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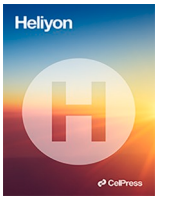

Research article

In-service teacher trainees experience with and preference for online learning environments during Covid-19 pandemic

Hailay Tesfay Gebremariam

Department of Ethiopian Languages and Literature (Amharic), College of Social Science and Humanities, Arba Minch University, Arba Minch, Ethiopia

A R T I C L E I N F O

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A B S T R A C T

The Covid-19 pandemic has forced the educational sector to quickly adapt to the crisis and shift to online learning environments (OLEs). Therefore, a critical area for research is assessing the readiness of teachers in terms of their familiarity and preference for OLEs. In this study, we aimed to improve the experience and preference of in-service teacher trainees with OLEs during the Covid-19 pandemic in Ethiopia. To achieve this goal, questionnaires were used to gather data from in-service teacher trainees. Descriptive and inferential statistical methods, including exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), Pearson correlation, and one-way ANOVA, were used to analyze the data and determine the participants' opinions and experiences with OLEs. The results showed that while in-service teacher trainees had less experience in knowledge and skills compared to cooperation and interaction, they preferred online learning platforms over online learning strategies. Additionally, correlations were found between cooperation and interaction, knowledge and skills; cooperation and interaction, online learning platforms; cooperation and interaction, online learning strategies; and online learning platforms and online learning strategies. Interestingly, no statistically significant correlation was found between knowledge and skills and online learning platforms. In conclusion, Ethiopian in-service teacher trainees favored online learning platforms over traditional online learning strategies, despite having less experience in knowledge and skills. Further research is needed to explore the experiences and preferences of in-service teacher trainees in various ecological aspects.

1. Introduction

Prior to the Covid-19 pandemic, face-to-face instruction was the primary method of teaching while online learning modalities were mainly designed for distance and online education. Only 20 % of these formats were properly implemented [1–5]. Gambo and Musonda [6] found that navigating online learning environments (OLEs) presented challenges for teaching staff, students, and managers. However, since the outbreak of Covid-19, all educational institutions in Ethiopian have been temporarily closed and the Ministry of Education has mandated that all classes be taught online. This pandemic has exposed numerous problems in the educational system [7]. The global quarantine that began in early 2020 has significantly impact on many academic institutions [8,9]. These changes are intended to promote innovation in various OLEs. The Covid-19 pandemic has severely damaged the world's educational system [10]. As a result, despite, the sudden switch from traditional classrooms to online learning (e.g., Microsoft team, Zoom and Google Meet) presenting numerous difficulties for students, teachers, and administrators [11–13], universities have chosen to

E-mail address: hailay33@gmail.com.

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temporarily move from face-to-face classes to online through digital channels instead of postponing them [3,6].

While recent attention has been given to the experiences of university students and teachers with OLEs [9–11], studies on in-service trainees' experiences with and preferences for OLEs may not be applicable to the context of this study. Given that previous studies have not explored teachers' experiences with and preferences for OLEs in the Ethiopian context, it is important to investigate this phenomenon further to understand the actual experience and preference towards OLEs during the Covid-19 pandemic. Sabaih et al. [14] have noted that the ecological focus of a study may not emphasize the past and the future concerns, indicating the need for more research to examine the contextual validity of OLEs in relation to in-service teacher trainees' experience and preference [6,15–22].

Similarly, Ghadermarzi et al. [23] suggest exploring the experiences and preferences of in-service teacher trainees in OLEs, as long with updating to the results [24]. Ghounane and Rabahi [25] also emphasize the scope of OLEs in various situations, such as in-service teacher trainees' experience and preference for it. This study focuses on the experiences and preferences of in-service teacher trainees who are not well versed in digital technologies [12,14]. Many educational sectors have developed interactive OLEs to facilitate effective learning conditions [1,14]. The Ethiopian Ministry of Education has recommended various modules and online teaching and learning approaches [15] to bring about comprehensive improvement. As the spread of the Covid-19 pandemic begins to slow, the learning process has been impacted by an unprecedented emotional and psychological state, shaking its foundation [16–18]. To manage the issues brought on by the pandemic, it is essential to gain a nuanced understanding of learners' experiences with online learning [19–21]. Therefore, the objective of this research is to investigate the validity of in-service teacher trainees' experiences and preferences towards OLEs in the Ethiopian context during the Covid-19 pandemic.

Most existing studies on OLEs during the Covid-19 pandemic have only reported on students' experiences and satisfaction, and the actual impact of OLEs on teachers' literacy and satisfaction has not been empirically explored. Only a few studies have examined teachers' use of OLEs, relying solely on teachers' self-reported data from surveys. As teachers continue to navigate OLEs in teacher education, this study seeks to explore the significance of in-service teacher trainees' experiences with and preferences for OLEs at Arba Minch University's selected colleges. The significance of this study lies in addressing the following research questions:

1. What experiences do in-service teacher trainees have with OLEs?
2. What are the preferences of in-service teacher trainees toward OLEs?
3. Is there a link between in-service teacher trainees' experiences with and preferences for OLEs?

2. Conceptual frameworks

Several conceptual frameworks were used to investigate OLEs [13,26–31]. This study focuses on important models and conceptual frameworks that form the basis for exploring in-service teacher trainees' experiences with and preferences for OLEs. Theses frameworks will be systematically presented in the following sub-headings.

2.1. Theoretical concepts of OLEs

During the Covid-19 pandemic, OLEs transitioned from traditional classroom learning to a web-based approach [32–35]. On the major challenges during the pandemic was the necessary for online learning [3,27,36]. Teachers, students, and administrators had to rethink the entire educational process [37,38–40]. Due to Covid-19, many educational systems restricted face-to-face learning, and in most developed countries, both teachers and students had to engage in OLEs [40–44]. In the Ethiopian context, the Ministry of Education announced a shift from face-to-face teaching to OLEs, making the use of OLEs necessary to replace the traditional educational system. According to Reviandani [45], there are two conceptual typologies of OLEs: 1) online learning platforms; and 2) online learning strategies. Online learning platforms are interactive online services that provide teachers and learners with the necessary support for online educational delivery and management via the internet. These platforms include digital reading materials (such as PDF and Word versions) and video streaming tools (such as Microsoft Teams, Moodle, Zoom, Google Meet, and You Tube) [44]. Liu et al. [43] concluded that during the Covid-19 pandemic, 72.2 % of higher education students were willing to use Zoom and Moodle platforms for the success of OLEs, even if they had never used them before. Additionally, Adeyeye [44] noted that a blended learning platform combines OLEs with face-to-face approaches.

The online learning strategies refer to the mode of OLEs delivery. Liu et al. [43] discussed cooperative and pair exploring as two online learning strategies used to facilitate OLEs and support each other in understanding the material. The cooperative online learning strategy allows teachers and learners to collaborate and find new ways to bring learning and teaching together to achieve a common goal [35,44]. Collaborating teachers can use real-time video calls over the internet to discuss course material delivery and share general reflections on their preferences and application of OLEs. Additionally, pair-review preferences (email, Facebook, Google, and Skype) and feedback-based approach interactions with learners are described as another online learning strategy [43,45]. Another strategy is self-directed learning, which involves learners instructing themselves. Sobaih et al. [22], Reviandani [45], and Davis et al. [46] concluded that most teachers in higher education prefer the self-directed online learning strategy. Furthermore, emotional instability is one of the major quandaries and challenges faced by young academics in teaching [47]. Sobaih et al. [22] noted that academic researchers deal with a wide range of emotions, which are unavoidable in the implementation of OLEs. Burcă-Voicu et al. [48] proposed that teachers learn how to integrate emotions into their cademic teaching to improve the presentation of their online courses. Due to the numerous challenging skills required, educators often experience frustration when using online learning platforms [44,49]. This frustration, while strengthening the OLEs and promoting effective use, can also lead to a sense of despondency and hinder progress in rank [25,50,51].

2.2. Teachers' experience with and preference for OLEs

As soon as the Covid-19 pandemic began to spread in early 2020, many countries imposed strict lockdowns in an effort to contain it [50]. In response, teaching staff delivered their face-to-face course and seminar content online in order to maintain educational continuity and alleviate student distress during the lockdown period [17,36]. This prompted, educational sectors to reevaluate their educational approaches, forcing professors to make drastic changes to how they delivered course material, often with little notice quickly adjusting curricula, resources, and tools to support online learning [12,52]. According to Schumacher et al. [5] the effect of workload, a lack of digital competency, and a lack of knowledge of digital strategy on staff stress are being explored. Prior to the 2020, educational sectors had the option to utilize online teaching and online tools, but this is no longer the case [14,51]. There has been limited research on OLEs in emergency situations as most studies have focused on distance learning during the SARS outbreak in Hong Kong [53]. Besides, the current pandemic has demonstrated the need for universities to take a proactive approach to ensure that their students receive the best education possible.

Teachers' pedagogical experience toward OLEs was critical to its success [19,52] there were also and lacking knowledge to OLEs experience [2]. To accommodate both traditional face-to-face learning and new digital learning experiences, teachers have had to adapt their teaching strategies, methods, materials, and techniques, placing more emphasis on readings, video, exercises, and so on [6,48,54]. The Covid-19 pandemic has also influenced teacher trainees' preferences, leading to a positive impact on OLEs usage [46]. Peer collaboration, learner-centered academics, and synchronous or asynchronously mediated communication have received more attention [55]. Consequently the use of OLEs has also increased [15,56]. For example, both Microsoft Teams and Moodle, two widely used e-learning platforms, provide adequate space for hosting course materials, forums, videos, and course calendars, making it simple to facilitate valuable educational support for an asynchronous learning experience [16,27,50,56,57]. Alternative knowledge-transmission techniques have also grown in popularity due to the Covid-19 pandemic [such as Zoom, WhatsApp, and/or Google Classroom), but they provide fewer opportunities for asynchronous learning [36,58]. Multiple online e-learning platforms are used concurrently by various teaching staff members [34,40]. Managing all of these e-learning platforms can be challenging at first and may require logistical changes [7,37]. In response to this, several educational sectors have developed or relied on technology to facilitate transition and improve control and oversight of the content provided to students [5,9,22,33].

Previous studies on teachers' preferences for OLEs have yielded some interesting results. Barnes et al. [21], Ghounane and Rabahi [25], Wan Hussin et al. [59] and Susilawati and Supriyatno [60] conducted studies to assess teachers' preferences and needs for successfully implementing OLEs. The researchers conducted a qualitative analysis using focus group discussions. The results varied depending on their backgrounds and personal preferences; some people prefer blended modes to face-to-face modes, while others prefer face-to-face modes [57]. Many studies employed a variety of methodologies to investigate teachers' opinions and concerns about professional development in OLEs [4,13,16,17,52,53,61,62]. The findings indicated that educators prefer digitalized written and visual materials, as well as online interactions. In light of these findings the researchers proposed that teachers' needs be better addressed to ensure they have access to appropriate professional development materials as well as meaningful online interactions tailored to their needs.

2.3. OLEs and Covid-19 pandemic

The Ethiopian Ministry of Education mandated the adoption of home-based learning for the first two years of the Covid-19 pandemic [10,29,50]. However, reports indicate that students, teachers, and other stakeholders encountered numerous challenges in ensuring the success of digital training, which served as the basis for this study [23,63]. Ghounane and Rabahi [25] examined students' preferred teaching formats during the pandemic and found that the development of OLEs is influenced by learners' preferred teaching methods. The use of digital platforms has enhanced the efficiency of teaching and learning progress [2,64,65]. OLEs involve delivering pedagogical instructions through online chatting and communication devices that students can access, such as smartphones, laptops, and computers. OLEs encompass both active online learning activities in daily routines and passive online educational instructions, adapting online learning practices to address the challenges faced during the Covid-19 pandemic.

2.4. Justification: previous studies and the need

Several empirical studies [7,37,47,66,67,68] on students' and teachers' use of OLEs from around the world have been conducted before and during the Covid-19 pandemic. There does not appear to be a scarcity of research on the experiences of Ethiopian in-service teacher trainees with OLEs. Studies on the broader experience of OLEs, the majority of which were related to distance education, have been conducted across multiple disciplines [69]. Additionally, it is important to note that findings from other studies may not be generalizable to Ethiopian teacher trainees' experiences with and preferences for OLEs [70]. For example, VanWart et al. [9], Racheva [55], Kaufman and Vallade [57], and Susilawati and Supryatno [60] conducted studies on social media learning environments with in the education system, using Twitter to improve college students teaching process. The results show that many of the sample students used Twitter for non-academic purposes, suggesting that reconsideration of OLEs for educational purposes is necessary. Similarly, Naqvi and Zehra [71] stated that using social media for classroom instruction needs to guide by the level of preference, and Maatuk et al. [29] added that students' and instructors' perspectives on using and implementing OLEs in higher education during the Covid-19 pandemic had its own challenges and advantages.

Although the efficacy of OLEs has long been recognized by previous studies [15,33,52,54,72], students' and teachers' preferences and experiences of it as a teaching mode continue to grow. Barrot et al. [33] and Alsuhaibani [62] conducted a study on

student-teachers' online learning challenges during the Covid-19 pandemic, as well as specific strategies for overcoming the obstacles encountered. Their findings revealed that the types and extent of challenges related to their own OLEs at home, while the least difficult thing was technology literacy and competency [24]. The greatest impact of the Covid-19 pandemic was related to the learning experience; some strategies 9 such as resource management and utilization, help-seeking, technical aptitude enhancement, time management, and learning environment control) were used during the Covid-19 pandemic [52]. Personal and contextual factors, as well as institutional values, were found to influence in-service teacher trainees' preferences for OLEs during the Covid-19 pandemic [16,25,51]. Though OLEs are essential and widely used at all levels of education, further empirical research is needed to explore teacher trainees' experiences with and preferences for OLEs. Therefore, given the factors mentioned above, more research appears to be necessary to determine the in-service teacher trainees' experience with and preferences for OLEs in the Ethiopian context. Based on this, the objective of the present study sought to address (i) in-service teacher trainees' experience with OLEs, (ii) in-service teacher trainees' preference for OLEs, and (iii) the relationship between in-service teacher trainees' experience with and preference for OLEs.

3. Methodology

3.1. Research design

The objective of the study was to explore the experience with and preference of in-service teacher trainees regarding OLEs, and to investigate the relationship between these two variables, at selected Ethiopian public university during the 2021/22 summer academic year. A concurrent design with a mixed methods approach was employed to address the primary research questions. The qualitative approach allowed for gaining insights into and tracking changes in the experiences of in-service teacher trainees, while the quantitative approach facilitated the collection of numerical data on their preferences for OLEs. Consequently, two types of questionnaires were utilized to investigate the experiences and preferences of in-service teacher trainees regarding OLEs.

3.2. Participants and context

The focus of this study was on in-service teacher trainees in their second year and above who were regularly enrolled in the education field during the summer program under the College of Social Sciences and Humanities, Natural Sciences, and other departments. Approximately 520 in-service teacher trainees were enrolled in the BA program at Arba Minch University. From this total population, 226 potential in-service teacher trainees were selected using Yamane's [73] formula. The sample size was determined using the equation n = N/1 + N (eˆ2), where n represents the sample size, eˆ2 represents the precision level (0.05 %) indicating the maximum variability, and 1 represents the probability of the event occurring. This formula is preferred for applications with a 5 % error margin and a 95 % confidence level due to the lack of prior research to serve as a reference point for the study. Additionally, according to Lakens [74], if a research question focuses on the size of a parameter and a researcher collects enough data to produce an estimate with the desired level of accuracy, the sample should be chosen to provide a comprehensive conclusion to the research question.

Using the sampling technique formula, 226 respondent in-service teacher trainees were selected from a total of 520 at Arba Minch University, as shown in Table 1.

Table 1 shows that out of the total population of the study (520), 226 were selected to participate. Among the selected participants, there were 90 males and 136 females. In terms of field of study, 155 participants were from social science and humanities, 51 were from natural science, and 20 were from other fields.

3.3. Data collection instruments

The data collection instruments used in this study were developed to address the research questions outlined in the introduction section. They were designed based on the experiences and preferences of in-service teacher trainees with OLEs theories, which are utilized in this study. The data instruments include a self-report survey questionnaire and in-depth interview.

3.3.1. Self-report questionnaire

The questionnaire was developed to gather information about in-service teacher trainees' experience and preferences with OLEs. The self-report questionnaire consists of two parts, including demographic profiles of the participants. The first part aims to measure the in-service teacher trainees' experience with OLEs, while the second part measures their preferences for OLEs. Each part has two

Table 1
Study population and Selected sample size.

Sample filed of studies	Total in-service teacher trainees			Sampled in-service teacher trainees		
	M	F	T	M	F	T
Social science and Humanities	146	210	356	63	92	155
Natural science	32	88	120	15	36	51
Other	24	20	42	12	8	20
Total	202	318	520	90	136	226

subcategories, as identified by Gebremariam [75]. The experience towards OLEs includes cooperation and interaction, as well as knowledge and skills of online learning. The preferences towards OLEs include online learning platforms and online learning strategies. The questionnaire was developed based on items adapted from Ghounane and Rabahi [72], Burca-Voicu et al. [48] and Gebremariam [75] to ensure content validity.

The scale for measuring the in-service teacher trainees' experience with OLEs during the Covid-19 pandemic consisted of 17 items and three sub-scales. The sub-scales include cooperation and interaction (3 items; Cronbach's alpha = 0.628; n = 208) and knowledge and skills (9 items; Cronbach's alpha = 0.740; n = 201). These sub-scales were adapted from the literature of Ghounane and abahi [72] and Gebremariam [75] that were relevant to the purpose of the current study. The internal reliability of the instrument at the scale level was 0.841 using Cronbach's alpha. These results indicate that the instrument is reliable and suitable for measuring the intended construct.

The second part of the questionnaire aims to explore the preferences of in-service teacher trainees for OLEs during the Covid-19 pandemic. The questionnaire was adapted from Burcă-Voicu et al. [48] and Gebremariam [75], with significant modifications. Initially, there were 13 items, but due to issues with item related reliability; the valid items were reduced to 10 for this study. Six items focused on online learning platforms (6 items; Cronbach's alpha = 0.646; n = 214) and four items examined online learning strategies (4 items; Cronbach's alpha = 0.601; n = 212) of in-service teacher trainees. These results indicate that the instrument is reliable and accurately measures the constructs it was designed to assess. Therefore, the data collection instrument is dependable and suitable for measuring the intended construct.

The overall construction of the questionnaire consisted of 32 items, which were rated on 5-point Likert scale ranging from strongly agree (5) to strongly disagree (1), following the approach used by Gebremariam [75]. Of these items, 30 were validated and their reliability scale exceeded the minimum alpha level of 0.30, as recommended by Pallant [76]. Out of 31 items, 30 pertained to in-service teacher trainees' experience with OLEs (e.g., 'the OLEs is new and I have not mode proper presentation to use it effectively', 'I have no information available in OLEs), while the remaining 2 measured in-service teacher trainees preferences with my instructor and classmates,' online learning helps me to discuss ("I felt very anxious when using OLEs"). During the participants' response coding in the SPSS software, the item scales labeled from 1 to 5; indicates 1 (strongly disagree), 2 (disagree), 3 (undecided), 4 (agree), and 5 (strongly agree) respectively for the positively phrased responses. On the other hand, negatively worded items were scored in reverse order to determine the scale mean value. The positively phrased items were scored using values of 1, 2, 3, 4, and 5, which correspond to the responses "strongly disagree," "disagree," "undecided," "agree," and "strongly agree" respectively. In contrast, the negatively worded items were scored in reverse order to calculate the scale's mean value.

3.3.2. Interview

To obtain the track changes regarding the convergence of the quantitative data results, we conducted research through a self-reported survey questionnaire and interviews with five in-service teacher trainees from the focused study site. These data measurements aimed to gauge their level of experience with and preference for OLEs. The main motivation behind using interviews is to triangulate the quantitative data in this study. By gathering the opinions of in-service teacher trainees, we can gain insights into their experiences and preferences regarding OLEs in educational interactions. For example, we asked questions like "*Have you used online learning environments with your peers?*" and "*What type of online learning are you interested in?*" If their responses were positive, we continued to ask for further clarification, such as "*What are these online learning environments?*" and "*Could you please explain briefly?*" The researchers conducted the interview process to validate the in-service teacher trainees' experiences and preferences towards OLEs.

3.4. Data analysis methods

To collect data from the study participants, two types of questionnaires were used. The data collected via questionnaires were analyzed using descriptive and inferential statistics. Before conducting descriptive statistical analysis, the collected data was checked against the basic assumptions of the statistical instruments used for analysis. The data was analyzed in three steps: the first step involved a preliminary analysis of the scale through exploratory factor analysis (EFA) using Maximum Likelihood and Varimax rotation in SPSS. The second step consisted of further validating the factor analysis by conducting confirmatory factor analysis (CFA) in Amos 23, utilizing the output from EFA. Step 3 explored the research questions of the current study using SPSS and Amos 23.

The quantitative data from the questionnaires was analyzed using mean values, standard deviation, Pearson product-moment correlation, ANOVA, and post hoc methods in SPSS. To address the experience of in-service teacher trainees with OLEs, standard deviation and mean scores at the item level, as well as item aggregate mean values, were utilized. The preference for OLEs among teacher trainees was determined by examining standard deviation and mean scores at the sub-scale level. Additionally, to determine if there were statistically significant differences between the mean values of the OLEs preference dimensions, the ANOVA test was employed. The mean scores were then compared using the Tukey HSD test. Furthermore, Pearson product-moment correlation was used to investigate the relationship between in-service teacher trainees' experiences with and preferences for OLEs. A significance level of 5 % (p = 0.05) was maintained throughout the study.

For the qualitative data gathered through interviews, transcriptions were examined to identify emerging themes related to in-service teacher trainees' experiences with and preferences for OLEs. These themes were used to triangulate the quantitative data. Themes related to the status and changes in interviewees' experiences with and preferences for OLEs among in-service teacher trainees were categorized and analyzed using verbal descriptions. Similarly, using verbal descriptions, themes related to the status and changes in the interviewees' experiences, cooperation and interaction, knowledge and skills, and preferences were sorted and analyzed.

4. Results

The purpose of this study was to investigate the experience with and preference for OLEs among in-service teacher trainees, as well as the relationship between their experiences and preferences of OLEs. To achieve these objectives, a concurrent mixed methods design was employed, combining both quantitative and qualitative data. Questionnaires and semi-structured interviews were administered to a group of participants to collect the data.

4.1. Quantitative data analysis

EFA using the maximum likelihood method with varimax rotation was used to analyze the factor structure and correlation between items included in the scale. However, two items (KS2 and KS7) did not produce the desired results when loading on other factors, so they were gradually removed. The final results are displayed in Table 3. Prior to analyzing the core variables to address the current study questions, the construct validity of the data was evaluated using Kaiser-Meyer-Olkin (KMO) measures and Bartlett's test of sphericity. The results of the exploratory factor analysis conducted in SPSS are presented in Tables 2 and 3.

The Kaiser-Meyer-Olkin measure of 0.803, which is above 0.70, indicates that the sample from which these data were collected was adequate. Additionally, Bartlett's test of sphericity was statistically significant at X^2/df (435) = 1686.207; p = 0.001 in the desired identity matrix. To ensure that items were correctly grouped in each construct, the researcher conducted an EFA. This analysis helped identify independent factors and the items that load onto these factors (See Table 3). Furthermore, Amos 23 software was used to perform the CFA model and assess the reliability, convergent validity, and discriminant validity. The graphical representation of the final CFA model can be found in Table 3.

Table 3 presents the results of the CFA using Amos 23. According to the results in Table 3, the extraction communalities ranged from 0.553 to 0.980, while the standardized loadings ranged from 0.509 to 0.792. All standardized factor loadings for the items were above 0.50, indicating good convergent validity. The factor analysis confirmed that the data collection instruments were suitable for further analysis in this study. Additionally, the research analysis utilized information gathered from the questionnaire provided to the respondents. To assess and determine the participants' experiences with reflective practice, the Pearson correlation coefficient was employed.

The model exhibited favorable fit statistics, including CMIN/DF = 2.75, RMSEA/PCLOSE = 0.088, HOELTER = 0.01, and CFI = 0.478. According to Schreiber [76], the recommended values for these statistics are RMSEA <0.90, HOELTER <0.05, and CFI >0.05. Finally, it is worth noting that all items' standardized factor loadings were above 0.50, indicating strong convergent validity [76]. Furthermore, the average variances extracted for all variables were lower than their respective variances, providing additional support for convergent validity. The Cronbach alpha and composite reliability for all variables exceeded 0.50, demonstrating satisfactory reliability.

Picture 1 indicates that the results of the CFA show that the model had good fit statistics, including X2/df = 36.12, RMSEA of 0.326, RMR of 0.404, and a Confirmatory Fit Index (CFI) of 0.441. The recommended values, based on the guidelines of Browne and Cudeck ([77]), are provided in the bracket (RMSEA <0.05; RMR <0.05; CFI >0.90). All items' standardized factor loadings were above 0.50, indicating good convergent validity [77]. Another piece of evidence of convergent validity is that the maximum shared variance is less than the respective average variances extracted for all variables. The Cronbach's alpha and composite reliability for all variables are above 0.80, indicating good reliability.

Furthermore, to identify the covariance and correlation of the OLEs dimensions, Table 4 presents the correlation analysis based on the survey data.

The covariance and correlation of the four factors in the study were calculated using Amos 23. The results revealed discriminant validity between the variables, as indicated by the inter-variable correlation. The estimated variables, along with their variances and discriminant validity model, showed a good fit for use in the study. Based on these findings, the first research question of the present study was: "What is the experience of in-service teacher trainees with OLEs?" Additionally, the study aimed to investigate the preference of in-service teacher trainees towards OLEs. The participants' experiences with OLEs were analyzed and determined using mean values, standard deviations, and ANOVA statistics. Table 5 presents the analysis of in-service teacher trainees' experiences with OLEs, based on the data collected through the self-reported questionnaire.

Table 5 displays the descriptive statistics for in-service teacher trainees' experience with OLEs across two dimensions. The mean scores for cooperation and interaction are M = 3.46; SD = 0.64; knowledge and skills are M = 3.40; SD = 0.64; online learning platforms are M = 3.45; SD = 0.61; and online learning strategies are M = 3.51; SD = 0.63. However, the mean value alone cannot determine if there are statistically significant differences between the mean values of the two dimensions of in-service teacher trainees' experience with OLEs. To determine this, the ANOVA test was performed to analyze the in-service teacher trainees' experience and

Table 2
KMO measures and Bartlett's test of sphericity.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.803
Bartlett's Test of Sphericity	Approx Chi-Square	1686.207
	Df	435
	Sig.	0.001

Table 3
Reliability and Convergent validity.

Items	IC	EC	SFL	CR	SSCA
I try to schedule the time to study my learning through OLEs.	CI1	0.553	0.674	0.465	0.628
I share my online learning problems with my classmates to solve them.	CI2	0.615	0.757		
I deliver the OLEs to help my friends.	CI3	0.560	0.792		
I am able to give my feedback during and after the OLEs sessions.	KS1	0.804	0.773	0.584	0.740
I develop poor self-efficacy on thought through OLEs.	KS3	0.949	0.582		
I am able to arouse attention and to maintain interest if it is necessary in OLEs.	KS4	0.977	0.597		
During an OLEs, it can be difficult to maintain control of the session and replicate the experience of face-to-face learning.	KS5	0.980	0.737		
OLEs are quite different with the face-to-face learning tradition.	KS6	0.942	0.593		
My skill to use technology devices and OLEs is poor.	KS8	0.833	0.674		
I solve problems myself that faced during the online learning process.	KS9	0.956	0.713		
I develop my skills to use the OLEs.	KS10	0.936	0.624		
I performed well when using the OLEs.	KS11	0.949	0.682		
I solve and clarity the inconsistences during OLEs.	OLP1	0.977	0.621	0.463	0.646
OLEs are new and there are no preparations to plan use properly.	OLP2	0.980	0.750		
Using technology is pretty hard to separate usefulness of OLEs.	OLP3	0.810	0.668		
I use video streaming platforms (e.g., Microsoft Teams, Moodle, Zoom, and You Tube) among others.	OLP4	0.915	0.670		
I utilize OLEs (e.g., digital reading materials, in the form of PDF and Word versions).	OLP5	0.977	0.672		
I am competent in using the OLEs (e.g., Microsoft Teams, Moodle, You Tube, Twitter, Zoom, Telegram, Facebook, etc.).	OLP6	0.949	0.602		
I am well-experienced in adapting the new content of OLEs.	OLS1	0.833	0.672	0.382	0.601
I am able to support my classmates when together in the OLEs.	OLS2	0.942	0.509		
I think OLEs are very interesting during Covid-19 pandemic.	OLS3	0.833	0.604		
I enjoy OLEs as they can be valuable to me.	OLS4	0.956	0.716		

Note: *IC = item code; EC = extraction loadings; CR = composite reliability; SSCA = sub-scale cronbach's alpha; SFL =* Standardized Factor Loadings*; CI = cooperation and interaction; KS = knowledge and skills; OLP = online learning platforms; OLS = online learning strategies*.

preferences sub-scales ratings (See Table 5). The ANOVA between-groups analysis was used to identify any statistically significant differences in the mean scores of respondents with OLEs dimensions. Table 3 shows that there are no statistically significant differences in cooperation and interaction at F (2, 223) = 1.15, p = 0.317; knowledge and skills at F (2, 222) = 0.41, p = 0.662; online learning platforms at F (2, 223) = 7.17, p = 0.001; and online learning strategies at F (2, 223) = 0.45; p = 0.636. The findings indicate that there is no difference in the in-service teacher trainees' experience with OLEs dimensions. However, when it comes to their preference for OLEs dimensions, there is a significant difference in online learning platforms at P = 0.001 and no significant difference in online learning strategies (p = 0.636).

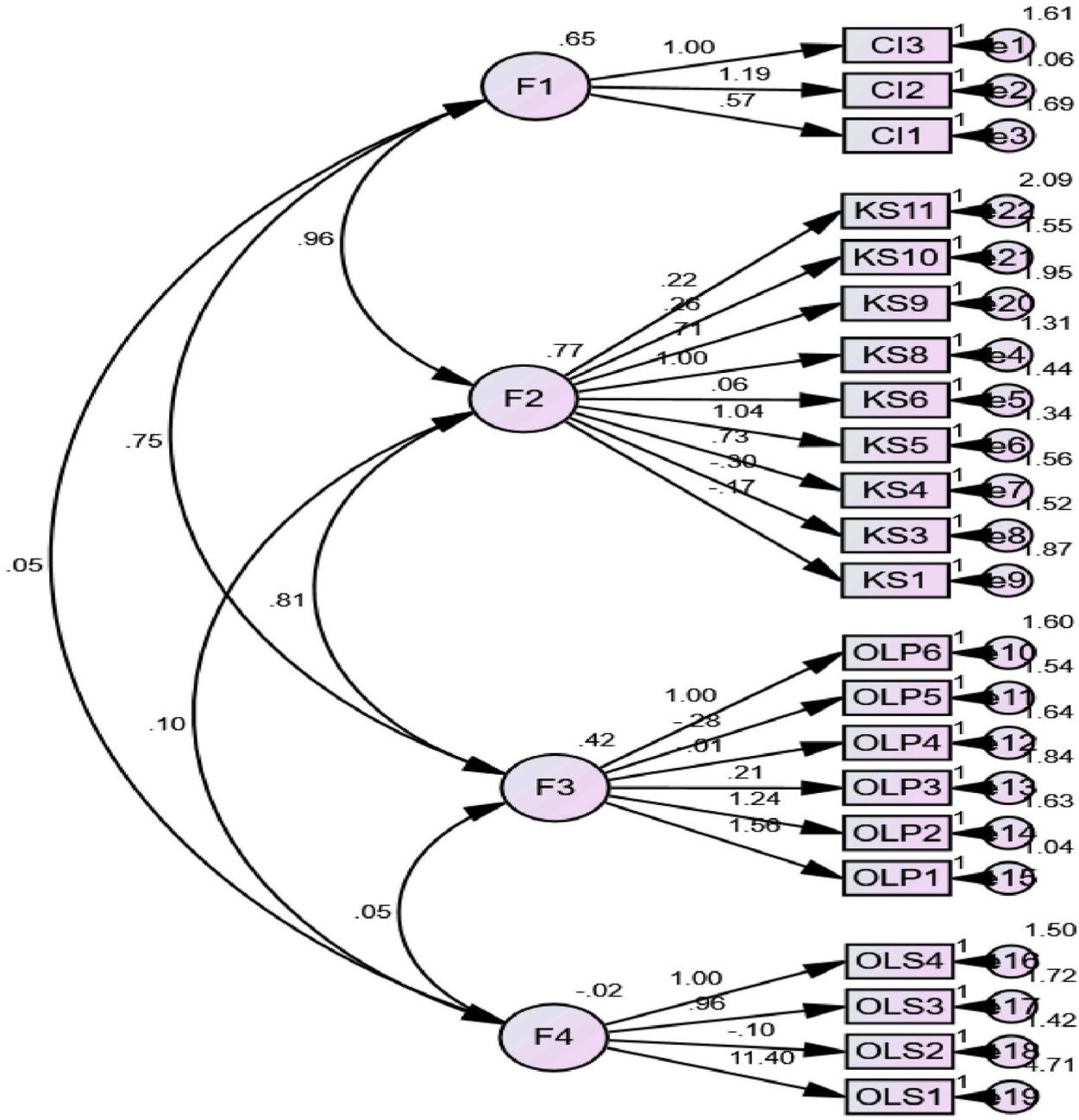
Additionally, the third research question, which examines the correlation between in-service teacher trainees' experience with and preference for OLEs, was addressed using the information gathered from the questionnaire given to the trainees. The Pearson correlation coefficient was used to evaluate and determine the participants' experiences with and preferences for OLEs. Table 6 analyzes the correlation based on the survey data.

Table 6 presents results of the study on in-service teacher trainees' experience with and preference for OLEs during the Covid-19 pandemic. The findings indicate a significant relationship between different dimension of OLEs and the trainees' experience and preferences. Specifically, there is a statistically significant correlation between cooperation and interaction, knowledge and skills (r = 0.414**); cooperation and interaction, online learning platforms (r = 0.635**); cooperation and interaction, online learning strategies (r = 0.431**); knowledge and skills, online learning platforms (r = 0.92**); and online learning platforms, online learning strategies (r = 0.445**). These dimensions of trainees' preference for OLEs have a significant impact. However, the dimensions of knowledge and skills, and online learning platforms do not have a significant impact.

4.2. Qualitative data analysis

In addition to the quantitative data collected through questionnaires, a small amount of qualitative data was also gathered through interviews. The data revealed a preference among online learners for traditional methods of instruction, such as face-to-face learning environments. During the interviews, it was found that the in-service teacher trainees had limited experience with OLEs and only expressed a preference for traditional methods. This indicates that simply preferring traditional methods is not sufficient for successful use of digital learning technologies. To further support the findings from the quantitative data, the following information is provided:

> I have a passion for technology. However, I am aware that passion alone may not be enough without sufficient experience. Additionally, technological tools can be quite expensive and are not necessarily influenced by our economy. In order to access them, we often rely on government provisions (Teacher, 3).
>
> Utilizing an online learning environment has become particularly convenient, especially during the Covid-19 pandemic. It requires some level of experience. Currently, I am eager to start teaching, but I only have a phone and lack a tablet or computer. Even if I were to acquire one, it would take time to learn how to effectively use it. Nevertheless, if there is evidence that supports its usefulness, I believe it should be utilized (Teacher, 2).



Picture 1. Confirmatory factor analysis through Amos 23.

Table 4
Covariance: and correlation of experience and preference dimensions.

Constructs/Dimensions			Variances Estimate				Correlation Estimate
			Estimate	S.E.	C.R.	P	Estimate
Cooperation and interaction	<→	Knowledge and Skills	−0.030	0.080	−0.368	0.713	−0.936
Online learning Strategies	<→	Online learning platforms	0.088	0.042	2.122	0.034	0.640
Online learning Strategies	<→	Cooperation and interaction	−0.008	0.021	−0.365	0.715	−1.145
Knowledge and skills	<→	Online learning Platforms	0.008	0.063	0.127	0.899	0.012
Cooperation and interaction	<→	Online learning Platforms	−0.003	0.007	−0.346	0.729	−0.105
Online learning Strategies	<→	Knowledge and Skills	0.181	0.075	2.428	0.015	1.028

Table 5
In-service teacher trainees' experience with and preference for OLEs (n = 226).

Variables	M	SD	Between-Within-subjects	Sum of Squares	Df	Mean Square	F	Sig.
Cooperation and Interaction	3.46	0.64	Between Groups	0.94	2	0.471	1.15	0.317
			Within Groups	91.07	223	0.408		
			Total	92.00	225			
Knowledge and Skills	3.40	0.64	Between Groups	0.34	2	0.169	0.41	0.662
			Within Groups	91.28	223	0.409		
			Total	91.62	225			
Online Learning Platforms	3.45	0.61	Between Groups	5.08	2	2.538	7.17	0.001
			Within Groups	78.99	223	0.354		
			Total	84.06	225			
Online Learning Strategies	3.51	0.63	Between Groups	0.36	2	0.182	0.45	0.636
			Within Groups	89.34	223	0.401		
			Total	89.71	225			

Table 6
In-service teacher trainees' experience with and preference for OLEs.

		CI	KS	OLP	OLS
CI	Pearson Correlation				
KS	Pearson Correlation	0.414[a]			
OLP	Pearson Correlation	0.635[a]	0.492[a]		
OLS	Pearson Correlation	0.431[a]	0.087	0.445[a]	

Note: CI = Cooperation and interaction; KS = Knowledge and skills; OLP = Online learning platforms; OLS = Online learning strategies.
[a] Correlation is significant at the 0.01 level (2-tailed).

> What is the question you are referring to? I am interested in using technology, but I lack the necessary experience. If I can find someone to teach me, I am confident that I can overcome this obstacle (Teacher, 4).

Based on the three results mentioned above, it is clear that in-service teacher trainees have a preference for OLEs but lack experience with OLEs. They require training to effectively utilize them.

The findings suggest that the Covid-19 pandemic has positively impacted the transformation of education from traditional face-to-face methods to OLEs. The pandemic remains a global challenge until its spread is fully controlled and accepted as the new norm. In the context of Ethiopia's education system, the experience and preference of in-service trainees for OLEs could influence policy and shift away from traditional face-to-face teaching and learning processes. While these findings may not be universally applicable, they provide valuable insights that teachers in other contexts may find useful. Additionally, the study establishes a connection between in-service teacher trainees' experience and preference for OLEs. Recent findings indicate a significant correlation between in-service teacher trainees' preferences for online learning platforms and strategies and their experiences in terms of cooperation, interaction, knowledge, and skills. In contrast, traditional online learning strategies are less favored by in-service teacher candidates compared to online learning platforms.

5. Discussion

The study aimed to understand the experiences and preferences of Ethiopian in-service teacher trainees towards OLEs during the Covid-19 pandemic. To achieve this objective, three research questions were developed in the introduction section. Data were collected through self-report questionnaires and in-depth interviews from in-service teacher trainees participating in this study. After data collection, results were developed through descriptive and inferential statistical analysis. This included EFA, CFA in Amos 23, ANOVA, and Pearson correlation to analyze the data. The results of the EFA showed that the solution was based on the expected four factors, with all items loading on their respective factors. The nine-factor solution explained 61.18 % of the total variance. The EFA results indicated that the factors had a good level of validity. Additionally, CFA validation using Amos 23 was performed to assess the reliability, convergent validity, and discriminant validity factors of the study data.

The first research question aimed to gather information about the experiences of in-service teacher trainees with OLEs during the Covid-19 pandemic. The findings for this question revealed that teacher trainees encountered difficulties in cooperation and interaction, as well as in acquiring knowledge and skills while using OLEs. This output is consistent with previous research [5–7,9,27,37,33,38,39,49]. For instance, Basheti et al. [9] assessed language teachers' OLEs experience and found that some teachers have a very useful experience and use appropriately. However, it contradicted other studies, such as Mahyoob [35] and Sadeghi and Navaie [68], who described in-service teacher trainees' experience with OLEs as a challenging issue that requires technical support. Eldeeb [1] also concluded that in-service teacher trainees' experience with OLEs lacked cooperation and interaction during the e-learning process, which aligns with the social learning theory. In light of these previous studies, one possible interpretation of this study's findings is that the experience of in-service teacher trainees with OLEs is a contentious issue among e-learning academics.

The second research question aimed to explore the preference of in-service teacher trainees for OLEs. The quantitative data

confirmed that in-service teacher trainees preferred online learning platforms, such as Microsoft Teams, Moodle, You Tube, Twitter, Zoom, Telegram, and Facebook, over face-to-face, collaborative, and individual earning strategies. This preference improvement was observed following the outbreak of the Covid-19 pandemic in the 2019/2020 academic calendar. These findings are consistent with previous research that focused on in-service teacher trainees for OLEs before and after the Covid-19 pandemic [18,21,37,44,46,67,74,75,78–82]. The study confirmed that the use of OLEs in the education sector to address Covid-19 related challenges. Klapproth et al. [18] found that the majority of teachers had a strong preference for online learning platforms contradicting the preference for face-to-face education found by Basheti et al. [14]. The study's findings suggest that the preference of in-service teacher trainees during the Covid-19 pandemic period can contribute to the development of OLE in the Ethiopian educational sector.

The third question revealed a link between the experience and preference of in-service teacher trainees with OLEs during the Covid-19 pandemic among Ethiopian teachers. The study findings showed that cooperation and interaction were significantly correlated with knowledge and skills, online learning platforms, and online learning strategies. Knowledge and skills were significantly correlated with online learning platforms but not with online learning strategies. Online learning platforms were significantly correlated with learning strategies. These results indicate that the dimensions of OLEs, except for knowledge and skills, and online learning strategies, have an impact on each other. Previous studies by Sobaih et al. [22], Revisndani [45], Benmansour [50], and Hu [67] have noted that teachers generally have a positive attitude toward online learning platforms, despite some limitations. Additionally, Em [2], Liu et al. [43], and Adeyeye [44] found that high school teachers and administrators faced challenges with online learning platforms due to a lack of technology resources and financial constraints. The new finding of this study is that online learning strategies are not influenced by knowledge and skills. Basheti et al. [14] and Reviandani [45] concluded that while students preferred face-to-face learning, teachers believed that OLEs could be a less stressful approach in the teaching and learning progress.

6. Conclusion and implications

The results of the present study aimed to examine in-service teacher trainees' experience with and preference for OLEs during the pandemic era. The data collected indicated that while in-service teacher trainees may have less experience in knowledge and skills compared to cooperation and interaction, they still prefer online learning platforms over traditional learning strategies. Furthermore, the correlation analysis revealed that there is no statistically significant correlation between knowledge and skills and online learning platforms. This suggests that in the context of Ethiopian in-service teacher trainees, blended technology should be utilized for successful online teaching and learning. It is recommended that teachers incorporate OLEs into the curriculum across higher education institutions and leverage their experiences with online learning and teaching, as these experiences have a positive impact.

In terms of theoretical implications, particularly in the field of education, there are two main aspects to consider. Firstly, this study contributes to the existing literature on OLEs by exploring the experiences and preferences of in-service teacher trainees specifically. This is important as it emphasizes the significance of OLEs in schools and their role in shaping the future of education. Secondly, the findings enhance our understanding of the factors that influence the effectiveness of OLEs. The study also highlights the crucial role of OLEs in educational settings, both inside and outside the classroom. Overall, this study provides valuable insights into the experiences and preferences of in-service teacher trainees during the Covid-19 pandemic. It underscores the benefits and challenges of OLEs and emphasizes the need for support and guidance in this new educational landscape.

7. Limitations and future directions

In light of the limitations of this study, some future directions are suggested for further research investigations. Chief among these is the acknowledgment that the study had limitations regarding the experience and preference for OLEs among participating in-service teacher trainees in instructional opportunities. Therefore, it is likely that the study did not fully capture the in-service teacher trainees' instructional opportunities through OLEs, and the outcomes of the OLEs for students were not connected with the teachers' experiences and preferences. Additional limitations of the study were related to the representativeness of the sample and the generalizability of the results, which should also be acknowledged and considered. Since the data were collected via a questionnaire, there may be a self-selection sampling bias present. Furthermore, the sample might be imbalanced in terms of the ecological site of the study. As the participants were in-service teacher trainees, there might be a bias towards professional and experienced individuals regarding the generalizability of the study. Therefore, further studies should address this gap by including heterogeneous participants, such as in-service teachers and students, to provide clearer insight into the potential role of OLEs in academic interaction.

Exploring further research into in-service teacher trainees' experiences with and preferences for OLEs would inform future research. The present study only targeted in-service teacher trainees in Ethiopia. However, the findings may be applicable to other developing countries facing challenges with the use of OLEs in terms of the in-service teacher trainees' experiences and preferences. The study also suggests that in-service teacher trainees should be trained in the use of OLEs to enhance teachers' self-efficacy and professional resilience. Furthermore, the study's findings encourage in-service teacher trainees to seek opportunities to broaden their experiences and preferences to incorporate additional activities that enhance their literacy of OLEs.

Ethics statements and consent to participate

Before commencing the data collection process, official letters were obtained from the relevant authorities to contact participants in the study area. The study was conducted in accordance with the local legislation and institutional requirements and approved by research and development committee of department of Ethiopian Languages and Literature (Ref. no. DELL/19/14). The participants in

this study were informed that they could voluntarily take part in the study, and that the results would be used for educational purposes. The participants provided their written informed consent to participate in the study.

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Data availability statements

All data is available upon request from the editors and/or reviewers, and will be provided by the author.

CRediT authorship contribution statement

Hailay Tesfay Gebremariam: Writing – review & editing, Writing – original draft, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization, Supervision, Validation, Visualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this paper, the author utilized Open AI's Natural Language Processing system's AI Editing System. This system was used to correct grammar, punctuation, and spelling errors, as well as to improve the clarity, coherence, and style of the research paper. After using this service, the author carefully reviewed and edited the content as needed, taking full responsibility for the final version.

Declaration of competing interest

The authors have declared that they have no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

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