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The Effect of Feedback Scope Through Digital Modality (Synchronous vs. Asynchronous) on Complexity, Accuracy and Fluency of Iranian EFL Learners' Written Productions*

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Abstract

This study investigated the effectiveness of two different scopes of corrective feedback on enhancing the complexity, accuracy, and fluency of L2 written productions among 150 intermediate EFL learners participating in intact online courses. The corrective feedback scope includes highly focused and comprehensive feedback delivered via digital platforms in synchronous and asynchronous formats. Participants were divided into five groups: synchronous highly focused feedback, synchronous comprehensive feedback, asynchronous highly focused feedback, asynchronous comprehensive feedback, and a control group receiving corrective feedback via traditional methods, characterized by the indiscriminate identification and marking of all errors. Results across the feedback groups regarding their impact on complexity, accuracy, and fluency in EFL learners' written productions indicated a significant effect on accuracy, while complexity and fluency showed no significant differences based on feedback scope and delivery modality. The results of this study have several important implications for educators, material developers, and policymakers in the field of language education. For teachers, adopting synchronous feedback strategies could significantly enhance the accuracy and complexity of students' written work.

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Introduction

Writing represents a formidable undertaking that demands significant time and cognitive investment. Writing, according to White and Arndt (1996), "is far from being a simple matter of transcribing words into written symbols: it is a thinking process in its own right, and it involves intentional intellectual effort that is typically sustained over a substantial amount of time" (p. 3). Similarly, Hyland (2002) has emphasized that writing is really a problem-solving activity that involves various processes. According to this perspective, writing is a skill that enables individuals to interact with readers within specific contexts and effectively communicate essential messages (Fu et al., 2021; Moss, 2015).

Writing an article or essay in English poses significant challenges for many Iranian EFL learners (Derakhshan, 2020). Often overwhelmed by these difficulties, some learners may resort to seeking external assistance, while others who attempt to write independently produce texts marred by numerous grammatical inaccuracies. This recurring cycle perpetuates within academia, contributing to a pervasive negative perception of writing among students. These challenges underscore the urgent need for further research to identify effective strategies for enhancing writing instruction within the English Language Teaching (ELT) domain (Finlayson & McCrudden, 2020).

Writing, as a demanding skill for L2 learners, encompasses critical components such as complexity, accuracy, and fluency, which are notoriously difficult to master (Bowles & Montrul, 2008). Given these challenges, it is essential to meticulously examine the factors that can potentially impact this skill. The concept of complexity, along with the triad including complexity, accuracy, and fluency (CAF), was introduced by Skehan (1989) as the three core dimensions that define L2 usage (Housen et al., 2009).

Considering the challenges mentioned above, the primary variable whose effectiveness on L2 writing components was selected to be examined in this study is the scope of feedback, defined as the extent to which feedback needs to be provided (Liu & Brown, 2015). Following Liu and Brown's classification, later expanded by Lee (2017), written corrective feedback (WCF) is categorized into comprehensive (correcting all error types), mid-focused (targeting two to five error types), and highly focused (targeting one error type) approaches. Mao and Lee's (2020) review highlight a significant gap in the literature regarding the comparative effectiveness of comprehensive versus focused WCF in L2 writing instruction. Addressing this gap through such comparisons could significantly contribute to the field. For the purposes of this study, comprehensive and highly focused feedback types were selected as the study's focus to ensure precision in the results. Comprehensive feedback involves correcting every error in learners' writing (Van Beuningen et al., 2012).

Furthermore, in light of the pervasive influence of mass media and technology in contemporary society, educators are increasingly compelled to integrate technology across various subjects and teaching methodologies, not just in computer and technology classes. This educational shift is driven by two main factors: the growing demand from industries for computer-literate workers and the ubiquitous exposure of students to technology and social

media, whether in educational settings or outside of them (Guo et al., 2021; Hew et al., 2007). The latter issue prompts a reevaluation of classroom teaching styles and methodologies. According to Jukes et al., (2010), modern learners prefer to access information through multimodal formats rather than just text, engage in networked activities with other web users, and seek instant gratification from their interactions. Failing to adapt to these evolving learning preferences could potentially impact students' cognitive processes.

Considering the integration of technology in education, this study was conducted on a digital platform. Today's learners prefer multimodal information sources and instant gratification, necessitating a reevaluation of traditional teaching methods (Jukes, McCain, & Crockett, 2010). The overarching goal of this study was to determine how digital-aided feedback and two different scopes of comprehensive and focused can improve writing accuracy, fluency, and complexity. Positive results will provide teachers with new instructional methods, guide material developers, and enhance teacher training programs for future EFL instructors.

Literature Review

Key components of writing

The primary working definitions of complexity, accuracy, and fluency (CAF) continue to be utilized globally for assessing proficiency (Barrot & Agdeppa, 2021). Complexity is defined as the elaborateness, magnitude, variety and richness of L2 performance. Accuracy measures the degree to which language use is precise and error-free. Fluency is defined as the ability to communicate smoothly, effortlessly, and eloquently, minimizing pauses, hesitations, and reformulations. In the 20-year period leading up to the present, an expanding body of SLA research has employed CAF measurements as dependent variables to evaluate L2 performance influenced by independent factors such as task difficulty and task repetition (Johnson, 2017; Lan et al., 2022).

According to Wolfe-Quintero et al. (1998), the dimensions of CAF can describe varying degrees of L2 performance. It is generally believed, albeit not always the case (Lambert & Kormos, 2014), that more proficient L2 learners, or those who have undergone instructional interventions, tend to: (a) use a wider variety of more intricate vocabulary and grammatical structures; (b) produce utterances with fewer errors, indicating higher accuracy; and (c) perform better compared to less proficient second language users or to themselves at initial developmental stages.

Considering the cognitive processing, higher complexity and accuracy are associated with a complex knowledge system which involves representing and restructuring interlanguage development (Kuiken et al., 2008). Conversely, higher fluency necessitates improved control and automatization which accelerates access to L2 knowledge (Housen et al., 2012; Skehan, 2009).

According to Norris and Ortega (2009) and Pallotti (2015), the complexity component within CAF frameworks remains a subject of significant debate. The diversity of applications of complexity across various aspects of SLA, namely, developmental complexity, cognitive complexity, and linguistic complexity is a source of confusion (Pallotti, 2015).

On the other hand, accuracy stands out as the most straightforward aspect of the CAF triad (Housen et al., 2009), focusing on language use that closely mirrors the target, whether in speech or writing, free of errors. It also quantifies the degree of deviation from this linguistic norm. Evaluating accuracy more precisely is often contingent upon the chosen linguistic standard, be it a prescriptive grammatical framework of the target language or native speaker usage.

While research on writing often employs measures of fluency, the components of complexity and accuracy are more likely to correspond to written and oral L2 performance. In contrast, fluency predominantly measures spoken language proficiency. The term "fluency" has been used both professionally and colloquially to describe individuals proficient in speaking a second language (Chambers, 1997). Recent studies adopt a more refined definition of fluency (Lennon, 2000), encompassing cognitive, performative, and perceptual dimensions (Kormos & Dénes, 2004; Segalowitz, 2010), supported by contemporary research. According to Tavakoli and Skehan (2005), fluency comprises three sub-dimensions of pace or rate, such as words spoken per minute, pauses or breakdowns, including their frequency, position, and duration, and repair, encompassing false starts, repetitions, and self-corrections. Speed reflects control over proceduralized knowledge, breakdowns mirror the planning and conceptualizing stages of language production, and repair fluency indicates monitoring processes (Segalowitz, 2010; Skehan, 2009; Tavakoli & Skehan, 2005).

Focus and types of written feedback

Written corrective feedback (WCF) is categorized based on its form and focus. Types such as direct and indirect (or implicit vs. explicit) instructor feedback have been distinguished in WCF literature (Ellis, 2009; Ferris, 2003; Karim & Nassaji, 2019; Suzuki et al., 2019).

WCF can adopt either a comprehensive or narrow focus. Comprehensive WCF entails correcting all errors in students' writing as part of holistic teaching. Conversely, focused WCF targets specific pre-selected errors. According to Ellis et al. (2008), focused WCF can be highly targeted, addressing a single kind of error, or less focused, limiting corrections to a few pre-selected categories. Lee (2018) refers to mid-focused feedback as a form of focused WCF, which involves addressing two to six different error categories chosen beforehand.

In assessing the potential impact of WCF on interlanguage development, highly focused studies within the field of SLA have predominantly explored its effects on the acquisition of specific linguistic forms (e.g., Han, 2002; Iwashita, 2003). These investigations have primarily concentrated on English article system learning (e.g., Ellis et al., 2008; Sheen, 2007). It has been argued by Hartshorn et al. (2010) that this narrow focus on acquiring particular linguistic forms does not align with the natural expectations of students and teachers in typical classroom settings, where comprehensive feedback on all linguistic errors is sought to enhance overall written accuracy. Consequently, they assert that studies focusing on such a limited scope may lack reliability and ecological validity. Furthermore, the forms examined in these studies serve very basic linguistic purposes and do not significantly improve the overall writing quality. The pieces of research by Shintani et al. (2014) and Suzuki et al. (2019) are two exceptions. Lee (2018) suggests that such studies provide little instructional benefit. Moreover, the linguistic forms examined in these studies often serve basic functions and may not substantially enhance

overall writing quality. However, exceptions to this trend include the research by Shintani et al. (2014), as well as Suzuki et al. (2019) concluding that direct WCF, followed by revision, was the most effective approach, emphasizing the importance of focusing on linguistic forms that significantly contribute to the overall meaning of the text, such as the hypothetical conditional.

Similarly, Suzuki et al. (2019) investigated the interaction between the explicitness of WCF and its targeted structures, finding improvements in all groups' revision accuracy in both target structures contrary to enhanced accuracy in the case of past perfect tense which was only observed in the new writing task.

On the other hand, studies employing comprehensive WCF have aimed to address all or a significant portion of students' errors in courses offering second language writing (Chandler, 2003; Ferris & Roberts, 2001; Rahimi, 2009). Criticism has been directed at these studies for their exhaustive nature, which may overwhelm students' attention spans and diminish the impact of WCF on specific errors that significantly affect the communicative aspects of student papers (Bitchener & Ferris, 2012; Hartshorn et al., 2010; Lee, 2018). In response, Lee (2018) advocates for a new approach to WCF called mid-focused, targeting a smaller scope of errors based on the classroom context and student needs, believing in the greater pedagogical relevance of this strategy in L2 writing classrooms.

Synchronous vs. asynchronous corrective feedback

Another crucial aspect of providing corrective feedback that warrants scrutiny is the modality through which feedback is delivered, as the choice of text, audio, or video modalities can significantly impact both the quality and quantity of feedback (Anson et al., 2016; Elola & Oskoz, 2016). With the advancements in technology, various social media applications have emerged, providing L2 teachers with opportunities to utilize different modalities in their teaching processes. These applications offer synchronous teaching capabilities, enhancing convenience and participant access, which can contribute to improved teaching and monitoring of the writing process (Akbar, 2018). Therefore, employing such applications for feedback provision and comparing synchronous versus asynchronous systems could prove beneficial for L2 writing teachers seeking to enhance their learners' writing abilities (Ahmed, 2021).

Synchronous and asynchronous classes are distinct modes of distance learning where all classes are conducted online. Synchronous writing classes involve real-time English writing sessions delivered via suitable platforms, fostering a sense of being present, spontaneous, and inclusive in the L2 writing classroom (Blake & Zyzik, 2003). Studies have shown improvements in linguistic accuracy through text-based chats, attributed to the pacing and recasts and metalinguistic feedback's effectiveness (Sauro, 2009). Additionally, immediate peer negotiation in synchronous settings has led to lexical and syntactic error corrections (Morris, 2005).

Conversely, some scholars advocate for asynchronous feedback modes in writing instruction. Research has demonstrated that asynchronous peer e-feedback enhances grammar, spelling, vocabulary, and discourse (Tolosa et al., 2013; Vinagre & Munoz, 2011), as well as morphosyntax (Ware & O'Dowd, 2008). It was noted that asynchronous writing feedback

enables students to monitor language use and use it later, promoting sustained attention (Ho & Savignon, 2007). The ongoing debate underscores the need for further research to elucidate the comparative effectiveness of synchronous versus asynchronous feedback methods in enhancing L2 writing instruction. Shintani (2016) carried out a case study investigating the effects of computer mediated synchronous and asynchrouns corrective feedback on writing performance. The results of this study indicated the creation of an interactive atmosphere in the writing process. Besides that, the study concluded that both types of feedback led to metalinguistic understanding of the target structure which could lead to a higher accuracy. Furthermore, Shintani et.al (2016) revealed higher accuracy in the performance of groups receiving synchronous feedback. Further, Shang (2017) revealed that despite the attractiveness of both modes of online feedback, the results indicated some reasons for priority of asynchronous peer feedback over synchronous corrective feedback.

Based on the challenges discussed regarding Iranian EFL learners' difficulties in producing written materials and teachers' uncertainties in choosing the best feedback modality and scope (Rezaei et al., 2017; Tabatabaei et al., 2017), this study was conducted on a digital platform to provide insights for EFL writing teachers to enhance their students' written productions through effective feedback strategies.

Overall, this study aimed to explore research focusing on writing development through corrective feedback. It emphasized the challenges of writing as a difficult task in EFL learning and highlighted the scarcity of research on the modality of feedback provision, particularly comparing synchronous and asynchronous methods. Existing experimental research has shown conflicting results in this regard, suggesting a need for further investigation into their effects on writing complexity, accuracy, and fluency (Biria et al., 2018). Additionally, the review by Mao and Lee (2021) identified a gap in comparing comprehensive and highly focused feedback in L2 writing, which serves as the main independent variable in this study. The study aims to address this gap in feedback research highlighted by Mao and Lee (2020), while also considering how the modality of feedback delivery may influence EFL learners' written productions as a moderating variable. This aspect has been underexplored in feedback studies, particularly concerning its impact on writing processes. In summary, this study seeks to contribute to filling these gaps by examining the comparative effects of different feedback scopes and modalities on the complexity, accuracy, and fluency of EFL learners' writing.

The following research questions were raised to be addressed in this study:

1. Is there any significant difference between feedback scope (highly focused and comprehensive) via digital platforms (synchronous and asynchronous modes) in terms of their effects on improving complexity in EFL learners’ written productions?
2. Is there any significant difference between feedback scope (highly focused and comprehensive) via digital platforms (synchronous and asynchronous modes) in terms of their effects on improving accuracy in EFL learners’ written productions?
3. Is there any significant difference between feedback scope (highly focused and comprehensive) via digital platforms (synchronous and asynchronous modes) in terms of their effects on improving fluency in EFL learners’ written productions?

Method

Design

The present study utilized a quasi-experimental design, comparing an experimental group with an intact group through the administration of a treatment involving feedback provision with different modalities (synchronous vs. asynchronous) and scopes (highly focused vs. comprehensive). The independent variable was feedback scope, with writing ability assessed based on response characteristics including complexity, accuracy, and fluency. The moderator variables included the modalities of feedback—synchronous and asynchronous modes.

Participants

A total of 150 participants were randomly selected from intermediate English as a Foreign Language (EFL) learners enrolled in online courses at a language institute in Iran during the spring semester of 2023. All participants were adult native speakers of Persian aging 18 to 28. The selection process involved intact classes, each consisting of 30 students. To ensure homogeneity among participants, the Oxford Placement Test was utilized. Given the study's sampling constraints, which were confined to only one city in Iran, a convenience sampling method was employed, classifying the study as quasi-experimental. Participants were then randomly assigned to one of five intact groups, as detailed in Table 1.

Table 1. *Participant Grouping*

Groups	N	Description
Synchronous Highly Focused Feedback (SHFF)	30	online feedback in class on one error
Synchronous Comprehensive Feedback (SCFF)	30	online feedback in class on all errors
Asynchronous Highly Focused Feedback (AHFF)	30	a recorded file containing feedback on one error
Asynchronous Comprehensive Feedback (ACF)	30	a recorded file containing feedback on all errors
Control group (C)	30	corrective feedback via traditional methods

Materials and Instruments

Instrument 1: Oxford Placement Test (OPT)

The first instrument utilized in this study was the Oxford Placement Test (OPT), administered to ensure participant homogeneity. The OPT is a widely recognized assessment tool comprising 60 multiple-choice items on grammar and vocabulary. It has been extensively validated for reliability and validity in educational contexts. Participants were allotted 45 minutes to complete the test, with scores ranging from 0 to 60.

Instrument 2: Writing Pretests and Posttests

Writing pretests and posttests were conducted at the beginning and end of the treatment period, respectively. These assessments were structured to mirror Task 2 of the IELTS Academic Module Writing Test, which requires participants to discuss two contrasting viewpoints and present their own stance on the topic. The IELTS writing test was chosen due to its international recognition for validity and reliability. Careful consideration was given to selecting topics that did not necessitate specialized knowledge, ensuring accessibility for all

participants. The selection of topics underwent rigorous evaluation by three experts in English Language Teaching (ELT) to ensure their quality and appropriateness, thereby enhancing the study's content validity (Bachman, 1990).

Instrument 3: Digital Platform for Feedback Delivery

The digital platform used for delivering synchronous and asynchronous feedback in this study was Skype. Skype was chosen for its versatility in supporting both real-time (synchronous) and delayed (asynchronous) interactions, which are crucial for providing different scopes of corrective feedback effectively.

Procedure

After the group assignment process, the participants were tasked with composing a timed essay (60 minutes) on a selected topic to assess their writing proficiency. These essays were collected and stored for subsequent comparison with posttest results. The scoring procedure focused on evaluating complexity, accuracy, and fluency based on established criteria which are mentioned in the data analysis section in the following. Two raters, whose inter-rater reliability had been confirmed, were engaged in the rating process.

Following the completion of homogeneity checks and pretest evaluations, the participants in each group were instructed to draft a second essay on a consistent topic, after which feedback provision commenced. The focused feedback groups exclusively received corrections related to their misuse of passive structures, while the comprehensive feedback groups were corrected on errors of any type present in their initial drafts. Some of the noticed errors before the treatment process were as the following:

Some people were catch by the police

Few books are published to increase people's information.

Synchronous groups engaged in corrective sessions via online video conferences using Skype, where errors were addressed based on whether they pertained to comprehensive or focused feedback. In contrast, asynchronous groups received recorded video feedback addressing specific error types. The control group received traditional feedback, with corrections and comments provided via Microsoft Office Word files not using the digital modality and considering feedback scope. Subsequent to the treatment phase, instructors assigned participants a third writing task designed to assess complexity, accuracy, and fluency, which was then compared to participants' pretest writing performance.

Data Analysis

Measuring the writing components (CAF)

First and foremost, all written essays were coded and scored according to the rubrics adapted from Zhang et. al (2022). Accoring to the rubrics in that table, complexity in written productions was assessed across two dimensions: lexical and sentence complexity. Lexical complexity was operationalized as the ratio of advanced vocabulary words within the text, while sentence complexity was defined by the ratio of clauses to terminable units (T-units). Accuracy, the second measured variable, was defined as the proportion of error-free T-units

relative to total T-units in the written texts. Fluency in written production was quantified as the average number of words per T-unit.

Analysis

Descriptive statistics were utilized initially to provide an overview of the impact of feedback scope (highly focused versus comprehensive) and delivery mode (synchronous versus asynchronous) on the complexity, accuracy, and fluency of EFL learners' written productions. Initially, mean values and standard deviations were calculated based on pretest results. The assessment of the homogeneity of covariance matrices, crucial for multivariate analysis, was performed using Box's Test of Equality of Covariance Matrices. This step ensured the validity of subsequent multivariate analyses by confirming comparable variances across groups. Second, the analysis focused on two primary effects: intercept and group effects. Intercept effects indicated the substantial variance explained by the dependent variables, while group effects examined differences attributable to feedback modalities. To validate the assumptions of parametric statistical analyses, Levene's Test of Equality of Error Variances was conducted across groups for the dependent variables of complexity, accuracy, and fluency in EFL learners' pretest written productions. Subsequently, tests of between-subjects effects were employed to assess the impact of group differences on complexity, accuracy, and fluency in EFL learners' pretest scores. This analysis aimed to determine whether variations in feedback modalities significantly influenced these linguistic aspects of written production.

Results

Pretest results

In an initial assessment aimed at evaluating the impact of different feedback modalities on English as a Foreign Language (EFL) learners' written output, pre-test data from five distinct groups were analyzed (see Table 2). This quantitative overview establishes a baseline for the comparative effectiveness of feedback types in enhancing the complexity, accuracy, and fluency of EFL learners' written productions. The significance level (Sig.) associated with this test was .902, suggesting that the null hypothesis—that the observed covariance matrices of the dependent variables are equal across groups—cannot be rejected. This outcome implies that the assumption of equal covariances, necessary for certain statistical analyses comparing groups, holds for the variables under consideration in this study.

Table 2. *Pre-Test Scores for Complexity, Accuracy, and Fluency across Feedback Groups*

	Group	Mean	Std. Deviation	N
Complexity Pre-test	SHFF	1.1733	.35481	30
	SCF	1.1597	.32091	30
	AHFF	1.1770	.35109	30
	ACF	1.2457	.38695	30
	C	1.1760	.39758	30
	Total	1.1863	.35968	150
Accuracy Pre-test	SHFF	.5150	.06318	30
	SCF	.5063	.06542	30
	AHFF	.4947	.07413	30

	ACF	.5117	.06481	30
	C	.5053	.07505	30
	Total	.5066	.06813	150
Fluency Pre-test	SHFF	9.8667	3.18112	30
	SCF	10.7333	3.11762	30
	AHFF	9.7333	3.31073	30
	ACF	11.0667	2.91173	30
	C	9.0333	3.29559	30
	Total	10.0867	3.20850	150

The assessment of the homogeneity of covariance matrices, a crucial assumption for multivariate analysis, was conducted using Box's Test of Equality of Covariance Matrices (Table 3). The outcome of this table implies that the assumption of equal covariances, necessary for certain statistical analyses comparing groups, holds for the variables under consideration in this study.

Table 3. *Box's Test of Equality of Covariance Matrices*

Box's M	16.326
F	.649
df1	24
df2	58051.327
Sig.	.902

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Group

The evaluation of the impact of feedback modality on the combined dependent variables of complexity, accuracy, and fluency in EFL learners' written production utilized multivariate tests (table 4). The findings of this table highlight that while the overall model is significant due to the intercept, the specific differences attributed to group variations, or the different feedback modalities, do not significantly impact the learners' written production in terms of complexity, accuracy, and fluency.

Table 4. *Multivariate Tests*

Effect		**Value**	**F**	**Hypothesis df**	**Error df**	**Sig.**	**Partial Eta Squared**
Intercept	Pillai's Trace	.986	3453.730[b]	3.000	143.000	.000	.986
	Wilks' Lambda	.014	3453.730[b]	3.000	143.000	.000	.986
	Hotelling's Trace	72.456	3453.730[b]	3.000	143.000	.000	.986
	Roy's Largest Root	72.456	3453.730[b]	3.000	143.000	.000	.986
Group	Pillai's Trace	.067	.833	12.000	435.000	.616	.022
	Wilks' Lambda	.933	.833	12.000	378.634	.617	.023
	Hotelling's Trace	.070	.832	12.000	425.000	.617	.023
	Roy's Largest Root	.056	2.033[c]	4.000	145.000	.093	.053

a. Design: Intercept + Group

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Levene's Test of Equality of Error Variances was conducted to examine the homogeneity of variance across groups for the dependent variables of complexity, accuracy, and fluency in the pre-test phase of EFL learners' written production (Table 5). The non-significant results across all dependent variables suggest that the error variance is equal among the groups, which satisfies a key assumption for subsequent analyses of variance. This homogeneity of variances across groups for complexity, accuracy, and fluency of pre-test scores facilitates comparability and validates the conditions for the planned parametric tests in the study.

Table 5. *Levene's Test of Equality of Error Variances for Pre-test Scores*

		Levene Statistic	**df1**	**df2**	**Sig.**
Complexity Pre-test	Based on Mean	1.007	4	145	.406
	Based on Median	.937	4	145	.444
	Based on Median and with adjusted df	.937	4	142.235	.444
	Based on trimmed mean	1.044	4	145	.387
Accuracy Pre-test	Based on Mean	.692	4	145	.599
	Based on Median	.676	4	145	.610
	Based on Median and with adjusted df	.676	4	142.889	.610
	Based on trimmed mean	.701	4	145	.592
Fluency Pre-test	Based on Mean	.206	4	145	.935
	Based on Median	.198	4	145	.939
	Based on Median and with adjusted df	.198	4	140.368	.939
	Based on trimmed mean	.206	4	145	.935

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Group

The Tests of Between-Subjects Effects were conducted to assess the impact of group differences on the dependent variables of complexity, accuracy, and fluency in the pre-test scores of EFL learners (Table 6). This analysis aims to determine if the variations in feedback modalities have a significant effect on these linguistic aspects of written production. The Intercept, representing the overall mean of each dependent variable across all groups, displayed highly significant effects across all dependent variables, indicating the substantial impact of the intercept on the variance in complexity, accuracy, and fluency scores. The Group effect specifically mirrored the corrected model results for each dependent variable, indicating that the variability attributed to group differences alone does not significantly affect the pre-test scores in complexity, accuracy, and fluency.

Table 6. *Tests of Between-Subjects Effects for Pre-test Scores*

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Complexity Pre-test	.138[a]	4	.034	.261	.902	.007
	Accuracy Pre-test	.007[b]	4	.002	.382	.821	.010
	Fluency Pre-test	79.840[c]	4	19.960	1.990	.099	.052
Intercept	Complexity Pre-test	211.108	1	211.108	1599.449	.000	.917
	Accuracy Pre-test	38.497	1	38.497	8156.562	.000	.983
	Fluency Pre-test	15261.127	1	15261.127	1521.879	.000	.913
Group	Complexity Pre-test	.138	4	.034	.261	.902	.007
	Accuracy Pre-test	.007	4	.002	.382	.821	.010
	Fluency Pre-test	79.840	4	19.960	1.990	.099	.052
Error	Complexity Pre-test	19.138	145	.132			
	Accuracy Pre-test	.684	145	.005			
	Fluency Pre-test	1454.033	145	10.028			
Total	Complexity Pre-test	230.384	150				
	Accuracy Pre-test	39.188	150				
	Fluency Pre-test	16795.000	150				
Corrected Total	Complexity Pre-test	19.276	149				
	Accuracy Pre-test	.692	149				
	Fluency Pre-test	1533.873	149				

a. R Squared = .007 (Adjusted R Squared = -.020)
b. R Squared = .010 (Adjusted R Squared = -.017)
c. R Squared = .052 (Adjusted R Squared = .026)

In addressing the research questions, descriptive statistics provide an initial overview of the effects of feedback scope (highly focused versus comprehensive) and the mode through which the feedback is delivered (synchronous versus asynchronous) on the complexity, accuracy, and fluency of English as a Foreign Language (EFL) learners' written productions.

Table 7. *Descriptive Statistics for Complexity, Accuracy, and Fluency by Feedback Group*

	Group	Mean	Std. Deviation	N
Complexity	SHFF	1.2830	.15685	30
	SCF	1.2263	.15977	30
	AHFF	1.2137	.15782	30
	ACF	1.2037	.16826	30
	C	1.1797	.18455	30
	Total	1.2213	.16715	150
Accuracy	SHFF	.6827	.05211	30
	SCF	.6407	.07274	30
	AHFF	.5921	.09357	30
	ACF	.5623	.07864	30
	C	.4998	.06928	30

	Total	.5955	.09700	150
Fluency	SHFF	9.8444	2.08944	30
	SCF	9.8889	2.00638	30
	AHFF	9.9556	2.00905	30
	ACF	10.0111	1.73422	30
	C	9.9667	1.76459	30
	Total	9.9333	1.90098	150

Box's Test of Equality of Covariance Matrices was conducted to assess the assumption of homogeneity of covariance matrices across the groups differentiated by feedback modalities (Table 8). This test is crucial for multivariate analyses where equality of covariance matrices across groups ensures the validity of the derived conclusions.

Table 8. *Box's Test of Equality of Covariance Matrices for Feedback Modalities*

Box's M	25.836
F	1.028
df1	24
df2	58051.327
Sig.	.424

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Group

In evaluating the effects of different feedback modalities on the complexity, accuracy, and fluency of EFL learners' written productions, multivariate tests revealed significant findings (Table 9).

Table 9. *Multivariate Tests for Feedback Modalities Impact*

				Hypothesis			Partial Eta
	Effect	**Value**	**F**	**df**	**Error df**	**Sig.**	**Squared**
Intercept	Pillai's Trace	.994	8161.581[b]	3.000	143.000	.000	.994
	Wilks' Lambda	.006	8161.581[b]	3.000	143.000	.000	.994
	Hotelling's Trace	171.222	8161.581[b]	3.000	143.000	.000	.994
	Roy's Largest Root	171.222	8161.581[b]	3.000	143.000	.000	.994
Group	Pillai's Trace	.467	6.677	12.000	435.000	.000	.156
	Wilks' Lambda	.536	8.396	12.000	378.634	.000	.188
	Hotelling's Trace	.862	10.181	12.000	425.000	.000	.223
	Roy's Largest Root	.857	31.080[c]	4.000	145.000	.000	.462

a. Design: Intercept + Group

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Levene's Test of Equality of Error Variances was conducted to assess the assumption of homogeneity of variances across the groups defined by different feedback modalities—focusing on their impact on complexity, accuracy, and fluency in EFL learners' written productions (Table 10). This test checks whether the variability in scores within each group is similar, an assumption critical for the validity of ANOVA tests.

Table 10. *Levene's Test of Equality of Error Variances for Feedback Modalities*

		Levene Statistic	df1	df2	Sig.
Complexity	Based on Mean	.432	4	145	.786
	Based on Median	.351	4	145	.843
	Based on Median and with adjusted df	.351	4	138.693	.843
	Based on trimmed mean	.433	4	145	.785
Accuracy	Based on Mean	2.612	4	145	.038
	Based on Median	2.232	4	145	.068
	Based on Median and with adjusted df	2.232	4	128.035	.069
	Based on trimmed mean	2.600	4	145	.039
Fluency	Based on Mean	.363	4	145	.835
	Based on Median	.275	4	145	.893
	Based on Median and with adjusted df	.275	4	137.872	.893
	Based on trimmed mean	.356	4	145	.840

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + Group

The Tests of Between-Subjects Effects were conducted to examine the influence of feedback modality—categorized by scope and delivery mode—on the complexity, accuracy, and fluency of EFL learners' written productions (Table 11). This analysis aims to understand how different feedback approaches affect these critical linguistic dimensions.

Table 11. *Tests of Between-Subjects Effects for Feedback Modalities Impact on EFL Learners' Written Productions*

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Complexity	.178[a]	4	.045	1.620	.172	.043
	Accuracy	.597[b]	4	.149	26.916	.000	.426
	Fluency	.526[c]	4	.131	.035	.998	.001
Intercept	Complexity	223.723	1	223.723	8141.051	.000	.983
	Accuracy	53.198	1	53.198	9586.474	.000	.985
	Fluency	14800.667	1	14800.667	3989.632	.000	.965
Group	Complexity	.178	4	.045	1.620	.172	.043
	Accuracy	.597	4	.149	26.916	.000	.426
	Fluency	.526	4	.131	.035	.998	.001
Error	Complexity	3.985	145	.027			
	Accuracy	.805	145	.006			
	Fluency	537.919	145	3.710			
Total	Complexity	227.886	150				
	Accuracy	54.600	150				
	Fluency	15339.111	150				
Corrected Total	Complexity	4.163	149				
	Accuracy	1.402	149				
	Fluency	538.444	149				

a. R Squared = .043 (Adjusted R Squared = .016)
b. R Squared = .426 (Adjusted R Squared = .410)
c. R Squared = .001 (Adjusted R Squared = -.027)

Table 12 presents the estimated means and their standard errors for complexity, accuracy, and fluency, across different feedback groups. These estimates indicate a less pronounced difference in fluency across feedback modalities compared to accuracy and complexity.

Table 12. *Estimated Means and Confidence Intervals for Complexity, Accuracy, and Fluency by Feedback Group*

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Complexity	SHFF	1.283	.030	1.223	1.343
	SCF	1.226	.030	1.167	1.286
	AHFF	1.214	.030	1.154	1.273
	ACF	1.204	.030	1.144	1.263
	C	1.180	.030	1.120	1.239
Accuracy	SHFF	.683	.014	.656	.710
	SCF	.641	.014	.614	.668
	AHFF	.592	.014	.565	.619
	ACF	.562	.014	.535	.589
	C	.500	.014	.473	.527
Fluency	SHFF	9.844	.352	9.149	10.539
	SCF	9.889	.352	9.194	10.584
	AHFF	9.956	.352	9.261	10.651
	ACF	10.01	.352	9.316	10.706
	C	9.967	.352	9.272	10.662

Table 13 presents the results for pairwise comparisons among different feedback groups concerning their impact on complexity, accuracy, and fluency in EFL learners' written productions. These comparisons help to elucidate specific differences between the feedback modalities, providing insights into how each uniquely influences the linguistic outcomes of learners. For complexity, no significant differences were observed between the groups, as all comparisons yielded non-significant results. In contrast, accuracy revealed notable differences between certain groups. Significantly higher accuracy scores were observed for learners receiving SHFF compared to those receiving AHFF, ACF, and conventional feedback. These results indicate that SHFF significantly enhances accuracy in written productions over other feedback types. Additional significant differences were found between SCF and ACF, and between synchronous comprehensive and control groups, underscoring the varied impact of feedback modalities on accuracy. For fluency, all groups showed no significant differences, with all p-values well above the .05 threshold, indicating that fluency levels across different feedback modalities remain statistically comparable.

Table 13. *Pairwise Comparisons for Feedback Modalities' Impact on EFL Learners' Written Productions*

Dependent Variable	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Complexity	SHFF	SCF	.057	.043	1.000	-.065	.179
		AHFF	.069	.043	1.000	-.053	.191
		ACF	.079	.043	.658	-.043	.201
		C	.103	.043	.170	-.019	.225
	SCF	SHFF	-.057	.043	1.000	-.179	.065
		AHFF	.013	.043	1.000	-.109	.135
		ACF	.023	.043	1.000	-.099	.145
		C	.047	.043	1.000	-.075	.169
	AHFF	SHFF	-.069	.043	1.000	-.191	.053
		SCF	-.013	.043	1.000	-.135	.109
		ACF	.010	.043	1.000	-.112	.132
		C	.034	.043	1.000	-.088	.156
	ACF	SHFF	-.079	.043	.658	-.201	.043
		SCF	-.023	.043	1.000	-.145	.099
		AHFF	-.010	.043	1.000	-.132	.112
		C	.024	.043	1.000	-.098	.146
	C	SHFF	-.103	.043	.170	-.225	.019
		SCF	-.047	.043	1.000	-.169	.075
		AHFF	-.034	.043	1.000	-.156	.088
		ACF	-.024	.043	1.000	-.146	.098
Accuracy	SHFF	SCF	.042	.019	.307	-.013	.097
		AHFF	.091*	.019	.000	.036	.145
		ACF	.120*	.019	.000	.066	.175
		C	.183*	.019	.000	.128	.238
	SCF	SHFF	-.042	.019	.307	-.097	.013
		AHFF	.049	.019	.125	-.006	.103
		ACF	.078*	.019	.001	.024	.133
		C	.141*	.019	.000	.086	.196
	AHFF	SHFF	-.091*	.019	.000	-.145	-.036
		SCF	-.049	.019	.125	-.103	.006
		ACF	.030	.019	1.000	-.025	.085
		C	.092*	.019	.000	.037	.147
	ACF	SHFF	-.120*	.019	.000	-.175	-.066
		SCF	-.078*	.019	.001	-.133	-.024
		AHFF	-.030	.019	1.000	-.085	.025
		C	.062*	.019	.014	.008	.117
	C	SHFF	-.183*	.019	.000	-.238	-.128
		SCF	-.141*	.019	.000	-.196	-.086
		AHFF	-.092*	.019	.000	-.147	-.037
		ACF	-.062*	.019	.014	-.117	-.008
Fluency	SHFF	SCF	-.044	.497	1.000	-1.462	1.373
		AHFF	-.111	.497	1.000	-1.529	1.307
		ACF	-.167	.497	1.000	-1.584	1.251
		C	-.122	.497	1.000	-1.540	1.295
	SCF	SHFF	.044	.497	1.000	-1.373	1.462
		AHFF	-.067	.497	1.000	-1.484	1.351

	ACF	-.122	.497	1.000	-1.540	1.295
	C	-.078	.497	1.000	-1.495	1.340
AHFF	SHFF	.111	.497	1.000	-1.307	1.529
	SCF	.067	.497	1.000	-1.351	1.484
	ACF	-.056	.497	1.000	-1.473	1.362
	C	-.011	.497	1.000	-1.429	1.407
ACF	SHFF	.167	.497	1.000	-1.251	1.584
	SCF	.122	.497	1.000	-1.295	1.540
	AHFF	.056	.497	1.000	-1.362	1.473
	C	.044	.497	1.000	-1.373	1.462
C	SHFF	.122	.497	1.000	-1.295	1.540
	SCF	.078	.497	1.000	-1.340	1.495
	AHFF	.011	.497	1.000	-1.407	1.429
	ACF	-.044	.497	1.000	-1.462	1.373

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Bonferroni.
Note: ACF = Asynchronous Comprehensive Feedback; SHFF = Synchronous Highly Focused Feedback; SCF = Synchronous Comprehensive Feedback; AHFF= Asynchronous Highly Focused Feedback.

Discussion

The development of writing skills in English as a Foreign Language (EFL) contexts is a multifaceted process influenced by various instructional factors, including the modalities of feedback provision (Shang, 2017). Understanding the effects of different feedback modalities on writing complexity, accuracy, and fluency is essential for optimizing language learning environments and instructional practices. This study investigated the impact of synchronous and asynchronous feedback, along with the focus of feedback provision, on the writing development of Iranian EFL learners. Specifically, the study examined the effect of a product-oriented approach to writing instruction on complexity, accuracy, and fluency in L2 writing, with modality (synchronous vs. asynchronous) and feedback type (highly focused vs. comprehensive) as mediating variables. Based on various statistical analyses, the results of the study have been reported. The findings highlight the intricate relationship between feedback modality and writing skill development among Iranian EFL learners.

The first finding of this study was that the mode and focus of feedback provision influence writing complexity, though not statistically significantly, with synchronous/focused feedback emerging as a relatively beneficial approach. The observed influence of feedback provision mode and focus on writing complexity suggests that synchronous and focused feedback can play a role in enhancing the depth and sophistication of learners' written productions. Synchronous feedback, characterized by immediate interaction between the learner and instructor, allows for targeted and tailored guidance, facilitating improvements in writing complexity (Lee & Lyster, 2016; Sheen, 2007). The emphasis on focused feedback further underscores the necessity of clear and specific corrective input, enabling learners to identify and address specific linguistic or structural issues within their writing (Ellis, 2009).

This finding aligns with Valizadeh (2022), who concluded that syntactic complexity can be somewhat improved through focused feedback. Similarly, Al-Olimat and AbuSeileek (2015) reported that online (synchronous) feedback significantly enhances students' writing

complexity and quality. However, Wahyuni's findings contradict our results, as she concluded that different types of feedback do not have differential effects on writing complexity. A closer examination of her study reveals that it was conducted on advanced academic students, whereas the present study included participants among general language learners in an institute with varying proficiency levels who were homogenized before taking part in the study. This discrepancy in participant characteristics may account for the differing outcomes.

Another finding of this study was that the mode and focus of feedback provision via digital platforms did not significantly affect the fluency aspect of Iranian EFL learners' writing skills. The adopted feedback approaches did not result in any noticeable improvement in writing fluency. This suggests that the enhancement of writing fluency may depend on factors beyond the scope and modality of feedback. Consequently, further research is needed to identify the factors that underpin fluency development. A review of the literature reveals that few studies have investigated the impact of feedback mode or focus on fluency, highlighting the novelty of the present study. Among the limited research, Hyland and Hyland (2001) also questioned the effectiveness of process-based feedback, whether focused or comprehensive, on students' writing fluency.

On the other hand, the lack of a significant impact on writing fluency based on feedback modality contradicts findings from some prior studies (e.g., Lai, 2015), suggesting that the mode and focus of feedback provision may not uniformly affect all aspects of writing skill development. This disparity could be attributed to various factors such as learner proficiency level, task complexity, or the nature of the feedback provided. For instance, while synchronous feedback may enhance complexity and accuracy by offering immediate clarification and correction, its effect on fluency might be mitigated by potential interruptions to the writing process due to real-time interaction (Ferris & Roberts, 2001). Conversely, asynchronous feedback allows learners to revise at their own pace but may lack the immediacy required to effectively address fluency issues.

A further significant finding of this study underscores the pivotal role of synchronous and focused feedback in enhancing the accuracy of writing among Iranian EFL learners, highlighting its effectiveness over other feedback types in promoting writing skill development. This finding can be attributed to the advantages of learner engagement facilitated by focused feedback, particularly when targeting specific grammar aspects such as the passive voice. The concentrated nature of feedback delivery during synchronous sessions, where learners actively receive feedback, fosters higher levels of engagement and potentially leads to greater productivity in terms of writing accuracy. Unlike the previous finding, this result is well-documented in the literature, affirming the critical influence of synchronous and focused feedback on enhancing writing accuracy (Bitchener & Ferris, 2012). The study suggests that timely and specific feedback enables learners to identify and correct errors, thereby improving overall linguistic accuracy. Furthermore, the superiority of synchronous feedback underscores its potential to expedite writing skill development among EFL learners, particularly in environments where accuracy holds paramount importance.

Among Iranian studies, Rahimi (2019) has previously validated that focused feedback delivered through a process-based approach significantly enhances students' writing accuracy.

Hartshorn et al. (2010) similarly documented the efficacy of process-based feedback provision in bolstering students' writing accuracy. Frear and Chiu (2015) reported similar findings, although their focused feedback was administered at the conclusion of students' writing (a product-based approach), rather than throughout the process. In alignment with these findings, Kurzer (2018) conducted a study demonstrating that a process-based approach to feedback during writing instruction notably improves writing accuracy, albeit in a study involving multilingual writers. These studies collectively underscore the effectiveness of process-based feedback approaches in enhancing writing accuracy across various educational contexts.

Theoretically, cognitive load theory could justify the effectiveness of highly focused feedback scope over the comprehensive one stating that overloading the learners needs to be avoided (Ginns et al., 2019). Moreover, in cognitive-based language learning, activities used should focus on the effects in developing students' thinking ability and problem-solving ability. The goal is to get them thinking and applying problem-solving strategies without the use of preparation or steps that lead to an answer. Cognitive activities include making mind maps, visualization, association, revision, using clues in reading comprehension, editing and modifying a writing production, skimming and scanning in reading, self-testing and monitoring and etc. (Lee & Shim 2012). This explanation should justify the reason why this study has been theoretically founded on cognitive approach to language learning.

In conclusion, the findings underscore the critical importance of integrating feedback modality and focus into the design of effective writing instruction for EFL learners. Synchronous and focused feedback are particularly highlighted for their significant role in enhancing writing accuracy, although their impact on complexity and fluency may vary. These results contribute substantively to the ongoing discussion on effective feedback practices in language learning and emphasize the necessity for continued research to uncover underlying mechanisms and refine instructional strategies for optimal writing development.

Conclusion

The findings of this study underscore the pivotal role of feedback modality in shaping the writing development of EFL learners. Specifically, the type and timing of feedback provided to learners significantly influence the accuracy of their written productions. The results reveal that synchronous, highly focused feedback proves particularly effective, resulting in higher scores for both accuracy and, to some extent, complexity. This indicates that real-time, targeted feedback enables learners to make precise and sophisticated revisions and edits to their work.

Additionally, the study found that while feedback modalities had a significant impact on accuracy and, to a lesser extent, on complexity, they did not substantially affect fluency. The consistent fluency levels across different feedback groups suggest that while learners can refine the precision and intricacy of their writing through appropriate feedback, the natural flow and ease of writing may be less influenced by feedback interventions.

Furthermore, the control group, which received conventional feedback, demonstrated the lowest improvements in accuracy and complexity, underscoring the relative ineffectiveness of traditional feedback methods compared to more interactive and focused approaches. Overall, this study illustrates the potential of synchronous, highly focused feedback to enhance specific

areas of writing proficiency among EFL learners. Educators are encouraged to consider integrating these strategies into their teaching practices to foster enhanced writing outcomes.

For material developers, designing interactive feedback tools is essential. Educational materials and digital tools should include features that facilitate synchronous feedback. These could include live commenting, real-time collaborative editing, and other interactive elements that support immediate and focused feedback. Additionally, comprehensive feedback options should be included. While highly focused feedback showed significant benefits, comprehensive feedback also plays a role. Materials should allow for flexibility in the type of feedback provided, catering to different learning needs and preferences.

Educational policy makers also play a crucial role. Promoting training programs that equip teachers with effective feedback strategies, particularly in providing synchronous and focused feedback, is vital. Moreover, allocating resources for technology integration is necessary. Investing in technology that supports synchronous feedback mechanisms, such as reliable internet access and interactive platforms, is crucial. Ensuring that schools have the necessary infrastructure can help implement these findings effectively. Additionally, developing guidelines for feedback practices can help standardize and improve the quality of writing instruction across educational institutions.

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