

Original Article (Mixed)

Presenting a fuzzy cognitive map of teachers' quantum skills using the FCM method

Zahra Mardani¹ , Nasrollah Ghashghaeizadeh² 

1- Master of Educational Management, Department of Educational Management, Faculty of Humanities, Islamic Azad University, Shahreza Branch, Shahreza, Iran

2- Assistant Professor, Department of Educational Management, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran

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Abstract

The present study was conducted with the aim of presenting a fuzzy cognitive map of teachers' quantum skills. The present study is applicable in terms of its purpose, and exploratory in terms of data collection. It also is a mixed (qualitative-quantitative) research based on the inductive deductive philosophy. The statistical population of the research is experts including secondary school teachers in Isfahan province, 26 of whom were selected using purposive sampling and based on the principle of theoretical adequacy. The data collection tool in the qualitative part is an interview, the validity and reliability of which was confirmed using content validity and theoretical validity and the intra-coder and inter-coder reliability methods. Also, the data collection tool in the quantitative part is a questionnaire, the validity and reliability of which was confirmed using content validity and test-retest reliability. Qualitative data were analyzed by content analysis method using MaxQDA software, and quantitative data were analyzed by fuzzy cognitive mapping method. The results of this study indicate that the skill and ability to act responsibly, the power to transform feelings, performance and cognition from internal to external states, maintaining a positive inner feeling regardless of external events, and exiting the limited and linear state towards students are the most important quantum skills of teachers.

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Corresponding Author: Zahra Mardani

Email: zahraa.mardani@yahoo.com



Extended abstract

Introduction

Although the status and dignity of the teaching as a profession is obvious to everyone and the role of a teacher has always been known, the world is changing rapidly and teachers must also face this reality like other professional groups (Habibzadeh et al., 2024). Therefore, teachers, as one of the complex components of the education system ecosystem, must be able to meet the expectations and demands of different officials and stakeholders and have a deep understanding of social developments and future changes. Thus, teachers should continuously seek to update their knowledge and skills and improve their professional behaviors (Claro et al., 2024). Strengthening the teachers' quantum skills is among the factors helping them achieve this goal. Creating novel knowledge has long been one of the basic functions of educational centers, and the greatest effort of the scientific and educational community has been to develop science and strengthen intellectual capital by utilizing existing information, intellectual, and human resources (Zohar, 2021). Thus, educational centers, especially the education system, should identify, acquire, and utilize these resources by using the right management methods. In this regard, one of the new concepts of the third millennium is quantum skills (Yin, 2019). Quantum capabilities are capabilities that enable teachers to think dynamically and intuitively (Coccia et al., 2022).

Quantum transforms and reverses teachers' perspective on phenomena from top to bottom and from outside to inside, and this is possible by equipping teachers and school administrators with quantum skills (Rachmawati, 2012). It should also be acknowledged that finding order in chaos, movement in the midst of organizational noise and job stress, self-organization and focusing on tasks in a thoughtful manner, focusing on holistic approaches and avoiding detail are some of the indicators related to quantum skills that teachers can use to improve the level of strategic flexibility in schools (Greinert et al., 2024). The success or failure of educational programs and activities in any system and any nation depends on its teachers, and transformation cannot be achieved without a change in the strength of the educational system (Soltani Ahmadi et al., 2023). Having quantum capabilities allows teachers to quickly identify the educational process in schools and respond to new demands in the field of teaching (Zohar, 2021). Thus, it can be acknowledged that teachers with a high level of quantum skills have high flexibility in the face of changes necessary for schools, and this makes the education process easier. On the other hand, a review of the domestic and foreign foundations and background indicates that more extensive and comprehensive research has been conducted on quantum management; and less on quantum skills. It is obvious that research on this concept is still not comprehensive and sufficient, and the increasing surveys and research on this concept itself confirms this claim. According to the study, there is no research in the field of quantum skills of teachers that examines the types of quantum skills. Therefore, considering what has been said, the present study seeks to answer the question: What are the types of quantum skills of teachers?

Theoretical Framework

Quantum Skills

Quantum skills are skills that enable teachers to think dynamically and intuitively (Coccia et al., 2022). The characteristics, capabilities, and tasks of teachers must be different from the traditional type in order to be able to develop and expand the space of their organizations and guide and lead it towards success and excellence (Salimi & Javidi Porkhabaz, 2022).

Types of Quantum Skills

The first quantum skill is quantum seeing. The power and ability to see purposefully is based on the logic that reality is inherently mindset that emerges according to the expectations and

beliefs of the observer. The second skill is quantum reasoning, which refers to the ability to think in a contradictory way, and stems from research in quantum physics, stating that the world often works in an irrational and paradoxical way (Surov & Melnikova, 2024). Another quantum skill is quantum sense, which is the ability to sense the living and vital, based on the logic that humans, like other beings in the universe, are faced with the same quanta and are therefore subject to the universal laws of energy excitation. The ability to sense quantum enables managers to have a good inner sense. Quantum understanding is another quantum skill that is derived from the ability to find creative and intuitive ways, from the field of quantum theory (Islami & Wiltsche, 2025). Quantum action, the ability to act in a responsible manner, based on the quantum content of the connection and the by-product of non-local (distributed) causes, is also a quantum skill (Hasanovic et al., 2022). Finally, the ability to establish a permanent relationship, which recognizes the relational nature of the world, is also a quantum skill that enables managers to own their own feelings and attribute them to others (Greinert et al., 2024).

Consequences of developing quantum skills in teachers:

The emergence of these skills in teachers can cause a change in the model of thought and, as a result, a change in the leadership model and structure of schools and the organization of the educational system, and help these organizations to develop and expand their international competition and education with appropriate efforts and improve their social cooperation (Noroozi Ziarat & Esmailshad, 2022). Similarly, the existence of quantum skills in teachers, by affecting the ethics and behavior of sharing knowledge, causes the creative creation of an atmosphere of knowledge and thought transfer among managers and teachers, and in turn, promotes trust and belief in the organization and management among teachers (Geok Soh Wan & Mohamad Bin, 2021). Also, the use of quantum management skills in the educational system leads to its transformation into an organization that is constantly changing and evolving, agile and free from borders, in which creativity and information flow freely. In these organizations, great emphasis is placed on connections so that through decentralization and the use of self-governing structures and the use of vertical, horizontal and diagonal organizational connections, the communication process in the organization will be facilitated and knowledge transfer and expertise promotion in the organization will be helped (Salimi et al., 2016).

Research Methodology

The present study is applicable in terms of its purpose, and exploratory research in terms of data collection. It is also a mixed (qualitative-quantitative) research based on the inductive deductive philosophy. The statistical population of the research consists of experts of secondary school teachers in Isfahan province, 26 of whom selected by purposive sampling and based on the principle of theoretical adequacy. The data collection tool in the qualitative part is an interview, the validity and reliability of which was confirmed by content validity and theoretical validity and the intra-coder and inter-coder reliability methods. The data collection tool in the quantitative part is a questionnaire, the validity and reliability of which was confirmed using content validity and test-retest reliability. Qualitative data were analyzed using content analysis method and MaxQDA software, and quantitative data were analyzed using fuzzy cognitive map method.

Research findings

In this study, the results can be presented in the quantitative and qualitative parts. The results of the qualitative part indicate the types of quantum skills of teachers. Accordingly, quantum skills of teachers include 7 types of skills: quantum thinking, quantum cognition, quantum



action, quantum existence, quantum feeling, quantum seeing, and quantum trust. Also, the results of the quantitative part of the research include measuring the importance and prioritization of the types of quantum skills of teachers. Accordingly, the most important quantum skills of teachers were identified as the skill and ability to act responsibly, the power to transform feeling, performance, and cognition from an internal to an external state, maintaining a positive internal feeling regardless of external events, breaking out of a limited and linear state towards students, and using inner wisdom to discover innovative win-win solutions.

Conclusion

The present study was conducted with the aim of identifying the types of quantum skills of teachers. Regarding the consistency of the present study with the research conducted in this field, it should be said that the results of the present study in intuitive insight dimension are consistent with the findings of the Laszlo (2020). In the communication dimension, the findings of the present study are consistent with the results of Razi & Nadi (2022). At the organizational level, the findings of the study are also consistent with the results of Hadizadeh et al. (2021).

Based on the results of this study, the following suggestions are made:

- Providing feedback to teachers
- Assigning the responsibility of continuous analysis of work to all students in order to implement and develop teaching methods
- Holding psychological training courses for teachers in the field of recognizing and applying emotion management and maintaining real and deep positive emotions
- Formulating ethical principles and requirements in a precise and transparent manner by school administrators
- Participating in scientific seminars