,m_3)=\left(\frac{1}{n}\sum_{i=1}^{n} a_1^{(i)}, \frac{1}{n}\sum_{i=1}^{n} a_2^{(i)}, \frac{1}{n}\sum_{i=1}^{n} a_3^{(i)}\right)$$

In this equation, iA indicates the expert's view i, and aveA represents the average of the expert's view. The results of these calculations have been presented in Table 3. The execution algorithm for the Fuzzy Delphi method is illustrated in Fig.2 [48].

Results and Findings

Content analysis method

In this study, the age range of the participants was 39 to 62 years. 80% of the participating teachers were men. The teaching experience of the academic staff varied from 8 to 31 years. In terms of rank, 54% were assistant professors, 24% were associate professors, and 22% were full professors. The academic group of the faculty members was 10 people from the humanities department, four people from the basic sciences, and six people from the technical and engineering departments. The results of the qualitative section included 452 initial codes, which were reduced to 31 main codes and five main categories after data reduction and merging overlapping terms. These five main classes include moral-social, technical-technological, educational-learning, individual-managerial, and supervisory-supportive skills. In Table 2, the dimensions,

and skills of academic staff members for virtual education in the post-Corona era are shown as a result of the content analysis method

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Fuzzy Delphi method

To explain, refine, and confirm the skills of virtual education, which was obtained in the stage before the content analysis approach, the fuzzy Delphi method has been used. The implementation steps of the fuzzy Delphi method are a combination of implementing the Delphi method and performing analyses of information using the definitions of the theory of fuzzy sets [49]. In the current research, 31 skills of virtual education were identified for virtual education with the content analysis method, which were entered into the fuzzy Delphi method for analysis and institutionalization. The following steps are used to implement the fuzzy Delphi approach:

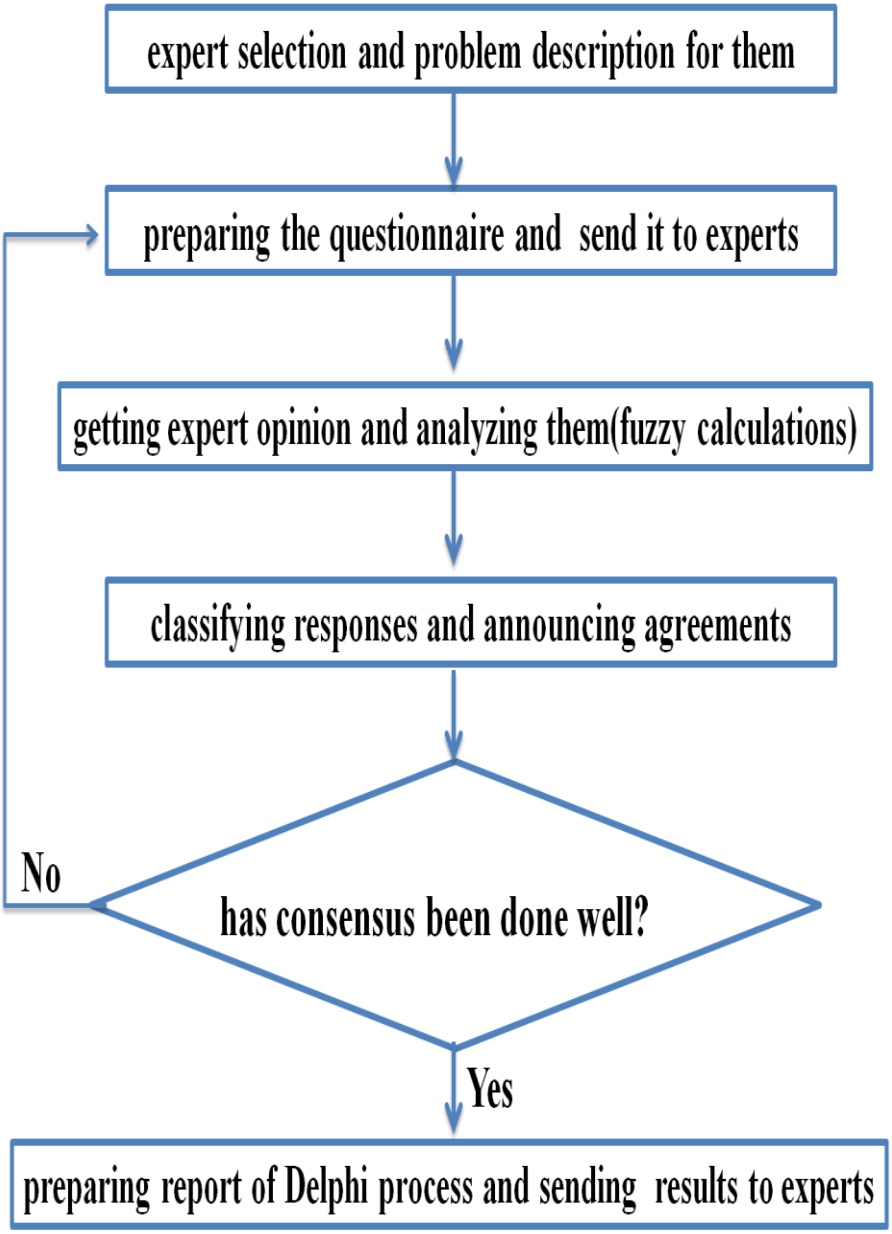

Fig. 2: Delphi technique implementation algorithm

First stage: In this stage, the identified skills were sent to the members of the expert group and their opinions were collected. According to the proposed options and linguistic variables defined in the questionnaire, the results of the examination of the answers are presented in Table 3. According to the results of this table, the fuzzy mean of each of the specified skills has been calculated according to Formulas 2 and 3, and then it has been de-fuzzified using the Minkowski Formula (Formula 1). The absolute mean obtained shows the intensity of experts' agreement with each of the research components. The results of calculations related to the first stage of the fuzzy Delphi method are shown in Table 3.

Table 2: skills of academic staff members for virtual education resulting from the content analysis

Ethical Social	Technical Technology	Educational Learning	Individual Managerial	Supervisory supportive
1.Social facilitation and appropriate counseling 2.Conflict management 3.Professional and ethical commitment 4.Creating motivation for virtual learning 5.Cognitive skill 6.Intercultural skills	7.Technological skills (hardware and software) 8.skill of updating teaching resources and methods 9. Support and solve technical problems 10. Production and presentation of content	11.Strategies and applications of learning theories 12.Teaching skills 13.Educational commitments 14.Educational design and planning 15.Resource identification skills 16.Scholarly, research and knowledge sharing skills 17.The skill of facilitating the training process 18.online lecture	19.The skill of positive attitude towards synchronous and asynchronous teaching 20.Time management and training course management 21.Encouraging and motivational skills 22.Organizational, administrative and operational skills 23.Diagnostic skills (analytical, initiative, creativity) 24.Leadership skills, guidance and guidance of students 25.Crisis management skills	26.Final evaluation and course 27.Maintaining contact with the student after completing the course 28.Feedback 29.Monitoring the learning activities of learners 30.The skill of spiritual and legal support of the input and output of virtual education 31.The skill of encouraging learners to group and self-evaluation

Table 3: Results and level of the experts' agreement

Skills	Very low	low	Medium	high	Very high	m	α	β	X
Social facilitation and appropriate counseling	0	0	0	2	18	0.98	0.24	0.02	0.92
Conflict management	0	0	0	1	19	0.99	0.25	0.01	0.93
Professional and ethical commitment	0	0	0	0	20	1.00	0.25	0.00	0.94
Creating motivation for virtual learning	4	4	4	4	4	0.50	0.16	0.16	0.50
Cognitive skill	0	3	11	1	5	0.60	0.23	0.17	0.58
Intercultural skills	0	0	9	3	8	0.74	0.24	0.14	0.71
Technological skills (hardware and software)	0	0	0	14	6	0.83	0.18	0.11	0.81

Skills	Very low	low	Medium	high	Very high	m	α	β	X
Skill of updating teaching resources and methods	0	0	6	6	8	0.78	0.22	0.12	0.75
Support and solve technical problems	3	0	5	9	3	0.61	0.17	0.17	0.61
Production and presentation of content	0	0	0	15	5	0.81	0.18	0.11	0.80
Strategies and applications of learning theories	0	0	0	0	20	1.00	0.25	0.00	0.94
Teaching skills	0	0	4	1	15	0.89	0.25	0.06	0.84
Educational commitments	0	0	0	18	2	0.78	0.16	0.14	0.77
Educational design and planning	0	5	9	2	4	0.56	0.22	0.17	0.55
Resource identification skills	0	0	0	16	4	0.80	0.17	0.12	0.79
Scholarly, research and knowledge sharing skills	0	0	0	11	9	0.86	0.20	0.08	0.83
The skill of facilitating the training process	0	0	0	5	15	0.94	0.23	0.04	0.89
online lecture	0	0	0	2	18	0.98	0.24	0.02	0.92
The skill of positive attitude towards synchronous and asynchronous teaching	0	0	10	6	4	0.68	0.22	0.17	0.66
Time management and training course management	0	0	6	0	14	0.85	0.25	0.08	0.81
Encouraging and motivational skills	17	1	2	0	0	0.06	0.03	0.25	0.12
Organizational, administrative and operational skills	0	0	13	6	1	0.60	0.22	0.21	0.60
Diagnostic skills (analytical, initiative, creativity)	0	1	11	6	2	0.61	0.22	0.19	0.61
Leadership skills, guidance and guidance of students	0	1	1	18	0	0.71	0.16	0.16	0.71
Crisis management skills	0	0	0	12	8	0.85	0.19	0.09	0.83
Final evaluation and course	0	0	4	4	12	0.85	0.23	0.08	0.81
Maintaining contact with the student after completing the course	0	0	1	0	19	0.98	0.25	0.01	0.92
Feedback	0	0	0	0	20	1.00	0.25	0.00	0.94
Monitoring the learning activities of learners	0	0	7	3	10	0.79	0.24	0.11	0.76
The skill of spiritual and legal support of the input and output of virtual education	1	4	5	8	2	0.58	0.18	0.17	0.57
The skill of encouraging learners to group and self-evaluation	0	0	6	6	8	0.78	0.22	0.12	0.75

Second stage: In this stage, the second questionnaire was prepared and sent to the members of the expert group together with the previous point of view of each person and the extent of their difference with the point of view of other experts. At this stage, the experts did not combine or remove any skill and they answered the questions again according to the opinions of other group members about the goals, the results of which are presented in Table 4 .

The last column of Table 4 shows the difference between the first and second stages of the survey. According to the views presented in the first stage and comparing it with the results of this stage, if the difference between the two stages is between 0 and 0.1, then the survey process will be stopped. In this way and

according to the above table of experts regarding the skills of social facilitation and appropriate counseling, conflict management, professional and ethical commitment, strategies and applications of learning theories, scholarly and research skills and knowledge sharing, process facilitation skills Training, online lectures, encouraging and motivational skills, administrative and operational organizational skills, maintaining communication with students after the course, feedback, monitoring learning activities have reached a consensus and these skills have been approved.

Third stage: In this stage, while making the necessary changes, a third questionnaire was prepared and sent to the experts along with the previous point of view of each person and the difference between them and the average point of view of other experts. The difference is that at this stage, out of the 31 skills available in the previous stage, 12 were stopped and a survey was conducted on the rest of the remaining skills. The survey results are shown in Table 5.

Table 4: Results and the expert's agreement and differences in skills

Skills	Very low	low	Medium	high	Very high	m	α	β	X	Difference
Social facilitation and appropriate counseling	0	0	0	0	20	1.00	0.25	0.00	0.94	0.02
Conflict management	0	0	0	0	20	1.00	0.25	0.00	0.94	0.01
Professional and ethical commitment	0	0	0	0	20	1.00	0.25	0.00	0.94	0.00
Creating motivation for virtual learning	0	0	6	11	3	0.71	0.20	0.16	0.70	0.20
Cognitive skill	0	0	3	12	5	0.78	0.19	0.13	0.76	0.18
Intercultural skills	0	0	0	2	18	0.98	0.24	0.02	0.92	0.21
Technological skills (hardware and software)	0	0	0	1	19	0.99	0.25	0.01	0.93	0.12
Skill of updating teaching resources and methods	0	0	1	6	13	0.90	0.22	0.06	0.86	0.11
Support and solve technical problems	0	0	1	3	16	0.94	0.24	0.04	0.89	0.28
Production and presentation of content	0	0	0	0	20	1.00	0.25	0.00	0.94	0.14
Strategies and applications of learning theories	0	0	0	0	20	1.00	0.25	0.00	0.94	0.00
Teaching skills	3	1	2	0	14	0.76	0.21	0.07	0.73	-0.11
Educational commitments	0	0	0	0	20	1.00	0.25	0.00	0.94	0.17
Educational design and planning	0	0	0	17	3	0.79	0.17	0.13	0.78	0.23
Resource identification skills	0	0	0	0	20	1.00	0.25	0.00	0.94	0.15
Scholarly, research and knowledge sharing skills	0	0	0	1	19	0.99	0.25	0.01	0.93	0.09
The skill of facilitating the training process	0	0	0	0	20	1.00	0.25	0.00	0.94	0.05
online lecture	0	0	0	0	20	1.00	0.25	0.00	0.94	0.02
The skill of positive attitude towards synchronous and asynchronous teaching	0	0	2	12	6	0.80	0.19	0.12	0.78	0.12

Skills	Very low	low	Medium	high	Very high	m	α	β	X	Difference
Time management and training course management	0	0	0	0	20	1.00	0.25	0.00	0.94	0.13
Encouraging and motivational skills	0	0	4	16	0	0.70	0.17	0.17	0.70	0.10
Organizational, administrative and operational skills	1	0	0	8	11	0.85	0.20	0.07	0.82	0.08
Diagnostic skills (analytical, initiative, creativity)	0	0	3	9	8	0.81	0.21	0.11	0.79	0.18
Leadership skills, guidance and guidance of students	0	0	0	2	18	0.98	0.24	0.02	0.92	0.21
Crisis management skills	0	0	0	0	20	1.00	0.25	0.00	0.94	0.11
Final evaluation and course	0	0	0	1	19	0.99	0.25	0.01	0.93	0.12
Maintaining contact with the student after completing the course	0	0	0	0	20	1.00	0.25	0.00	0.94	0.02
Feedback	0	0	0	0	20	1.00	0.25	0.00	0.94	0.00
Monitoring the learning activities of learners	0	0	0	10	10	0.88	0.20	0.08	0.84	0.09
The skill of spiritual and legal support of the input and output of virtual education	0	0	2	10	8	0.83	0.20	0.10	0.80	0.23
The skill of encouraging learners to group and self-evaluation	0	0	0	3	17	0.96	0.24	0.02	0.91	0.16

Table 5: Results and the expert's agreement and differences with skills of stages 2 and 3

Skills	Very low	low	Medium	high	Very high	m	α	β	X	Difference
Creating motivation for virtual learning	0	0	0	4	16	0.95	0.23	0.03	0.90	0.20
Cognitive skill	0	0	0	1	19	0.99	0.25	0.01	0.93	0.17
Intercultural skills	0	0	0	0	20	1.00	0.25	0.00	0.94	0.02
Technological skills (hardware and software)	0	0	0	0	20	1.00	0.25	0.00	0.94	0.01
Skill of updating teaching resources and methods	0	0	0	1	19	0.99	0.25	0.01	0.93	0.07
Support and solve technical problems	0	0	0	0	20	1.00	0.25	0.00	0.94	0.05
Production and presentation of content	0	0	0	0	20	1.00	0.25	0.00	0.94	0.00
Teaching skills	0	2	2	1	15	0.86	0.24	0.05	0.82	0.09
Educational commitments	0	0	0	0	20	1.00	0.25	0.00	0.94	0.00
Educational design and planning	0	0	0	1	19	0.99	0.25	0.01	0.93	0.15
Resource identification skills	0	0	0	0	20	1.00	0.25	0.00	0.94	0.00
The skill of positive attitude towards synchronous and asynchronous teaching	0	0	0	1	19	0.99	0.25	0.01	0.93	0.15
Time management and training course management	0	0	0	0	20	1.00	0.25	0.00	0.94	0.00

Skills	Very low	low	Mediu m	high	Very high	m	α	β	X	Differe nce
Diagnostic skills (analytical, initiative, creativity)	0	0	0	2	18	0.98	0.24	0.02	0.92	0.13
Leadership skills, guidance and guidance of students	0	0	0	0	20	1.00	0.25	0.00	0.94	0.02
Crisis management skills	0	0	0	0	20	1.00	0.25	0.00	0.94	0.00
Final evaluation and course	0	0	0	0	20	1.00	0.25	0.00	0.94	0.01
The skill of spiritual and legal support of the input and output of virtual education	0	0	0	2	18	0.98	0.24	0.02	0.92	0.12
The skill of encouraging learners to group and self-evaluation	0	0	0	0	20	1.00	0.25	0.00	0.94	0.03

According to Table 5 and by comparing the difference with the base number of 0.1, it is clear that the expert group has agreed with the skills of intercultural skills, technological skills, the skill of updating resources and teaching methods, supporting and solving technical problems, content production and presentation, teaching skills, educational commitments, resource identification skills, time management and training course, leadership skills, mentoring and guidance, crisis management skills, final and course evaluation, persuasion skills and group evaluation and self-evaluation. The rest of the targets will enter the next round of the survey.

Fourth stage: In this stage, the fourth questionnaire was prepared and sent to the experts along with the previous point of view of each person and the amount of difference between them and the average point of view of other experts. With the difference that at this stage, only 6 remaining skills have been surveyed.

Based on the output of this stage, the amount of disagreement between the experts in the third and fourth stages was less than the threshold, so the polling was stopped at this stage. According to the results of this stage, the skills of motivation for learning, cognitive skills, educational design and planning, positive attitude to teaching skills, diagnostic skills, and spiritual and legal support skills were also confirmed. In this way, the experts agreed with all the identified skills for the virtual training of the academic staff .Figure 3 shows the conceptual model of the skills of faculty members for virtual education in the post-Corona period.

Discussion

The teaching quality of virtual education depends not only on the existence of advanced technology and multimedia computers and connection to the global network but also on the existence of professors with new qualifications and skills [44]. Improving the teaching-learning process through programs and professional development centers for teachers is one of the goals of higher education centers; In addition, in virtual education environments, due to the change in the role of the teacher, his previous skills can no longer be answered, and in addition to mastering the necessary skills in the traditional learning environment, teachers need skills and expertise in the virtual education environment, such as are technical, technology and expertise in the field of information technology.

Based on the constructivist approach, in the teaching-learning process, the role of the instructor has changed from a mere speaker in

a traditional classroom environment, whose task is only to convey the message to students through educational media, to a guide of learning activities [50]. In fact, the instructor guarantees the quality of e-learning by managing motivation, supporting students, and helping them understand the content; Therefore, due to the change in the teacher's role, his previous skills can no longer be answered and teachers need to be empowered in different fields in addition to acquiring the necessary skills in the traditional learning environment [51].

In the virtual education environment, the role of faculty members is changing from providing information to managing motivation, supporting students, and helping them to understand the content and the necessity of connecting to the network for learning so that they guarantee the quality of virtual education. Teachers need training and support to effectively teach using technology. They need more knowledge than the technical and operational aspects of using technology. The training and support of teachers should address the way of using technology to improve student learning and performance; Merely providing instructors with software and other technological tools does not guarantee that they can effectively use those tools to help students learn. Teachers need training that gives them the skills to produce and use pedagogically perfect educational materials suitable for online education [25].

The skills presented in this research, and the model presented, enable instructors to manage the synchronous and asynchronous virtual environment, manage communication channels and files that are shared in it. In other words, in the post-corona era, virtual education teachers should have social, moral, managerial, personal, teaching, supervisory skills, educational and technological commitment. Considering the need to strengthen the human infrastructure of virtual education, it is suggested that senior managers and those in charge provide suitable grounds for using the mentioned model and the results of this research to train and develop the skills of faculty members for virtual education and accordingly, improve the quality of virtual education. This model can be used in designing career development programs, determining training skills in future courses and modifying the learning management system, and compiling the best features needed for instructors in virtual education. Using this skills assessment, it is possible to choose suitable training areas and design appropriate activities to create optimal virtual education with an emphasis on the skills of teachers.

Although the spread of Corona disease was terrible in various fields, it seems that it was a blessing in the field of education to be able to force teachers into virtual education; Therefore, this form of education should be strengthened by providing comprehensive in-service courses, with the titles of effective virtual education instructor, or the competencies and skills required for virtual education. The different nature and role of faculty members for effective teaching in virtual environments has highlighted the necessity of equipping lecturers with teaching, social, and cognitive skills. Thinking about the results of the existing research for teaching in virtual education with fewer restrictions, you should choose professors for teaching who, in addition to having teaching skills and capabilities, are also proficient in electronic skills and capabilities, and are able to manage the virtual environment. Due to the existence of important challenges in the field of virtual education in the country, it is necessary to use capable and committed teachers in the virtual education of universities, because part of the above challenges are related to professors and

lecturers and if he has sufficient mastery in using the facilities and tools available in the virtual classroom and the educational system, the limitations of such training that are related to professors and lecturers will be removed to a large extent.

Finally, today, due to the development of Internet technologies, and the existence of huge challenges during face-to-face education such as the Coronavirus, universities cannot ignore virtual education. Virtual teaching has become an unavoidable part of higher education and the use of its capabilities is recommended for most educational systems and institutions. But in the meantime, and now and in the post-corona period ,it is necessary to have a correct understanding of the realities, conditions, and competencies in the implementation of virtual education. Knowing the weaknesses and strengths, threats and opportunities and examining the competencies and skills in the environment where virtual education is going to be established, as well as examining issues such as ethical, social, technical, technological, educational, learning competencies, individual, managerial, supervisory, and support, especially in university faculty members, as the front line of virtual education, will guarantee the success of such a system. What was done in this research was to understand part of the existing conditions and examine the importance of academic faculty members' skills for virtual education in the post-Corona period, and present a conceptual model based on, and it was concluded that these academic faculty members' skills are very important for implementing virtual education. Fig. 3 shows the conceptual model of the skills of faculty members for virtual education in the post-Corona period.

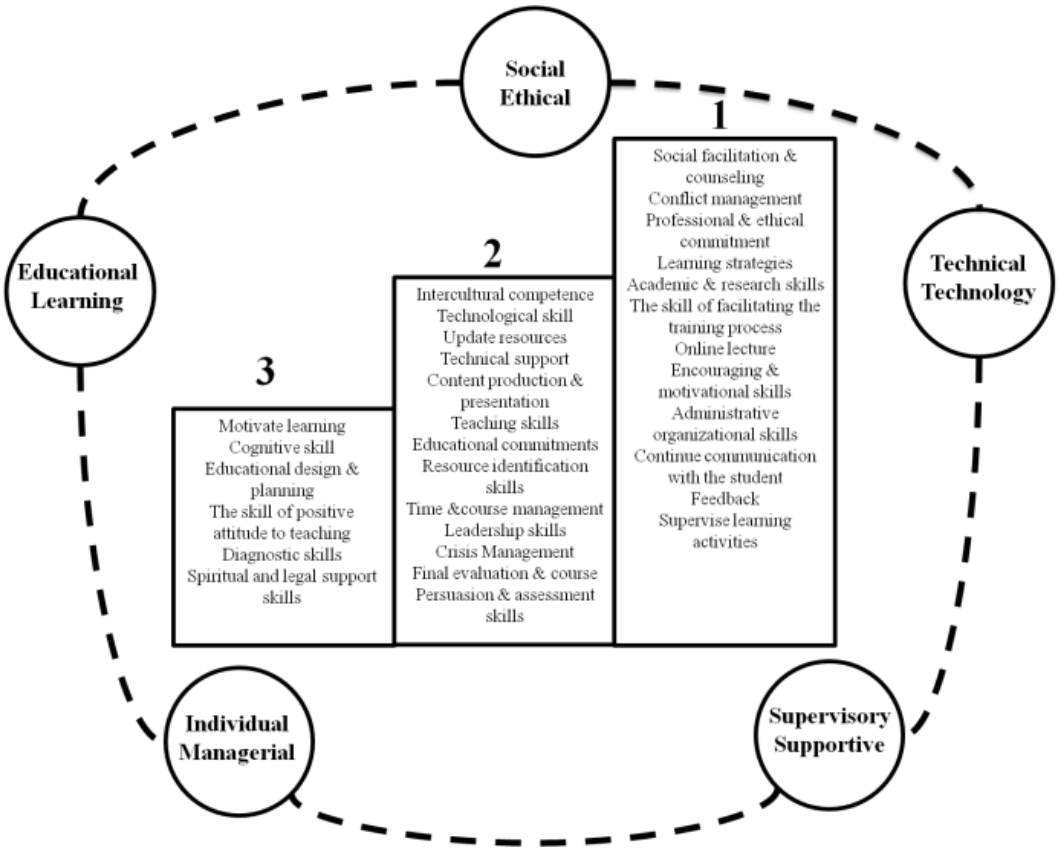

Fig. 3: Conceptual model of faculty members skills for virtual education in the post-corona era

Conclusions

Considering the lack of comprehensive and sufficient studies on the skills of academic staff members for virtual education, in the research conducted, it was tried to use semi-structured interviews, and with the approach of content analysis, all the skills of teachers were identified. Then, experts' opinions and the fuzzy Delphi method were used to clarify and refine all these skills. According to the study conducted based on the content analysis method, 31 skills were identified for this virtual training. The identified skills were categorized into 5 moral-social, technical-technological, educational-learning, personal-managerial, and supervisory-supportive categories. Then, with the help of the fuzzy Delphi method, these skills were examined by a panel of 20 experts, and after 4 stages, all the identified skills were approved by the expert group. Therefore, in this study, it was determined that 31 skills are considered for virtual education teachers. In the meantime, we can safely say that 12 skills of social facilitation and appropriate counseling, conflict management, professional and ethical commitment, strategies and applications of learning theories, scholarly and research skills and knowledge sharing, skills to facilitate the teaching process, lectures Online, encouraging and motivational skills, administrative and operational organizational skills, maintaining communication with students after completing the course, feedback, and monitoring learning activities, which were approved in the first round of the fuzzy Delphi method, are the most important skills of virtual education. and therefore, skills should be emphasized more in virtual courses.

Of course, due to the emerging nature of the subject and the lack of comprehensive research on the subject, especially in the post-corona period, the authors face a problem for comparison. But in general, this research can be compared with the research of other researchers such as Hajizadeh et al. [40], Narenji et al. [44], Golabi et al [52], Bashir et al. [53], Santos Karimi et al. [54], Goli et al. [55] and Mehralian and Maghami [56] who sought to identify the skills and competencies of teachers or provide a suitable model in the field of virtual education, are in line.

It is suggested that the skills identified for academic staff members for virtual education should be given more attention in universities and higher education institutions, and training courses should be held to strengthen these skills of virtual course instructors. It is also suggested that these skills should be carefully considered by the educational authorities, and with the cooperation and coordination of all the beneficiaries of virtual education, meet the needs and requirements of virtual education to strengthen these skills, and promote the development of virtual education, in the future, it will be considered as an effective supplement to traditional education and will cause the growth, improvement of capabilities and education of students as well as possible.

It is suggested to implement virtual education skill training and skill assessment courses for academic staff members. It is suggested that to promote the professors, these skills of virtual education known in this research should be somehow included in the promotion regulations.

Finally, it is suggested that in future research, the skills identified in this research should be measured in different universities and for different lecturers, and if there is a deficiency, the existing situation should be changed to a favorable situation in terms of the skills required by academic staff members. It is suggested to investigate these skills among

different universities with a comparative perspective and make an optimal comparison. It is suggested to identify the skills of virtual education instructors with other approaches of qualitative studies, such as meta-synthesis, and test and rank them using advanced quantitative methods. It is suggested that while refining and customizing this model and its variables, they should be used and compared in universities and higher education institutions. The main limitation of this research is the challenges and problems in collecting information and interviewing experts, as well as feedback to them, in the fuzzy Delphi approach, as well as the long and time-consuming process during the research.

Authors' contributions

The authors are equally involved in the preparation and presentation of the article.

Acknowledgments

We are grateful to the participants and research experts. Also, we are very grateful to the reviewers of the article and the staff of the Technology of Education Journal.

Conflict of interest

No conflicts of interest are declared by the authors.

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Citation (Vancouver): Fazel A, Harandi A. [Identifying and explaining the skills of academic staff members for virtual education in the post-corona with the approach of content analysis and fuzzy delphi: providing a conceptual model]. *Tech. Edu. J. 2024; 18(1): 249-270*

https://doi.org/10.22061/tej.2024.10249.2975