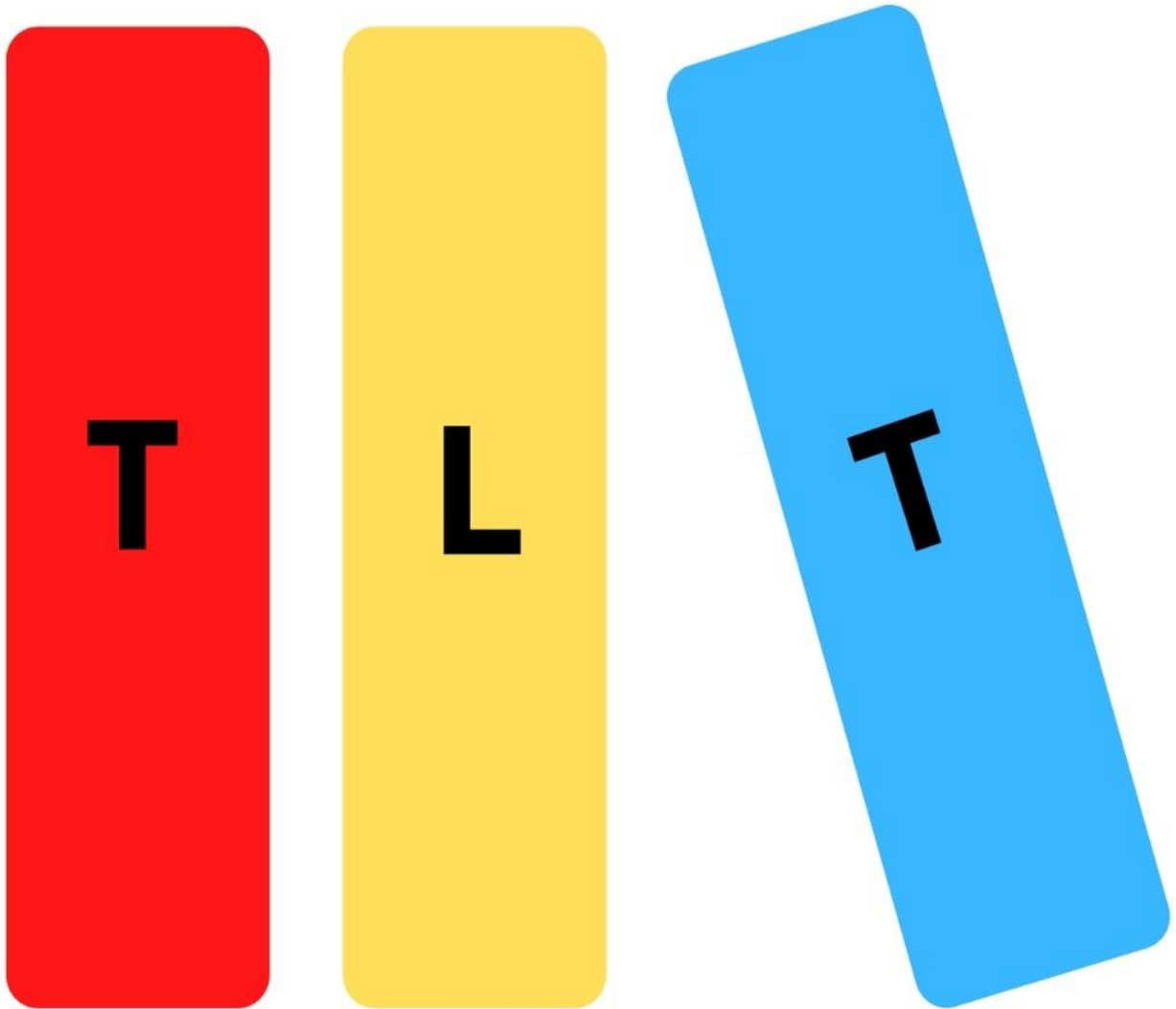


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Navigating the digital shift: The intersection of applied linguistics and instructional technology in ELT

Tuncer Can

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The field of English Language Teaching (ELT) is undergoing a transformation, largely driven by the digital revolution that has redefined the educational landscape. In this Special Issue of Literacy Trek Journal, we delve into the rich interplay between applied linguistics and instructional technologies, exploring how they collectively contribute to the advancement of ELT. The insights presented in the three pivotal studies featured in this issue underscore the complexities and innovations defining this new era.

The first paper, "Online Testing and Assessment in the English as a Foreign Language Context: Teachers' Perspectives" by İrem Gedil and Selami Aydın, casts a much-needed spotlight on the often-overlooked views of English instructors. The ambivalence in their perspectives on online assessment mirrors the broader uncertainties of our digital transition. This research, encompassing the opinions of 302 instructors across Türkiye, reveals a nuanced landscape where excitement for innovation is tempered by concerns over affective factors and the integrity of assessment measures. The neutrality of instructors' views signals a call to action for ELT professionals to shape online assessment tools that are not only reliable and secure but also sensitive to the human element of language teaching.

Ahmet Başıal's introspective piece, "An Autoethnographic Study: Self-growth Approach for Teacher Educators in Training Tech-effective Teachers," takes us on a personal journey highlighting the pivotal role of teacher educators in the digital paradigm. Başıal's candid examination of his own journey towards enhancing his digital

literacy and pedagogical skills is a testament to the transformative power of self-reflection and continuous learning. By advocating for a non-formal self-growth approach, Başal invites fellow educators to reconceptualize their professional development, prioritizing the acquisition of digital competencies to empower the next generation of ELT professionals.

The third paper, "An Interactive Conversation with a Chatbot: Does ChatGPT Know Standard Phraseology in Aviation English?" by Rabia Dinçer, Nazmi Dinçer, and Oğuz Guksu, ventures into the realm of artificial intelligence, showcasing ChatGPT's remarkable proficiency in aviation English. The implications of this study are profound, suggesting that AI can not only complement traditional language learning tools but also enhance the specialized training required for high-stakes environments like aviation, where precision and clarity are paramount.

As we conclude this editorial, we reflect on the central theme that binds these studies: the imperative for ELT professionals to embrace and harness the power of technology. It is an invitation to innovate, to adapt, and to reimagine the possibilities of language education. This Special Issue is not just a collection of research; it is a call to the ELT community to participate actively in shaping the future of our field—a future where technology and linguistics converge to create more effective, engaging, and inclusive learning experiences.

We thank our contributors for their groundbreaking work and invite our readers to engage with these studies, to reflect on their implications, and to contribute to the vibrant dialogue they inspire.

Online testing and assessment in the English as a foreign language context: Teachers' perspectives

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Abstract

As online assessment is a rather new phenomenon, available research regarding it is limited, and most of the research in literature today examines the views of students regarding online assessment as they are one of the most important stakeholders of exams. On the other hand, although they are the basic users and practitioners of the system, studies on the views and perspectives of instructors on online assessment in the context of English as a foreign language (EFL) are limited in number. With these concerns in mind, this study aims to explore English instructors' perspectives of online assessment in tertiary educational institutions in Turkey with regard to their general views on online assessment, along with their views on affective factors, validity, reliability, security, practicality, and the impacts of online assessment on teaching and learning. In this descriptive study, the data were collected from 302 English instructors working at English preparatory schools in various universities in Turkey through a background questionnaire and the Student Perceptions of e-Assessment Questionnaire (SPEAQ). The results show that instructors' overall perspectives on online assessment are neutral.

Keywords

English as a foreign language, online assessment, teachers, perceptions

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Introduction

Testing and assessment play a crucial role within the EFL context, exerting indispensable significance for both students and educators through varied means. First, assessment is essential for learners as it increases their motivation and interest and eventually helps students learn a language (Madsen, 198). When teachers employ meaningful and trustworthy assessment methods, students will be more willing to learn the language and enjoy a sense of achievement, thereby facilitating their overall learning process. In addition, when students are aware that they will be evaluated, they will study

the language more willingly, thus positively impacting their overall learning outcomes. Second, testing and assessment are very important for teachers to collect information on the language capabilities of learners (Hughes, 1989). With the help of tests and evaluation methods, teachers will be able to identify students' level of language proficiency, their strengths, and weaknesses and will be able to measure if learners have achieved their goals. Therefore, they will be able to get to know the students and their needs easily. Finally, according to testing and evaluation results, teachers and administrators can make educational decisions in the right direction (Hughes, 1989). This way, the teaching program, books and materials in use, course content, and the teaching method will be effectively evaluated and re-adjusted if necessary (Aydin, 2004). For these reasons, testing and assessment have been the backbone of language teaching for enlightening the teaching and learning process and providing the opportunity to improve them. Without assessment, it will not be possible to evaluate learner responses to educational activities (Pehlivan Şişman & Büyükkarcı, 2019).

Online testing and assessment in the EFL context are also significant for three fundamental reasons. First, online testing and assessment fit well into the 21st-century language teaching context since it is the natural outcome of changing and evolving education systems with improving technology. Today's students, called Generation Z learners or I-Gens (Rothman, 2016), prefer the involvement of technology in their language learning experience. Online assessment is considered a more accessible and suitable system for today's students (Prensky, 2010), and this preference should be reflected in language assessment activities (Appiah & van Tonder, 2018). Second, online testing and assessment provide increased practicality, logistic efficiency, and reliability in language assessment (Long et al., 2018). It allows the test taker to take the test in any location and at any time, increasing the flexibility for taking the test. Moreover, when marking is done by automatic scoring, online assessment increases practicality by saving time, effort, and accuracy by utilizing computer programs for marking. It also provides immediate reporting of the results to stakeholders, thereby saving time. In addition, since test developers can upload and update test items easily, with little time and location restrictions, it eases the test developers' work (Long et al., 2018). The final reason why online testing and assessment is essential is that they provide the opportunity to continue testing and evaluation activities in the EFL context

even in times of crisis (Alghammas, 2020). With the help of online assessment methods, language learning and assessment activities can continue uninterrupted, even when face-to-face learning and assessment have to stop.

Teachers' perceptions of online testing assessment in the EFL context are also very important for three reasons. First, EFL teachers need to adapt to technological improvements since they are teaching and assessing today's tech-savvy students who automatically need the involvement of technology to be interested (Mahbub, 2020). As language teachers need to grab students' attention, they need to make use of online assessments. However, if they do not believe in the effectiveness or usefulness of the system, they cannot appeal to students. Therefore, knowing teachers' perceptions regarding online testing and assessment in the EFL context is paramount. Second, to improve assessment, it is necessary to identify the needs and requirements of teachers with regard to online assessment methods (Gamage et al., 2020). Improving assessment or catering to their needs may not be possible without asking them about their perceptions, wants, and needs. Third and last, it is important to discover teachers' perceptions of online assessment in the EFL context to see how well their opinions match with the principles of language learning and teaching in teachers' minds. Since their perceptions greatly affect their performance in class, it might be important to understand what teachers think of online assessment and make changes in the curriculum, assessment methods, teaching methods, and the teaching program accordingly (Balaman & Tiryaki, 2021).

As online testing and assessment in the EFL context have recently gained popularity, its problems are gradually emerging. One of the most commonly referred problems related to online testing and assessment is the issue of security (Mellar et al., 2018). It is believed that language students find many interesting ways to cheat or commit plagiarism during online testing and assessment practices, negatively affecting the reliability of the assessment (Rogers, 2006). Additionally, many teachers believe that online tests and assessments make both cheating and plagiarism easier (Mellar et al., 2018). The second problem of online assessment is the issue of validity. As many online tests include objectively marked items such as multiple choice items, true/false items, or fill-in-the-blank types of items, opportunities to foster students' critical

thinking abilities are overlooked. Thus, many of the online EFL assessment tasks and tests are found to be disempowering since students who do not add any ideas, improve existing opinions, or devise new ways of thinking become passive participants in activities (Öz, 2014b). Finally, accessibility and practicality are also problems for online testing and assessment. Lack of necessary equipment or internet connection can lead to serious problems during the process of testing and assessment tasks (Alruwais et al., 2018). Sometimes, students tend to feel anxious because of the Internet connection, Internet speed, or software problems such as unexpected updates, system failures, or overloaded systems (Khan & Khan, 2019). In addition, complicated test procedures that might require technological support might result in serious consequences for the stakeholders (Fitriyah & Jannah, 2021).

An important issue about testing and assessment is that despite their significant role as item writers, assessors, or decision-makers, teachers' perception of testing and assessment in the EFL context is usually ignored (Sevilen, 2021). Unfortunately, when their opinions about testing and assessment practices are not given enough importance, testing, and assessment activities might not lead to better learning outcomes in the language learning context, contrary to what is expected of them. Since EFL teachers are to choose learning materials, make up the curriculum, or define learning objectives, their perceptions, and conceptions play a very important role in making those decisions, as the research on the issue is limited in number (Mede & Atay, 2017), the EFL learning context might be deeply affected by this lack of insight negatively. The understanding which suggests that not all teachers participate in item writing activities and they do not need to have an understanding of assessment-related issues is a problematic approach since teachers need to be highly aware of assessment issues as one of the basic stakeholders of testing and assessment, even if they are not test writers (Sevilen, 2021). That is because teachers' understanding of assessment activities fundamentally affects classroom learning and teaching activities (Sahinkarakas, 2012). Thus, raising awareness on the issue of teacher perceptions regarding assessment in the EFL context is very important.

As mentioned before, since online testing and assessment in the EFL context is a new practice in many institutions, it has brought about many challenges and

uncertainties (Gamage et al., 2020), most of which are directly related to teacher roles and responsibilities. As the process involves many uncertainties, it causes many differences in teachers' ideas. Thus, the problem of now knowing how EFL teachers feel about these uncertainties is an issue in terms of the effectiveness, efficiency, and safety of online testing and assessment procedures. However, EFL teachers' general feelings and attitudes about the issue are not known because of the lack of research (Rea-Dickins, 2004). When the teachers' overall perceptions are not known, how much they accept this new phenomenon is also subject to doubt. As the acceptance level of new technology is unknown, it is impossible to understand the general attitude toward the new procedures (Al-alak & Alnawas, 2011). This can also be valid for the components of validity, reliability, and the effects of assessment on learning and teaching. In addition, EFL teachers' perception of online testing and assessment is highly affected by their computer expertise (Alruwais et al., 2018), and existing studies on the issue reflect conflicting results (Öz, 2014b). For this reason, it is crucial to explore how teachers perceive online testing and assessment concerning their computer expertise. Below, a brief review of the literature on EFL teachers' perceptions of online testing and assessment is presented.

Literature review

The results of a limited number of studies indicate that one of the most common concerns for teachers regarding online assessment is the issue of security and academic integrity. Rogers' study deals with the teachers' perspectives regarding academic integrity which aims to find if online assessment tools are used in a higher education institution and what concerns the faculty has regarding online education. Rogers (2006) revealed that more than half of the faculty used online assessments under unsupervised environments, and almost half of the faculty members using online assessment were suspected of cheating in varying methods such as Internet surfing during an assessment, copying, or cheating from others. It was also found that no instructors were using security software to prevent cheating (Rogers, 2006). Another recent study by Sa'di et al. (2021) conducted in certain universities in Jordan revealed that instructors were skeptical about online assessment due to security and academic integrity issues and the

lack of training and expertise. Through an online survey, participants expressed their perceptions of online assessment and provided feasible solutions to the challenges such as providing training for online assessment practices for instructors, using high-tech plagiarism software, and using a combination of formative and summative online assessment tasks (Sa'di et al., 2021). Another study focused on academic integrity in online assessment (Mellar et al., 2018). In their study, they used a mixed method of surveys and interviews to see if faculty made use of a newly introduced security system to prevent cheating cases in three different universities and some solutions to address the issue. They found that faculty expected cheating to be greater in online assessment. In addition the biggest cheating cases occurred in the form of ghostwriting, plagiarism, or copying work from the Internet. Thus, they concluded that online systems do not increase cheating cases, but authorship-checking software should be used, and assessment should be made in a variety of methods rather than in one method or one type (Mellar et al., 2018).

According to other studies investigating how teachers perceive online assessment in general, teachers tend to have positive attitudes regarding online assessment in general but also have certain concerns such as the lack of technical infrastructure, technical and technological support, or security. For instance, in a study by Chien et al. (2014), semi-structured interviews were conducted to explore teacher beliefs about technology-based assessments and the relation between teacher beliefs and their practices. It was found that the vast majority of teachers found technology-based assessment useful, beneficial, and effective, and the difficulties regarding the use of technology-based assessment stemmed from poor infrastructure or lack of technical support (Chien et al., 2014). A more recent study by Küppers and Schroeder (2020) looked into university teachers' perceptions of online assessment through online surveys and demonstrated that most of the teachers were open-minded about the use of online assessment, and their major concerns were related to fairness and security. They also compared demographic results and revealed that the younger and the more technologically experienced the teachers were, the more positive attitudes they had toward using online assessment tools.

Other studies investigating teacher perceptions of online assessment show that although teachers find online assessment useful in times of crisis, they do not prefer to use it as a regular assessment. For instance, a study in Saudi Arabia explores the university instructors' general feelings toward online assessment in terms of its validity, reliability, security, practicality, the types of questions they prefer during the online assessment, and differences between the types of questions that male and female instructors choose to use (Alghammas, 2020). In his quantitative study, Alghammas (2020) used Dermo's (2009) questionnaire, which originally explored student perceptions on the issue and found that instructors working at Saudi universities had a slightly positive attitude toward the use of online assessment at universities with some concerns such as technical problems, security issues, and reliability. It was also revealed that the faculty had not used online assessment tools a lot previously. The research indicated that online assessment might be useful in difficult times but may not stand as a regular assessment method in their institution. The research could not indicate any significant correlation between the gender of participants and their question type preferences. As for the types of questions, most faculty members expressed that the questions should be feasible for objective grading due to immediate feedback opportunities and scoring ease (Alghammas, 2020). In another noteworthy and recent study, Yulianto and Mujtahid (2021) explored teacher perceptions towards online assessment through online interviews with 12 teachers and found out that in the Indonesian context, online assessment was less effective than traditional assessment due to the socio-economic background of students, lack of Internet connection and teachers' inexperience in and unfamiliarity with the technology. The teachers found online assessment useful in emergencies but very difficult to conduct (Yulianto & Mujtahid, 2021).

Some other studies indicate that teachers might also have negative attitudes toward online assessment due to several factors such as inexperience in technology, lack of support from relevant parties, or personal barriers or difficulties. In a study that investigates teachers' perceptions of online assessment in higher education institutions in Lebanon, it was found through online interviews that instructors were anxious about using online assessment due to the lack of training before using it, and they were refraining from using summative assessment via online tools (Mirza, 2021). In China,

another qualitative study by Zhang et al. (2021) revealed that the lack of preparation time and training caused a great variety in teacher practices of online language assessment at universities. The sudden change to online assessment due to unexpected situations caused great stress among teachers. Teachers also stated that they feared security issues, and thus, they mostly used formative online assessment rather than summative online assessment (Zhang et al., 2021). Another study in the Indonesian context searched for teachers' perspectives on online formative assessment and the advantages and constraints of online assessment according to their understanding (Astiandani & Anam, 2021). Through semi-structured interviews, it was found that public school teachers mostly had negative perceptions toward online assessment due to the lack of parental support when necessary and the irresponsible behaviors of students. In private institutions, though, teachers were neutral toward it. Although they listed advantages such as immediate feedback, promoting autonomy, and being enjoyable and motivating for the students, the lack of Internet connection and the time-consuming nature of creating assessments made online assessments difficult for them. Teachers also proposed some solutions such as getting support from all stakeholders and obtaining better Internet connection availability (Astiandani & Anam, 2021). In Iran, a similar result was found in the study by Ghanbari and Nowroozi (2021) which searched for teacher perceptions of online assessment through interviews and showed that teachers faced technological barriers such as lack of technical infrastructure and lack of technical knowledge and thus, their online assessment experience was affected negatively. Teachers also expressed personal problems such as the lack of motivation and awareness about the issue. Thus, their overall perspective on online assessment practices remained negative (Ghanbari & Nowroozi, 2021). Another similar result was obtained from a study conducted in India by Joshi et al. (2020) through an interview with 19 teachers which found that teachers had problems in both home settings such as the lack of basic facilities, personal external distractions, and institutional settings such as lack of budget, training and technological support (Joshi et al., 2020).

Overview of the current study

In its general sense, language teaching assessment aims to gather information about different aspects of educational processes to make meaningful decisions about plausible

action plans to improve teaching and learning. (Carol, 1961, as cited in Fulcher, 2010). To this end, as one of the important stakeholders of the assessment process, teachers' role should not be underestimated but rather valued and investigated. Their perception and understanding of assessment will play a significant role in the decision-making process as when they develop a solid understanding and ownership of the assessment, they will affect the whole process by making beneficial decisions for learners and also by improving learner and public acknowledgment through raising awareness (Xerri & Vella Briffa, 2018). Moreover, existing literature shows that how teachers conceive assessment deeply affects how they behave in the classroom, directly impacting learning and teaching (Sahinkarakas, 2012). As the core of the language learning process, classroom activities might be affected by teachers' perceptions, and thus, their opinions on assessment should be considered. In short, when institutions apply online testing and assessment procedures in language classes, it is vital to identify teacher perceptions of the new assessment procedures (Alghammas, 2020). With these concerns in mind, this study aims to discover teachers' perceptions of online assessment practices in the EFL context and asks one research question:

- How do English as a foreign language instructors perceive using online testing and assessment?

Method

Research context

This research aims to identify online assessment perspectives of teachers working at English preparatory programs of universities in Turkey. It mainly explores instructors' general perspectives of online assessment. The research follows an analytic approach as it is assumed that the survey items relate to the predetermined construct of online assessment perspectives, and it tries to discover the relationship between this construct and the items rather than attempting to analyze the construct as a whole. The participating groups naturally exist without any pre-formation; thus, the data is collected naturally. In terms of the degree of control over the research context, it can be said that the research is carried out in a semi-controlled environment as the context is narrowed

down to university teachers only, and the scope is to teacher perceptions of online assessment in general, as well as, reliability, security, practicality, and pedagogy issues. Finally, it is possible to claim that the researchers have been as objective as possible since they had no control over the participants and their answers (Seliger & Shohamy, 1989).

Participants

Participants of the study were 302 English instructors working at the English preparatory programs in various universities in Turkey; 228 (75.5%) were females, and 74 (24.5%) were males. The mean age of these participants was 41.1, between 24 and 71. The mean score for teaching experience was 17.5 years with one year of experience being the lowest and 48 years being the highest level of experience. One hundred seventy-seven of the participants had a master's degree (58.6 %), while 92 had a bachelor's (30.5%) and 33 had a doctoral degree (10.9%). Of these participants, one hundred eighty-eight instructors graduated from English Language Teaching departments (62.3%), 74 of them graduated from English Language and Literature departments (24.7%), 19 from American Culture and Literature departments (6%), and 21 (7%) from other departments such as Translation Studies, or Linguistics. Of the participants, two hundred and three (67.4%) instructors worked at private or foundation universities, and 99 of them worked at state universities (32.6%). Two hundred fifty-six of these teachers expressed that they did not have an administrative duty (84.7%), while only 46 of them (15.2%) stated that they had administrative duties. As for office duties such as being a curriculum development, testing, and assessment, or professional development unit member, two hundred and six instructors stated that they did not have such responsibilities (68.2%), and 96 of them stated that they were working at one of these offices (31.7%). One hundred sixty-eight of the participants stated that they found themselves good in terms of computer expertise (56.6%), 69 of them (22.8%) stated they were excellent at using computers, and 65 of them (21.5%) thought that they were adequate users of computers.

Tools

The study used two data collection tools. First, a background questionnaire to collect demographic and background information about participants was shared with the

participants. The participants were expected to give information about their gender, age, highest level of educational degree completed, graduation department, level of teaching experience in years, position in their institutions, and level of computer expertise. The second tool was the SPEAQ developed by Dermo (2009), which was originally administered to students to identify their online assessment perceptions and perspectives. In the original research, the questionnaire was divided into six dimensions related to online assessment: affective factors, validity, practicality, reliability, security, and effects on learning to analyze the data more effectively (Bryman & Cramer, 2001, as cited in Dermo, 2009). Then, five indicators to measure students' perceptions of e-assessment for each dimension were formed in accordance with existing literature and expert opinions (Dermo, 2009). Although the scale's overall reliability coefficient and construct validity values were not reported, the reliability coefficients in Cronbach's alpha for each questionnaire component were stated in the paper. The reliability value for affective factors was .80, and .33 for validity. For practicality, it was measured as .68, and for reliability, it was .63. For security, it was measured as .69, and for effects on learning, it was .82. Dermo's (2009) SPEAQ was adapted to measure teachers' perceptions and perspectives of online assessment and includes 30 items, slightly changed in wording from the original to fit the purpose of this research. To indicate their beliefs on each of the 30 statements with a numerical expression, the participants were asked to select the options given on a Likert-type scale of 5 points (5= "Strongly Agree"; 4= "Agree", 3= "Neutral", 2= "Disagree", 1= "Strongly Disagree"). Each of five statements of the survey refers to an aspect of testing and assessment collected data on affective factors regarding the use of online assessment (See Appendix A).

Procedure

Upon receiving the approval of the Ethics Committee of Educational Sciences, the online survey was shared with instructors working at English preparatory programs of diverse universities in Turkey via e-mails and social media tools. Since the online questionnaire and scale are one of the most efficient ways of data collection, participation is positively affected when participants are sent personal messages via mail (Muñoz-Leiva et al., 2010). The data were collected through personalized e-mails. It

was ensured that the data would be anonymous used only for research purposes, and participation would be on a voluntary basis.

Data analysis

SPSS was used in the analysis process. Before the analysis, some of the items had negative expressions regarding different aspects of online testing and assessment. The reliability of the overall survey with 30 items was found as $\alpha = .92$, indicating good internal reliability. The reliability value of each aspect of online assessment is as follows: $\alpha = .81$ for affective factors; $\alpha = .61$ for validity; $\alpha = .73$ for practicality; $\alpha = .70$ for reliability; $\alpha = .73$ for security and $\alpha = .83$ for impact on teaching and learning. The overall construct validity of the scale was computed as a percentage of total variance of 59.82. The values regarding the construct validity and internal consistency for the aspects related to online assessment evaluated in this scale are shown in the following table.

Table 1

The reliability coefficients and % of variances

Scales	N of Items	Cronbach's Alpha	% of variance
Overall Scale	30	.92	59.82
Affective Factors	5	.81	67.82
Validity	5	.61	62.84
Practicality	5	.73	49.83
Reliability	5	.70	56.23
Security	5	.73	59.96
Impact on Teaching and Learning	5	.83	60.31

Results

The values in Table 2 show that instructors had an overall neutral perspective of online assessment in this context. According to the table, it can be seen that the impact of online assessment on the teaching and learning category had the highest average score ($\bar{x}=3.38$), whereas the security aspect had the lowest ($\bar{x}=2.32$). While the overall average for all the items was 2.81, the closest mean score to the overall average belonged to validity ($\bar{x}=2.80$) and practicality ($\bar{x}=2.72$).

Table 2

Descriptive statistics for the aspects of online assessment (N=302)

Scales	Mean	Std. Deviation
Overall Scale	2.81	.58
Affective Factors	2.70	.82
Validity	2.80	.69
Practicality	2.72	.74
Reliability	2.96	.72
Security	2.32	.67
Impact on Teaching and Learning	3.38	.70

According to the values given in Appendix A, the mean scores indicate that the perceptions of instructors could be different according to each component of online assessment. To begin with, the mean score of affective factors ($\bar{x}=2.70$) was lower than the overall average ($\bar{x}=2.81$), suggesting that teachers had psychological barriers regarding online assessment. Instructors felt more comfortable with paper-based exams ($\bar{x}=3.80$) when compared to online exams ($\bar{x}=2.36$) despite the fact that they expected online assessment to be a part of the regular assessment at the tertiary level ($\bar{x}=3.40$). For the validity aspect of online assessment ($\bar{x}=2.80$), Instructors' perspectives were in line with their overall perceptions ($\bar{x}=2.81$). However, they possibly thought that online assessment could not effectively assess their subject area ($\bar{x}=2.92$), as English could be too complex to deal with online multiple-choice items ($\bar{x}=3.21$) and online assessment also tested the technological skills of students ($\bar{x}=3.40$). Practicality ($\bar{x}=2.72$) also fell behind their overall perceptions of online assessment ($\bar{x}=2.81$) as they very strongly believed that technical problems ($\bar{x}=3.96$) and Zoom/computer fatigue ($\bar{x}=3.59$) made online assessment impractical. They did not seem to appreciate the practicality of online assessment in terms of time and space very much as well ($\bar{x}=2.95$). Yet, they welcomed the prevention of paper waste with online assessment ($\bar{x}=3.74$). Reliability scores ($\bar{x}=2.96$) of instructors were a little higher than their overall perceptions ($\bar{x}=2.81$) as they thought that computer-based marking was more accurate ($\bar{x}=3.50$). However, they also thought that paper-based exams were fairer than online assessments ($\bar{x}=3.45$). Security ($\bar{x}=2.32$) fell significantly behind the overall perceptions of instructors ($\bar{x}=2.81$), making this aspect the most negatively perceived aspect of online assessment. They especially worried about the ease of cheating ($\bar{x}=4.26$), and they had little trust in the system in

terms of plagiarism and cheating ($\bar{x}=2.26$) and hackers ($\bar{x}=3.75$). Instructors seemed to value the impacts of online assessment on teaching and learning as the mean score of this component ($\bar{x}=3.38$) was a lot higher than their overall perception ($\bar{x}=2.81$). Last, they seemed to appreciate the immediate feedback opportunity of online assessment ($\bar{x}=3.65$) and its complying nature with online learning ($\bar{x}=3.75$).

Conclusions and Discussion

This study aims to investigate teachers' perceptions of online testing and assessment. Given that the Internet and computers have inevitably been integrated into many aspects of education because of advancing technology (Momeni, 2022), it is of utmost importance to discover how teachers perceive online assessment. To this end, instructors' overall perceptions of online assessment are identified, and their overall perceptions of different components of online assessment are studied. This study concludes that most instructors hold a neutral perception of online assessment. It is apparent from instructors' responses that although a small minority seems to appreciate the advantages of online assessment in terms of practicality and pedagogy, the vast majority seem to have serious concerns regarding anxiety, difficulty, reliability, and security.

This study shares similar results with many studies in the existing literature. Many existing studies in the literature indicate that teachers have profound concerns and worries regarding security issues. Rogers (2006), Mellar et al. (2018), Meccawy et al. (2021), Alghammas (2020), and Sa'di (2021) are some of the researchers that conclude that teachers have serious security and academic integrity concerns for online assessment. This study indicates that the same concerns are shared by teachers, as seen in instructors' responses to the security component. Moreover, this study also shares common findings with Rollim and Isaias (2018), as both studies indicate that teachers lack trust in the system of online assessments. Another similarity of results between this study and other studies such as Mirza (2021), Zhang et al. (2021), and Astiandani and Anam (2020) is that instructors feel anxious during online assessment due to many reasons. This study also concludes that instructors' stress levels increase during online assessment. Another similar finding is on technical barriers. The current study shares

similar results with Nowroozi (2021) and Joshi (2020), as all conclude that instructors face technical barriers during online assessment. In this study, instructors' perspectives on technical issues are apparent in their responses regarding technical problems. Furthermore, similar to Yulianto and Mujtahid (2021) who found that teachers feel online assessment is less effective compared to paper-based exams, this study reveals that the majority of teachers would feel more comfortable with paper-based exams, and they would prefer online exams less than paper-based exams. Moreover, they find paper-based exams fairer than online ones, indicating that instructors find online assessments less efficient than traditional ones.

There are also contrasting results of this study with others in the literature with regard to many findings. First, this study shares contradictory results with those claiming that instructors have positive perspectives of online assessment with less anxiety when the assessment is online (Baleni, 2015). In the current study, on the other hand, instructors seem to have neutral perspectives towards online assessment, with a serious level of anxiety, as can be seen in the mean scores of instructors in affective factors. Other studies in the literature that have different results from this study are Chien et al. (2014) and Fageah's (2015) studies, both of which reveal that teachers have positive attitudes toward online assessment. However, the results of this study reveal that instructors had a neutral perception toward online assessment. In sum, the current study has contradictory results with other studies in literature, some of which found that instructors have less anxiety during online assessment and positive attitudes toward it.

There are also studies that are in partial agreement with the results of this study. First of all, this study partially complies with Küppers and Schroeder's (2020) study and Fitriyah and Jannah's (2021) study, both of which reveal that instructors have positive perspectives toward online assessment but have security concerns in mind. This study exhibits findings similar to those of the aforementioned studies, as security emerges as the primary concern based on the responses of participating instructors while having neutral perspectives toward online assessment. Another study that aligns, to some extent, with this study is Asma's (2021) research, which reveals that teachers have positive attitudes towards online assessment owing to its benefits such as being flexible and eco-friendly, but have concerns toward it because of screen fatigue and cheating

issues. The current study also unveils instructors' concerns about screen fatigue and cheating. However, as the current study concludes that instructors have neutral perceptions of online assessment, contradicting results that were reached by Asma (2021) regarding the overall attitude of instructors.

In conclusion, this study contributes to the existing literature by providing scientific data on a rather immature field of research, which is online testing and assessment, collected from a specific group of teachers who work in the field of EFL. The study may also help relevant parties such as teachers, administrators, curriculum developers, and item writers working in the EFL context to make educated decisions regarding online testing and assessment issues. The results are to be analyzed meticulously and, therefore, may be helpful in planning and administering online tests and assessments in the EFL context in a more relevant manner. Finally, by shedding light on how teachers perceive online assessment in the EFL context, this study may open the gate for further research on online assessment practices in the EFL context.

Teachers can benefit from practical recommendations in light of this research. Since teachers have a neutral perspective of online assessment with many issues in mind such as security and validity concerns, less appreciation of flexibility of time and space, nonacceptance of immediate feedback chances, and disapproval of potential positive contributions to class learning, it is necessary to raise awareness on such issues with relevant input. Thus, it is essential to help instructors understand and appreciate the nature of online assessment with to-the-point workshops or training sessions.

As for decision makers such as school administrators, testing office members, and test writers, several recommendations can be put forward. First, as it is evident that teachers' overall perception of online assessment is neutral, security being the least positive aspect of online assessment according to teachers' perspectives, decision-makers can improve the security of the systems against both cheating and hackers. To this end, several measures such as using a secure browser technology, exam recording, auto and live proctoring methods can be taken. Moreover, exam data should be kept in well-protected virtual areas so hackers cannot enter the system. In order to ensure security and prevent technology-related misconduct or failures, continuous technology support should be provided before, during, and after the exam. Second, the decision-

makers should be aware of the benefits and opportunities that online assessment might provide and promote online assessment in their institutions by giving relevant information and training to the teachers working at their institutions. As online assessment will probably be much more common in the future thanks to its ease of use, efficient administration, ease of grading and grade announcement, flexible nature of time and space, prospect of giving immediate feedback to the student and the teacher, institutions, and decision-makers need to be ready to equip their instructors with essential information and skills. Moreover, they need to be ready to make necessary technological innovations and install the required equipment to adapt to 21st-century assessment methods.

There are several limitations of this study. First, the data were collected from 302 participants who worked in a specific context in Turkey. Second, only quantitative data is used to come up with descriptive results. The third limitation is that the data is collected in a limited time, which might lead to the assumption that instructors' overall perceptions of online assessment might change or improve. A fourth limitation of this study is the challenge of studying the perspectives of instructors as perspectives, beliefs, perceptions, and attitudes are personal values that are hard to measure and explain, especially with a quantitative study.

Some recommendations for further research can be noted. First, instructors' perspectives of online assessment should be researched in as many contexts as possible since they are actually the "agents of the assessment process" (Harlen, 1996, as cited in Shim, 2009). Being the core users of the system, they contribute greatly to the decision-making process in relation to assessment, teaching, learning, policies, and curriculum. In other words, how teachers perceive online assessment seriously affects the way they implement online assessment practices in and outside the class. Therefore, as teachers' beliefs and perceptions greatly influence their practices, a considerable amount of research should be done to understand their perspectives on all types of assessment, including online assessment, and the factors that influence their perceptions (Shim, 2009). Second, it is necessary to understand the dynamics, principles, designs, and pedagogical implications of online assessment to fully utilize the unprecedented potential of online assessment for students' learning and teachers' jobs (Stödberg,

2015). Third, data collection can be done from multiple resources. Although the data collected from instructors is meaningful, seeing the issue from the eyes of the students is crucial to understanding the issue of online assessment in a better and clearer way, as they are also at the core of assessment along with teachers. Moreover, to view the issue from the administrators' and testing office members' viewpoints, involving them in the process would be wise. Involving as many relevant parties as possible will allow data collection in a multifaceted way, making data triangulation possible multiple times.

Ethics Committee Permission Information

This research study was conducted with the Research Ethics Committee approval of Istanbul Medeniyet University, dated 03.10.2022 and numbered 2022/08-01.

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Appendix A

Descriptive statistics for the scale items (N=302)

Online testing and assessment in the English as a foreign language context: Teachers' perspectives

Items		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard Deviation
1. Using a computer adds to the stress of exams for teachers.	N	24	63	64	125	26	3.21	1.11
	%	7.9	20.9	21.2	41.4	8.6		
2. I expect computers to be used as part of regular assessment at university.	N	15	48	81	116	42	3.40	1.06
	%	5	15.9	26.6	38.4	13.9		
3. I'd feel more comfortable if the exam was on paper, not online.	N	9	32	59	110	92	3.80	1.07
	%	3	10.6	19.5	36.4	30.5		
4. I find it hard to invigilate/do relevant tasks when doing an online exam.	N	24	68	57	122	31	3.22	1.14
	%	7.9	22.5	18.9	40.4	10.3		
5. I'd rather do exams on a computer than on paper, because I am used to working online.	N	57	138	59	36	12	2.36	1.04
	%	18.9	45.7	19.5	11.9	4		
6. Online assessment is appropriate for my subject area which is English.	N	35	83	74	91	19	2.92	1.13
	%	11.6	27.5	24.5	30.1	6.3		
7. My subject area/ English is too complex to be dealt with by online multiple-choice questions.	N	23	88	43	96	52	3.21	1.24
	%	7.6	29.1	14.2	31.8	17.2		
8. Online exams don't just test knowledge of the subject, but IT skills as well.	N	10	61	60	138	33	3.40	1.03
	%	3.3	20.2	19.9	45.7	10.9		
9. Online exams facilitate more authentic assessment than traditional methods through integration of multimedia, simulations, etc.	N	16	78	84	114	10	3.07	.98
	%	5.3	25.8	27.8	37.7	3.3		
10. Because they can guess the answer, online multiple-choice questions don't really reflect students' level of knowledge.	N	10	83	57	102	50	3.32	1.14
	%	3.3	27.5	18.9	33.8	26.6		
11. Online assessments use less paper, which is important to me.	N	7	34	56	137	68	3.74	1.00
	%	2.3	11.3	18.9	45.4	22.5		
12. Technical problems make online exams impractical.	N	3	30	34	143	92	3.96	.95
	%	1	9.9	11.3	47.4	30.5		
13. Computer/Zoom/Internet fatigue makes online assessments impractical.	N	6	56	53	125	62	3.59	1.06
	%	2	18.5	17.5	41.4	20.5		
14. It isn't practical for students to do online exams in the computer labs/ dormitory rooms/ libraries.	N	12	57	52	123	58	3.52	1.11
	%	4	18.9	17.2	40.7	19.2		
15. Online exams are more practical than paper based exams because they are free from time and space.	N	31	91	66	89	25	2.95	1.15
	%	10.3	30.1	21.9	29.5	8.3		
16. Marking is more accurate, because computers don't suffer from human error.	N	9	45	71	137	40	3.50	.99
	%	3	14.9	23.5	45.4	13.2		
17. The technology used in online assessments is unreliable.	N	19	71	77	110	25	2.83	1.07
	%	6.3	23.5	25.5	36.4	8.3		
18. Online assessments favor some students more than others.	N	28	76	51	116	31	3.15	1.18
	%	9.3	25.2	16.9	38.4	10.3		
19. Paper-based exams are fairer than online exams.	N	10	67	59	108	58	3.45	1.13
	%	3.3	22.2	19.5	35.8	19.2		
20. Randomized questions from a bank means that sometimes students get easier questions.	N	10	64	86	126	16	3.24	.95
	%	3.3	21.2	21.2	41.7	5.3		

Items		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard Deviation
21. The test materials and results of online assessment are just as secure as paper-based assessment.	N	28	101	85	76	12	2.81	1.04
	%	9.3	33.4	28.1	25.2	4		
22. The technology used in online exams is sufficiently effective in dealing with cheating and plagiarism.	N	80	120	51	44	7	2.26	1.07
	%	26.5	39.7	16.9	14.6	2.3		
23. It is easier to cheat on online exams than with paper-based exams.	N	1	18	25	113	145	4.26	.87
	%	.3	6	8.3	37.4	48		
24. The online exam system is vulnerable to hackers.	N	6	25	66	146	59	3.75	.93
	%	2	8.3	21.9	48.3	19.5		
25. Username and password login provide adequate security for online exams...	N	34	122	92	59	4	2.56	.94
	%	11.3	40.4	30.5	16.6	1.3		
26. The potential for immediate feedback with online assessment could help students learn.	N	2	33	66	166	35	3.65	.84
	%	.7	10.9	21.9	55	11.6		
27. Online assessment facilitates a more adaptive learning approach than paper-based exams.	N	7	73	109	98	15	3.13	.91
	%	2.3	24.2	36.1	32.5	5		
28. Online assessment can add value to students' language learning.	N	7	78	101	102	14	3.12	.92
	%	2.3	25.8	33.4	33.8	4.6		
29. Online assessment is just a gimmick that does not really benefit learning and teaching.	N	19	131	76	65	11	2.72	.98
	%	6.3	43.4	25.2	21.5	3.6		
30. Online assessment goes hand-in-hand with e-learning (erg, using Blackboard/ Zoom/ Moodle etc).	N	5	23	58	172	44	3.75	.85
	%	1.7	7.6	19.2	57	14.6		

An interactive conversation with a chatbot: Does ChatGPT know standard phraseology in aviation English?

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Abstract

This research investigates the profound effects of ChatGPT, an artificial intelligence (AI) language model, on the domain of aviation English. Within an industry that places significant emphasis on safety and accuracy, this study utilizes a qualitative case study methodology to evaluate the performance of ChatGPT. There has been an interactive conversation with ChatGPT acting as an air-traffic controller. The observations based on the instant responses of the chatbot following the prompts demonstrated that ChatGPT shows exceptional competence in conforming to conventional aviation phraseology throughout different flight stages, ranging from ground clearances to landing, by using role-play situations. Beyond linguistic accuracy, ChatGPT facilitates dynamic and contextually relevant dialogues, enhancing aviation education and training experiences.

Keywords

Aviation English, Standard Phraseology, Chatbot, ChatGPT

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Introduction

The aviation industry, known for its meticulousness, intricacy, and steadfast dedication to safety, largely depends on efficient communication as a cornerstone element. Within the dynamic airspace, where pilots and air traffic controllers operate, the use of clear and precise language holds significant implications for the preservation of human life. People find themselves in an era commonly referred to as the age of artificial intelligence, whereby the distinctions between human and machine capabilities are becoming increasingly indistinct. Within this context, the domain of aviation

communication emerges as a prominent arena in which this revolution is taking place (Dincer, 2023).

Aviation English, a domain-specific language, functions as a common medium of communication for pilots, air traffic controllers, and professionals in the aviation industry on a global scale (Ragan, 1996). The language that has been carefully constructed is not only a compilation of words and phrases, but rather a well-organized framework designed to minimize uncertainty and facilitate efficient, lucid, and unequivocal interaction, especially in situations characterized by heightened pressure. At the core of this system lies the concept of "standard phraseology," which encompasses a collection of predetermined words and terms that undergo training for pilots and air traffic controllers (Campbell, 2004). This standardized code serves as a universal means of communication within the aviation domain. Aviation communication Rightly recognized as one of the key components, standardized phraseology in aviation is especially known for its several characteristics that make up an important element in a framework language governing life and work there (Bieswanger 2016). Because this system remains determined in its mission to promote clarity and accuracy, it guarantees that communication within the aviation domain is always clear, and details are never omitted anywhere around the world expecting maximum efficiency. Besides being used in everyday speech, standard phraseology is often essential to emergency communications. It provides an orderly orientation for aviation personnel to be able to quickly and securely deal with emergency situations (Estival, 2016). Secondly, as Dinçer and Gokhan note (2023), the use of this type of language is really important in aviation training and certification procedures. It truly reflects industry thinking with its emphasis on standardization for safety reasons.

With technological progress disrupting numerous fields, AI is the game-changer that promises overwhelming gains in efficiency and precision (Luckin & Cukurova 2019). AI is affecting business across healthcare, finance and even manufacturing (Sharma et al., 2021). Yet the aviation sector, known for its attention to safety and innovation, has been very hesitant about adopting AI. This caution has given rise to a central question: Can AI, represented here by ChatGPT (an artificial intelligence language model developed by OpenAI), actually understand the subtle distinctions of

Aviation English and use standard phraseology in real-world safety-critical aviation settings?

When AI is introduced into the field of aviation communication, it brings up many considerations. Such a humanized AI can help streamline processes and decision-making (Huang, 2022), but the aviation industry is in its own league. Safety is paramount, with standards and procedures of the greatest rigor (Alderson 2009). As a result, its entry into this field requires an in-depth analysis of whether it can fit the industry 's safety architecture.

So now the limelight has fallen on ChatGPT, an advanced language model using AI that can generate text as though written by a human from massive amounts of data. Therein, we are forced to ask ourselves: Can it skillfully maneuver through the rigid world of Aviation English with its often bizarre phraseology, its conceptualized customs, and even more nuanced change in meaning from utterance to utterance? Can ChatGPT understand the special language, abbreviations, and background of aviation dialogues? Accordingly, can it combine these two aspects to communicate smoothly with air traffic control and other human pilots in a robotic voice while meeting the precision and clarity required by standard phraseology? These questions are at the core of this inquiry. On the question of how effective this innovation could be, very little was found in any literature.

In this climate of questioning and reflection, the aviation industry is at a crossroads. Combining AI with communication means innovation will always be paired with the need to ensure safety. Therefore, the findings from this study have important implications for aviation but also broader conversations about how AI should find its place in safety-critical environments. Embarking on this exploration of how ChatGPT operates in the language world of aviation, is done with profound respect for aerospace's devotion to safety as well as genuine questions about what role AI can play working alongside humans.

This study sets out on an exploratory mission to discover the limits and potentials of ChatGPT in aviation conversation. Consequently, we hope our research into the aviation dialogues that will occur across various stages and phases of flight--from clearance to taxi, approach to landing--can explore whether this AI-based system can

naturally fit in with existing methods used by human operators. Therefore, it is aimed to seek answers to the following research question:

1. To what extent does ChatGPT maintain a seamless dialogue with the users based on the prompts provided?
2. To what extent does ChatGPT use standard phraseology during the role-play as pilots and air traffic controllers?

Standard Phraseology

In the field of aviation, communication is of the utmost importance due to its impact on safety, productivity, and understanding. English has become the lingua franca of aviation since the 1950s (Crystal, 2003). In this respect, the International Civil Aviation Organization (ICAO) that is a specialized agency of the United Nations and makes regulations about aviation has put forward in Annex 10 Volume 2 (2001) that the function of English is explicitly confirmed as the common language of aeronautical aviation. It further expresses:

Air-ground radiotelephony communications shall be conducted in the language normally used by the station on the ground or in the English language (5.2.1.2.1).

The English language shall be available, on request from any aircraft station, at all stations on the ground serving designated airports and routes used by international air services (5.2.1.2.2).

Standard phraseology is a component of Aviation English, which was developed specifically to meet the requirements of the aviation industry (Seidlhoffer, 2005). Even though it is specialized, this framework is essential for ensuring interactions that are clear and unambiguous. In the field of aviation, standard phraseology refers to a structured and formal collection of idioms and phrases that are universally acknowledged and used to enhance communication among members of the aviation industry. ICAO (2010) notes that “The purpose of phraseologies is to formulate short, simple and unambiguous language for the transmission of routine messages” (para. 3). This specialized language has the primary characteristics of codification. However, haphazard development is not the way standard phraseology come about. It is subject to a long process of editing by international aviation organizations, including the

International Civil Aviation Organization (ICAO). Thus these standardized expressions are used throughout the world regardless of nationality or culture (ICAO, 2016). This is in contrast to informal language, which abounds with idiomatic terms and has just as many ways of understanding them. Standard phraseology must be intendedly constructed into a directive without ambiguity or exceptions. There are also some terms in aviation--like takeoff or landing as technical concepts--which have well-defined meanings and can hardly be replaced by colloquial equivalents (Renouf 1992). Standard phraseology uses such phrases and terms as are specially adapted to aviation. They have this advantage, especially for those working in the aviation industry, with all its special problems and situations. For example, several terms are used to denote different stages of flight or meteorological situations (Estival et al., 2016). In the current case, redundancy is a defensive measure rather than an extraneous one. Repeating or reinforcing certain important directives in conventional terms helps enhance perception and recognition. This is one of the altitude assignments by air traffic controllers to pilots: They repeat the number so that its accuracy can be checked (Ferrer et al., 2017). Because of its dynamic nature, standard phraseology in the aviation industry also has to keep changing. These expressions are regularly reviewed, amended and updated by the various regulatory agencies to ensure their continued currency, clarity and implementability in addressing a changeable environment (Mackenzie 2010). The systematic approach of standard terminology gives its users an adaptable communication tool for meeting precisely what is required as part of the country.

Safety, efficiency and consistency are the elements of standard phraseology's significance in aviation communication. In such circumstances, in which even the simplest misunderstanding could turn into calamity, use of standardized terms helps ensure clarity. By reducing or alleviating misconceptions, it is aimed to decrease the likelihood of accidents. Additionally, the aviation industry is characterized by a multitude of time-sensitive scenarios. The use of standard phraseology ensures expeditious and efficient communications, hence facilitating the acceleration of processes and decision-making (Bieswanger, 2016). In terms of consistency, it can be said that individuals with many language origins come together due to the worldwide scope of the aviation industry. According to Drayton and Coxhead (2023), using a

unified linguistic strategy ensures consistent communication, irrespective of the participants' native language.

Lopez et al. (2013) emphasize that there are basically two types of language that pilots utilize during the flight. While plain English refers to general English that is used in daily work, standard phraseology refers to the routine conversations taking place between air traffic controllers and pilots. In this respect, Bieswanger (2016) states that “while standardized phraseology is concerned with the fairly restricted aspects of routine air traffic control issues, plain Aviation English covers a broader range of topics in non-routine situations, such as emergencies as well as other unusual or unexpected contexts.” (p.74). Standard phraseology is characterized by a greater degree of structure and specificity, in contrast to the natural flexibility seen in plain English. The presence of rigidity in a system or process is essential for promoting clarity and minimizing ambiguity. Moreover, standard phraseology in aviation contexts involves the use of specialized terminology that may be unfamiliar to those without expertise in the field, who are more accustomed to everyday language (Lopez, 2011). Although there may be variations in the details of plain English across different countries, the use of standard phraseology ensures worldwide understanding regardless of geographical location (Campbell, 2014).

All in all, the very nature of aviation demands the existence of an effective communications system. Making sure that these are clear, safe and efficient is of vital importance to standard phraseology. The distinction between specialist language and plain English is precisely intended to point up the individuality of the latter, thus injecting a new sense into it. It also helps us understand that for safety reasons aviation must be kept at its most safe and effective levels possible.

Chatgpt in Education

ChatGPT, developed by OpenAI and released in November 2022 is a major step forward in natural language processing (NLP). Because it can create text imitating human speech, it is a very useful tool. Based on the GPT-3 pretrained language model, ChatGPT also introduces methods to resolve questions about its conduct (Haleem et al., 2022).

To uphold the quality of its responses and mitigate the risk of generating erroneous outputs, ChatGPT implements three primary strategies: fine-tuning under human supervision, reward modeling and reinforcement learning. It starts by applying supervised learning to a set of labeled demonstrations in order to fine-tune its performance. First comes the use of a labeled dataset containing demonstrations for improving performance through supervised learning. Later, the system creates a dataset in which human graders rate these outputs of the model. This is done as an attempt to further improve performance via reinforcement learning based on direct feedback from humans experiencing it side-by-side with them. The outcome of this process is the model we call InstructGPT (Ouyang et al., 2022).

Bozkurt (2023) points out that a standout feature of ChatGPT is the ability to generate original, contextually appropriate material in real-time interactions with users. Unlike some databases of alternative artificial intelligence language models, ChatGPT is rather adept at maintaining a neat and interesting conversation style. This enhances its authenticity and entices us to try it in real-life situations. The unique characteristic of ChatGPT makes it stand out among language models.

As Dignum (2021) simply puts it, ChatGPT has much potential as a handy reference work--especially to those taking part in the act of learning. It gives learners the opportunity to look into and solve complex problems. In the view of Rudolph et al. (2023), ChatGPT is seen as a very effective base for those who prefer experimental and practical forms of learning enrichment activities. One notable feature of ChatGPT is its ability to understand and answer inquiries phrased naturally. In this way, it becomes possible for learners to conduct conversational exchanges by using ChatGPT in a manner similar to asking teachers questions. In Rahman and Watanobe (2023), according to the user-friendly, intuitive nature of ChatGPT. It is thus useful for learners at many educational levels from elementary school all through higher education up until professional development.

The educational usefulness of ChatGPT is by no means limited. Fitria (2023) states that this tool can help enhance reading skills and improve writing ability thanks to its valuable suggestions including those related to grammar and syntax. Additionally, the aforementioned model can offer practice activities and quizzing with all kinds of

courses including mathematics, physics, languages as well as literature (Bozkurt et al., 2023). Beyond that, ChatGPT is able to produce detailed explanations for a wide range of topics and well-structured answers toward various questions not only developing problem-solving abilities but also encouraging analytical and innovative thinking (Kasneji et al., 2023). It has also been proposed that ChatGPT could be something of a dream come true in terms of individualized learning assistance, such as for group discussions or debates (Limo et al., 2023). Additionally, it provides assistance to people with disabilities by supplying services such as speech-to-text and text-to-speech capabilities.

That is to say, ChatGPT can be a very capable instructor across many professions (Lo 2023). The use of this tool helps improve the level of mastery in terms of language proficiency, programming skills, and report writing ability; others can even be used for specific applications such as medical reports or legal papers. Another feature is that learners are given the opportunity to discuss explanations, questions, and other things with ChatGPT using detailed talks. This sort of interactive activities could be engaged in across all manner of times and places.

Methodology

A qualitative research methodology is used in the present study to examine comprehensively how well ChatGPT performs when it comes to aviation communication. Human quality harmonizes with humanity: The qualitative methodology is particularly beneficial for fully grasping the complexities of language, interpersonal relations and context--factors that play crucial roles in evaluating whether a natural-language processing algorithm can truly master its task. The qualitative research framework is employed through the use of a case study technique in this study. As a technique for carefully studying the relations and behavior of participants, case study is extremely well suited to providing an in-depth description that preserves authenticity; as appropriate this can be applied even to separate incidents or events. The chosen sample chatbot for this research is ChatGPT as an air traffic controller (ATC) within the context of aviation role-play situations. This particular scenario provides an

opportunity to conduct a targeted examination of the system's efficacy in the specialized domain of aviation communication.

Procedure

During the joint investigation, a systematic protocol was used to evaluate the efficacy of ChatGPT in the context of aviation communication, namely via the utilization of role-play situations. At the outset, participants were assigned specific roles, whereby one individual assigned the position of the pilot (researcher), while the other individual undertook the tasks associated with the ATC. The allocation of responsibilities had a significant role in replicating the genuine communication dynamics seen in flight circumstances.

To ensure the appropriateness of the framework for each role-play session, much consideration was devoted to defining the specific aviation context. The identified phases of the flight included clearance and taxi, take-off, climb, cruising, descent, approach, and landing, with the delineation of the departure and destination airports. The rigorous adherence to standard phraseology played a pivotal role in the role-play sessions. The researcher conscientiously adhered to the precise terminology and conventions used in aviation communication, ensuring that our interactions faithfully mirrored genuine aviation scenarios.

Prior to conducting the experimental conversation, the researcher had done a couple of trials to decide the appropriate prompts to initiate, maintain and close the conversation. Finally, it took about four hours to maintain a real life-like conversation with the chatbot by using different prompts based on standard phraseology of aviation and a wide range of contexts such as departure from Istanbul to Chicago or vice versa in different weather conditions.

The researcher that interacted with the chatbot is known as an English language expert (ELE) who provides aeronautical communication training for more than 5 years as well as a certified English Language Proficiency Rater that assesses the oral competency of ab-initio pilots. Additionally, a commercial airline pilot accompanied throughout the research to ensure that the flight procedures, phraseology and prompts are well suited to address the research questions. Therefore, two individuals were in front of the computer and observing the conversation as subject matter experts.

In these role-play interactions, the activities between a pilot and an air traffic controller developed in much the same way as would those of two people chatting with each other. In communication, the pilot carried out submission of requests and transmission of relevant information while air traffic control (ATC) responded promptly by issuing instructions or clearances in conformity with established standards for standard phraseology. Through this process of role-play games, ChatGPT also demonstrated an ability to adjust its language style according to the situation. It involved how to assess changing weather conditions, real-time traffic reports and unexpected situations that might crop up along a plane's course.

All role-play sessions were recorded in detail, from the generation of textual transcripts to timestamps. The keeping of records proved to be a key factor in the subsequent examination and assessment of ChatGPT's effectiveness for aviation communication. To evaluate the capabilities of ChatGPT in a comprehensive manner, and to actively participate inside situations simulated for normal functioning including all terms of flying. They also considered all angles of the situations which flight operations might encounter, from getting a first clearance and receiving taxi instructions during ground control to complicated communications for approach & landing procedures. The transcripts were carefully analyzed after every role-play session. The objectives of this study were to evaluate whether ChatGPT can comprehend not only the specific aviation language, but also provide satisfactory answers. Not just that, it should answer in a way consistent with accepted standards for correctness and clarity required by standard phraseology (SP). Our work took the approach of performing several rounds of role-play scenarios. The data so obtained were thus rich and varied in nature. The dataset was then used for a thorough assessment of ChatGPT's performance.

Findings and Discussion

The aviation industry, with its paramount focus on safety and precision, relies heavily on effective communication. For decades, the aviation industry has been placing emphasis on fluent and accurate communication with regulations, standardization and advanced training techniques including Computer-Based Training (CBT). As aviation has seen exponential growth in terms of the number of personnel, passengers and

vehicles, so does the technology, as well. The AI movement around the world has been transforming every field. It improves effectiveness and raises the standards. This paper, therefore, explores the transformative impact of one of the most famous chatbots, ChatGPT.

The interactive role-play exercises conducted using ChatGPT have yielded significant findings about the language model's ability to sustain coherent conversations with human participants that adopt the roles of pilots and ATCs (see Figure 1, Figure 2, and Figure 3). The results of this study suggest that the model has the capacity to improve aviation communication in several aspects.

Figure 1

Departure Information with ChatGPT

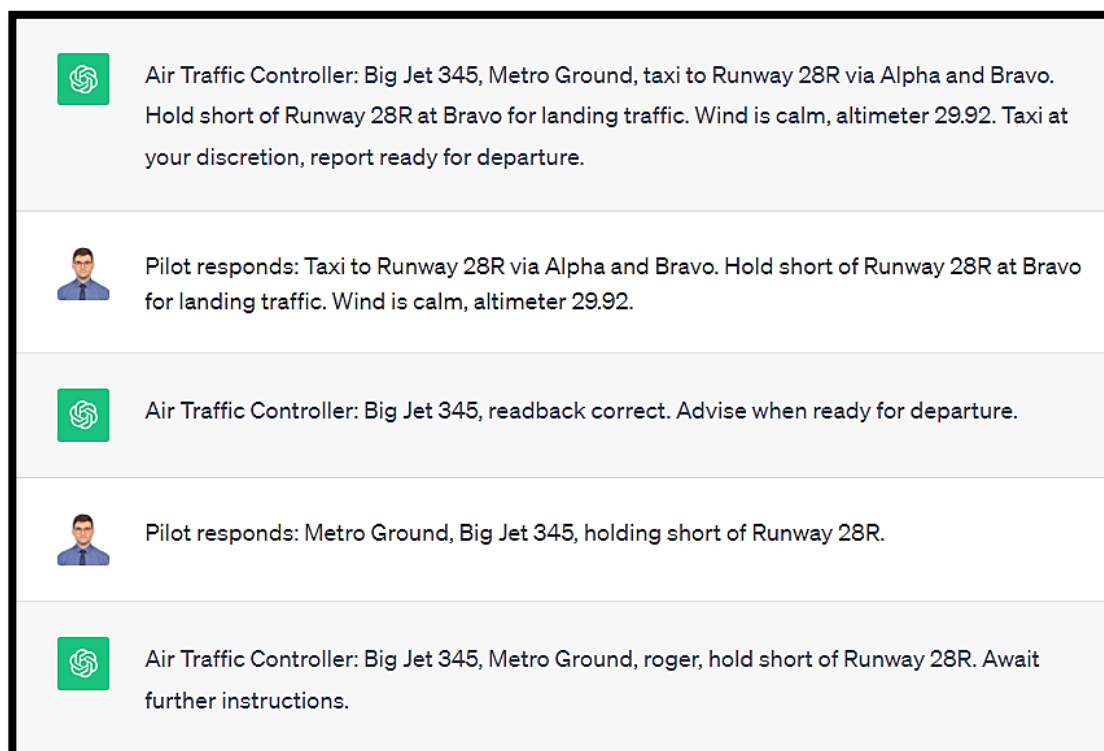


Figure 2

Initial Climb with ChatGPT

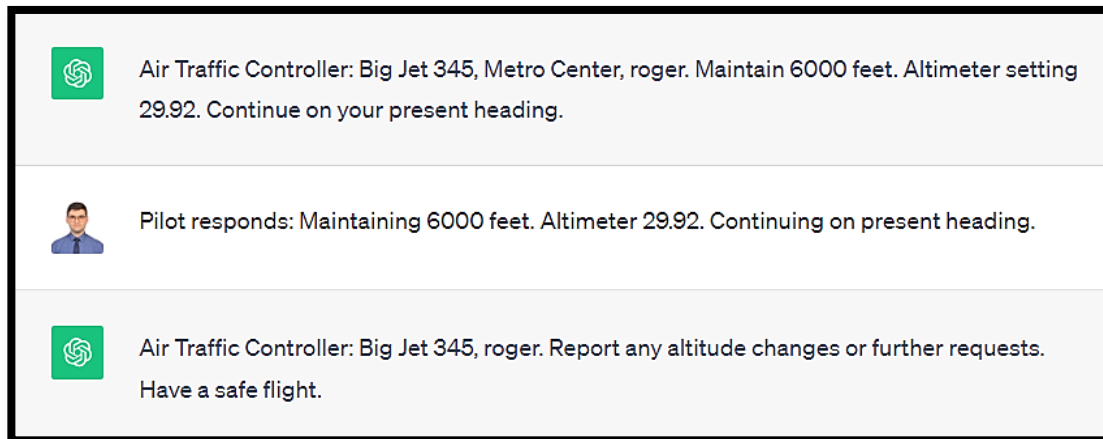
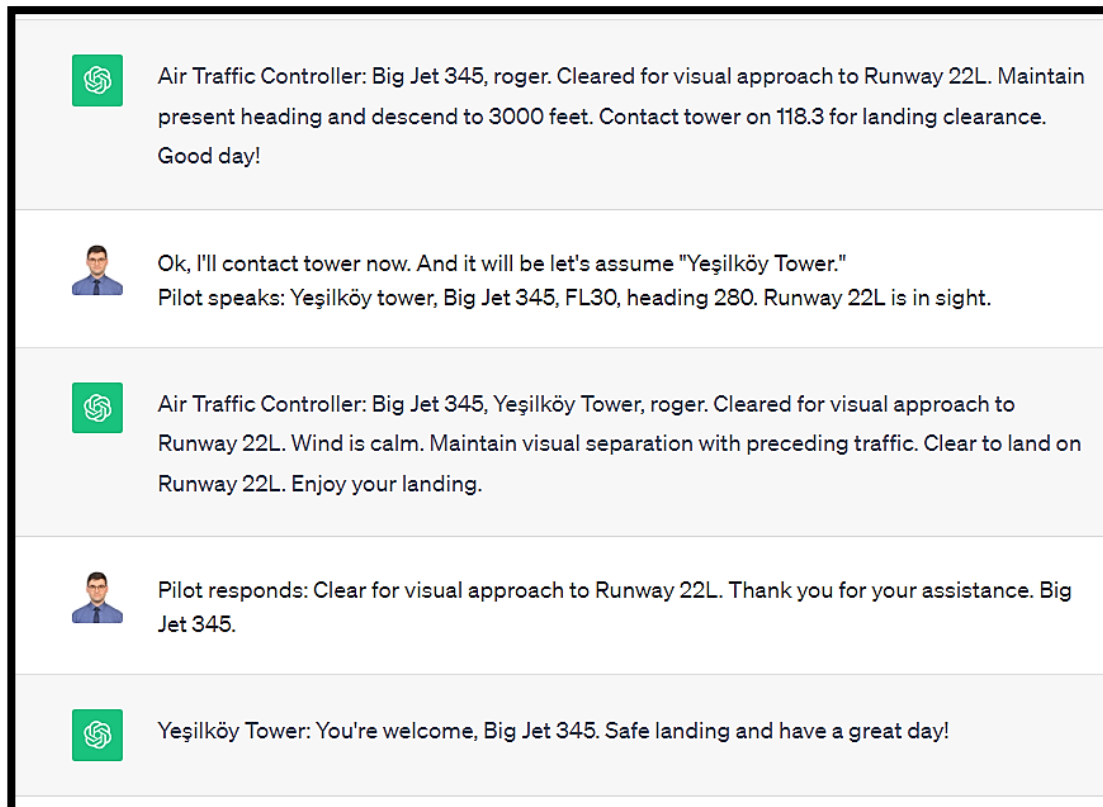


Figure 3

Landing with ChatGPT



An particular finding to note, first of all, is that ChatGPT is capable in its use of standard phraseology. The aviation communication system successfully replicates the fundamental characteristics of precision and clarity. This ability to maintain a constant form of conversation was particularly impressive, and it also shows just how well ChatGPT can reproduce typical conversations with aircraft. In other words, its suitability for use in aviation applications was once again confirmed by the model's

superior ability to keep response accuracy and precision high across many different utterance types. This skill is of particular importance, as in operational situations where the accuracy with which language can be used may affect both safety and efficiency. Aviation communication is all about precision. Studies by Huang et al. (2022) and Haristiani (2019) have emphasized ChatGPT's proficiency in replicating specific language structures and terminology, a skill of paramount importance in aviation communication, where precision can directly impact safety and operational effectiveness. In fact, Huang (2017) argues that dialogue-based computer-assisted learning is an effective means of improving education. Kohnke (2022) sees chatbots like this as a way for learners to continue self-studying.

What's more, the role-play sessions proved that ChatGPT could adapt to different stages of a flight. The model was adaptable, as evidenced by its various phases of operation. Clearances for taxi and detailed communications around on operator's approach going into landing were all examples of stage operations performed successfully in this manner. The adaptability shown by ChatGPT is also in keeping with the evolving characteristics of aviation communication. This starkly demonstrates how much of a resource ChatGPT can be as an aid in aviation training and education at all phases of flight. This is in line with the highlights of Dignum (2021) specifying ChatGPT as a dynamic and flexible learning tool. Its adaptive nature has already been praised by Bozkurt (2023) who says that the system's ability to be adapted makes ChatGPT a personalized tutor. This finding is consistent with those reported by Elbanna and Amrstrong (2023), both of whom discovered that ChatGPT promotes productivity, encouraging adaptive learning.

A major discovery was the stimulation of productive interactive discussion generated by ChatGPT. The algorithms-generated replies thus allowed for interactive and relevant dialogue. For both those engaged in aviation education and for practicing-aviation professionals, this character of involvement is crucial because it allows them to achieve real experiences that can provide the best possible preparation for actual. This appears to fit with the results of Opara et al. (2023) who indicate that ChatGPT offers quick answers that mimic conversations in real-time. Moreover, this discovery further demonstrates the point that Cao (2023) has put forward about intelligent interaction.

That is to say: while there are other technological tools used in education that interact with students through activities programmed after the integration of data sets such as transcripts and school records, ChatGPT converses directly with a student according to their prompts, and answers.

These findings pave the way for further exploration and development. Given that it has capabilities for interactive use and a track record as an aviation communication tool, ChatGPT holds possibilities in the area of flight training. In particular, those students who are interested in actually trying to put their verbal skills into practice but don't have many opportunities can get some experience using standard phraseology interactively via real-time conversation with air traffic control or other related. Subsequent efforts might concentrate on enhancing the model's capability to manage specialist aviation terminology and tackling particular difficulties.

Conclusion

Over the years, stability in emphasis on safety; accuracy and speed of transmission have brought about rapid development of aviation. This development has been accelerated through the establishment of rules and standardization activities, as well as training reforms. Today, the aviation industry is once again expanding dramatically in terms of manpower, passengers and technical progress. At the same time, profound changes have come about in other areas through the global AI movement. This study seeks to assess just how much impact an artificial intelligence (AI) breakthrough like ChatGPT can have on the field of aviation communication.

It's clear from the observation that ChatGPT has potential to change communication in aviation. These results have serious consequences for the field. They also shed some light on the future of AI, likely to help in upgrading safety, training and operational standards.

ChatGPT's strength resides in its rigid conformity to established language usage. These replies conform to the expectations of aviation communication in terms of accuracy and clarity. This serves a vital function in the aviation industry. The only thing more important than precision of movement are words themselves-the safety on board

and operational success all depend upon them. In addition, the roleplay sessions have enabled us to observe the different nature of ChatGPT at different stages of flight. From the first ground clearances and taxi instructions to the complexities of approach and landing, the model showed its adaptability at many levels. The adaptability seen in the ChatGPT is conducive to changeable characteristics of aviation training. As a result, it makes ChatGPT an extremely helpful resource for aviation training and education from all aspects of flight operations.

The investigation on ChatGPT's incorporation into aviation communication all in all brings out its ability for deep change. This particular system has demonstrated its ability to keep up with the aviation industry in role-playing situations. It conforms well to the accepted safety and accuracy criteria of that profession. The current effects of tech on the aviation industry have produced AI constructs such as ChatGPT, giving glimpses into a future with greater communication, safety, and training in this important profession. The first step toward the realization of this revolutionary vision has been taken, and now that ChatGPT takes center stage in aviation communications, its role is pivotal.

Despite its excellent abilities, this research also showed that with the language model struggling to accommodate itself to case requirements, there were some limitations. When confronted with more complex aviation vocabulary or context, some problems would sometimes arise. ChatGPT often comes across as being capable of adapting to typical usage, but sometimes it needed more explanation or provided commentary that was relevant in the context, if not entirely reflective of what one would expect on aviation radio. For example; if the system is not prompted about shifting from one stage of flight into another, it is somewhat hesitant to do so by itself. In other words, prompts are very important in stimulating the chatbot to respond.

Ethics Committee Permission Information

Ethical approval is not applicable, because this article does not contain any studies with human or animal subjects.

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An autoethnographic study: Self-growth approach for teacher educators in training tech-effective teachers

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Abstract

I hold the view that teachers have a significant impact on students' academic performance, and in the current digital educational environment, this impact has become much more significant. Although the technology available to teachers remained largely unchanged since before the pandemic, their struggles with online teaching highlighted the shortcomings of their technology training in teacher education programs. The lack of technological proficiencies among teachers frequently stems from insufficient training in digital skills within teacher education programs, which is often due to the teacher educators' own deficiencies in digital proficiency. Therefore, I contend that teachers' development in technology use should start with teacher educators. In this qualitative autoethnographic study, I, as a teacher educator, critically examine how I improve my digital literacy and technological pedagogical skills, utilizing a collection of data sources including reflective accounts, lecture notes, teaching diaries, and student feedback. By sharing this journey, I aim to offer insights that other teacher educators may perceive as beneficial for their own professional development. I argue that adopting a non-formal self-growth approach is a useful way for teacher educators to equip future teachers with the required knowledge and skills for effective technology integration in their future practices.

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Keywords

autoethnography, teacher, teacher education, teacher educators, technology, self-growth approach

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Introduction

Behind every great teacher, there is a great teacher educator.

Teacher education must adapt to provide practice-oriented guidance and equip teachers to integrate modern technology in varied teaching settings. This is necessary to meet the ongoing need for high-quality instructors. During the Covid-19 pandemic, many teachers had to quickly switch to online teaching. In this online teaching environment, some teachers chose only lecturing or slide presentations because they were uncomfortable with technology while some other teachers ignored other ways of teaching. It was a reflection of their basic level of technology integration into their

previous classroom practices. The challenge originates from the preparation that prospective teachers undergo, pointing to the role of teacher educators. This means that teachers should be trained by educators who are well-versed in how technology can be integrated in a meaningful way into instruction.

As a teacher educator, I have realized that my effectiveness greatly impacts the training quality of new teachers and their being tech-effective teachers. Goodwin and Kosnik (2013) emphasized this, but a challenge I face, as noted by Cochran-Smith et al. (2020), is the lack of support for my professional growth. This gap hinders my improvement as a teacher educator. Van der Klink et al. (2017) argue that our development is crucial for long-term success. However, Czerniawski et al. (2018) highlight a lack of clarity on how to facilitate this. In areas like educational technology, which Tondeur et al. (2020) stress, our expertise is especially critical in shaping the changing educational environment. Considering all these challenges, I can not help but ask myself: What is the best way for us as teacher educators to keep up with educational technology?

I know that my use of technology not only influences future teachers' attitudes and practices but also establishes the standard for how they integrate technology into their classroom instruction. Pre-service teacher education programs, for example, have been shown to alter pre-service teachers' attitudes about and experience with technology (Chen, 2010; Limboro & Kaugi, 2020). However, because their major responsibility is to train new teachers, many of these programs are dependent on how competent the teacher educators are. Studies such as those conducted by Başal (2015), Haydn (2014), and Nelson (2017) support the idea that teacher educators' use of technology has a substantial influence on how successfully teachers employ it in their future practices.

According to Fisher (2009), an issue is the absence of a sufficient number of professional teacher educators. This constraint is critical because, as Ball (1990) and Fisher (2009) noted, teacher candidates frequently imitate the teaching approaches they were exposed to throughout their training. As a result, teacher educators have a substantial impact on the abilities and knowledge of prospective teachers (Liston et al., 2008; Tondeur et al., 2019). If pre-service teachers use technology in their teacher education programs, they will feel more at ease using it in their own teaching practices

(Chapelle, 2003; Erben, 1999; Hernandez-Ramos, 2005; Mayo et al., 2005). Reflecting on these insights, I firmly believe that empowering teacher educators with adequate resources and training is crucial. The question is how can we, as educators, better equip ourselves to be the role models for the next generation of teachers, especially in integrating technology effectively? I will try to answer this question from my perspective in this research after touching on a few more key points.

The attitudes and skills of teacher candidates about using technology in their future practices have been influenced by their learning of technological knowledge through their teacher education programs (Voogt & McKenney, 2017). The limited focus on technology instruction in teacher education programs complicates the success of integrating technology into teaching, a concern raised by numerous researchers (Angeli & Valanides, 2005; Dudeney & Hockly, 2007; Gudmundsdottir & Hatlevik, 2018; Hubbard, 2008; Kay, 2006; Koehler & Mishra, 2009). This is a concerning tendency since Kirschner and Selinger (2003) and Hall et al. (2006) observe a constant lack of proper guidance on using technology in teacher education. Even though the references I used might seem a bit dated, the problem they highlight is still very much present. In a current research study, Nelson et al. (2019) reveal that many programs still fall short of providing teachers with the necessary training for integrating digital technology in the classroom. As noted by Hubbard (2008) and Garrett (2009), closing this gap requires overcoming a shortage of experienced, qualified educators as well as a lack of emphasis on instructional technology throughout their own education. Limboro and Kaugi (2020) highlight deeper structural issues in teacher education by addressing teacher educators' lack of technological training. Again, this brings us back to the question: How can we, teacher educators, best improve our technological knowledge and skills to guide future teachers effectively?

According to Polly et al. (2010), providing stand-alone courses on using different technologies is insufficient to prepare aspiring teachers to incorporate technology into their future practices. Rather, as stated by Limboro and Kaugi (2020), all teacher education programs have to showcase the integration of technology within their curricula. In other words, teaching digital skills alone is not the only aspect of teacher preparation for successful technology integration (Valverde-Berrocoso et al.,

2021). Teacher candidates need to witness and experience the application of these skills to their teaching practices. For teacher candidates, to utilize technology with confidence, proper instruction is essential (Başal, 2016; Hare et al., 2002). It is not enough to have technology available; it needs to be integrated smoothly into the teaching process. Therefore, teacher educators should model effective strategies for implementing technology in teaching for their students. For this reason, teacher educators should provide an example for their pupils on how to use technology in the classroom. Hayler (2011) notes that although a significant body of literature has been produced on teacher education and training, “the voices of teacher educators themselves have until recently been largely absent from this literature” (p. 2). I believe this is still true today, and it is something we really need to pay attention to.

I am convinced that courses and systematic models play a crucial role in the development of teacher educators. These structured educational frameworks may provide a foundation for imparting essential teaching skills and methodologies. By engaging in these well-organized programs, teacher educators can gain the knowledge and experience necessary to effectively train future teachers. However, teacher educators typically favor self-guided learning and research for their professional growth, often considering it a personal endeavor rather than engaging in structured training programs or organized courses (Herro et al., 2021). Bridging this general trend with my personal journey, this study explores my own experiences as a teacher educator. In this study, by focusing on my experiences as a teacher educator, I exemplify how I have attempted to develop myself as a teacher educator who integrates technology into my teacher education courses by adopting a five-phase self-growth approach. With this in mind, this autoethnographic study aims to portray my technology learning trajectory as a teacher educator.

Method

This qualitative study adopted the autoethnography approach “in which a researcher recounts a story of his or her own personal experience” (Lapadat, 2017, p. 589). Autoethnography is a “reflexive self-observation” (Bochner & Ellis, 2016, p. 48) that can be used in teacher education to gain a deeper understanding of the teacher educators’

profession by employing a self-reflection on their own experiences (Hayler, 2011). This “self-study [approach] may yield valuable analytic insights” (Anderson, 2006, p. 446). Such an autoethnographic self-study approach enables teacher educators to learn more about their teaching perspectives and teaching practices and the relationship between teaching and learning through self-reflection and analysis of their identity as teacher educators (Loughran, 2014). Based on the value of autoethnographic self-study, the following central question guided my study: How did I develop myself as a teacher educator in integrating technology into my teacher education courses? In this, I try to explore and understand my personal development as both a teacher and a teacher trainer, specifically in relation to integrating technology into teaching practices. I believe that my journey and the various phases of my development could provide a roadmap for other teacher trainers navigating similar territory. In essence, this is an introspective examination of my professional growth in technology integration, with the dual purpose of enhancing personal practice and contributing to the collective knowledge of teacher training.

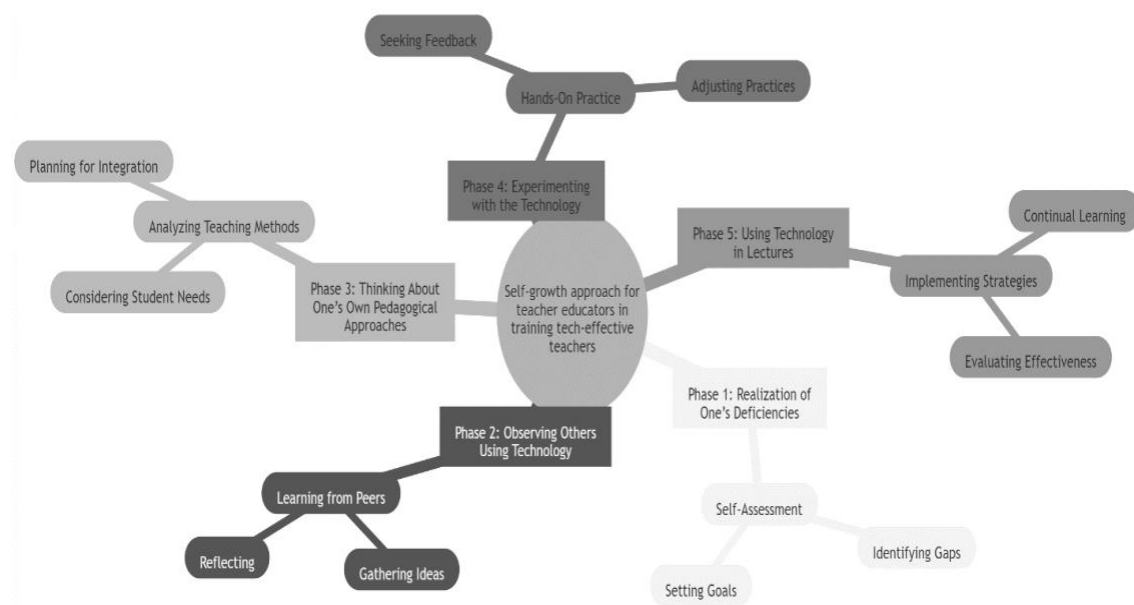
The data (reflection on over my twenty years of experience, my lecture notes, my teaching diaries, and written student feedback) for the current autoethnography study consisted of a detailed autobiographical account of my work as a teacher and teacher trainer. This study follows my personal journey in both of these roles. My expertise spans a variety of subjects including educational technology, instructional design, introduction to education, curriculum development, academic writing, and project development in education. This blend of practical teaching experience and teacher education allows me to offer a comprehensive and informed perspective on the development of future teachers, particularly in their effective integration of technology into teaching practices. In my teaching, I have used numerous technologies and digital tools including LMSs, online learning platforms, smart boards, digital tools, video tools, and more, to create a collaborative, cooperative, motivating, and engaging learning environment for the teacher candidates. By focusing my critical lenses on my prior experiences in teaching, I attempted to examine my own views regarding becoming a tech-effective teacher educator. My self-study based on my experiences as a teacher educator “might be both meaningful and applicable in the practice of others in the teacher education professional community” (Loughran, 2005, p. 13).

Results

By focusing on my experience as a teacher educator, I devised a self-growth approach which includes five (5) phases (See Figure 1; For a concise explanation of the phases, please refer to Appendix A). This approach answers the question of how I developed myself as a teacher educator in integrating technology into my teacher education courses. I described the phases of my self-growth approach below. The phases listed here are the progressive uptake of technology in education by me as a teacher educator, and the phases I believe show this development. However, these phases should not be considered as *a consecutive process, but rather be seen as more complex and interrelated with some phases overlapping at some point.*

Figure 1

Self-growth approach for teacher educators in training tech-effective teachers



Phase 1: Realisation of one's deficiencies

(In this phase, educators critically evaluate their current technological skills, pinpoint areas of deficiency, and set clear objectives for improvement)

As a teacher educator, it is important to get comfortable with technology. It starts with just getting to know different digital tools out there and how to use them. The first thing I had to acknowledge was that, despite the fact that it occasionally seemed like an intrusion on my traditional teaching methods, technology was becoming more and more

common in classrooms. Thus, I started by acknowledging that I could not avoid technology and that I would not be able to adequately prepare my trainees for the educational contexts they would be working in if I did not develop into a tech-effective teacher educator. So, I began my own education by learning about technologies that are widely available on the Internet. In particular, I watched how-to videos on YouTube to learn about the functions of these technologies. I engaged in learning about various educational technologies, their functionalities, and potential applications. Here, I became acquainted with the fundamental abilities required to operate these technologies efficiently. It became easier for me to master more technical and digital tools once I became familiar with a few of them.

Phase 2: Observing others using technology

(Educators learn by observing their experienced peers, collecting effective strategies and tools, and reflecting on how to adapt these practices to their own teaching style and subject matter).

Observing how others successfully integrate technology into their lectures provides valuable insights for one's own teaching practices. The second phase of my self-growth involved observing others who were currently integrating these technologies into their lectures. I requested permission to watch several of my colleagues' lectures whom I knew were utilizing technology, and I made notes about the technologies they were using, as well as how, when, and why they were using them. Again, I turned to viewing YouTube videos of various educators and teachers using these tools in the classroom. I also searched for case studies of effective technology integration by reading journal papers, internet discussion boards, and blogs on educational technology. Additionally, I subscribed to educational technology publications, attended webinars and seminars, made connections with other instructors in the industry, and asked students for their opinions. I gained a great deal of knowledge and insight from this phase of intensive observation and study, which I ultimately used to design engaging courses that included technology. These endeavors provided me with a wealth of useful information which influenced how I would approach utilizing technology in the classroom.

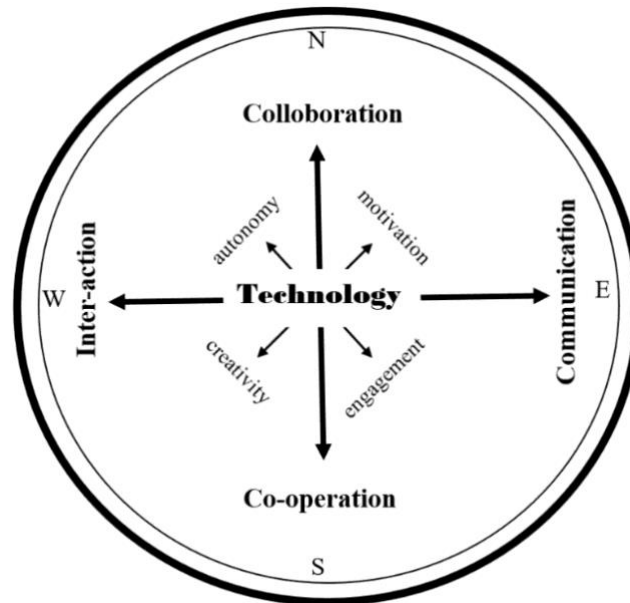
Phase 3: Thinking about one's own pedagogical approaches

(This phase involves a thorough analysis of current teaching methods, a consideration of how technology can meet diverse student needs, and the development of a plan for meaningful technology integration).

Before introducing technology into the classroom, it is crucial to consider one's pedagogical approach and comprehend how it might improve teaching and learning. I chose to take my time applying what I had learned to my own teaching methods when I felt the time was right. I conducted a comprehensive investigation before acting, thinking carefully about the material I was teaching, asking plenty of questions about how to utilize technology in my lectures, and contemplating the possible effects of integrating technology into my students' learning experiences. To better understand technology in educational settings I studied several models and frameworks, such as TPACK (Technological Pedagogical and Content Knowledge), RAT (Replace, Amplify & Transform), PICRAT (Passive, Interactive, Creative - Replacement-Amplification-Transformation), and TAM (Technology Acceptance Model), instructional design models (eg. ADDIE, Merrill's Principles of Instruction) and made connections between theory and practice rather than putting technology before pedagogy or allowing technology to dictate what I did as a teacher educator. At the same time, it was imperative to acknowledge that integrating technology into my teaching would not only alter my pedagogical approach but also establish a dynamic interplay between the two, whereby both components would persistently impact and mold one another in the quest for more efficient and captivating educational experiences for my students. Figure 2's Whys-tech Teaching Compass may appear mysterious to some, however, I employed it as a guide for myself after learning from a variety of models and theories about the use of technology. I concluded that I should have sound reasons before utilizing any type of technology in my classroom.

Figure 2

Whys-tech Teaching Compass



The whys-tech teaching compass primarily focuses on interaction, communication, collaboration, and cooperation. I aimed to create a dynamic classroom environment that encourages idea-sharing and active student involvement by integrating technology. Key sub-aspects of my approach included supporting autonomy, creativity, engagement, and motivation. My main goal was to create a student-centric learning environment that is focused on the needs of the students, and where technology serves as a facilitator rather than a tool. In the end, using technology is like building a bridge that makes my teaching even better and helps me connect more deeply with my students. By intertwining technology with pedagogy, I aim to continually transform the classroom into a rich learning environment where students are not only consumers of information but also active creators and collaborators.

Phase 4: Experimenting with the technology

(Educators actively engage with various technologies, seek feedback from peers, and adjust their practices based on this feedback and personal reflection).

As with anything one wishes to improve upon, it is important to practice maintaining quality over quantity by practicing the usage of the technologies you choose and being comfortable with them before integrating them into lectures. Based on my Whys-tech Teaching Compass, I determined the digital tools and technologies that were

in line with my pedagogical understanding, my learners' needs, and my teaching objectives. During this phase, I followed the trial-and-error method and learned from both my achievements and mistakes. I worked with these tools until I could utilize them with ease. I concluded that among hundreds of available digital tools and technologies, a few sufficiently met my needs as a teacher educator. Consequently, I made the decision to take a 'less is more' stance. I concentrated on mastering a select few technologies and digital tools rather than attempting to study a broad variety of them. As I gained confidence and expertise, I worked toward consolidating and mastering the use of the technologies I chose. I am currently delving into the world of artificial intelligence tools and their potential applications in teacher training. I have gained valuable experience in this field and even started a lecture called "The Use of AI (Artificial Intelligence) in Teaching and Learning".

Phase 5: Using technology in lectures

(In the final phase, educators implement learned strategies and tools into their teaching, evaluate the impact of technology on student engagement and learning, and commit to continual learning to enhance their teaching practices).

Finally, using technology in lectures requires continuous reflection and adaptation to ensure a cohesive learning environment that supports students' needs and outcomes. After the first four phases (and the occasional revisiting of them), I planned my lectures to integrate the digital tools and technologies I had mastered where appropriate. With every use, I observed my students' reactions to these tools and technologies and their learning outcomes. After each class, I reflected on what went well and what went wrong. With each use, I learned a great deal, and over time I deeply understood that using technology and digital tools is not in and of itself sufficient for creating a desirable learning atmosphere, but rather it depends on how one uses them to create a learning and teaching environment as an integrated ecology consisting of content, models of teaching, models of learning, and support of technology. For me, learning was an ongoing process that involved reflection on my own methods. As a teacher educator, reflective practice enabled me to intentionally consider the lessons I teach. This phase also highlighted how adaptable and ongoing my learning journey has been.

Discussion

Since they have a significant influence on how teacher candidates teach in the future, teacher educators must pursue professional development and lifelong learning throughout their careers to stay up-to-date with the changing environment of education. Ceallaigh (2021) emphasizes their crucial function in educating future teachers. Fray and Gore (2018) expand on this stating that they also trigger interest and passion in teachers for teaching. In terms of training tech-effective teachers, teacher educators are urgently in need of adding technology knowledge and skills to their repertoires to develop self-efficacy for training pre-service teachers in the effective use of technology in their own classrooms. I believe that without proper background and active use of technology, teacher educators cannot properly prepare pre-service teachers for their future careers, as they are the backbones of teacher education programs.

Every learning trajectory is deeply unique and non-linear, especially when it comes to teacher educators' use of technology in the classroom. I propose a self-growth model that acknowledges this complexity, comprising five interconnected phases: realization of one's deficiencies, observing others using technology, thinking about one's own pedagogical approaches, experimenting with technology, and using technology in lectures. Importantly, these phases are not sequential but often overlap and interact in a dynamic process. In the following discussion, I will explore each of these phases in detail, examining their nuances and the way they collectively contribute to a teacher educator's development in effectively integrating technology into their teaching methodology.

The first phase of my approach is the "*Realisation of one's deficiencies*". As we all know, "professional development is about intentional engagement in change" (Bartimote-Aufflick et al., 2010, p. 427), which begins with being aware of our deficiencies and making a conscious effort to fill in the gaps. Self-awareness, by its very nature, stimulates the professionals' search for those aspects that need further development. Recognizing one's deficiencies not only promotes humility but also provides a clear direction for targeted learning. Acknowledging their areas of weakness allows individuals to create a targeted plan for improving both personally and professionally. This proactive mindset guarantees that individuals are actively pursuing

opportunities and resources to bridge knowledge or skill gaps rather than passively engaging in their professional journeys. In a nutshell, it is the initial move toward meaningful change in any field.

The second phase is “*observing others using technology*”. Hendry et al. (2014) argue that teachers can merely get useful insights from observing how other colleagues teach. Peer observation is a critical aspect of this idea within education. By witnessing firsthand the strategies and methods employed by their colleagues, teacher educators (also teachers) not only gain insights into different instructional techniques but can also identify the potential advantages and limitations of various technological tools in real-time classroom scenarios. Such observations can serve as a valuable source of professional development, encouraging educators to adapt and grow in response to the ever-changing educational technology. It also promotes a sense of community and collaboration among educators, emphasizing the collective pursuit of enhancing teaching and learning experiences through technology.

“Thinking about one’s own pedagogical approaches” is the third phase. This includes the need for us to reflect on our own pedagogical practice as teacher educators who shape future teachers. However, “there is little public evidence that teacher educators themselves are engaging in reflection-in-action” (Russell & Martin, 2007, p. 1175). Russell (1999) and Korthagen et al. (2006) agree that teacher educators should analyze their own teaching strategies to train better teachers. Russell (1999, p. 220) is correct in saying that “universities generally, and university-based teacher educators particularly, have no right to recommend to teachers any teaching practices that they have not themselves used successfully at the university”. Because of this, it is crucial for ongoing development that teacher educators actively participate in reflective analysis and methodology adaptation.

The other remaining phases are “*experimenting with the technology*” and “*using technology in our lectures*”. In the literature, the TPACK framework by Mishra and Koehler (2006) focuses on teachers, but I believe that this framework is also applicable to teacher educators who are accepted as *second-order teachers* (Uerz et al., 2018). For the last two phases of my self-growth approach TK (technological knowledge) is related to experimenting with the technology phase and TPK (technological pedagogical

knowledge) is related to *using technology in our lectures*. The experimenting phase is crucial for educators to adapt to the evolving technologies, ensuring active engagement rather than passive observation. During this phase, we teacher educators become acquainted with various tools and evaluate their benefits and drawbacks. After mastering this phase, the next step, using technology in our lectures, centers around making informed teaching decisions. It is not just about using technology, but integrating it effectively to enhance student engagement and understanding.

By following this self-growth approach, I believe that I can effectively use technology to create a learning environment that promotes communication, cooperation, interaction, and collaboration among students, helping them become more engaged, motivated, autonomous, and creative. I believe that effective and meaningful technology integration requires more than learning about particular technologies and digital tools. The meaningful use of technology in teaching is supported by four pillars, as illustrated in my Whys-tech Teaching Compass. All four should be taken into account when determining which technology to use, when and how to use it, and why. With this guidance, teacher educators may utilize technology to provide a learning environment where their students have many windows of opportunity to connect with the lesson content, their peers, and their teacher through various modalities of communication, cooperation, and collaboration. By purposefully using technology to create such environments, teacher educators can help teacher trainees become more engaged, more motivated, more autonomous, and more creative. Whether in online or face-to-face education, teacher educators should include technology in their lessons for strong pedagogical reasons rather than just adopting it for its own sake. In a nutshell, teaching and learning needs should drive technology choices. In this process, teacher educators should set an example and become role models for their students so that they may use technology in the classroom when they become teachers in the future. To effectively implement the self-growth approach phases I highlighted here, teacher educators must seamlessly align their technological tools with their pedagogical objectives, ensuring they cater to the learning needs of future teachers.

In my self-growth approach, which is organized into five phases, the progression might seem to be a straightforward, linear, or consecutive process.

However, a closer look shows it is more complex and nonlinear. Even though the phases are set in a sequence, my journey often revisits previous phases or blends elements from multiple ones. This happens as a result of the challenges and teaching opportunities I have as a teacher educator while utilizing technology. This nonlinear path highlights the varied and layered nature of my growth. While at times things might appear to move in a direct line, the true path is filled with diversions and intersections.

Teacher educators need to be aware of their own strengths and weaknesses when integrating technology into their practices. To effectively guide prospective teachers, they should align their pedagogical objectives with relevant technologies. While my self-growth approach serves as a guideline, it is important to understand that it is just a starting point. Teacher educators are welcome to modify it according to their own experiences and learning trajectories so they may pursue their own unique routes and even go beyond the structure I have laid out. The nuances of one's pedagogical reasoning and reflective practice can indeed modify the phases outlined here. The approach, rooted in self-study, allows educators to deeply reflect on their methods, as emphasized by Cochran-Smith and Lytle (2004), and Loughran (2005). While this approach centers on technology integration in teacher education, it can also be workable in other areas of development for teacher educators. Ultimately, to put better food on the table, effective technology integration requires more than just basic operational knowledge; educators need immersive, technology-rich learning experiences. Teachers are most adept at utilizing technology for education when it is used as a medium for their own learning, as Erben (1999) correctly points out.

Autoethnographic studies can guide teacher educators in adopting a lifelong self-growth approach, encouraging the development of better teachers through improved technology integration. I hope that the current autoethnographic study may encourage teacher educators who are beginning their journey to developing their proficiency in integrating technology into their teacher education courses to help their teacher trainees prepare for the technology-rich teaching and learning environments of their future careers. In particular, I believe that as an ongoing, cyclical practice, the self-growth approach is a form of lifelong learning that is more meaningful in terms of professional development than separate technology training and one-shot workshops and is more

likely to help teacher educators keep up-to-date with constant changes in technology. For these reasons, I have shared my own self-growth learning trajectory here as a model for other teacher educators to adopt in their efforts to learn about and integrate technology in their teacher preparation courses. I believe better teachers are the result of better teacher educators.

Conclusion

The availability as well as the affordability of instructional technology are expanding, influencing classroom practices in the twenty-first century. Teachers should leave their training programs with the knowledge and abilities needed to integrate technology into their instruction in a way that is relevant to today's students. Teacher educators play a crucial role in preparing future educators in these training programs, but they frequently lack the theoretical and practical skills necessary to equip future educators with technology in an efficient manner. As a teacher educator who transitioned from being a teacher, I aim to share lessons I have learned from my experiences throughout my technology learning trajectory. Since they consider themselves to be authorities in their domains, teacher educators may find it difficult to put themselves back in the shoes of students and learn how to integrate technology into the classroom. I can understand them. However, bearing in mind that learning is the best strategy for growth, teacher educators should adopt the principle of life-long learning and seek ways to gain the necessary knowledge and skills to promote technology integration in their teacher training courses. Adopting a self-growth approach is a non-formal way for teacher educators to learn to integrate technology into their courses, a process that begins with the acknowledgment of one's own areas for improvement. My five-phase self-growth approach appears linear, but it is a nonlinear journey filled with revisits and blends, reflecting the challenges of integrating technology into education. I want to speak directly to all the devoted teacher educators out there: Think of the approach I have presented as a starting point. Every teacher educator has their own experiences and ways of learning. Feel free to mold it to fit your journey. After all, your unique teaching insights and reflections might lead you to see things a bit differently.

Ethics Committee Permission Information

This study is non-invasive in nature, and as such, did not require the approval of an ethics committee.

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Appendix A

Self-growth approach for teacher educators in training tech-effective teachers		
Phase	Activity	Description
Phase 1: Realization of One's Deficiencies	<i>Self-Assessment</i>	I evaluate my current skills and knowledge in using technology for teaching.
	<i>Identifying Gaps</i>	I pinpoint specific areas where I lack proficiency or confidence.
	<i>Setting Goals</i>	I establish clear and achievable objectives for my improvement.
Phase 2: Observing Others Using Technology	<i>Learning from Peers</i>	I watch experienced teacher educators effectively integrate technology into their lessons.
	<i>Gathering Ideas</i>	I collect strategies and tools that could be beneficial for my own teaching.
	<i>Reflecting</i>	I consider how these observed practices could be adapted to my own teaching style and subject matter.
Phase 3: Thinking About One's Own Pedagogical Approaches	<i>Analyzing Teaching Methods</i>	I evaluate which teaching strategies are most effective and which could be enhanced with technology.
	<i>Considering Student Needs</i>	I reflect on how technology can meet the diverse needs of my students.
	<i>Planning for Integration</i>	I develop a plan for how to integrate technology into my lessons in a meaningful way.
Phase 4: Experimenting with the Technology	<i>Hands-On Practice</i>	I actively use diverse types of technology to become more comfortable and proficient.
	<i>Seeking Feedback</i>	I gather input from peers on the use of technology.
	<i>Adjusting Practices</i>	I make changes and improvements based on feedback and personal reflection.
Phase 5: Using Technology in Lectures	<i>Implementing Strategies</i>	I apply the strategies and tools I learned and practiced into my actual teaching.
	<i>Evaluating Effectiveness</i>	I assess the impact of technology integration on student engagement and learning.
	<i>Continual Learning</i>	I stay updated on recent technologies and pedagogical strategies to continually enhance my teaching practices.

Note: As you look through this table, please be aware that my self-growth journey is actually nonlinear. It often involves frequent overlaps, revisits to previous phases, and adaptations based on the ongoing challenges I face and the learnings I acquire in integrating technology into my teaching practices.