O R I G I N A L   A R T I C L E

comparing the effectiveness of face to face in- service and virtual in-service trainig courses for primary teachers based on the kirkpatrick model

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A B S T R A C T

Abstract: The present research was conducted with the aim of measuring the effectiveness of face to face and virtual in-service training of elementary school teachers in Birjand city based on the Kirkpatrick model and comparing them. The current research method is a quasi-experimental pre-test-post-test type. The statistical population of this research includes all primary school teachers of Birjand city who have participated in in-service and virtual courses in the academic year 2023-2024. Using available sampling, 45 teachers participating in face-to-face courses and 45 teachers participating in virtual courses were selected. In the first level, i.e. reaction, participants' opinions were collected in two stages (the beginning of the courses and the end of the courses). The tool used at this level was a researcher-made questionnaire. The second level, i.e. learning, was conducted using a researcher-made test of 19 questions and was performed as a pre-test and post-test. In the third level, i.e. behavior, data was collected 5 months after the end of the courses using the teachers' self-evaluation form and the teachers' evaluation form by their managers. The results of the inter-subject effects test to compare the reaction level components in the post-test stage and the f value obtained for all components are significant at the alpha level of 0.05. The F value obtained in the results of covariance analysis for comparing learning scores in the post-test stage is 26.563. The value of the t statistic and the value of the significance level for comparing the scores of the behavior level show that there is no difference in the variance between the two groups of face-to-face and virtual educatio The findings of the research show that face-to-face and virtual in-service courses are effective in the levels of reaction, learning and behavior, and there is a significant difference between the effectiveness of face-to-face and virtual courses; So that the obtained averages show that face-to-face training can have a significant effect compared to virtual training in these three levels

K E Y W O R D S

Effectiveness, in-service courses, Kirkpatrick model, teachers

Extended Abstract
Introduction

Human capital is considered one of the most important and strategic resources of an organization (Sepahvand & Baqerzadeh Khodashahri, 2022). Organizations that possess capable human resources can make swift decisions in global markets and move in sync with the pace of networks (Samwel, 2018). Even if an organization has the most advanced technologies and the most equipped facilities, it will not achieve significant success without skilled and trained human resources (Gu et al., 2023). Empowering employees is a key aspect for any organization (Ghorbani Zadeh et al., 2019). The long-term development and success of organizations depend on leveraging existing competencies and enhancing employee capabilities (Sanaei et al., 2021). In the new decade, human resources are regarded as one of the key strategic factors of organizations, and human resource managers must act as strategic partners, with the goal of implementing HR programs being to create competitive advantages and achieve organizational strategic objectives (Gupta, 2020). Human resource processes are very important, as organizations and managers are eager to create an environment that improves managerial effectiveness, reduces resource erosion, and enhances organizational identity and performance (Mansoori et al., 2019). Today, training is recognized as one of the main processes for developing human resources within organizations, gaining attention from many scholars, officials, and educational managers (Sudarwati & Naeem, 2022). Although training helps employees perform their current jobs, the benefits of training affect all job programs and also assist in the individual's development for future responsibilities (Nguyen, 2020). The training that employees receive can impact service quality outcomes (Leigh et al., 2021). In recent years, there has been an increasing focus on training and developing human resources, as organizations aim to enhance their employees' capabilities (Hendy, 2021). Thinkers from various fields believe that this training is a tool that helps managers manage organizations; therefore, their existence is beneficial and essential for achieving organizational goals effectively (Steinbach, 2013).

In today's world, no organization can be considered free from the need to train its employees (Jahani et al., 2023). Educational institutions are among these organizations, and as mentioned, the need to create and hold training sessions may be even greater than in other organizations. In this system, the quality of teachers is a determining factor in helping students achieve success and advance educational goals (Pishghadam et al., 2021). Teachers are key players in the education system and play a significant role in facilitating learning and enhancing the effectiveness of the educational process (Adib et al., 2022). To perform their duties and transfer valuable knowledge to students, teachers must possess adequate expertise and knowledge (Copriady et al., 2018). One effective way to acquire this necessary knowledge and expertise is through in-service training for teachers (Kivirand et al., 2022). In other words, in-service training is one of the most common and effective solutions for training teachers and updating their information. In-service training represents a type of investment; the higher the quality of these trainings, the greater their impact on the workforce (Darvishi Chari, 2021). In-service training for teachers is essential in the current era, where the increasing diversity of students, changing teaching and learning conditions, evolving educational environments, and technological advancements are considered integral parts of education (Körkkö et al., 2022). There are various interpretations of in-service training. It comprises a series of purposeful, premeditated, and planned actions aimed at enhancing the well-being and effectiveness of individuals and organizations, focusing on the continuous improvement of knowledge, skills, and attitudes that enhance current and future job performance (Jala, 2022). According to Fathi Vajaragah (2020), in-service training is a type of organized training in the workplace, aimed at systematically and continuously improving knowledge, skills, and employee efficiency, while increasing their adaptability to the work environment and advancements within it. From

an organizational perspective, in-service training refers to the training that employees must undergo after being hired, enabling them to perform their assigned duties and responsibilities effectively (Junejo et al., 2018).

On the other hand, today's world is moving toward virtualization in all its aspects, and education has no choice but to align with this trend (Nikkhah & Ghanbari, 2021). Furthermore, since traditional approaches are unable to meet all educational needs, leveraging information and communication technology, especially virtual education, can address many obstacles and issues associated with traditional teaching methods, paving the way for a new approach to human resource training (Fathi Vajaragah, 2020). In the past decade, the use of virtual training courses has become an effective and widespread method worldwide for enhancing the quality and effectiveness of teachers. E-learning and virtual tools provide employees the advantage of learning individually and collaboratively, allowing them to engage with electronic learning technologies whenever and wherever is convenient (Dehghanzadeh et al., 2022). Based on research findings regarding in-service training courses—both face to face and virtual—there has not been a significant impact on improving teachers' performance. This indicates that various factors affect the effectiveness of in-service training, and each method of training has its own specific advantages (salehi et al., 2014).

Undoubtedly, the primary goal of in-service training is to bring about a change in employee performance, thereby enhancing the quality and quantity of the organization's products and services. Despite the increased investment and growing attention to this area regarding training and human resource development programs, there is a degree of doubt and hesitation among organizational investors regarding the effectiveness of training programs, which affects their willingness to increase educational investments (Zavvar et al., 2019).On one hand, there is a distinction between training that focuses on planned learning actions to identify and develop key competencies, enabling employees to perform their current jobs, and workplace learning, which integrates learning with other actions aimed at improving individual and organizational performance (Arets et al., 2016). Many organizations invest hours in training their employees while the individuals are uncertain about where to apply this knowledge; undoubtedly, such training will lack the necessary effectiveness (Lee & kang, 2018). When the results of organizational training are measured based on the stated objectives, the effectiveness of the training comes into focus. In other words, the question that institutions face is to what extent the efforts and activities aimed at human resource development through training lead to improved individual and organizational performance (Farhad & Jafari, 2016). Research findings within the country, despite significant expenses and widespread implementation, indicate a poor and ineffective state of these training courses. Issues such as the lack of practical content, disregard for infrastructure, non-needs-based courses, and a lack of specialization (Habibi Azar et al., 2021), as well as low effectiveness and inadequate implementation and follow-up of educational applications (Hakimzadeh et al., 2015), are among the problems contributing to the ineffectiveness of organizational training. This ineffectiveness causes irreparable damage to the educational system. A crucial question that arises is whether the organization of these courses achieves the intended goals of the educational system. Do they equip teachers with the necessary skills and knowledge for entering the teaching profession? These important considerations necessitate the evaluation of the effectiveness of training courses. As everyone agrees, the most significant aspect of designing and implementing training is the evaluation of its effectiveness (Akbari et al., 2011).

Educational evaluation is one of the most important programs of any organization, providing valuable information regarding the design and revision of any system (Hojati, 2013). Evaluating the effectiveness of training courses enables both managers and employees to gain a clearer understanding of the quality and quantity of educational activities, while also equipping planners and educational staff with insights into the positive and negative aspects of the program

(Methani & Hasanzadeh, 2008). Conducting a precise evaluation of the effectiveness of training courses helps determine how well the designed programs have achieved predetermined outcomes and how much they need to be revised (Noe, 2023). If training has no impact on the learners' work processes and the growth trajectory of the organization, it is not only futile but also wastes significant organizational costs and resources (Zheng, 2017). To ensure high-quality training programs, evaluation is essential to assess the quality and competence of the training, identify missing content, strengths of the program, and exclusive elements of the curriculum (Megan & Patricia, 2017). Whenever an organization's training programs lead to the achievement of their goals, effectiveness has been attained. Training effectiveness can be defined as the degree of alignment between the behaviors of learners and expectations, the proper execution of tasks, and the level of skills, knowledge, and attitudes acquired through training (Fathi Vajaragah, 2020).

Given the above, evaluating the effectiveness of in-service training is an essential study that should be conducted continuously. By identifying strengths, weaknesses, and factors influencing the effectiveness of these courses, we can optimize organizational training. As the education sector has increasingly shifted to virtual in-service training courses, the significance of evaluating these courses has grown. Therefore, the aim of this research is to assess the effectiveness of virtual and face to face in-service training based on the Kirkpatrick model. Accordingly, the research questions are as follows:

1. Is there a significant difference in the effectiveness of virtual and face to face in-service training at the reaction level?

2. Is there a significant difference in the effectiveness of virtual and face to face in-service training at the learning level?

3. Is there a significant difference in the effectiveness of virtual and face to face in-service training at the behavior level?

Research literature review

One of the most important organizations that plays a significant role in the political, economic, cultural, and educational systems of any country is the formal education system, responsible for teaching and training, as well as providing human resources for other organizations (Amin Bidokhti et al., 2022). Any positive change in society requires attention to the importance and position of education. The teacher, as the main actor in education, is the most crucial factor in implementing the curriculum and plays a significant role in determining the success or failure of the educational system (Challob, 2021). The dynamism and effectiveness of the education system are realized when the personnel involved, namely the teachers, receive appropriate training based on the principles and rules of scientific human resource management. This is essential because having a skilled workforce is one of the most important factors in the efficiency and effectiveness of an organization (Engetou, 2017). Organizations that aspire to achieve development, success, and sustainability strive to educate their human resources through training programs, thus improving their credibility and competitive advantage (Abu Lehyeh et al., 2021). Training and development refer to the planned efforts made by an organization to facilitate job-related learning behaviors among employees (Khan & Patil, 2023). Continuous training prepares employees for unexpected changes in systems and unforeseen adversities (Garg et al., 2021).

The importance and role of in-service training are well understood in every organization, which allocates time and resources to the training of its human resources according to the significance it places on this matter. To justify this importance, it should be noted that organizations that do not plan for the enhancement of their employees' knowledge and skills and disregard in-service training will face challenges (Kachuei et al., 2019).

On the other hand, there are various methods for evaluating effectiveness. Traditional methods of evaluating effectiveness include goal-based assessments, systems approaches, and evaluations based on the internal processes of the organization. Modern methods include effectiveness assessments based on competitive values and evaluations based on stakeholder satisfaction (Fernandes et al., 2023). Most well-known evaluation models in recent years are based on the four-level evaluation model first introduced by Kirkpatrick in 1959. This model has been described as a comprehensive, simple, and practical framework for many educational situations and is recognized by many specialists as a standard in this field. Kirkpatrick defined

evaluation as determining the effectiveness of a training program and divided the evaluation process into four levels or steps (Jones et al., 2018).

Level 1: Reaction Evaluation: The most common type of evaluation in organizations involves assessing the reactions and responses of trainees immediately after the completion of the training course. This evaluation, referred to as "Level 1," primarily uses surveys to capture trainees' opinions regarding the quality of the training course.

Level 2: Learning Evaluation: At this level, the question arises whether trainees have actually learned what the course aimed to teach. Instructors of training courses seek to achieve objectives at three levels: knowledge, attitude, and skills. Measuring learning is significant because no change in behavior occurs unless one or all three of these learning levels are achieved (Kirkpatrick, 2009).

Level 3: Behavior Evaluation: At this level, the question arises regarding the impact of the training course on the performance of participating trainees in their work environment. In other words, has the training improved the performance and professional behavior of the trainees? It is evident that answering this question is much more complex and challenging than evaluating the first two levels (Kirkpatrick & Kirkpatrick, 2007).

Level 4: Results Evaluation: The fundamental question at this level is what benefits the organization has gained from conducting the training course. What have been the organizational impacts of the course? This type of evaluation is very challenging and requires a minimum of 1 to 2 years after the course has been conducted, following a systematic phased process. Evaluating results, the fourth level of evaluation, poses the greatest challenge among training professionals (Fathi Vajargah & Diba Vajari, 2020).

As can be seen, this model evaluates different levels, where the first two levels pertain to evaluating the individual learner, the third level evaluates at the work unit, and the fourth level assesses performance at the organizational level. A review of the literature on the effectiveness evaluation of in-service training courses indicates that scholars and researchers have evaluated these courses from various perspectives, with some results summarized as follows:

Yazdani et al. (2023) conducted a study titled "Evaluating the Effectiveness of In-Service Training Courses for Programming Teachers Based on the Kirkpatrick Method." The analysis of data collected from the in-service training courses showed with 95% confidence that these courses had an impact on the levels of reaction, learning, behavior, and results. Mohammadi et al. (2020) found in their research titled "Measuring the Effectiveness of In-Service Training for Primary School Teachers Based on the Kirkpatrick Model" that teachers' reactions had a relatively favorable average of 3.47. Additionally, the effectiveness of the courses on teacher learning was 3.17, and on improving teachers' capabilities, it was 3.11, while the effectiveness regarding the objectives of Region 9 was only 2.97. Rezaeian and Morad Saleh (2021) conducted a study titled "Evaluating the Effectiveness of Natural Resources and Environmental Education in Schools in District One of Tehran Using the Kirkpatrick Model." The results indicated that face to face environmental education classes had the highest effectiveness, and the results of pre-test and post-test scores, along with statistical analysis of the third and fourth level questionnaires of the Kirkpatrick model, revealed the effectiveness of face to face training. Maqami (2019), in his research titled "Evaluating the Effectiveness of Skill-Enhancing Courses for Students at Allameh Tabatabai University Based on the Kirkpatrick Model," concluded that all skill-enhancing training courses positively impacted resolving organizational issues and achieving organizational goals. Mahmoudi Hekmat et al. (2019) studied the effectiveness of the training course "Cultivating the Character of Vocational Students" at the secondary level based on the Kirkpatrick model and found that the training course was effective at the reaction and learning levels, with the average behavior scores of the experimental group in real work environments being higher than those of the control group. Sadeghi et al. (2018), in their research titled "Measuring and Evaluating the Effectiveness of

Specialized Training Courses for the Islamic Republic of Iran Railways Based on the Kirkpatrick Model," showed that according to the four-level Kirkpatrick model, the training courses were successful and effective at all levels. Safari (2015), in his research titled "Evaluating the Effectiveness of Human Resource Training Courses in Physical Education in Fars Province Based on the Kirkpatrick Model," demonstrated that training courses were effective at all four levels (reaction, learning, behavior, and results) from the perspective of physical education teachers and managers. Touraj Derakhshanfar et al. (2013) found in their research titled "Evaluating the Effectiveness of In-Service Training Courses for Teachers in Kohgiluyeh and Boyer-Ahmad Province Based on Levels One and Two of the Kirkpatrick Model in the 2013-14 Academic Year" that the higher the motivation and enthusiasm of participants for attending the courses, the greater the increase in learning. Supriyadi and Aulia (2022) in their research titled "Evaluating the Effectiveness of Distance Learning and Practical Classes During the COVID-19 Pandemic," based on the Kirkpatrick model, concluded that students faced many barriers to participating in online learning. The results also suggest that a blended approach could lead to higher quality learning experiences for students. McCarthy et al. (2023) in their longitudinal study titled "Evaluating the Effectiveness of Educational Podcasts on Students' Study Habits and Exam Performance," which utilized Levels 1 and 2 of the Kirkpatrick model, found that students developed a new attitude towards podcasts and spent more time studying. Furthermore, podcasts hold strong potential as a complement to existing curricula, fulfilling the needs of interested students. Dwikurnaningsih and Waruwu (2022) in their research titled "Evaluating the Effectiveness of Online Training for Instructors Using the Kirkpatrick Model," found that the reaction level was satisfactory, the learning level was high, and the behavior level was average. Kavak et al. (2017) in their research titled "Evaluating Primary and Secondary Teachers' Opinions on In-Service Teacher Training" concluded that teachers were not inclined towards distance learning, even though they all had access to a computer at home; however, according to the teachers, the

design and implementation of in-service training programs should be conducted in schools by university experts during working hours.

Methodology

The research is applied in nature and, regarding data collection, it is quasi-experimental with a pre-test and post-test design. The statistical population includes primary school teachers in Birjand County who participated in in-service training courses, both face-to-face and online, during the 2022-2023 academic year. Using a convenient sampling method, 45 teachers from the face-to-face courses and 45 from the online courses were selected. Both the face-to-face and online courses started and ended simultaneously within a specific time frame. The content delivered and the instructor for both types of courses were identical. The gender composition was also balanced, with half of the participants in each group being male and half female. The inclusion criteria for the current study are as follows: a) informed consent, b) being a primary school teacher in Birjand County, c) participation in in-service training courses, both face-to-face and online. The exclusion criteria are: a) attendance of a participant in the face-to-face course in the online course and vice versa, b) unwillingness to participate in the study. At the first level, i.e., reaction, the opinions of participants were collected at two stages (the beginning and the end of the courses). The instrument used at this level was a researcher-designed questionnaire. The second level, i.e., learning, was assessed using a 19-item researcher-designed test administered as a pre-test and post-test. At the third level, i.e., behavior, data were collected five months after the conclusion of the courses using self-assessment forms from the teachers and assessment forms completed by their managers. The content and construct validity of the data collection instruments were confirmed by experts in the field. The reliability of the questionnaires and the researcher-designed test, based on Cronbach's alpha method, was estimated as follows: reaction area: 0.783, learning area: 0.759, and behavior area: 0.819. For data analysis at the quantitative level, both descriptive and inferential statistical methods were employed. Descriptive statistics included frequency, mean, and standard deviation of

scores, while inferential statistics involved the use of dependent t-tests, one-way ANCOVA, and MANCOVA.

RESULT

1. Is there a significant difference in the effectiveness of virtual and face to face in-

service training at the reaction level?

To compare the effectiveness of face to face and virtual in-service training courses for elementary school teachers in Birjand at the reaction level, Multivariate Analysis of Covariance (MANCOVA) was used.

Table 1: Box's Test of Covariance Matrix Homogeneity

Box's	F	df1	df2	Sig.
26/248	1/218	6	56107/472	0/841

As shown in Table 1, the significance level of Box's test is 0.623. Since this value is greater than the required significance level of 0.05 to

reject the null hypothesis, the null hypothesis of covariance matrix homogeneity is confirmed.

Table 2: Kolmogorov-Smirnov Test Results for Normality of Score Distribution

	Pre-test		Post-test	
Variable	Z	Sig	Z	Sig
Content	0/187	0/101	0/205	0/056
Instructor	0/149	0/293	0/148	0/297
Organization	0/121	0/546	0/143	0/337

Table 2 presents the results of the Kolmogorov-Smirnov test used to examine the normality of pre-test and post-test score distributions. According to the results in the

table, the calculated significance level is greater than 0.05, confirming the assumption of normal distribution.

Table 3: Levene's Test for Homogeneity of Variances

Variable	F	df1	df2	Sig.
Content	0/037	1	88	0/848
Instructor	2/467	1	88	0/120
Organization	0/273	1	88	0/673

As shown in Table 3, the Levene's test results are not significant for any of the variables, thus

confirming the null hypothesis of homogeneity of variances.

Table 1: Multivariate Analysis of Covariance (MANCOVA) Results for Reaction Level

Effect	Test	Value	F	df1	df2	Sig	Effect Size
Group	Pillai's Trace	0/512	28/985	3	83	0/001	0/512
	Wilks' Lambda	0/488	28/985	3	83	0/001	0/512
	Hotelling's Trace	1/048	28/985	3	83	0/001	0/512
	Roy's Largest Root	1/048	28/985	3	83	0/001	0/512

As seen in Table 4, the significance levels for all four multivariate statistics—Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root—are below 0.01 ($p < 0.01$). Thus,

the null hypothesis is rejected, indicating a significant difference in the reaction level between face to face and virtual in-service training groups in the post-test. To further

investigate the differences between the two groups in each component of the reaction level, the test of between-subjects effects was used, with the results provided below.

Table 2: Between-Subjects Effects Test for Reaction Level Components

Variable	Source	Sum of Squares	df	Mean Square	F	Sig.	Effect Size
Content	Between Groups	139/125	1	139/125	29/835	0/001	0/260
	Error	396/362	85	4/663			
Instructor	Between Groups	115/592	1	115/592	30/239	0/001	0/262
	Error	342/917	85	3/823			
Organization	Between Groups	171/458	1	171/458	35/356	0/001	0/295
	Error	410/118	85	4/825			

Table 5 shows the results of the between-subjects effects test for comparing the reaction level components in the face to face and virtual training groups in the post-test. Based on the results presented in Table 5, the F-value obtained for all components is significant at the 0.05 level ($p < 0.05$). Given the significance of the statistics and the higher mean scores of the face to face training group in the post-test, it can be concluded that face to face training is more effective in enhancing the reaction level of elementary school teachers in Birjand compared to virtual training.

2. Is there a significant difference in the effectiveness of virtual and face to face in-service training at the learning level?

To compare the effectiveness of face to face and virtual continuing education courses for primary school teachers in Birjand regarding learning outcomes, a one-way analysis of covariance (ANCOVA) was used. The results of this test and an examination of its assumptions are presented below.

Table 3: Test of Homogeneity of Regression Slopes

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Group * Pre-test	79/949	1	79/949	2/516	0/116

Table 6 shows the results of the analysis of covariance regarding the equality of regression slopes. According to the reported results, the significance level for the interaction effect of the group and the pre-test ($p = 0.116$) is greater than 0.05. Therefore, the assumption of homogeneity of regression is accepted.

Table 4: Kolmogorov-Smirnov Test Results for Normality of Learning Level Scores

Variable	Pre-test		Post-test	
	Z	Sig.	Z	Sig.
Learning Level	0/090	0/438	0/091	0/423

Table 7 presents the results of the Kolmogorov-Smirnov test for assessing the normality of the distribution of pre-test and post-test scores. Based on the results shown in the table, the significance level of the computed statistic is greater than 0.05, so the assumption of normality of the score distribution is accepted.

Table 5: Levene's Test for Homogeneity of Variances (Learning Level)

Variable	F	df1	df2	Sig.
Learning Level	2/979	1	88	0/088

As shown in Table 8, the results of Levene's test are not significant. Thus, the null hypothesis of the homogeneity of variances for the variables is confirmed. Consequently, it is concluded that the assumption of homogeneity of variances holds.

Table 6: ANCOVA Results for Comparison of Learning Levels in Virtual and Face to face Training Groups

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.	Effect Size
Pre-test	4932/951	1	4932/951	152/568	0/001	0/637
Group	858/861	1	858/861	26/563	0/001	0/234
Error	2812/960	87	32/333			
Total	8782/914	89				

Table 9 presents the results of the analysis of covariance for comparing learning scores between the face to face and virtual continuing education groups in the post-test phase. The obtained F value is 26.563, which is significant at the alpha level of 0.01 (p < 0.01). Given the significance of the obtained statistic and the higher mean scores of the face to face continuing education group in the post-test, it can be concluded that face to face continuing education has been more effective in enhancing the learning level of primary school teachers in Birjand compared to virtual continuing education.

3. Is there a significant difference in the effectiveness of virtual and face to face in-service training at the behavioral level?

To compare the effectiveness of face to face and virtual continuing education courses for primary school teachers in Birjand regarding behavioral outcomes, a paired t-test was used. The results of this test and an examination of its assumptions are presented below.

Table 7: Kolmogorov-Smirnov Test Results for Normality of Behavioral Level Scores

	face to face Training		Virtual Training	
Variable	Z	Sig.	Z	Sig.
Learning Level	0/105	0/200	0/113	0/188

Table 10 presents the results of the Kolmogorov-Smirnov test, used to assess the normality of score distribution for the behavioral level variable. According to the results in the table, the calculated significance level is greater than 0.05, confirming the assumption of normality in score distribution.

Table 8: Independent t-Test Results for Comparison of Behavioral Level Scores in Virtual and Face to face Training Groups

	Levene's Test for Equality of Variances		t-Test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	0/29	0/866	-3/659	88	0/00	-6/377	1/743	-9/842	-2/913
Equal variances not assumed			-3/659	88	0/00	-6/377	1/743	-9/842	-2/913

Table 11 displays the independent t-test results comparing behavioral level scores between face to face and virtual in-service training groups. The t-statistic and significance level in the first row indicate no variance difference between the two groups. However, the independent t-test results show that behavioral evaluation scores differ between virtual and face to face training. Given the statistical significance and the higher mean score in the face to face training group, it can be concluded that face to face in-service training is more effective than virtual training in enhancing behavioral levels among elementary teachers in Birjand.

Discussion and Conclusion

Teachers are the central element in any transformation within the education system.

Investing in teacher training, especially in elementary education, which forms the foundation of the educational system and is one of the most fundamental and important academic stages, is considered one of the most beneficial investments. This investment contributes to the expansion of public education and yields positive outcomes both individually and organizationally; it also serves as a crucial factor for qualitative growth and development in teaching and education. To this end, the Ministry of Education allocates significant resources each year for training its human resources, with the aim of increasing teachers' efficiency and effectiveness, updating their knowledge and skills in line with advances in science and technology, fostering ethical values, and improving organizational culture and human relations. The key question here is whether these courses achieve the desired level of effectiveness.

In response to the research questions, the findings revealed a significant difference in the effectiveness of in-service virtual and face to face training across the three levels of Kirkpatrick's model: reaction, learning, and behavior. The responses of elementary teachers at the first level, which reflects their reaction to the course, showed that teachers rated face to face training higher than virtual training in terms of the course's content, instructor, and organization. The results align with the findings of Hemmati (2012), Mohammadi et al. (2020), Yazdani et al. (2023), Maghami (2019), and Mahmoodi Hekmat, who concluded that "teachers had a positive reaction to the offered courses." However, these results diverge from the findings of Razaghi et al. (2015), who noted that "the perceived quality of content, resources, and strategies in educational courses was below average according to experts in learning disabilities, and participants' motivation was assessed as less than optimal." This discrepancy may be due to the specific research population in Razaghi's study, which focused on learning disability experts. Through expert reviews and needs assessments, content can be designed to be more engaging for participants and foster the motivation needed to participate in such courses.

The results of the teachers' feedback on the effectiveness of in-service training in the learning dimension indicated that these trainings had a statistically significant impact on teacher learning, and the level of impact was relatively high. Moreover, face to face training had a greater effect on enhancing learning and improving teachers' behaviors compared to virtual training, suggesting that face to face training is more effective in improving learning levels than virtual training. The findings of this study align with those of Hemmati (2012), Mohammadi et al. (2020), Yazdani et al. (2023), Maghami (2019), and Mahmoodi Hekmat (2019), who found that these courses made relatively positive changes to teachers' knowledge and learning levels. However, they diverge from Mohammadi et al. (2020), who reported that these trainings had no significant impact on teachers' learning. Nastiezaie et al. (2010) concluded that face to face training more effectively enhances teachers' adaptability and capabilities than virtual training. Additionally, assessing teachers' opinions on virtual and face to face training at the behavioral level showed that face to face training was more effective than virtual training in enhancing job-related and behavioral characteristics. According to Nikkhah and Ghanbari (2021), virtual in-service training exams did not meet satisfactory standards in various areas, and much effort from different individuals and groups is required to improve these courses. The higher effectiveness of face to face training compared to virtual training aligns with Hakimzadeh et al. (2015), who found that face to face training is more effective than virtual training for psychological empowerment, teachers' skills, and social empowerment, while the ineffectiveness of virtual training compared to face to face training is identified as a current challenge. Conversely, mostahfezian (2018) research indicated that virtual in-service training courses were effective in improving the job performance of physical education teachers.

The research findings at the third level of Kirkpatrick's model, namely behavior, align with the results of Iqbal Ahmad et al. (2012), who found that training programs positively contribute to teachers' educational skills, and Khandan's findings (2012), which indicate that "participation in in-service training courses enhances trainees' professional skills." Additionally, the findings are consistent with Salehi (2014), who states that "the impact of virtual in-service training on teachers' professional performance is assessed as above

average with a 98% probability." In explaining this question, "behavior" refers to the extent and nature of changes in participants' actions due to their training, which can be further evaluated in real-world work environments. The primary goal of training is to align individuals' needs and interests with the organization's needs and goals to improve behavior and performance through the continuous acquisition of knowledge, skills, and desirable attitudes (Orangi et al., 2011).

Despite the advantages of face to face training over virtual training, it is essential to recognize that the main requirement for effective training and enhancing teachers' capabilities is training itself (whether face to face or virtual). Given the necessity of information and communication technology in education today, the findings of this study indicate that teachers have a preference for face to face training over virtual training. Yazdani's research (2015) on the effectiveness of virtual in-service training systems for teachers revealed that virtual training lacks sufficient effectiveness in the examined components (such as support quality, content quality, accessibility, and technology). Therefore, it is crucial to address the shortcomings of virtual training through a thorough assessment. Transitioning from face to face to virtual training in education is a significant and challenging topic, involving many internal and external factors. The question arises: has the educational system considered the dimensions and theories of change when shifting to virtual training? Are teachers, as the agents of change in schools, adequately trained and informed about virtual platforms? Do teachers possess the necessary skills to engage in virtual environments? Are the required infrastructures in place to support their participation in virtual platforms?

Undoubtedly, every research faces certain limitations and challenges. Recognizing and addressing these limitations paves the way for future research, allowing researchers to conduct studies with a broader perspective and greater insight. This study also encountered some limitations, the most significant being that it was conducted among elementary school teachers and administrators in Birjand. Therefore, caution is required when generalizing the findings to other groups. Additionally, as this study relied on questionnaires, different results might be obtained using alternative instruments. Other factors affecting the effectiveness of face to face and virtual in-service training might also exist, which were beyond this study's control. Given these findings and limitations, it is recommended that educational administrators and officials prioritize various elements of in-service training in the educational system. Accurate planning for the assessment and implementation of virtual training should be undertaken to ensure that teachers make the most of virtual training opportunities. It is further recommended that researchers utilize qualitative methods to examine teachers' lived experiences with virtual in-service training, exploring their perceptions and experiences in depth. Additionally, the quality of courses (content, instructors, facilities, and equipment) should be prioritized to enhance the overall effectiveness of training sessions.

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