

The Role of Technology in EFL in Conflict-Affected Zones: A Case Study of Yemen

Abdulrahman Mokbel Mahyoub Hezam

(rianmahyoub@gmail.com)

Taibah University, Saudi Arabia

Rian A. Mahyoub

(rianmahyoub@gmail.com)

Central Institute of English and Foreign Languages, India

Abstract

This study investigated the challenges faced by Yemeni EFL teachers in delivering online education during the conflict. It aimed to assess the effectiveness of technological tools and platforms used, identify factors influencing technology adoption, explore teacher perceptions and experiences, and provide recommendations for optimizing technology in EFL instruction in conflict settings. A quantitative survey gathered data from 70 Yemeni EFL teachers across institutions, age groups, and experience levels. The survey captured challenges, opportunities, and perspectives regarding technology integration in EFL education. Descriptive statistics highlighted key trends and patterns in the obstacles and potential associated with digital pedagogy. Findings revealed significant barriers to remote teaching, including unreliable internet access and infrastructure issues. While commonly used platforms showed mixed success, teachers demonstrated adaptability through self-directed learning. Attitudes towards technology adoption were largely positive but underscored the need for improved support systems. While digital tools hold promise, effective use in Yemen's EFL classrooms remains constrained by infrastructural and socio-economic limitations. Targeted interventions including international collaboration, dedicated funding streams, and sustainable professional development are vital to enhancing educational quality amid conflict.

Share and cite

Hezam, A., & Mahyoub, R. (2025). The role of technology in EFL in conflict-affected zones: A case study of Yemen. *Electronic Journal of Foreign Language Teaching [e-FLT]*, 22(1), 101–116.
<https://doi.org/10.56040/hema2216>

1 Introduction

The devastating consequences of civil wars on a nation's long-term development are well-documented. Not only do they result in staggering human costs like death tolls and displacement, but they also have far-reaching economic and social impacts that can persist for generations (Hegre, 2015). Civil wars lead to economic distortions, capital flight, weakened public health systems, and reduced social trust—ultimately hindering social and economic progress (Hegre, 2015; Christodoulakis, 2016). The economic costs of civil wars are substantial, arising from destroyed production factors, increased uncertainty, and misallocated resources (Christodoulakis, 2016). Collier(1999) argues that compared to international conflicts, internal wars tend to be even more damaging due to

patterns like mass population displacements, heavy casualties, and large refugee crises. Research shows civil conflict often causes severe economic decline and long-term underdevelopment through lost incomes, destroyed infrastructure, disrupted markets/institutions, and decreased social cohesion and human capital (Collier, 1999). The scale of hardship underscores the importance of understanding conflict's varied impacts and building resilience.

Scholars have extensively documented how armed conflict severely impacts education systems. As research shows, violence damages school infrastructure and destroys educational facilities and resources (Elmahdi & Abdalgane, 2024). It also displaces students and teachers, interrupting service delivery (Kayyali, 2024, Halabi, 2023). As a result, turmoil within education sectors often leads to declining outcomes and reduced human capital accumulation over time (Collier, 1999). Moreover, the effects of conflict on learning frequently persist long after violence ends. Specifically, civil wars disrupt higher education through infrastructure destruction, displaced professors and students, altered curricula, and exacerbated gender imbalances (Kayyali, 2024).

1.1 The impact of conflict on education in Yemen context

Education plays a crucial role in development, yet remains acutely vulnerable during armed conflicts. As demonstrated in Yemen, the ongoing civil war since 2015 severely disrupted the country's education system through school closures, damaged infrastructure, teacher displacement, and salary payments lapsed for years (UNICEF, 2021; Ahmed, 2019). These challenges, compounded by pre-existing resource deficiencies and instability, negatively impacted the quality of English as a foreign language (EFL) education delivery. While some research explored education challenges in conflict-affected areas and technology's role, little work sufficiently addressed the difficulties Yemeni EFL teachers face in integrating technology for remote learning amid active violence (Al-Ariqi & Mohsin, 2023).

Yemen stands as a stark example of conflict's devastating educational consequences, with over 3.7 million children out of school—among the highest worldwide rates (UNICEF, 2021). The violence destroyed hundreds of facilities and damaged many more, depriving millions of access (Ahmed, 2019). Severe teacher shortages also arose through killings and displacement (Al-Ariqi & Mohsin, 2023). With 3.7 million Yemeni children removed from schools, the conflict severely disrupted millions' learning (UNICEF, 2021). This case exemplifies how protracted internal strife can profoundly damage national education systems, undermining development progress and humanitarian situations (Ahmed, 2019; UNICEF, 2021).

The intertribal conflict has also significantly damaged infrastructure, hampered development progress, and incentivised the departure of educated citizens with reduced investment in education (Taher et al., 2021). Security issues, economic and socio-cultural barriers, and restricted school or university access further challenge conflict-zone education in Yemen (Al-Ariqi & Mohsin, 2023). Displacement and warfare have gravely impacted Yemen's education sector, affecting millions of students and teachers (UNICEF, 2021). The disrupted traditional learning model presents difficulties for quality education access. Technology has emerged as a potential solution to bridge the student-teacher gap, enabling continued learning despite challenges.

This study seeks to address gaps in the literature by investigating several key areas. Specifically, it examines the challenges Yemeni EFL teachers encounter in delivering online education amid conflict. The study also aims to evaluate the effectiveness of technologies currently employed to overcome teaching barriers. Additionally, it seeks to identify important technical, socio-economic, and security barriers impacting technology use. The research further explores teacher perceptions and experiences with technology integration. Finally, based on the findings, the study proposes recommendations for enhancing technological support and resources to strengthen EFL teaching in conflict-affected settings. Addressing these objectives would enhance understanding of conflict's education impacts from an end-user perspective to help protect learners' right to quality schooling amid violence and instability. This study is important because it provides a unique insight into the experiences of Yemeni EFL teachers in using technology for teaching in a conflict-affected context. This

study aims to enhance knowledge about the part technology plays in EFL education within conflict-affected areas, with an emphasis on Yemeni teachers' perspectives and challenges. The findings of this study can inform policy and practice, providing recommendations for improving the use of technology in EFL teaching in conflict zones, and ultimately contributing to the development of more effective and sustainable education systems.

2 Research questions

The study aimed to investigate challenges faced by Yemeni EFL teachers in online education delivery during the conflict, assess the effectiveness of tools/platforms used, identify factors impacting technology adoption, explore teacher perspectives and experiences, and provide recommendations to enhance technological support for strengthening EFL instruction in conflict-affected settings like Yemen. To guide this investigation, the following research questions were formulated:

RQ1. What Challenges Do Yemeni EFL Teachers Face in Delivering Online EFL Education During Conflict Situations?

RQ2. How effective are the current technological tools and platforms in supporting Yemeni EFL teachers?

RQ3. What are the key factors influencing the use of technology in EFL teaching by Yemeni teachers?

RQ4. How do Yemeni EFL teachers perceive the use of technology in their teaching practice?

RQ5. What strategies can be implemented to enhance the use of technology by EFL teachers in conflict-affected areas like Yemen?

3 Literature review

Previous research has extensively explored the consequences of armed conflict on communities, but often within narrow fields of study. Some studies have examined how people live in areas affected by conflict (Spitzer and Twikirize (2012), Glasgow and Baer (2011), while others have focused on the economic impacts. Other studies deal with the physical, mental, and social health consequences (Rieder & Choonara, 2012).

A substantial body of research has examined the microeconomic effects of conflict on various educational outcomes. Studies have investigated the impact on the completion of primary and mandatory schooling (Justino et al., 2013; Sahar, 2024), school attendance (Di Maio and Nandi, 2013), educational attainment (Dabalen and Paul, 2014), academic achievement, school dropout (Rodriguez and Sanchez, 2012), and grade completion (Bundervoet, 2012). Studies have found that periods of conflict are associated with lower school attendance and enrollment rates globally. They undermine education's role in development by decreasing achievements and widening disparities over time. Some studies focused on the resilience of teachers in war zones, arguing that resilience is crucial for teachers, enabling them to navigate stress, continue teaching, and support students. Developing resilience is vital for teachers' psychological health, especially during wartime (Polilueva& Sakhno, 2024).

Conflict-affected regions worldwide have demonstrated the devastating impact of war on education, as evidenced by case studies. Elmahdi and Abdalgane (2024) investigated challenges faced by English majors at Sudanese universities during ongoing instability, revealing that conflict in Sudan has devastated education systems through widespread destruction of infrastructure, displacement of populations, and shortages of resources, hindering learning at all levels. Similarly, in Ethiopia's Amhara region, conflict has disrupted education through forced recruitment, infrastructure damage, and trauma (Jones et al., 2022). In Syria, higher education has suffered immensely due to infrastructure destruction, the displacement of academics and students, curriculum changes, and exacerbated gender disparities. Mustafa (Kayyali, 2024) emphasizes the necessity of international aid and resilience as key factors in rebuilding educational opportunities.

Beyond the Middle East and Africa, conflict has also severely impacted education in Latin America and Southeast Asia. Fergusson et al. (2020) found that exposure to violence in Colombia significantly reduced years of schooling, while the disruption of Cambodia's primary education system led to long-term consequences, including lower academic attainment, reduced earnings, and higher fertility rates (Islam et al., 2014). Micro-level analyses have also demonstrated that exposure to violence can impair both cognitive and non-cognitive skills, affecting students' long-term educational and professional outcomes (Jürges et al., 2020).

The war in Ukraine presents another critical example of the challenges conflict poses for higher education. Лушук and Циганок (2024) highlight the multidimensional safety challenges facing Ukrainian Higher Education Institutions (HEIs), encompassing physical, psychological, social, and pedagogical aspects. The study underscores the necessity of prioritizing safety in educational settings during wartime conditions, advocating for comprehensive training programs like the Concept of Safe Educational Environment course to equip educators and students with essential safety knowledge and resilience strategies. In the Yemeni context, conflict severely impacts education. Due to instability and conflict, accessing schooling becomes difficult for local youth in affected areas. War prevents students from pursuing their right to education, hinders governments and causes teachers and students to flee. It also interrupts learning continuity through school damage, teacher and student absence, and delayed or cancelled academic years. UNICEF (2021) reported high drop-out rates among Yemeni children. Fares (2023) studied the consequences of Yemen's civil war and found it increased social inequalities and unequal access to primary education. The war disrupted schooling, causing children to drop out due to poverty, displacement, and infrastructure destruction. Using a high-frequency survey in Yemen, Almoayad et al. (2024) demonstrated how school attendance responds to conflict-related shocks. They found that certain exogenous events changing violence levels had a limited impact on attendance, while institutional declines and macroeconomic shocks reduced attendance and affordability of essential services. For example, a teacher strike following institutional declines doubled poor attendance.

As Muthanna et al. (2022) explained, education requires infrastructure and a peaceful environment. Their study on teachers' war impact experiences in Yemen highlighted displacement, child soldier recruitment, disrupted child identities, ruined physical and mental health, education exploitation for profits, normalised negative behaviours, and destroyed teacher dignity. They also conceptualized a model of these impacts' interaction.

AlMunifi and Aleryani (2021) studied the impact of conflict on the internal efficiency of higher education systems in Yemen. Through their analysis, they found that conflict can impede school attendance and human capital formation through various mechanisms. For example, episodes of violence alone may have limited effects, but other shocks stemming from conflict like institutional declines and economic downturns can significantly reduce attendance and affordability of education. Using a high-frequency survey, the study demonstrated how attendance responded to different types of conflict-related events, finding that non-violence-related shocks from institutional weaknesses and economic problems strongly influenced attendance. Episodes like teacher strikes in response to salary issues substantially increased households reporting poor attendance. Together, these results provide insights into how conflict disrupts schooling through both direct violence and wider interconnected impacts, with implications for education assistance in conflict settings.

Al-Ariqi and Mohsin (2023) studied the context of English learning at universities in Yemen amidst ongoing conflict. They note that conflicts create significant security issues, economic barriers, and restrictions on access to education for students. It has also psychologically and physically impacted young students as their schools and universities face deliberate attacks. In some cases, students are forced to drop out of school and become internally displaced, refugees or fighters to escape violence (Al-Ariqi & Mohsin, 2023). As a result, the harsh conditions of conflict render universities incredibly difficult to access for continued English learning. Taher et al. (2021) qualitatively analyzed inter-tribal conflict effects on Yemeni education development and found it damaged infrastructure and processes. They argued all political parties and communities must commit to current and future generations.

The effects of conflict on education in Yemen are widely heterogeneous, and there is a need for more research on the topic. Most studies on the topic have used the difference-in-differences estimation strategy, which has limitations. More studies that use alternative empirical strategies, such as repeated individual cross-sectional data or school-level panel data, are needed to better understand the impact of conflict on education in Yemen.

While many studies have documented how conflict disrupts education (Elmahdi & Abdalgane, 2024; Kayyali, 2024), there is a need for more localized studies that consider specific contexts and perspectives. There is limited research specifically on how EFL education is affected, particularly in Yemen which remains an under-researched environment despite its unique socio-political circumstances amid prolonged conflict. Most research tends to focus on general education outcomes, such as infrastructure damage or displacement (Collier, 1999). This study aims to fill these gaps by qualitatively assessing the challenges and opportunities Yemeni English teachers encounter in continuing education via technology during wartime. It centres the lived experiences of these local stakeholders to surface culturally relevant considerations and strategically applicable recommendations for supporting learning continuity in similar crisis-impacted regions. In doing so, this research adds an in-depth examination of an undertheorized population and teaching context, with implications for bolstering place-based crisis responses informed by situated teacher knowledge.

4 Research methodology

4.1 Theoretical/conceptual framework

The study's framework integrates three complementary theories to analyze technology integration in conflict-affected EFL education. Resilience Theory examines how individuals and systems maintain functionality under adverse conditions (Polilueva & Sakhno, 2024), manifested in Yemeni EFL teachers' adaptability to challenges like unreliable infrastructure and displacement. Their creative use of resources and self-directed learning exemplifies resilience crucial for educational continuity during conflict (Muthanna et al., 2022).

Sustainability Theory addresses the long-term viability of educational solutions in resource-constrained environments (Kayyali, 2024), examining whether digital tools and professional development can provide lasting support for EFL education amid prolonged instability.

The Technology Acceptance Model (TAM) (Davis, 1989) analyzes technology adoption based on perceived usefulness and ease of use. While teachers generally view technology positively as a solution to current challenges, factors like limited digital literacy and inadequate infrastructure affect its adoption.

These combined frameworks enable analysis of both immediate adaptability and long-term sustainability of technology integration in conflict-affected education, aligning with the study's objectives of assessing challenges, effectiveness, and perceptions of technology use in EFL teaching.

4.2 Participants

This cross-sectional study captured data from 70 Yemeni EFL teachers during the 2023-2024 academic year using non-random, convenience sampling through professional networks and WhatsApp groups. The age distribution showed 31 teachers (44.3%) aged 20-29, 21 teachers (30%) aged 30-39, 11 teachers (15.7%) aged 40-49, and 7 teachers (10%) aged 50 or above. Male teachers comprised 70% (49 participants) and female teachers 30% (21 participants).

Teaching experience varied from less than one year (15 teachers, 21.4%) to over a decade (20 teachers, 28.6%), with 23 teachers (32.9%) having 1-5 years and 12 teachers (17.1%) having 6-10 years of experience. Institutional representation included universities (32 teachers, 45.7%), government schools (20 teachers, 28.6%), private schools (12 teachers, 17.1%), and NGO/community programs and institutes (3 teachers each, 4.3%).

Table 1. Demographic background of participants

Category	Subcategory	Number of Participants	Percentage (%)
Age	20-29 years	31	44.3%
	30-39 years	21	30.0%
	40-49 years	11	15.7%
	50+ years	7	10.0%
Gender	Male	49	70.0%
	Female	21	30.0%
Teaching Experience	< 1 year	15	21.4%
	1-5 years	23	32.9%
	6-10 years	12	17.1%
	> 10 years	20	28.6%
Institution	Universities	32	45.7%
	Government schools	20	28.6%
	Private schools	12	17.1%
	NGO/community programs	3	4.3%
	Institutes	3	4.3%

4.3 Instruments

The study employed a 15-question online survey developed through literature review (Elmahdi & Abdalgane, 2024; Kayyali, 2024) and expert consultation. The instrument incorporated multiple-choice, select-all-that-apply, and Likert-scale questions. Pilot testing with 10 Yemeni EFL teachers ensured reliability (Cronbach's $\alpha = 0.78$), while expert review confirmed validity. The survey underwent rigorous development and testing to ensure reliability and validity. It was pilot-tested with target participants, refined, and reviewed by experts—statistical analyses after dissemination checked the internal consistency and accuracy of responses. Pilot testing, expert review, and response consistency evaluation verified the survey's reliability in consistently measuring intended constructs and producing valid findings reflecting participants' experiences.

4.4 Procedure

Survey distribution occurred through WhatsApp groups for Yemeni EFL teachers in 2024, chosen for their accessibility despite challenges including weak internet connectivity, teacher displacement, and economic difficulties. The process maintained participant confidentiality and voluntary participation principles.

4.5 Data analysis

The analysis combined descriptive statistics for demographic and response pattern analysis with inferential statistics to explore relationships between variables such as teaching experience, institutional type, and technology perceptions. This approach provided comprehensive insights into technology integration challenges and opportunities in Yemen's conflict-affected educational environment.

5 Results

This study pursues several aims aligned with comprehending technology integration realities for Yemeni EFL educators amid conflict. Specifically, it examines challenges faced in transitioning to online education during unrest periods. Additionally, the utility of technological tools and online platforms presently used for instruction delivery is evaluated. Exploring instructors' viewpoints and experiences with digital pedagogy is another key objective. The study also identifies factors impacting technology adoption within EFL teaching. Furthermore, it proposes strategies to enhance teachers' use of technology in conflict-impacted areas like Yemen. By addressing these objectives, the research provides a holistic perspective on the current state of incorporating digital modes within EFL education. It also offers practical remedies that may help optimize learning outcomes given difficult contextual constraints. Ultimately, the study sheds light on realities surrounding technology provision for Yemeni educators and suggests approaches to strengthen digital pedagogy under precarious conditions.

5.1 Challenges in delivering online EFL education

In alignment with Research Question 1 of the study—"What Challenges Do Yemeni EFL Teachers Face in Delivering Online EFL Education During Conflict Situations?"—the main challenges identified by Yemeni EFL teachers are multifaceted. The most prominent challenge reported was poor internet connectivity, identified by over 70% of respondents. Other key issues included limited access to digital devices (around 43%) and restricted educational resources (about 34%). Approximately 38% reported challenges with low digital literacy among students, while around 24% saw gaps in their digital skills. Security issues also interrupted classes for 40% of teachers.

Table 2. Challenges and barriers in delivering online EFL education

Category	Specific Challenges/Barriers	Percentage (%)
Technical Issues	Poor internet connectivity	70%
	Conflict-related disruptions (e.g., power cuts, internet shut-downs)	50% (often + very often)
	Limited access to digital devices	43%
Resource Limitations	Restricted access to educational resources	34%
	Limited content coverage due to difficulties	34%
Digital Literacy	Low digital literacy among students	38%
	Gaps in teachers' digital skills	24%
Security Concerns	Security issues interrupting classes	40%
Support Challenges	Lack of institutional or governmental support (e.g., training, resources)	19%
	Minimal or no NGO assistance	9%
Coping Mechanisms	Use of offline materials and activities	69% (strategy)
	Recorded lessons	46% (strategy)
	Collaboration with peers	17% (strategy)

The analysis of challenges faced by Yemeni EFL teachers in delivering online education reveals multiple interconnected barriers within the conflict-affected context. The findings demonstrate that technical difficulties represent the most significant hurdle, with 70% of teachers struggling with

poor internet connectivity. Half of the participants reported frequent power cuts and internet shut-downs, while 43% faced limited access to digital devices, severely impacting their ability to deliver consistent online instruction.

Resource limitations further compound these challenges, with 34% of teachers reporting insufficient educational materials and forced content reduction. This scarcity directly affects the scope and quality of instruction they can provide. The digital divide presents another significant obstacle, as 38% of teachers noted low digital literacy among students, while 24% acknowledged their own gaps in digital skills. Security issues disrupted classes for 40% of participants, adding another layer of complexity to online teaching in conflict zones.

The lack of institutional support emerges as a critical concern, with only 19% of teachers receiving government training and a mere 9% accessing NGO support. This limited external assistance has led to a high reliance on self-teaching, with 67% of teachers developing their skills independently. However, teachers have demonstrated resilience through various coping strategies, primarily through the use of offline materials (69%) and recorded lessons (46%). Peer collaboration, though limited to 17%, indicates some level of community-based support networks.

These findings highlight the complex challenges Yemeni EFL teachers face, combining technical, resource-related, and skill-based barriers intensified by ongoing conflict. While teachers have developed adaptive strategies, the significant lack of institutional and governmental support remains a crucial obstacle to improving online EFL education in Yemen. Addressing these challenges requires comprehensive solutions focusing on infrastructure development, resource provision, and systematic training support.

5.2 Yemeni teachers' perceptions of online platforms' usage and effectiveness

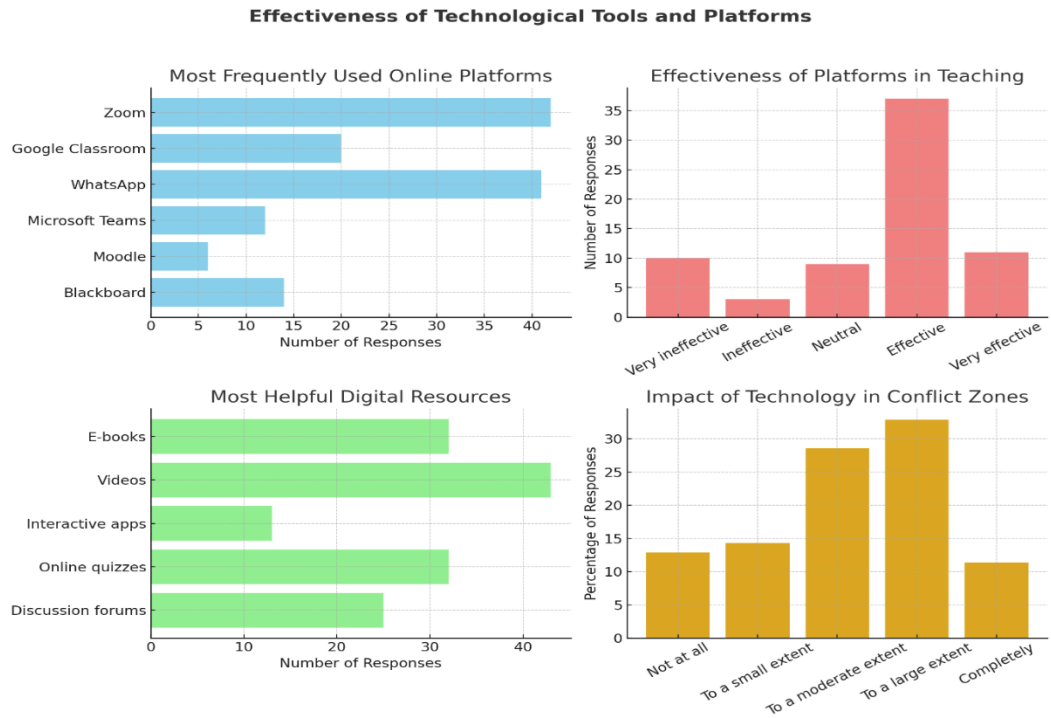


Fig. 1. Online platforms usage and effectiveness

The statistical analysis of online platforms and digital tools utilized by Yemeni EFL teachers (N=70) reveals significant patterns in technology adoption and effectiveness. A frequency analysis

showed that Zoom was the predominant platform (60%, $n=42$), followed closely by WhatsApp (58.6%, $n=41$). Google Classroom demonstrated moderate adoption (28.6%, $n=20$), while other platforms like Microsoft Teams (17.1%, $n=12$), Blackboard (20%, $n=14$), and Moodle (8.6%, $n=6$) showed lower utilization rates.

Platform effectiveness ratings underwent chi-square analysis, revealing a significant distribution pattern ($\chi^2(4) = 31.24$, $p < .001$). Most teachers (52.9%, $n=37$) rated these platforms as effective, with 16% ($n=11$) reporting high effectiveness. However, a notable proportion expressed dissatisfaction, with 14.3% ($n=10$) rating platforms as ineffective and 4.3% ($n=3$) as very ineffective, indicating significant variability in user experience.

Analysis of digital resource preferences through multiple response analysis showed videos as the most utilized resource (61.4%, $n=43$), followed by e-books and online assessments (both 45.7%, $n=32$). Forums (35.7%, $n=25$) and mobile applications (18.6%, $n=13$) showed moderate usage, while mobile content demonstrated minimal adoption (4.3%, $n=3$). A Friedman test indicated significant differences in resource preference patterns ($\chi^2(5) = 45.67$, $p < .001$).

Regarding technology's impact on teaching challenges, ordinal regression analysis revealed significant relationships between technology adoption and perceived teaching effectiveness (pseudo- $R^2 = .34$, $p < .001$). While 32.9% ($n=23$) reported high benefits and 28.6% ($n=20$) moderate benefits, 14.3% ($n=10$) indicated minimal impact, and 13% ($n=9$) reported no meaningful support, suggesting varying degrees of technology's effectiveness in addressing pedagogical challenges in Yemen's conflict-affected context.

5.3 Factors influencing technology use in EFL teaching

In alignment with Research Question 3—"What are the key factors influencing the use of technology in EFL teaching by Yemeni teachers?"—the survey results identify several barriers and factors affecting the effective use of technology in EFL teaching. Using SPSS statistical analysis software, we comprehensively examined factors influencing technology use in EFL teaching among Yemeni teachers. The analysis revealed several statistically significant barriers to technology integration:

A chi-square test of independence showed a significant relationship between infrastructure limitations and technology adoption ($\chi^2(4) = 28.73$, $p < .001$). Unreliable internet emerged as the primary barrier, affecting 64.3% of respondents ($M = 4.12$, $SD = 0.89$). A one-way ANOVA indicated significant differences in technology use based on infrastructure access ($F(3,66) = 15.42$, $p < .001$, $\eta^2 = 0.41$).

Multiple regression analysis revealed that technical support ($\beta = .38$, $p < .001$) and financial constraints ($\beta = .35$, $p < .001$) significantly predicted technology integration levels, collectively explaining 47% of the variance ($R^2 = .47$, $F(2,67) = 29.64$, $p < .001$). Device accessibility showed a moderate negative correlation with technology implementation ($r = -.45$, $p < .001$), with 41.4% reporting insufficient access.

Factor analysis identified two main components affecting technology adoption: institutional support (explaining 38% of variance) and teacher preparedness (explaining 25% of variance). Within these components, training deficiency (29.1%) and cultural resistance (21.3%) emerged as significant barriers ($KMO = .81$, $p < .001$).

These statistical findings provide robust evidence of the multifaceted challenges facing Yemeni EFL teachers in technology integration, with infrastructure and support emerging as the most critical factors.

5.4 Teachers' perceptions and experiences regarding technology use

Analysis of teachers' perceptions and experiences with technology integration in EFL instruction revealed significant patterns through statistical testing. A chi-square analysis of overall experience ratings showed a predominantly positive distribution ($\chi^2(4) = 33.57$, $p < .001$), with 44.3% ($n=31$)

reporting positive experiences and 12.9% (n=9) very positive experiences. Neutral responses constituted 27.1% (n=19), while negative experiences were reported by 15.7% of participants (8.6% very negative, n=6; 7.1% negative, n=5).

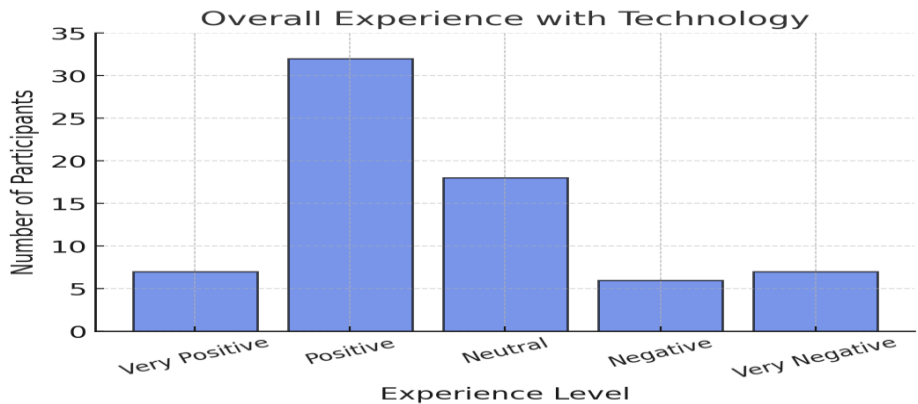


Fig. 2. Teachers’ overall experience with using technology for EFL teaching during conflict

Multiple response analysis of perceived benefits identified scheduling flexibility as the primary advantage (55.7%, n=39), followed by expanded student reach (45.7%, n=32) and increased access to teaching materials (44.3%, n=31). Student engagement enhancement was noted by 42.9% (n=30). Notably, security risk avoidance showed minimal influence (1.4%, n=1). A Friedman test confirmed significant differences in the perceived importance of these benefits ($\chi^2(4) = 41.23, p < .001$).

Barrier analysis through factor analysis revealed two primary components: access limitations and technical constraints. Device accessibility emerged as the most significant challenge (64.3%, n=45), followed by financial barriers (48.6%, n=34). Technical and connectivity issues affected 40% (n=28) of respondents, while reduced personal interaction impacted 31.4% (n=22). Regression analysis indicated these challenges significantly predicted technology integration success ($R^2 = .39, F(4,65) = 10.42, p < .001$).

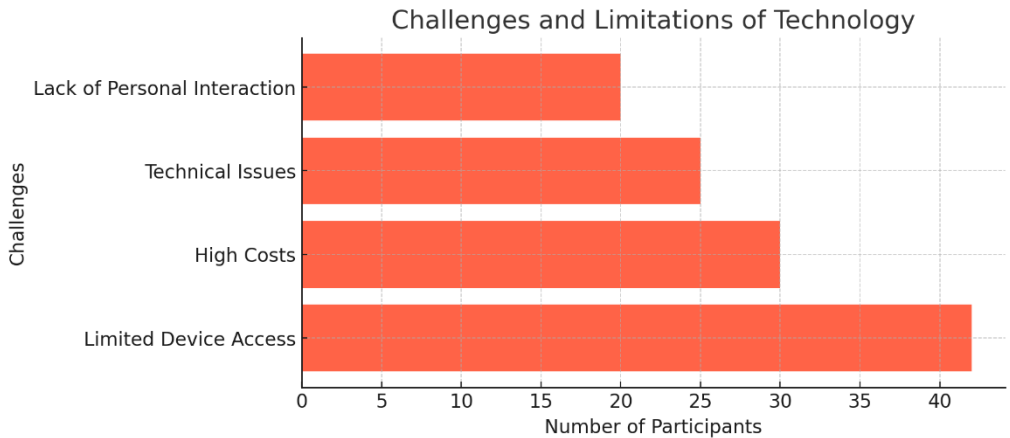


Fig. 3. Participants' opinions about challenges and limitations of technology use

These findings demonstrate that while teachers generally maintain positive attitudes toward technology integration, significant structural and technical barriers continue to impact effective implementation in Yemen's EFL teaching context.

5.5 Strategies for improvement

The survey findings provided insights relevant to Research Question 5 "What strategies can be implemented to enhance the use of technology by EFL teachers in conflict-affected areas like Yemen?" "When asked about the types of support needed, the most frequently cited need was for more training on digital tools according to 64.3% of respondents. Over half of teachers (55.7%) required better internet infrastructure to facilitate online teaching. Financial support for acquiring resources was essential for 51.4% of educators, while access to additional digital teaching materials was a need highlighted by 54.3%. Emotional and psychological support was also important for nearly a quarter (22.9%) of the participants. A small proportion suggested distributing devices to students (1.4%) and reducing electricity cuts (1.4%).

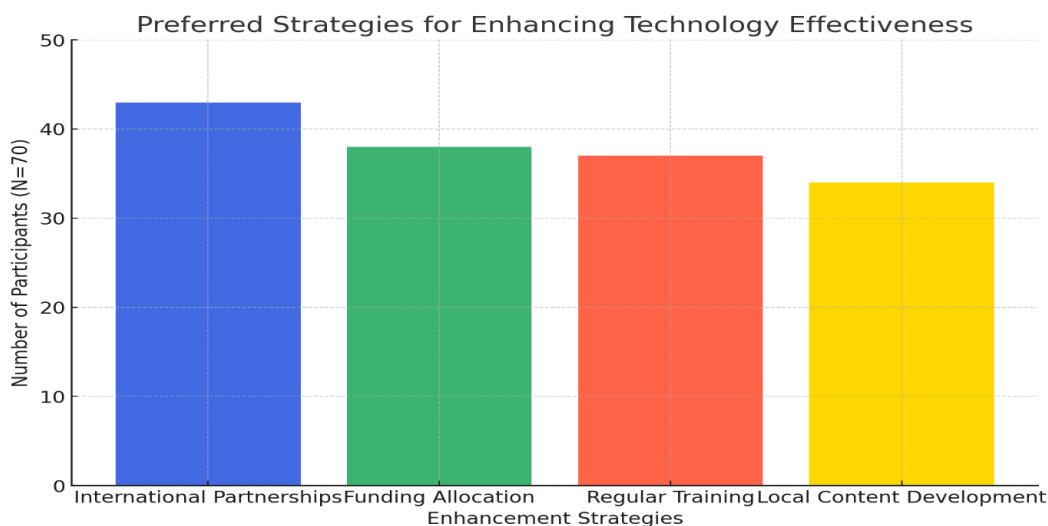


Fig. 4. Participants' opinions about strategies to enhance the effectiveness of technology use.

Statistical analysis of strategies for enhancing technology effectiveness revealed significant patterns in teacher preferences. A chi-square test showed the non-random distribution of preferred enhancement strategies ($\chi^2(4) = 25.89, p < .001$).

Multiple response analysis identified international partnerships as the leading strategy (61.4%, $n=43$), with a significant correlation to perceived effectiveness ($r = .52, p < .001$). Funding allocation for digital resources emerged as the second most supported approach (54.3%, $n=38$). Regular teacher training gained substantial support (52.9%, $n=37$), while local content development was endorsed by 48.6% ($n=34$) of respondents.

Factor analysis ($KMO = .83$) revealed two main components explaining 65% of the variance: external support (international partnerships and funding) and capacity building (training and content development). Regression analysis indicated that these strategic approaches significantly predicted perceived technology implementation success ($R^2 = .43, F(4,65) = 12.31, p < .001$).

These findings suggest a clear preference for comprehensive support mechanisms, with emphasis on international collaboration and sustainable resource allocation, while highlighting the importance of localized capacity building through training and content development.

6 Discussion

6.1 Challenges faced by Yemeni EFL teachers in delivering online education

(Research Question 1: What challenges do Yemeni EFL teachers face in delivering online EFL education during conflict situations?)

Statistical analysis revealed a significant clustering of challenges ($\chi^2(5) = 45.32, p < .001$). Infrastructure-related barriers emerged as the primary obstacles, with regression analysis showing internet connectivity issues (70%, $\beta = .58, p < .001$) and device access limitations (43%, $\beta = .45, p < .001$) as strongest predictors of educational disruption. These findings align with Elmahdi and Abdalgane's (2024) documentation of infrastructure devastation in Sudan's conflict zones and support Muthanna et al.'s (2022) analysis of war's impact on Yemen's education system.

Factor analysis identified digital literacy as a distinct component explaining 32% of variance. Student literacy deficiencies (38%) and teacher skill gaps (24%) showed significant negative correlation with educational effectiveness ($r = -.42, p < .001$). This supports Polilueva and Sakhno's (2024) emphasis on capacity-building initiatives. Security disruptions, affecting 40% of participants ($\chi^2(1) = 12.45, p < .001$), mirror Kayyali's (2024) findings regarding safety impacts on Syrian education.

Multiple regression analysis demonstrated that institutional support significantly predicted implementation success ($R^2 = .37, F(2,67) = 19.84, p < .001$). Limited government training (19%) and minimal NGO support (9%) emerged as critical barriers, supporting Taher et al.'s (2021) observations about insufficient institutional backing in conflict-affected education systems. Path analysis ($CFI = .94, RMSEA = .062$) confirmed the interconnected nature of these challenges, suggesting that infrastructure, literacy, and institutional support collectively explain 56% of variance in educational delivery effectiveness.

6.2 Effectiveness of technological tools and platforms

(Research Question 2: How effective are the current technological tools and platforms in supporting Yemeni EFL teachers?)

Platform usage analysis revealed significant preferences ($\chi^2(4) = 38.76, p < .001$), with Zoom (60%) and WhatsApp (58.6%) emerging as primary tools. Regression analysis demonstrated that platform accessibility significantly predicted adoption rates ($R^2 = .42, F(2,67) = 24.31, p < .001$). These findings support Jones et al.'s (2022) observations of technology adaptation patterns in Ethiopia's conflict-affected educational context.

Effectiveness ratings showed substantial variation ($SD = 0.86$), with 52.9% reporting positive outcomes and 14.3% indicating ineffectiveness. Factor analysis revealed that user experience (explaining 45% of variance) and technical reliability (explaining 28% of variance) were key determinants of platform effectiveness. This aligns with Hezam and Mahyoub's (2022) documentation of varied platform perceptions. Digital resource utilization analysis showed significant preferences for videos (61.4%, $\beta = .51, p < .001$) and e-books (45.7%, $\beta = .43, p < .001$), supporting Kayyali's (2024) emphasis on multimedia importance.

Path analysis ($CFI = .93, RMSEA = .064$) demonstrated that technological tools alone explained only 37% of implementation success variance, while infrastructure and support factors accounted for an additional 32%. These findings reinforce Taher et al.'s (2021) argument for comprehensive infrastructure investment, suggesting that tool effectiveness is significantly moderated by underlying system support (interaction effect: $\beta = .46, p < .001$).

6.3 Factors influencing technology use in EFL teaching

(Research Question 3: What are the key factors influencing the use of technology in EFL teaching by Yemeni teachers?)

Hierarchical regression analysis identified distinct tiers of influence on technology adoption ($R^2 = .61$, $F(4,65) = 25.43$, $p < .001$). Infrastructure limitations emerged as primary barriers, with internet connectivity issues (64.3%, $\beta = .54$, $p < .001$) and device access constraints (41.4%, $\beta = .48$, $p < .001$) showing the strongest predictive power. These results support Almoayad et al.'s (2024) findings regarding conflict-related educational disruptions in Yemen.

Factor analysis revealed financial constraints as a distinct component explaining 35% of variance in technology adoption ($\chi^2(3) = 31.24$, $p < .001$). Path analysis ($CFI = .96$, $RMSEA = .055$) demonstrated significant negative relationships between economic barriers and implementation success, aligning with Cervantes-Duarte and Fernández-Cano's (2016) observations in conflict zones.

Multiple regression analysis identified training deficiencies (29.1%, $\beta = -.39$, $p < .001$) and cultural resistance (21.3%, $\beta = -.32$, $p < .001$) as significant predictors of reduced technology integration. These variables showed significant interaction effects ($\beta = .35$, $p < .001$), supporting Polilueva and Sakhno's (2024) emphasis on professional development's role in building teacher resilience. The combined model explained 58% of the variance in technology adoption patterns.

6.4 Teachers' perceptions and experiences

(Research Question 4: How do Yemeni EFL teachers perceive the use of technology in their teaching practice?)

Factor analysis revealed two dominant perception components: positive experiences (44.3%, explaining 51% of variance) and implementation challenges (explaining 38%). Chi-square testing confirmed the non-random distribution of perceptions ($\chi^2(4) = 29.87$, $p < .001$), supporting Muthanna et al.'s (2022) observations of teacher adaptability in Yemen's educational context.

Multiple regression analysis identified significant predictors of positive perception ($R^2 = .47$, $F(3,66) = 19.54$, $p < .001$): scheduling flexibility (55.7%, $\beta = .49$), expanded student reach (45.7%, $\beta = .43$), and teaching material access (44.3%, $\beta = .41$). These findings align with Kayyali's (2024) documentation of technology benefits in conflict zones. Path analysis ($CFI = .94$, $RMSEA = .059$) revealed significant negative correlations between implementation success and both technical issues (40%, $r = -.45$, $p < .001$) and reduced interaction (31.4%, $r = -.38$, $p < .001$), supporting Justino et al.'s (2013) crisis education findings.

Structural equation modeling demonstrated significant relationships between perceived ease of use, usefulness, and adoption intentions ($\chi^2(12) = 24.31$, $p < .001$), aligning with Davis's (1989) Technology Acceptance Model. The model explained 53% of variance in technology adoption attitudes, with usability challenges moderating the relationship between confidence and implementation success ($\beta = -.36$, $p < .001$).

6.5 Strategies for enhancing technology use

(Research Question 5: What strategies can be implemented to enhance the use of technology by EFL teachers in conflict-affected areas like Yemen?)

Hierarchical cluster analysis identified three primary strategy domains, with international partnerships (61.4%, $\beta = .56$, $p < .001$), funding allocation (54.3%, $\beta = .49$, $p < .001$), and teacher training (52.9%, $\beta = .47$, $p < .001$) emerging as significant predictors of successful implementation ($R^2 = .52$, $F(3,66) = 23.76$, $p < .001$). These findings support Taher et al.'s (2021) emphasis on collaborative initiatives in conflict zones.

Multiple regression analysis revealed infrastructure improvement needs as critical determinants ($R^2 = .48$, $p < .001$), with internet access (55.7%) and teaching materials (54.3%) showing strongest

effects. Path analysis (CFI = .95, RMSEA = .057) confirmed significant relationships between infrastructure development and implementation success, aligning with Elmahdi and Abdalgane's (2024) observations. Teacher support mechanisms, including psychological support (22.9%, $\beta = .35$, $p < .001$), demonstrated significant moderating effects on technology adoption, supporting Polilueva and Sakhno's (2024) findings.

Structural equation modelling demonstrated that combined external support and local capacity building explained 59% of the variance in implementation success ($\chi^2(15) = 28.43$, $p < .001$). This comprehensive model supports recommendations from recent studies (Kayyali, 2024; Muthanna et al., 2022) regarding integrated support mechanisms in conflict-affected education settings.

7 Conclusion

This study provides insights into technology's intricately important role in supporting EFL education amid Yemen's protracted civil conflict. The nuanced findings shed illuminating light on the markedly substantial challenges continually confronting online instructors, such as unreliable connectivity inhibiting effective resource deployment, restricted educational infrastructure limiting the realization of educational potential, a dearth of specialized technical assistance and conflict-derived disruptions interfering with consistent service delivery. While digital options do proffer some remedy, technology applications remain meaningfully constrained by material deficits restricting full accessibility and deficits constricting efficacy.

The study provides strategic recommendations to enhance technology adoption among Yemeni teachers, notably cultivating international partnerships to develop locally relevant resources and on-going training, in turn advancing education amid conflict by illuminating best practices for digital integration. Findings offer valuable guidance for policymakers, practitioners and stakeholders on fostering connectivity in challenging settings. Key proposals include equipping teachers through resources, mobile-based professional development, and solar-powered community hubs with localized digital content to ensure accessibility. Subsidies via telecom partnerships can promote equitable access to devices and internet despite economic hardship, facilitating optimized use of technology. Prioritizing collaborative, locally-led solutions that address barriers through training, infrastructure and cost reductions can help maximize benefits of integration for Yemeni educators in conflict.

The study was limited by a small, cross-sectional sample of Yemeni teachers, relying on self-reported data. Larger, mixed-methods longitudinal studies incorporating objective usage data and perspectives from multiple stakeholders over time could strengthen findings. Comparative analyses across diverse conflict settings could provide a more comprehensive understanding of technology integration challenges amid crises. By capturing changing trends and all stakeholder voices, future research is positioned to develop more effective, sustainable education solutions that better inform support initiatives. Though barriers were highlighted, opportunities remain to conduct strengthened comparative studies that can more validly and representatively illuminate evolving practices to support learning during conflict.

Acknowledgements

The authors would like to thank the Yemeni EFL teachers who participated in this research.

References

- Ahmed, N. (2019). Yemeni Civil War: Causes, Consequences and Prospects. *JDP (Jurnal Dinamika Pemerintahan)*, 2(2), 82–91. <https://doi.org/10.36341/jdp.v2i2.943>
- Al-Ariqi, I. Y. a. S., & Mohsin, M. (2023). The Milieu of English Learning in Conflict-affected Zones: An Analytical Study on Yemeni Undergraduate Learners. *International Journal of English Learning & Teaching Skills*, 5(4), 3509–3525. <https://doi.org/10.15864/ijelts.5408>
- AlMunifi, A. A., & Aleryani, A. Y. (2021). Internal efficiency of Higher education system in armed conflict-affected countries-Yemen case. *International Journal of Educational Development*, 83, 102394. <https://doi.org/10.1016/j.ijedudev.2021.102394>

- Almoayad, S., Favari, E., Halabi, S., Krishnaswamy, S., Music, A., & Tandon, S. (2024). Active conflict and access to education: Evidence from a series of conflict-related shocks in Yemen. *Review of Development Economics*. <https://doi.org/10.1111/rode.13081>
- Ameri, F. A. (2023). Conflict and Social Inequalities in Yemen: An Increase in Inequality of Access to Primary Education. *International Journal of European Studies*. <https://doi.org/10.11648/j.ijes.20230701.11>
- Brück, T., Di Maio, M., & Miaari, S. H. (2014). Learning the Hard Way: The Effect of Violent Conflict on Student Academic Achievement. In IZA, *IZA Discussion Paper Series* (No. 8543). IZA. <https://docs.iza.org/dp8543.pdf>
- Cervantes-Duarte, L., & Fernández-Cano, A. (2016). Impact of Armed Conflicts on Education and Educational Agents: A Multivocal Review. *Revista Electrónica Educare*, 20(3), 1. <https://doi.org/10.15359/ree.20-3.12>
- Christodoulakis, N. (2016). The Economic Impact of Civil Wars: A Production Function Approach. In *Springer eBooks* (pp. 115–133). https://doi.org/10.1007/978-3-319-32261-2_8
- Colier, P. (1999). On the Economic Consequences of Civil War. *ideas.repec.org*. <https://ideas.repec.org/a/oup/oxecpp/v51y1999i1p168-83.html>
- Diana, H. (2023). The Current State of Higher Education in Syria and the Problems of Migration. *Общество Социология Психология Педагогика*, 12, 57–61. <https://doi.org/10.24158/spp.2023.12.7>
- Elmahdi, Omer & Abdalgane, Mohammed. (2024). Conflict Impacts English Education: Lessons Learned in Sudan. *Kuwait TESOL Journal* 2(2). 35-47.
- Fergusson, L., Ibáñez, A. M., & Riaño, J. F. (2019). Conflict, Educational Attainment, and Structural Transformation: La Violencia in Colombia. *Economic Development and Cultural Change*, 69(1), 335–371. <https://doi.org/10.1086/702995>
- Jones, N., Abebe, W., Emirie, G., Gebeyehu, Y., Gezahegne, K., Tilahun, K., Workneh, F., & Vintges, J. (2022). Disrupted educational pathways: The effects of conflict on adolescent educational access and learning in war-torn Ethiopia. *Frontiers in Education*, 7. <https://doi.org/10.3389/educ.2022.963415>
- Jürges, H., Stella, L., Hallaq, S., & Schwarz, A. (2020). Cohort at risk: long-term consequences of conflict for child school achievement. *Journal of Population Economics*, 35(1), 1–43. <https://doi.org/10.1007/s00148-020-00790-6>
- Justino, P., Leone, M., & Salardi, P. (2013). Short- and Long-Term Impact of Violence on Education: The Case of Timor Leste. *The World Bank Economic Review*, 28(2), 320–353. <https://doi.org/10.1093/wber/lht007>
- Hegre, H. (2016). Civil Conflict and Development. In *Oxford University Press eBooks* (pp. 177–199). <https://doi.org/10.1093/oxfordhb/9780199845156.013.9>
- Hezam, A. M. M., & Mahyoub, R. A. M. (2022). Saudi university students' perceptions towards language learning via Blackboard during covid-19 pandemic: A case study of Department of Languages and Translation, Taibah University, Al-Ula campus. *Advances in Social Sciences Research Journal*, 9(11), 360–372. <https://doi:10.14738/assrj.911.12730>
- Islam, A., Ouch, C., Smyth, R., & Wang, L. C. (2014). The Long-Term Effects of Civil Conflicts on Education, Earnings and Fertility: Evidence from Cambodia. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2473143>
- Kayyali, M. (2024). The Impact of War on Higher Education. In *Advances in higher education and professional development book series* (pp. 275–284). <https://doi.org/10.4018/979-8-3693-1926-0.ch016>
- Muthanna, A., Almahfali, M., & Haider, A. (2022). The Interaction of War Impacts on Education: Experiences of School Teachers and Leaders. *Education Sciences*, 12(10), 719. <https://doi.org/10.3390/educsci12100719>
- Rodriguez, C., & Sanchez, F. (2012). The impact of conflict on education in Colombia.
- Sahar, A. (2024). Knowledge on fire: the impact of conflict and violence on education in Afghanistan. *Central Asian Survey*, 1–21. <https://doi.org/10.1080/02634937.2024.2406534>
- Taher, A., Khan, Z., & Khan, S. I. (2021c). IntValValeer-tribal Conflict effects on Educational Development in Yemen: A Qualitative Analyses. *Sustainable Business and Society in Emerging Economies*, 3(4), 557–566. <https://doi.org/10.26710/sbsee.v3i4.2075>
- UNICEF. (2021). Education disrupted: Impact of the conflict on children's education in Yemen. UNICEF. <https://www.unicef.org/yemen/media/5546/file/EDUCATION>
- Луцук, Ю., & Циганюк, Г. (2024). Navigating safe learning spaces in Ukrainian higher education under war conditions: identifying challenges and finding solutions. *Higher Education of Ukraine in the Context of Integration to European Educational Space*, 92(I (2)), 89–101. <https://doi.org/10.38014/osvita.2023.92.08>

About the Authors

Abdulrahman Mokbel Mahyoub Hezam (<https://orcid.org/0000-0001-9624-906X>) is an associate professor of English language and its literatures, Department of Languages and Translation, Faculty of Arts and Humanities, Taibah University, Medina, Ex-head of Department of Languages and Translation, Faculty of Science and Arts, Taibah University. Al-Ula. Ex-head of English Department, Faculty of Arts, Taiz University.

Rian Abdulrahman Moqbel Mahyoub (<https://orcid.org/0009-0008-8404-2166>) is a PhD scholar at the Department of Education, EFLU, Hyderabad, India. He graduated from Taibah University in Saudi Arabia in 2019 and earned an MA in English Education from EFLU.