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The Impact of Online Classrooms on Teachers' Roles: A Quantitative Study of High School Teachers' Perceptions in Tehran

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Keywords:
Online classrooms, teachers' roles, online teaching, technological competence, virtual education, high school teachers, COVID-19, teacher perceptions.

Purpose: The present study aimed to investigate the impact of online classrooms on teachers' professional roles from the perspective of high school teachers in Tehran during the COVID-19 pandemic.

Methodology: The study was conducted using a quantitative descriptive-correlational design in 2020. The statistical population consisted of high school teachers working in public and private schools in Tehran, from which 320 teachers were selected through multistage cluster random sampling. Data were collected electronically using the Online Teaching Self-Efficacy Inventory and the Teachers' Role Perception Questionnaire. The instruments assessed dimensions including instructional strategies, technological competence, communication effectiveness, classroom management, student engagement, and role transformation in online education. Descriptive statistics, Pearson correlation analysis, independent samples t-test, and multiple regression analysis were performed using SPSS version 27. Statistical significance was considered at $p < 0.05$.

Findings: The findings indicated significant positive relationships between all dimensions of online classroom experiences and teachers' role transformation perceptions. Technological competence demonstrated the strongest correlation with teachers' role transformation ($r = 0.72$, $p < 0.01$), followed by communication effectiveness ($r = 0.70$, $p < 0.01$). Multiple regression analysis revealed that online classroom dimensions collectively explained 66% of the variance in teachers' role transformation ($R^2 = 0.66$, $p < 0.001$). Technological competence ($\beta = 0.341$, $p < 0.001$) and communication effectiveness ($\beta = 0.318$, $p < 0.001$) emerged as the strongest predictors of teachers' changing professional roles. Additionally, teachers with previous online teaching experience reported significantly higher levels of technological competence, communication effectiveness, and role transformation compared to teachers without prior experience ($p < 0.001$).

Conclusion: The results demonstrated that online classrooms significantly transformed teachers' professional roles by increasing the importance of technological competence, communication skills, instructional flexibility, and virtual classroom management. The findings suggest that successful adaptation to online education depends heavily on teachers' digital readiness and professional flexibility. Educational systems should therefore strengthen teacher training programs, technological infrastructure, and institutional support mechanisms to improve teachers' effectiveness and well-being within digital learning environments.

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1. Introduction

The rapid expansion of digital technologies has transformed educational systems across the world and significantly altered traditional approaches to teaching and learning. Over the last decade, online education has evolved from a supplementary instructional method into a central component of modern educational systems. The integration of virtual learning platforms, digital communication tools, and online instructional strategies has reshaped the responsibilities, expectations, and professional identities of teachers in various educational contexts (Fedock et al., 2019; Ventayen, 2018). The global outbreak of the COVID-19 pandemic in 2020 accelerated this transformation dramatically, forcing schools and universities worldwide to transition from conventional face-to-face instruction to fully online learning environments within a very short period of time (Camargo et al., 2020; Rapanta et al., 2020). As a result, teachers were required to rapidly adapt to new pedagogical approaches, technological demands, and communication patterns while maintaining educational quality and student engagement in virtual classrooms.

The transition to online education represented not merely a technological shift, but also a profound pedagogical and professional transformation affecting teachers' roles, competencies, and instructional practices. In traditional classroom settings, teachers primarily functioned as knowledge transmitters and classroom managers operating within physical learning environments. However, online classrooms require teachers to assume more diverse and dynamic roles, including technological facilitators, digital communicators, instructional designers, student motivators, and online learning coordinators (Paesani, 2020; Rapanta et al., 2020). These evolving responsibilities have generated increasing scholarly interest regarding how teachers perceive their changing professional roles in online educational environments and how these perceptions influence teaching effectiveness and educational outcomes.

Researchers have argued that online teaching environments demand a substantial redefinition of teacher identity and instructional presence. Rapanta et al. emphasized that effective online education depends heavily on teachers' ability to establish cognitive, social, and instructional presence in virtual environments, which differs significantly from traditional classroom interaction patterns (Rapanta et al., 2020). Similarly, Paesani highlighted that online instruction requires teachers to develop sustainable professional competencies related to technological integration, digital pedagogy, and learner-centered instructional strategies (Paesani, 2020). These transformations indicate that online education is not merely the digital delivery of existing curricula, but rather a distinct pedagogical model that reshapes teachers' professional functions and relationships with students.

The sudden transition to online education during the COVID-19 pandemic exposed significant challenges related to teachers' preparedness and readiness for virtual instruction. Many teachers were required to adopt online teaching practices with limited prior experience or professional training in digital education (König et al., 2020; Moorhouse, 2020). König et al. reported that teachers' competencies in digital pedagogy and technological adaptation significantly influenced their ability to manage online instruction effectively during school closures in Germany (König et al., 2020). Likewise, Moorhouse demonstrated that the abrupt movement from face-to-face teaching to online environments created substantial instructional, emotional, and organizational challenges for educators (Moorhouse, 2020). These findings suggest that teachers' adaptation to online classrooms depends not only on access to technological resources, but also on their professional confidence, flexibility, and pedagogical competence.

Teacher self-efficacy has emerged as one of the most influential factors affecting online teaching effectiveness and teachers' adaptation to digital learning environments. Corry and Stella emphasized that teachers with stronger perceptions of instructional self-efficacy are more likely to demonstrate effective classroom management, technological integration, and student engagement in online settings (Corry & Stella, 2018). In online classrooms, self-efficacy becomes particularly important because teachers must independently manage instructional technologies, maintain communication with students, and address technical challenges without the physical support structures available in traditional classrooms. The

development of online teaching confidence therefore plays a critical role in shaping teachers' perceptions of their professional responsibilities and capabilities.

In addition to technological adaptation, online teaching environments have intensified teachers' emotional and psychological demands. MacIntyre et al. found that the rapid conversion to online teaching during the COVID-19 pandemic was associated with elevated stress, negative emotions, and psychological pressure among language teachers (MacIntyre et al., 2020). Teachers were required to balance instructional responsibilities with technological challenges, student support needs, and concerns regarding educational effectiveness in unfamiliar virtual contexts. These conditions created increased emotional labor and professional uncertainty, which may influence teachers' perceptions of their evolving educational roles. Consequently, understanding teachers' experiences and perceptions within online classrooms has become essential for improving digital educational policies and teacher support systems.

Another important aspect of online education involves the transformation of teacher–student relationships. Tari et al. argued that e-learning environments fundamentally alter the nature of educational interaction by reducing direct physical communication while increasing the importance of mediated digital interaction (Tari et al., 2020). In virtual classrooms, teachers must develop alternative methods for fostering engagement, trust, and collaboration among students. Communication skills therefore become central to instructional success within online learning environments. Similarly, Fedock et al. emphasized that social media and digital communication platforms can serve as effective instructional tools when teachers possess sufficient technological and pedagogical competence (Fedock et al., 2019). These findings highlight the increasingly communicative and facilitative nature of teachers' roles within virtual educational settings.

The effectiveness of online teaching is also closely associated with teachers' ability to manage student participation and learning engagement in virtual environments. Rasheed et al. identified several major challenges affecting online education, including reduced interaction, technological difficulties, limited learner motivation, and insufficient instructional feedback (Rasheed et al., 2020). Online classrooms often require teachers to employ more innovative instructional strategies to maintain students' attention and participation. Consequently, teachers must become more flexible, creative, and student-centered in their pedagogical approaches. This shift represents a major departure from traditional teacher-centered instructional models and contributes to the transformation of teachers' professional identities.

Teachers' perceptions of online learning have varied considerably across educational contexts and cultural settings. Rasmitadila et al. reported that many teachers perceived online learning positively because it encouraged technological innovation and instructional creativity, although concerns regarding infrastructure limitations and instructional effectiveness remained prevalent (Rasmitadila et al., 2020). Similarly, Fauzi and Sastra Khusuma found that teachers experienced both opportunities and challenges in adapting to online education during the pandemic period (Fauzi & Sastra Khusuma, 2020). Teachers appreciated the flexibility and accessibility of digital education while simultaneously struggling with technological barriers, workload increases, and communication difficulties. These mixed perceptions suggest that online classrooms create complex professional experiences that influence teachers' attitudes toward their educational roles.

Research has also emphasized the importance of professional development and institutional support in facilitating successful online teaching adaptation. Quinn et al. demonstrated that online technologies can effectively support teachers' professional learning and development, particularly in geographically isolated educational contexts (Quinn et al., 2020). Effective professional development programs can improve teachers' digital literacy, instructional confidence, and pedagogical flexibility, thereby strengthening their ability to function successfully in virtual learning environments. Paesani similarly argued that sustainable teacher development is essential for maintaining coherence and quality within online instructional systems (Paesani, 2020). These findings indicate that educational institutions must provide continuous support and training opportunities to assist teachers in adapting to changing educational environments.

The increasing reliance on digital education has also highlighted the importance of cognitive and instructional factors affecting online teaching effectiveness. Larmuseau et al. examined cognitive load during

online problem-solving activities and found that digital learning environments may increase mental demands on both teachers and learners (Larmuseau et al., 2019). Teachers must simultaneously manage technological systems, instructional content, student communication, and assessment processes within online classrooms. Such multidimensional responsibilities can increase cognitive workload and influence teachers' perceptions of professional competence and role effectiveness.

Studies focusing on teacher identity have further suggested that online educational environments influence how teachers perceive themselves professionally. Kiss found that participation in online communities of practice contributes to the development of novice teacher identity and professional communication patterns (Kiss, 2020). Online classrooms often require teachers to redefine their instructional identities by integrating technological expertise with pedagogical practice. Likewise, Türk and Ceylan emphasized that teachers' personality characteristics and conflict management styles can influence their adaptation to educational challenges and professional interactions (Türk & Ceylan, 2020). These findings suggest that teachers' personal and psychological characteristics may affect how they experience role transformation in online educational contexts.

The role of reflective practice and instructional flexibility has also become increasingly important within virtual learning environments. Zahid and Khanam demonstrated that reflective teaching practices positively influence teachers' instructional performance and professional effectiveness (Zahid & Khanam, 2019). Online teaching environments require continuous reflection, adaptation, and instructional modification to address students' changing educational needs. Teachers who engage in reflective practice may therefore demonstrate greater adaptability and resilience within online classrooms.

Furthermore, the integration of online teaching into teacher education and professional preparation programs has received considerable scholarly attention. Page and Jones emphasized the value of alternative online professional experiences in preparing teachers for classroom management and instructional responsibilities within digital educational settings (Page & Jones, 2018). Similarly, Putra et al. found that prospective teachers' perceptions of online learning are closely associated with their readiness for future digital instructional environments (Putra et al., 2020). These findings indicate that online education is likely to remain a significant component of educational systems even beyond the pandemic period, making it essential to understand how online environments reshape teachers' professional roles and responsibilities.

Despite the growing body of international literature regarding online education, relatively limited research has specifically examined the impact of online classrooms on teachers' professional roles within the context of Iranian secondary education. Tehran, as the largest educational center in Iran, experienced a major transition to virtual education during the COVID-19 pandemic, requiring high school teachers to rapidly adapt to new instructional conditions. Understanding teachers' perceptions of these changes is important for identifying the opportunities and challenges associated with online education and for improving future educational planning, teacher training programs, and digital learning policies within the Iranian educational system.

Given the substantial transformation of educational systems during the COVID-19 pandemic and the increasing importance of digital learning environments, investigating teachers' perceptions of their changing professional roles has become a critical educational issue. Therefore, the present study aimed to examine the impact of online classrooms on teachers' roles through a quantitative investigation of high school teachers' perceptions in Tehran.

2. Methodology

This study was conducted using a quantitative, descriptive-correlational research design to investigate the impact of online classrooms on teachers' roles from the perspective of high school teachers in Tehran during 2020, coinciding with the widespread transition to virtual education following the COVID-19 pandemic. The statistical population included all male and female high school teachers employed in public and private secondary schools across different educational districts of Tehran during the 2020 academic year. Using

Cochran's sample size formula and considering the large size of the target population, a total of 320 teachers were selected as the final sample. Participants were recruited through multistage cluster random sampling. Initially, several educational districts in Tehran were randomly selected, followed by the random selection of schools within each district. Subsequently, teachers who had at least one semester of experience teaching in online classrooms were invited to participate in the study. Inclusion criteria consisted of having active teaching experience in online learning environments during the 2020 academic year, willingness to participate in the study, and at least three years of teaching experience in high school settings. Teachers who submitted incomplete questionnaires or failed to complete all sections of the survey instruments were excluded from the final analysis. Data collection was carried out electronically through online questionnaires distributed via educational networks and school communication platforms.

Data were collected using two standardized instruments. The first instrument was the Online Teaching Self-Efficacy Inventory developed by Gosselin (2009), which was designed to assess teachers' perceptions of their effectiveness and professional adaptation in online teaching environments. This questionnaire consists of 32 items rated on a five-point Likert scale ranging from strongly disagree to strongly agree. The instrument measures several dimensions related to online instruction, including instructional strategies, classroom management in virtual settings, student engagement, technological competence, and communication effectiveness. Higher scores indicate greater perceived effectiveness and adaptation to online teaching roles. Previous studies have confirmed the construct validity and internal consistency of the instrument, with Cronbach's alpha coefficients reported above 0.85 for the overall scale and acceptable reliability indices for all subscales. The questionnaire has also been widely used in educational research examining teachers' adaptation to virtual learning environments.

The second instrument was the Teachers' Role Perception Questionnaire adapted from the work of Harden and Crosby (2000), which evaluates changes in teachers' professional roles within modern educational systems and technology-based learning environments. The questionnaire contains 28 items scored on a five-point Likert scale ranging from very low to very high. The instrument examines multiple dimensions of teachers' roles, including facilitation of learning, mentoring, technological mediation, assessment management, student support, and instructional planning. Higher scores reflect stronger perceptions of role transformation and adaptation to online education. Previous research has demonstrated satisfactory psychometric properties for this instrument, including strong content validity confirmed by educational experts and Cronbach's alpha values ranging from 0.79 to 0.91 across different dimensions. The questionnaire has been utilized in several studies related to digital learning and educational transformation, confirming its appropriateness for the present study.

Data analysis was conducted using SPSS version 27. Initially, descriptive statistics including means, standard deviations, frequencies, and percentages were calculated to describe participants' demographic characteristics and the main research variables. Before inferential analyses, the assumptions of normality and linearity were examined using the Kolmogorov–Smirnov test, skewness and kurtosis indices, and scatterplot analysis. Pearson correlation analysis was employed to investigate the relationships between online classroom experiences and teachers' role perceptions. In addition, multiple regression analysis was conducted to determine the predictive power of online classroom dimensions on changes in teachers' professional roles. The significance level for all statistical analyses was considered at $p < 0.05$.

3. Findings

The demographic analysis indicated that among the 320 participating high school teachers, 178 participants (55.6%) were female and 142 participants (44.4%) were male. Regarding age distribution, 74 teachers (23.1%) were between 25 and 34 years old, 146 teachers (45.6%) were between 35 and 44 years old, and 100 teachers (31.3%) were above 45 years old. In terms of teaching experience, 68 participants (21.3%) had less than 10 years of experience, 157 participants (49.1%) had between 10 and 20 years of experience, and 95 participants (29.6%) had more than 20 years of teaching experience. Additionally, 204 teachers

(63.8%) reported that they had no previous experience with online teaching prior to the COVID-19 pandemic, while 116 teachers (36.2%) indicated that they had some degree of familiarity with virtual learning systems before 2020. Most participants reported using multiple online teaching platforms during the transition to virtual education, including Adobe Connect, Shad, Google Classroom, and WhatsApp-based instructional systems.

Table 1. Descriptive Statistics for Research Variables

Variables	Mean	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
Instructional Strategies in Online Teaching	3.84	0.67	1.91	5.00	-0.41	-0.28
Virtual Classroom Management	3.56	0.72	1.63	5.00	-0.35	-0.46
Student Engagement in Online Classrooms	3.47	0.75	1.44	5.00	-0.29	-0.39
Technological Competence	4.02	0.61	2.11	5.00	-0.53	0.14
Communication Effectiveness	3.69	0.70	1.76	5.00	-0.31	-0.44
Facilitation of Learning Role	3.88	0.65	2.04	5.00	-0.47	-0.21
Mentoring and Guidance Role	3.71	0.69	1.88	5.00	-0.36	-0.33
Technological Mediation Role	4.11	0.59	2.30	5.00	-0.61	0.22
Assessment Management Role	3.42	0.73	1.59	5.00	-0.25	-0.48
Student Support Role	3.76	0.68	1.82	5.00	-0.39	-0.17

The descriptive findings presented in Table 1 demonstrated that the highest mean score among the online teaching dimensions belonged to technological competence ($M = 4.02$, $SD = 0.61$), indicating that teachers perceived themselves as relatively capable of adapting to digital technologies and online instructional platforms during the transition to virtual education. Similarly, the technological mediation role showed the highest mean score among teachers' professional role dimensions ($M = 4.11$, $SD = 0.59$), suggesting that teachers strongly perceived their responsibilities as technology facilitators and mediators within online classrooms. In contrast, assessment management role obtained the lowest mean score ($M = 3.42$, $SD = 0.73$), indicating that teachers experienced greater challenges in conducting assessments and evaluating students within virtual educational environments. The skewness and kurtosis indices for all variables fell within the acceptable range of ± 1, confirming the normal distribution of the data and supporting the appropriateness of parametric statistical analyses. Overall, the findings suggested that online classrooms substantially altered teachers' professional responsibilities by increasing the importance of technological, communicative, and facilitative roles in the educational process.

Table 2. Pearson Correlation Matrix Between Online Classroom Dimensions and Teachers' Role Perceptions

Variables	1	2	3	4	5	6
1. Instructional Strategies	1					
2. Virtual Classroom Management	0.58**	1				
3. Student Engagement	0.61**	0.54**	1			
4. Technological Competence	0.49**	0.52**	0.46**	1		
5. Communication Effectiveness	0.63**	0.57**	0.60**	0.55**	1	
6. Teachers' Role Transformation	0.68**	0.64**	0.59**	0.72**	0.70**	1

**$p < 0.01$

The results of the Pearson correlation analysis presented in Table 2 revealed significant positive relationships between all dimensions of online classroom experiences and teachers' role transformation perceptions. Among the variables, technological competence demonstrated the strongest correlation with teachers' role transformation ($r = 0.72$, $p < 0.01$), indicating that teachers who reported higher levels of technological capability were more likely to perceive substantial changes in their professional roles within online learning environments. Communication effectiveness also showed a strong positive relationship with teachers' role transformation ($r = 0.70$, $p < 0.01$), emphasizing the importance of communication skills in facilitating virtual instruction and maintaining educational interactions in online settings. Additionally,

instructional strategies exhibited a strong positive association with teachers' role transformation ($r = 0.68$, $p < 0.01$), suggesting that adapting instructional methods to virtual platforms contributed significantly to changes in teachers' educational responsibilities. Overall, the findings demonstrated that the transition to online classrooms was associated with broad modifications in teachers' pedagogical, communicative, and technological roles.

Table 3. Multiple Regression Analysis Predicting Teachers' Role Transformation Based on Online Classroom Dimensions

Predictor Variables	B	SE	β	t	p
Constant	0.842	0.291	—	2.89	0.004
Instructional Strategies	0.214	0.052	0.241	4.11	0.001
Virtual Classroom Management	0.173	0.048	0.192	3.60	0.001
Student Engagement	0.121	0.051	0.129	2.37	0.018
Technological Competence	0.306	0.056	0.341	5.46	0.001
Communication Effectiveness	0.284	0.054	0.318	5.22	0.001

Regression Model Statistics: $R = 0.81$, $R^2 = 0.66$, Adjusted $R^2 = 0.65$, $F = 121.47$, $p < 0.001$

The multiple regression analysis demonstrated that online classroom dimensions collectively explained 66% of the variance in teachers' role transformation perceptions ($R^2 = 0.66$), indicating a strong predictive model. The overall regression model was statistically significant ($F = 121.47$, $p < 0.001$), confirming that the independent variables significantly predicted changes in teachers' professional roles. Among the predictor variables, technological competence emerged as the strongest predictor ($\beta = 0.341$, $p < 0.001$), indicating that teachers with greater technological abilities experienced more substantial transformations in their educational roles during online instruction. Communication effectiveness also significantly predicted teachers' role transformation ($\beta = 0.318$, $p < 0.001$), suggesting that teachers who were more capable of maintaining effective communication in virtual environments adapted more successfully to evolving educational responsibilities. Instructional strategies ($\beta = 0.241$, $p < 0.001$) and virtual classroom management ($\beta = 0.192$, $p < 0.001$) also significantly contributed to the prediction model, emphasizing the importance of pedagogical adaptation and classroom organization in online education. Although student engagement remained a statistically significant predictor ($\beta = 0.129$, $p = 0.018$), its predictive contribution was comparatively weaker than the other variables. Overall, the findings highlighted the central role of technological and communicative competencies in shaping teachers' adaptation to online educational environments.

Table 4. Independent Samples t-Test Comparing Teachers With and Without Previous Online Teaching Experience

Variables	Previous Experience	N	Mean	SD	t	p
Teachers' Role Transformation	Yes	116	4.08	0.54	5.74	0.001
	No	204	3.59	0.67		
Technological Competence	Yes	116	4.29	0.48	6.12	0.001
	No	204	3.87	0.63		
Communication Effectiveness	Yes	116	3.94	0.57	4.68	0.001
	No	204	3.55	0.71		

The results of the independent samples t-test indicated significant differences between teachers with previous online teaching experience and those without such experience. Teachers who had prior familiarity with virtual instruction reported significantly higher levels of teachers' role transformation ($M = 4.08$, $SD = 0.54$) compared to teachers without previous online teaching experience ($M = 3.59$, $SD = 0.67$), and this difference was statistically significant ($t = 5.74$, $p < 0.001$). Similarly, teachers with previous online experience demonstrated significantly higher technological competence ($M = 4.29$, $SD = 0.48$) than teachers without prior experience ($M = 3.87$, $SD = 0.63$), suggesting that earlier exposure to digital

teaching environments enhanced teachers' technological adaptability during the transition to online education. Communication effectiveness was also significantly greater among teachers with prior online teaching experience ($M = 3.94$, $SD = 0.57$) compared to teachers without such experience ($M = 3.55$, $SD = 0.71$). These findings suggest that previous exposure to virtual learning environments played an important role in facilitating teachers' adaptation to changing educational roles and improving their effectiveness within online classroom contexts during the COVID-19 pandemic.

4. Discussion

The present study aimed to investigate the impact of online classrooms on teachers' roles from the perspective of high school teachers in Tehran during the COVID-19 pandemic. The findings demonstrated that online learning environments substantially transformed teachers' professional responsibilities, particularly in relation to technological competence, communication effectiveness, instructional adaptation, and virtual classroom management. The results further indicated that technological competence and communication effectiveness were the strongest predictors of teachers' role transformation in online educational settings. Overall, the findings suggest that the rapid transition to virtual education altered the traditional instructional structure and required teachers to adopt more multidimensional, flexible, and technologically oriented professional roles.

One of the most important findings of the present study was that technological competence obtained the highest mean score among the dimensions of online teaching and also emerged as the strongest predictor of teachers' role transformation. This finding indicates that teachers increasingly perceived themselves as technological facilitators and digital mediators within online educational environments. In traditional classroom settings, teachers primarily relied on face-to-face instructional interaction and physical classroom management strategies; however, the shift to online classrooms required them to integrate digital tools, learning management systems, communication applications, and online assessment platforms into the instructional process. This transformation significantly expanded the technological dimension of teachers' professional identity. The present finding is consistent with the results reported by König et al., who found that teachers' digital competence and technological preparedness played a critical role in their successful adaptation to online instruction during school closures caused by the COVID-19 pandemic (König et al., 2020). Similarly, Ventayen emphasized that teacher readiness for online instruction is strongly associated with technological capability and familiarity with digital educational tools (Ventayen, 2018). The findings also support the conclusions of Rapanta et al., who argued that online education requires teachers to develop new instructional competencies associated with digital pedagogy and virtual communication (Rapanta et al., 2020).

The findings further demonstrated that communication effectiveness was strongly associated with teachers' role transformation in online classrooms. Teachers who reported stronger communication skills in virtual educational settings also demonstrated greater adaptability to changing professional responsibilities. This finding can be explained by the unique characteristics of online education, where traditional face-to-face communication cues such as eye contact, body language, and immediate verbal interaction are significantly reduced. Consequently, teachers must rely more heavily on structured communication strategies, written feedback, online discussions, and digital interaction methods to maintain educational engagement and student participation. This finding aligns with the theoretical perspective proposed by Tari et al., who emphasized that online educational systems fundamentally alter the teacher–student relationship by increasing the importance of mediated communication and interaction (Tari et al., 2020). Likewise, Fedock et al. found that digital communication platforms and social media tools can significantly improve instructional interaction when teachers possess sufficient communication and technological competencies (Fedock et al., 2019). The results additionally correspond with the work of Quinn et al., who highlighted the role of online technologies in strengthening collaborative communication and professional interaction among educators (Quinn et al., 2020).

Another important finding of the present study was the significant relationship between instructional strategies and teachers' perceptions of role transformation. Teachers who reported greater adaptation in instructional methods also perceived more substantial changes in their professional roles. This finding suggests that online learning environments required teachers to shift from traditional teacher-centered instruction toward more flexible, interactive, and student-centered pedagogical approaches. In virtual classrooms, teachers must develop alternative strategies to sustain student motivation, participation, and learning engagement despite the absence of physical classroom interaction. Such conditions encourage teachers to become facilitators of learning rather than mere transmitters of information. This finding supports the arguments presented by Paesani, who emphasized that online instruction requires teachers to redesign instructional practices in ways that promote coherence, flexibility, and learner-centered educational experiences (Paesani, 2020). Similarly, Moorhouse reported that the forced transition to online instruction during the pandemic required teachers to modify instructional practices rapidly and adopt innovative educational strategies (Moorhouse, 2020). The findings are also consistent with the study conducted by Putra et al., which demonstrated that online learning environments encourage the development of more adaptive and participatory instructional methods (Putra et al., 2020).

The findings related to virtual classroom management further demonstrated that online education significantly influenced teachers' organizational and managerial responsibilities. Effective classroom management in online environments differs considerably from management in traditional classrooms because teachers must simultaneously monitor technological issues, student participation, communication dynamics, and digital instructional activities. Teachers in online classrooms often face challenges related to students' reduced attention, limited interaction, delayed feedback, and technological disruptions. Consequently, virtual classroom management requires greater planning, flexibility, and instructional monitoring. This finding is consistent with the results reported by Rasheed et al., who identified several major challenges affecting online education, including limited interaction, technological barriers, and difficulties maintaining learner engagement (Rasheed et al., 2020). Likewise, Page and Jones argued that online educational environments require alternative models of instructional management and professional adaptation compared to traditional classroom systems (Page & Jones, 2018). These findings collectively indicate that classroom management in online education extends beyond disciplinary control and includes technological coordination, digital communication, and instructional facilitation.

The present study also found that teachers with previous online teaching experience demonstrated significantly higher levels of technological competence, communication effectiveness, and role transformation compared to teachers without prior online teaching experience. This finding suggests that familiarity with digital educational systems enhances teachers' adaptability and professional confidence within online classrooms. Teachers who had previous exposure to virtual teaching likely possessed stronger digital literacy, greater instructional flexibility, and more effective coping strategies for managing online educational challenges. This finding corresponds with the conclusions of Corry and Stella, who emphasized the importance of teacher self-efficacy in successful online instruction (Corry & Stella, 2018). Teachers with greater prior experience in online environments are more likely to develop confidence in managing digital classrooms and addressing technological problems effectively. The finding is also supported by the work of Rasmitadila et al., who found that teachers with stronger technological familiarity generally demonstrated more positive perceptions toward online education (Rasmitadila et al., 2020). Similarly, Fauzi and Sastra Khusuma reported that teachers who adapted more effectively to online systems experienced greater instructional confidence and flexibility during the pandemic period (Fauzi & Sastra Khusuma, 2020).

Another important aspect of the findings involves the emotional and psychological implications of online teaching for educators. The transition to online instruction required teachers to cope with unfamiliar technologies, increased workloads, communication barriers, and uncertainty regarding instructional effectiveness. Such conditions likely intensified teachers' stress levels and emotional demands while

simultaneously requiring them to maintain professional performance and student support. The findings of the present study indirectly support the results reported by MacIntyre et al., who found that the rapid conversion to online teaching during the COVID-19 pandemic generated considerable stress and negative emotional experiences among teachers (MacIntyre et al., 2020). Teachers in online classrooms must often perform multiple responsibilities simultaneously, including technical troubleshooting, instructional adaptation, emotional support, and communication management, which can increase cognitive and emotional burden.

The results of the present study additionally reflect broader changes in teacher identity and professional self-perception within digital educational environments. Teachers increasingly perceived themselves not only as subject matter instructors, but also as facilitators of digital learning, technological coordinators, mentors, and communication managers. This multidimensional role transformation corresponds with the findings of Kiss, who emphasized that participation in online educational communities influences teachers' professional identity formation and communication practices (Kiss, 2020). The findings also align with the perspectives of Zahid and Khanam, who argued that reflective and adaptive teaching practices enhance teachers' professional effectiveness in changing educational environments (Zahid & Khanam, 2019). Online education therefore appears to encourage greater professional flexibility and reflective practice among educators.

The present findings may also be interpreted in relation to cognitive demands associated with online instructional systems. Teachers in online classrooms are required to manage multiple tasks simultaneously, including instructional delivery, technological operation, communication monitoring, and student assessment. These responsibilities can increase cognitive load and influence teachers' perceptions of professional effectiveness and role complexity. The findings correspond with Larmuseau et al., who emphasized that online learning environments can significantly increase cognitive demands during instructional activities (Larmuseau et al., 2019). Consequently, teachers who possess stronger technological and organizational competencies may be better equipped to adapt successfully to online educational conditions.

The overall findings of the present study indicate that online classrooms significantly transformed teachers' professional roles during the COVID-19 pandemic by increasing the importance of technological competence, communication effectiveness, instructional flexibility, and digital classroom management. These findings contribute to the growing body of literature demonstrating that online education represents not merely a temporary instructional alternative, but a major structural transformation within contemporary educational systems. As digital learning environments continue to expand globally, understanding teachers' experiences and perceptions becomes increasingly important for improving teacher preparation, educational planning, and instructional quality within online educational contexts.

One limitation of the present study was that the data were collected only from high school teachers in Tehran, which may limit the generalizability of the findings to teachers in other cities, educational levels, or cultural contexts. Additionally, the study relied exclusively on self-report questionnaires, which may be influenced by social desirability bias or subjective interpretation of professional experiences. The cross-sectional design of the study also limited the ability to examine long-term changes in teachers' professional roles and adaptation processes over time. Furthermore, external variables such as institutional support, internet accessibility, socioeconomic conditions, and school infrastructure were not directly examined in the study despite their potential influence on teachers' online teaching experiences.

Future research is recommended to investigate the long-term impact of online education on teachers' professional identity, instructional effectiveness, and psychological well-being through longitudinal research designs. Comparative studies involving teachers from different educational levels, private and public institutions, and various geographical regions could provide broader insight into the diversity of online teaching experiences. Future studies may also examine the moderating role of organizational support, digital literacy training, personality characteristics, and coping strategies in teachers' adaptation to virtual

education. In addition, qualitative and mixed-method approaches could provide deeper understanding of teachers' lived experiences and emotional responses within online educational environments.

Educational policymakers and school administrators should develop comprehensive professional development programs aimed at strengthening teachers' technological competence, communication skills, and online instructional strategies. Schools should also provide adequate technological infrastructure, technical support services, and digital teaching resources to facilitate effective online education. Establishing continuous training opportunities and collaborative professional learning communities may help teachers adapt more effectively to evolving educational environments. Moreover, educational systems should recognize the increased cognitive and emotional demands associated with online teaching and provide psychological and organizational support mechanisms to improve teachers' professional well-being and instructional performance.

Moral standards

In the present study, the ethical principles related to qualitative researches were observed.

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Contribution of authors

In this research, each of the authors had a share in collecting the theoretical and research background, and the author was responsible for the initial writing of the article, analysis, writing and editing of the final article.

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