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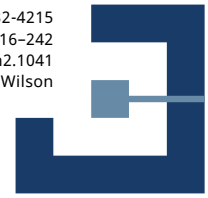

Castledown

Student engagement with teacher and automated written corrective feedback on L2 writing: A multiple case study

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The present multiple-case study, based on the multi-dimensional perspective on student engagement with Corrective Feedback (CF) proposed by Ellis (2010), set out to scrutinize students' behavioral, cognitive, and affective engagement with written corrective feedback (WCF) provided by two different sources: teacher WCF and automated written corrective feedback (AWCF) provided by Writing Mentor. To this end, four Iranian EFL learners – two limited proficient and two modestly proficient writers – were selected purposefully from two sections of an academic writing course, one providing teacher WCF and the other AWCF. Participants in both sections wrote five argumentative essays during an academic term, received feedback on grammar, usage, and mechanics, and made revisions. The results demonstrated that the participants had different engagement levels and were categorized as highly engaged, moderately engaged, and minimally engaged students. In section 1, both participants who received teacher WCF were behaviorally and cognitively engaged with the feedback; however, one participant spent more time, used more resources, and showed more revision acts. Regardless of their behavioral and cognitive engagement level, they both demonstrated deep affective engagement with teacher feedback. In section 2, while one participant who received AWCF demonstrated deep and active engagement in all three dimensions, the other participant was reluctant to respond to the feedback and demonstrated a minimal level of engagement.

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Findings indicate that students' engagement with WCF, whether provided by a teacher or automated writing evaluation system, is influenced by students' beliefs and attitudes toward feedback and the sources of that feedback. Students' writing proficiency was not clearly or consistently related to their degree of feedback engagement.

Keywords: engagement; written corrective feedback; automated writing evaluation; automated written corrective feedback, Writing Mentor

Introduction

Over the past three decades, research on WCF has proliferated and demonstrated the importance and necessity of feedback in the field of L2 writing. Hence, the critical question in WCF research has shifted from whether corrective feedback works to how and for whom it works (Ferris, 2006). Although research indicates the effectiveness of WCF for improving the accuracy and reducing the errors in L2 students' writing (e.g., Koltovskaia & Mahapatra, 2022), there is also research indicating that merely providing WCF does not of itself lead to writing improvement (Hyland & Hyland, 2006). For feedback to be effective students must engage with it (Ellis, 2010; Storch, 2018). The concept of student engagement with feedback has received considerable scholarly attention in recent years (Chen et al., 2022; Han, 2017; Jiang & Yu, 2022; Lee, 2020; Zhai & Ma, 2021; Zhang & Hyland, 2022). Scholars maintain that exploring the engagement process enables us to obtain a deep understanding of the problems that students encounter and the way they solve those problems in the revision process. Basically, studies have attempted to scrutinize how individual students engage with different sources of WCF such as a teacher or peer WCF and AWCF (e.g., Tian & Zhou, 2020).

Recent years have seen the growing importance of automated writing evaluation (AWE) as a source of feedback on student writing. Using AWE, students can write their texts and receive immediate feedback on a variety of areas of their writing. There are now many AWE systems that provide numeric scores and written comments on student writing and can be effectively integrated into teacher-led writing instruction in writing classrooms (see Fu et al., 2022 for review). Research on the effectiveness of AWE has produced mixed findings (see Stevenson & Phakiti, 2014), but overall findings are positive with medium effect sizes for AWE compared to traditional approaches to providing feedback (Li, 2022). AWE has the capacity to free up teachers' time to focus less on lower-level qualities, such as grammar and mechanics, and dedicate their time to higher-level qualities, such as content and organization (Dikli & Bleyle, 2014; Link et al., 2020; Wilson & Czik, 2016), and may help improve students' revision skills by promoting noticing of errors, self-directed learning, and student autonomy (Barrot, 2021; Link et al., 2014).

Although many studies have demonstrated the positive effects of AWE, few AWE studies have focused on the importance of learning and teaching processes. This indicates a need to explore how students engage with and respond

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to AWCF. Studies on student engagement with feedback have demonstrated that although AWCF may positively impact L2 writing, this impact varies across individual students, depending on how they engage with the feedback (Jiang & Yu, 2022; Koltovskaia & Mahapatra, 2022). Despite much research on the effectiveness of AWCF on students writing, there is a need for further research on student engagement with AWCF provided by different AWE tools, especially modern tools that take advantage of recent developments in natural language processing to provide more targeted AWCF. Furthermore, since qualitative research provides in-depth information about how individual students engage with written corrective feedback, particularly their behavioral, cognitive, affective engagement, case studies that sample individuals with diverse profiles and in different L2 contexts are particularly insightful and useful to the field. Prior case studies have demonstrated that student engagement with feedback is complex and influenced by individual factors; while some students engage deeply with feedback, others do not. Despite the insights gained from these studies, they have been limited by examining only one particular source of feedback, either teacher or AWE (e.g., Han, 2017; Lee, 2020; Liu & Yu, 2022). Scholars have called for more investigations that examine student engagement with different sources of feedback (Storch, 2018; Zhang & Hyland, 2018; Zheng, 2018). Thus, the present study addressed these limitations by conducting a multi-faceted examination of how Iranian post-secondary students in an EFL course engaged with written corrective feedback provided by their instructor and by an AWE system called Writing Mentor. This is the first study of its kind to examine students' engagement with AWCF from Writing Mentor, which is a modern and advanced AWE system providing detailed AWCF. Prior research has instead focused on more common AWE tools such as Grammarly and Pigai (e.g., Chen et al., 2022; Guo et al., 2021; Jiang & Yu, 2022). These studies demonstrated that students show different engagement levels with AWCF, and they differ in how they utilize the AWCF to make revisions. Although these studies have provided insightful findings about student engagement with the above-mentioned tools, more studies are needed to focus on engagement with other AWE tools, contrast that engagement with that for teacher WCF, and consider engagement in a multi-faceted manner to better understand how different types of WCF engage EFL learners.

Conceptual framework for student engagement with WCF

Ellis (2010) proposed a componential framework for investigating oral and written CF. The components presented in his framework are as follows: (a) individual factors; (b) contextual factors; (c) engagement; and (d) learning outcomes. Ellis (2010) stated that "individual learner factors include age, language aptitude, memory, learning style, personality, motivation, language anxiety, and learner beliefs" (p. 339). Contextual variables include factors related to the learning setting and the activity during which learners receive correction, and in the case of the current study, the source of feedback (i.e., teacher WCF and AWCF). Engagement refers to how learners respond to the feedback they

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receive and can be examined from three perspectives: cognitive, behavioral, and affective. Motivated by Elis's (2010) conceptual framework, as well as subsequent empirical research that has applied that framework, the present study was designed to explore the diversity in students' behavioral, cognitive, and affective engagement with different sources of WCF, be it from a teacher or an AWE system.

Literature review

Student engagement with feedback in L2 writing

Student engagement is not a simple and clear-cut construct because various factors are involved when students engage with learning. Hyland (2019) referred to engagement as "the extent students are committed to their learning, embracing a complex of factors which can be seen in students' responses to texts and their attitudes to writing and responding" (p. 404). Studies on student engagement have demonstrated that students engage with feedback differently, and some engage more deeply than others. Factors such as their proficiency level, individual characteristics, and the classroom context, including the source of feedback, may account for these variations.

Most studies on student engagement with feedback have adopted Ellis's (2010) framework. Han and Hyland (2015) conducted case studies on four non-English major EFL learners to investigate their cognitive, behavioral, and affective engagement with teacher WCF. Multiple sources were used, including interviews, retrospective verbal reports, and teacher-student writing conferences. They argued that learners engage differently with teacher WCF, even when they receive the same feedback. The highly engaged student regulated negative emotions caused by WCF and consulted her teacher which contributed to her understanding of errors, implementation of cognitive and metacognitive strategies, as well as revision operations. The under-engaged student who was overly confident in her writing abilities was affectively and cognitively overwhelmed by WCF and made ineffective revisions, and even resisted WCF. The moderately engaged student made effective surface-level revisions and showed partial understanding of WCF. The intentionally disengaged student was pleased when receiving a few WCF points on his writing; while revising his errors, he did not approach the teacher but invited a friend to work with him. He felt confused by the indirect WCF and his understanding of his errors was insufficient; hence, his contribution was only to monitor and evaluate the revision made by his friend. Han and Hyland (2015) concluded that individual differences such as learners' beliefs and experiences about WCF and their L2 learning goals affect how students engage with feedback.

In a qualitative multiple-case study, Zhang and Hyland (2018) investigated students' behavioral, cognitive, and affective engagement with teacher WCF and AWCF provided by Pigai by analyzing the participants' writing tasks and semi-structured interviews. The results demonstrated that the depth of the two participants' engagement varied due to individual differences such

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as their proficiency levels and their beliefs and values about feedback. The highly engaged student displayed more engagement in all three dimensions; she spent more time revising, showed a more positive attitude towards WCF, and used more revising strategies. The moderately engaged student showed less engagement in all three dimensions which demonstrated that there is a dynamic relationship between the three dimensions of affective, behavioral, and cognitive engagement.

Han (2017) conducted a case study of six Chinese EFL university students who engaged with WCF over 16 weeks. Data from interviews, retrospective verbal reports, and reflective accounts illustrated the complexities of student engagement with WCF. Indeed, students' person-related beliefs, task-related beliefs, and strategy-related beliefs directly influenced multiple forms of engagement with WCF, including behavioral, affective, and cognitive. However, the relationship between students' beliefs about WCF and their engagement with WCF was non-linear and reciprocal: beliefs and engagement varied over time because of increased use of WCF, suggesting that engagement is a dynamic process and one that is aided by consistent exposure to WCF.

Another case study of Chinese university students conducted by Jiang and Yu (2022) examined students' engagement with AWCF provided by the Pigai AWE system using students' draft data, semi-structured interviews, and automated feedback information. As with Han and Hyland (2015), Jiang and Yu (2022) reported that students' engagement ranged along a continuum that they classified as either 'regular', 'partial', or 'rare.' These engagement profiles differed in terms of the degree to which students utilized AWCF to make error corrections and utilized resources (e.g., dictionary) to assist in their revision behaviors.

Findings from these studies illustrate that students' engagement with WCF, be it teacher WCF or AWCF, is complex and often idiosyncratic, with some students engaging deeply, exerting significant cognitive and behavioral effort, and other students not doing so (see Chen et al., 2022; Jiang & Yu, 2022; Tian & Zhou, 2020). Even when engagement is deep, affectively engaged students may feel overwhelmed by the feedback they receive (Koltovaskai & Mahapatra, 2022). Moreover, the relationship between the form of the feedback, be it direct or indirect, affects engagement: indirect feedback may promote greater time spent revising and greater expenditures of cognitive effort than direct feedback, but indirect feedback may be taken up less frequently and lead to less successful revisions (Liu & Yu, 2022) and large expenditures of cognitive effort may not be desirable (see Ranalli, 2018). Moreover, in the context of AWCF, the actual or perceived accuracy of the underlying error detection algorithms may influence feedback engagement (Feng et al., 2016; Zhai & Ma, 2021). While most of the existing AWE tools provide comprehensive feedback on student writing, Writing Mentor differs from others by allowing students to choose the categories they intend to receive feedback on. As the literature suggests, focused feedback of this sort is more effective than comprehensive feedback because it is less overloading and can enhance the student's attention to and noticing of the error (see, for instance, Lee, 2019; Rahimi, 2021); naturally, it

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is expected that students have deeper engagement with feedback when they focus on certain errors.

Thus, the present study adopted a qualitative multiple case study and used a combination of different methods of measuring engagement to explore students' behavioral, cognitive, and affective engagement patterns with WCF (i.e., teacher WCF and AWCF) in an English as a Foreign Language (EFL) context. Hence, the following research question guided the study: How do the students behaviorally, cognitively, and affectively engage with WCF?

Methods

Setting and participants

This study was conducted in the Department of Foreign Languages and Linguistics at Shiraz University. Data were collected from an academic writing course. The course was a developmental writing class intended to teach the students how to write well-organized argumentative essays. A total of 30 undergraduate English majors with an average age of 22 years old enrolled in two sections of the writing course. They were native speakers of Persian but the courses they had passed in university were all in English. There were no systematic differences in the composition of the two sections of the course, and the students were randomly assigned to either section after they enrolled in the course. Both classes were held by the second researcher and on the same day consecutively. Thus, the students were exposed to the same writing practices and were given the same assignments. The only difference between the sections was that one section solely utilized teacher WCF (section 1), and the other utilized Writing Mentor AWE system (section 2) as part of a trial approach to English language instruction that semester.

Since a qualitative multiple-case study was adopted, the researchers used purposive sampling to select two students, regardless of gender, from each section as the focal cases. As such, from each section, the researchers selected one student with a limited and one with a modest writing ability, determined based on an in-house rubric (see Appendix C) made for scoring students' argumentative writing ability based on written accuracy, content, and organization. This rubric assigned a score of 1 to 25, indicating levels of proficiency from very limited to fully proficient writers. Students who received a two were considered "limited" writers; students who received a three were considered "modest" writers. Based on these criteria, the researchers selected Mona (the limited writer) and Ali (the modest writer) from section 1 and Ava (the limited writer) and Shiva (the modest writer) from section 2. All names are pseudonyms. Student profiles are illustrated in Table 1. Regarding feedback on English writing, they all recalled that in other English courses that they had taken before, their English teachers did not provide much feedback on their writing (prior to attending this course) and the academic writing course was the first time that they were exposed to teacher WCF. It was also in the academic writing course that the participants got to know the AWE system for the first time.

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Table 1. Student profiles

	Student name (pseudonyms)	Gender	Writing ability
Section 1 – Teacher WCF	Mona	Female	limited writer
	Ali	Male	modest writer
Section 2 – AWCF	Ava	Female	limited writer
	Shiva	Female	modest writer

Materials and instruments

To reveal the participants' engagement with WCF, multiple sources of data were used, including students' essays, semi-structured interviews, stimulated recalls, and data from a keystroke logging tool. For students receiving AWCF, data were collected from Writing Mentor's reports.

Students' essays included one out of five argumentative essays (450–500 words) they had written and revised during the semester on Google Drive. Prompts were related to education and technology, which are familiar subject areas to these students. The essays were scored based on the essay writing scoring rubric both before and after revision. The students' third essay was analyzed to explore their engagement with WCF, be it from the teacher or the AWE system. The third essay was selected to ensure that the students were familiar with the feedback provided by the teacher and AWE, and the revision process.

Semi-structured interviews (SSI, hereafter) and stimulated recall interviews (SRI, hereafter) were conducted individually with the four participants two from each section. The interview questions (see Appendices A and B) were adopted from Zhang and Hyland (2018). As the students' availability was limited towards the end of the term, we had to conduct both the SSI and SRI simultaneously. The interviews for each individual lasted approximately one hour and occurred within two days following the students' revising the third essay so that they were able to remember the revision process. The interviews were conducted with the participants in their L1 and was recorded, transcribed, and translated into English by the first researcher. The SSIs focused on behavioral and affective engagement by asking the participants about their experience with English writing and written feedback, the present writing course, and the difficulties they encountered while writing the assignments. They were also asked how they used the teacher WCF or AWCF, how much time they spent on revising their essays, and what strategies they used for revision. The SRIs were also run to capture the students' cognitive engagement by asking them to recall what they did while revising. The researchers showed the participants their essays and feedback and asked about their comprehension of specific feedback provided by the teacher and AWE. They were also asked about how they responded to the feedback, what strategies they used for revision, and why they made a specific revision or used a particular strategy.

A Keylogger software, Spy Monitor screen recorder, was installed on the

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computers in the computer laboratory to show the amount of time spent and the revision activities done by each student while revising their essays. The total time spent between the first keystroke and final keystroke of a session including pauses of typing and the time a participant spent on other tabs to help them revise their essays (e.g., using desktop dictionaries or websites) was considered as the total time spent on the revision process.

The AWE software (i.e., Writing Mentor) is freely available as a Google Docs plugin and students can install it conveniently through Google Drive. Students can choose to receive instant feedback on different categories; in the present study, students received feedback on grammar, usage, and mechanics. The tool provides students with suggestions for the correct form or metalinguistic explanation they may use to revise their essays. For the data collection purposes, the report of the feedback types that the user received and the time spent revising were examined.

Data collection procedures

The study was conducted in the two sections of an argumentative writing course that lasted 15 weeks. The data collection procedures for each section were as follows:

Section 1. The first two weeks of the semester focused on introducing and practicing argumentative writing by deconstructing samples of argumentative essays. The third and fourth sessions involved practicing the argumentative genre; students wrote a group essay and received WCF. Feedback on the form was coded based on Ferris and Roberts's (2001) categories. The teacher covered different areas in students' essays: noun-ending, article, sentence structure, wrong word, spelling, and punctuation. The errors were implicitly highlighted and coded by the teacher, and a chart that included the meaning of each code was provided at the end of the essay. The WCF was comprehensive (rather than focused) and largely indirect. Students received instructions on how to revise their essays based on the WCF they received. Starting from week five, the students wrote and revised an argumentative essay every two weeks. The students were asked to write the assignment within two hours. After submitting each essay, the teacher provided WCF within three days, and the students were supposed to revise the errors before the next session.

Section 2. The data collection procedures for Section 2 were similar to Section 1. However, concerning the WCF, the teacher provided instructions to the students on how to receive AWCF and revise their essays. For this section, two sessions were allocated to teach the students how to use Writing Mentor. During the fourth session and an additional session held at the end of the week, the students were introduced to Writing Mentor and taught how to select feedback categories, make revisions, obtain reports on their errors and the revisions they had made in response to AWE feedback, and share this information with the instructor. To facilitate this, sample writings were shared with the students,

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and they practiced using the AWE tool. Although the students were new to the AWE platform, it was not feasible to allocate more than one extra session for them to learn how to use Writing Mentor effectively. This was because it was necessary to maintain parity between the two groups in terms of the amount of feedback practice and the duration of instruction. Despite this, we hoped that the students would become more familiar with Writing Mentor over the course of the term. Afterward, similar to Section 1 students, from week five, the students wrote their essays on Google Drive, received focused feedback immediately via Writing Mentor, and revised their essays in class.

Data analysis

Students' essays were collected and all the errors and feedback points were identified. The changes made by the participants in the revised draft were compared with the first draft of their third essay. The classification of revision acts was informed by Zhang and Hyland (2018) and was categorized as correction, no correction, deletion, substitution, and addition.

To analyze the interview data, data coding was conducted to identify the significant patterns and themes. The data coding moved through three phases: open coding, axial coding, and selective coding (Strauss & Corbin, 1998). To determine the depth of students' engagement, the interview data were coded based on Uscinski's (2015) model. The participants' depth of engagement was determined by the extent to which they comprehended linguistic errors. In the interviews, students in both sections were asked to provide metalinguistic explanations for the correct forms of their errors; if the student was able to provide metalinguistic explanations, the researchers coded it as "Yes" which means the student comprehended the error; if not, the researchers coded it as "No".

To see how students were behaviorally engaged with teacher WCF and AWCF, the amount of time spent on revisions and the use of different resources during revision were explored. The cognitive engagement was explored by examining the participants' acts of revision and text modification, and the depth of processing. To explore how the participants affectively engaged with the feedback two aspects were investigated: emotional responses and attitudinal reactions (Zhang & Hyland, 2018), which were determined via the semi-structured interviews.

Trustworthiness of the data and analyses. Given that the trustworthiness of the data and subsequent analyses are essential for supporting valid inferences from a qualitative study, the following steps were taken to ensure trustworthiness (i.e., reliability): (a) the second researcher double-checked the translated texts from the interviews for accuracy; (b) the first and first and second authors independently coded a random 10% of the data and the discrepancies between codes were discussed to ensure a reliable and credible coding process; and (c) trustworthiness was also enhanced by triangulating the data from interviews

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and stimulated recalls with the keystroke logging data, which is collected automatically and reliably.

Results

Case 1: Mona

Behavioral engagement with WCF. Mona received WCF from the teacher. The report of the keylogger software showed that Mona spent approximately 1 hour revising her third essay in class. Mona talked about the time she spent on revision and how she corrected her errors in the interview:

> After spending 1 hour on the revision in class, I spent 1 more hour correcting my errors. I consulted the teacher, websites, dictionaries, and online grammar checker tools.

Table 2 presents the error focus in teacher WCF on Mona's third essay, the number of errors in her essay, and the number of errors she addressed. It can be seen that Mona revised all her grammatical errors. A comparison between the initial draft and the revised draft of her third essay revealed that almost all the errors were successfully corrected by Mona. Mona also detected one more grammatical error not addressed in her writing. Behaviorally speaking, the amount of time (Han & Hyland, 2015; Zhang & Hyland, 2018) Mona spent on the revision, the multiple resources she used to revise her errors, and her interview (SSI) showed that Mona was actively engaged in the revision process.

Table 2. Error focus in teacher WCF on Mona's third essay

Error focus	Number of errors	Number of revised errors
Noun-ending	2	2
Article	3	3
Sentence structure	2	2
Spelling	1	1
Punctuation	2	2

Cognitive engagement with WCF. Three types of revision acts were performed in her third essay: (1) correction (2) substitution (3) addition. Mona corrected all the errors identified by the teacher. In the SRI, she talked about how she responded to teacher WCF:

> It was interesting to receive feedback in an interactive environment (Google Docs). Concerning the article errors, most of the time, I had forgotten to write the correct article, but regarding other errors, I learned a lot from the feedback on my errors and tried to apply them to the next essays.

Some examples of revision acts in Mona's third essay are illustrated in Table 3. It can be seen that Mona corrected the grammatical errors effectively. Overall,

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Mona's use of multiple revision acts and having different solutions to her problems, such as consulting the teacher, websites, dictionaries, and online grammar checkers, suggests that she was cognitively engaged in the revision process. Since learning occurs when learners reach deep levels of cognitive processing, in addition to determining if and how students were engaged, it was essential to explore how deep their engagement was (Uscinski, 2015). She received ten instances of WCF in total, and in the interview, she was able to provide metalinguistic explanations for all the errors. Hence, she was able to use the feedback effectively and was deeply engaged with the feedback on her essay.

Table 3. Examples of revision operations in Mona's third essay

Revision acts	Initial draft	Teacher WCF	Revised draft
Correction	So however well the teacher teaches, she/he does not evaluate the teacher honestly.	Sentence structure	**Even if the teacher teaches well,** she/he does not evaluate the teacher honestly.

Affective engagement with WCF. In response to the questions asked in the SSI, Mona showed a positive attitude towards teacher WCF, and regarding her emotional response, she was very eager and pleased to receive the comments from her teacher. A strong interest in the teacher's comments was demonstrated in her interview response:

> I really liked to write on Google Docs and was eager to receive the teachers' comments. The comments were very important for me and helped me recognize my errors and revise my essay. So, in the following writings, I would be more careful not to make the same errors.

While the results showed Mona's deep and active engagement with teacher WCF, it is also essential to examine whether the depth of her engagement contributed to her writing accuracy. A comparison of the initial and revised draft of Mona's third essay revealed her deep and active engagement.

Case 2: Ali

Behavioral engagement with WCF. Ali received WCF from the teacher. The report of the keylogger software showed that Ali spent approximately 14 minutes revising his third essay in class. When asked about the time he spent on the essay, he said:

> When I was writing the essay, I was not careful enough, so, when I received the comments, I could correct the errors immediately. Since revising the errors was not difficult, I did not use any resources.

Table 4 presents the error focus in teacher WCF on Ali's third essay, the number of errors in his essay, and the number of errors he addressed. It can be seen that Ali addressed all the grammatical errors. A comparison between the initial

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and revised drafts of his third essay revealed that Ali successfully corrected all the errors. His time on revision, his limited strategies (Ali addressed the errors on his own and did not consult any additional resources), and his interview showed his moderate (Zhang & Hyland, 2018) behavioral engagement.

Table 4. Error focus in teacher WCF on Ali's third essay

Error focus	Number of errors	Number of revised errors
Noun-ending	1	1
Article	2	2
Punctuation	5	5

Cognitive engagement with WCF. Only one type of revision act was performed in his third essay: (1) correction. However, he was able to correct all the errors identified by the teacher. In the SRI, he talked about how he responded to teacher WCF:

> I think I was not careful enough while writing the first draft of my essay. I did not put much effort into correcting the linguistic errors because I knew that I had the opportunity to receive feedback and correct the errors.

Some examples of revision acts in Ali's third essay are illustrated in Table 5. Although Ali addressed all the errors in his essay successfully, unlike Mona, he did not try to make more modifications to improve his writing quality and as mentioned in his interview, he was not motivated to revise his essay due to the explicit feedback. In addition, the researchers sought to determine the extent to which he used the teacher feedback effectively, and hence, how deeply he was engaged in the process. He received eight instances of WCF in total and in his interview, he provided meta-linguistic explanations for all the correct forms. Thus, he was moderately cognitively engaged with WCF.

Table 5. Examples of revision operations in Ali's third essay

Revision acts	Initial draft	Teacher WCF	Revised draft
Correction	Another part of information should come from parents' feedback on their children education development.	Noun-ending	Another part of information should come from parents' feedback on their **children's** education development.

Affective engagement with WCF. Based on the results of the SSI, Ali's emotional response to the teacher's feedback was positive as he was pleased to receive the comments and satisfied with his scores. He also showed an affirmative attitude toward the feedback on his writing and tried to revise his essay after receiving the comments. He explained it in his interview:

> I really liked the comments and I think they were very insightful. They

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> helped me recognize my errors, and because they were somehow indirect, I attempted to find the reason behind my errors, and try to correct them.

In summary, although Ali's behavioral and cognitive engagement with teacher feedback was moderate, his affective engagement was at a high level.

Case 3: Ava

Behavioral engagement with WCF. Ava received WCF from Writing Mentor. The report of the keylogger software showed that Ava spent approximately 14 minutes revising her third essay. Ava submitted her writing six times to Writing Mentor, soliciting its feedback, thereby demonstrating that Ava was engaged with the feedback provided by Writing Mentor. In the SSI, she discussed the time she spent on revision:

> The suggestions provided by Writing Mentor helped me a lot, so I did not need to consult other sources and I could easily correct the errors and it did not take much time to correct the errors. At first, I did not spend enough time on revising my essays, but for the next essays, I was more interested and spent more time on writing and revising my essays. I was really motivated to revise my drafts many times and improve my writing.

Table 6 presents the error focus in AWCF on Ava's third essay, the number of errors in her essay, and the number of errors she addressed. It can be seen that Ava addressed all the grammatical errors and almost all the errors were successfully corrected. It was also found that Ava detected two grammatical errors that Writing Mentor had not addressed. In summary, Ava was motivated and willing to revise her essays; the interview, the keylogger software report, and the Writing Mentor report confirmed that she was actively engaged with AWCF.

Table 6. Error focus in AWCF on Ava's third essay

Error focus	Number of errors	Number of revised errors
Article	3	3
Sentence structure	1	1
Punctuation	2	2
Capitalization	1	1

Cognitive engagement with WCF. Three types of revision acts were performed in Ava's third essay: (1) correction (2) substitution (3) addition. Ava not only addressed all the feedback provided by Writing Mentor, but she also detected a noun-ending error and corrected it successfully. Although the suggestions provided by Writing Mentor seemed helpful for Ava, analyzing her revised draft showed that one suggestion was misleading, and Ava substituted the correct form with an incorrect form of punctuation. Ava did not seem to

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be aware of this and instead seemed to trust Writing Mentor's accuracy. In the interview, she said:

> I was interested to receive feedback on my essay immediately. Concerning the article errors, most of the time I had forgotten to write the correct articles. For other errors, the suggestions provided by Writing Mentor helped me revise the errors.

Some examples of revision acts in Ava's third essay are illustrated in Table 7. The changes made in the revised draft and the interview illustrated that Ava could interpret and analyze the AWCF and was able to perform multiple revision acts in response to the feedback provided, which was indicative of her cognitive engagement. Moreover, Ava received seven instances of WCF in total and during the SRI, when asked about the errors, she was aware of the grammatical rules and was able to provide meta-linguistic explanations for six out of seven errors (86% error awareness). Thus, based on these data, Ava was moderately cognitively engaged with AWCF.

Table 7. Examples of revision operations in Ava's third essay

Revision acts	Initial draft	AWCF	Revised draft
Correction, addition, deletion	...teachers try to improve their teaching skills and starting to use new methods of teaching like using power points, realia that is instructional materials, to purport their meaning in a more understandable way	Is this a run-on sentence? Do you need to add punctuation, add conjunctions, or create separate sentences?	...teachers try to improve their teaching skills and starting to use new methods of teaching like using power points **and realia.** ~~**that is instructional materials, to purport their meaning in a more understandable way**~~

Affective engagement with WCF. Affectively speaking, the results of the SSI showed that Ava was pleased to receive AWCF, especially after the first sessions. As she mentioned in her interview, the reason was that after some sessions, she got used to the feedback provided by Writing Mentor. She also reacted positively to the feedback and attempted to revise her essay and improve her writing. She explained it in her interview:

> The comments I received from *Writing Mentor* were very helpful. I liked working with Writing Mentor. At first, I thought that there were too many comments, but afterwards, I got used to them.

Overall, the results illustrated that Ava was actively and affectively engaged with the AWCF.

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Case 4: Shiva

Behavioral engagement with WCF. Shiva received WCF from Writing Mentor. The report of the keylogger software showed that Shiva spent approximately 16 minutes revising her third essay. However, only 7 out of the 16 minutes of the revision time were spent on the linguistic errors provided by the AWE system. The rest was spent on other tabs that seem irrelevant to revising her essay. As the time spent on revision indicates behavioral engagement, the little amount of time reported by the keylogger illustrates a lack of behavioral engagement in the revision process. In the SSI, she discussed the time spent on revisions:

> At first, I thought it was only a project by the teacher and not a way to help me improve my essay. I did not consider it as a useful source of feedback and it was just a responsibility that I had to take as a part of the writing course. Also, because the tool provided feedback in the form of suggestions, I was not sure whether I should revise the highlighted words or not.

Although Shiva demonstrated modest writing ability, her preference to receive teacher feedback (as she mentioned in her interview) and her poor opinion of the AWE system resulted in her showing minimal behavioral engagement with WCF from Writing Mentor.

Cognitive engagement with WCF. Only two types of revision acts were performed by Shiva: (1) correction and (2) no correction. Shiva's use of revision acts was rather limited and she did not address all the errors in her essay. Analyzing the revised draft of Shiva's third essay and her reflections on her revisions during the SRI revealed that her cognitive engagement with AWCF was minimal (Zhang & Hyland, 2018) because she did not make revisions effectively. The lack of cognitive strategies and limited use of revision acts illustrated that she was not cognitively engaged with WCF from Writing Mentor.

Affective engagement with WCF. The findings of the SSI revealed that while Shiva was not satisfied with the feedback and did not even try to revise her essay, she held a positive attitude regarding the immediacy of receiving WCF from Writing Mentor and the ability to select which feedback categories she wished. She said:

> It was interesting for me that I could receive immediate feedback from Writing Mentor and I could also choose the category on which I was eager to receive feedback. I tried to improve my writing to get higher scores but they didn't change and I didn't know what the problem was.

As mentioned in her interview, Shiva could not make use of the AWCF to improve her writing and "didn't know what the problem was". It seems that she lacked sufficient understanding of how Writing Mentor worked and how to respond to its feedback effectively; thus, her lack of technical knowledge might have led to her minimal affective engagement with the WCF from Writing Mentor.

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Summary of the four cases

Behavioral engagement. Table 8 illustrates the results of the four participants in the two sections. Since the teacher's WCF was indirect and did not indicate how students should correct the error, it placed a greater burden on students. Therefore, it is expected that the students spend more time and use more resources, particularly if they did not already know the underlying grammatical rules, like Mona (and unlike Ali). The WCF from Writing Mentor not only highlighted an error, but it offered suggestions on exactly how to fix the problem; hence, it is likely for students who received AWCF to consult fewer resources and spend less time on revision.

Table 8. The four participants' time spent on revision and strategies used

Participant	Time spent on revision	Strategies used	Section
Mona	60 min	Grammar checkers Dictionaries Websites	1
Ali	14 min	-	1
Ava	14 min	-	2
Shiva	7 min	-	2

Table 9 illustrates the number and percentage (%) of errors in the four participants' third essay and the number and percentage (%) of errors they revised. It can be seen that the participants in section 1 that received teacher WCF revised all their errors; while in section 2, Ava revised all her errors, but Shiva revised only one out of the four errors which may be attributed to her negative attitude toward Writing Mentor and her lack of understanding of its feedback.

Table 9. The number and percentage of revised errors in the four participants' third essay

Participant	Number of errors	Number and percentage of revised errors	Section
Mona	10	10 (100%)	1
Ali	8	8 (100%)	1
Ava	7	7 (100%)	2
Shiva	4	1 (25%)	2

Cognitive engagement. The four participants' cognitive engagement was explored by examining their revision acts and error awareness. Table 10 illustrates the four participants' cognitive engagement including the revision acts they made and the percentage of the errors that were successfully corrected. The data illustrates that while the participants in section 1 successfully revised all their errors, Ava and Shiva who received AWCF were not successful in revising all the errors which may be due to limited knowledge of AWCF and how to respond to such feedback effectively.

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Table 10. The four participants' cognitive engagement

Participant	Revision acts	Successful	Section
Mona	Correction Substitution Addition	100%	1
Ali	Correction	100%	1
Ava	Correction Deletion Substitution Addition	86%	2
Shiva	Correction	25%	2

Table 11 illustrates student error awareness, that is, whether the students were able to provide metalinguistic explanations for the correct forms of their errors. Awareness varied across participants, with students receiving teacher WCF demonstrating 100% and participants receiving WCF from Writing Mentor demonstrating less awareness.

Table 11. Number and percentage of errors of which participants demonstrated awareness

Participant	Number of errors	Awareness percentage	Section
Mona	10 (100%)	100%	1
Ali	8 (100%)	100%	1
Ava	6 (86%)	86%	2
Shiva	1 (25%)	25%	2

Affective engagement. Regardless of their behavioral and cognitive engagement, the two participants who received teacher WCF showed a high level of affective engagement. In section 2, while one participant demonstrated deep affective engagement with WCF from Writing Mentor, the other (Shiva) demonstrated minimal affective engagement. Shiva generally held a poor attitude to Writing Mentor, with the exception of liking the immediacy of the feedback and the flexibility to select which feedback she would receive.

Discussion

Based on Ellis's (2010) multi-dimensional framework for investigating student engagement, the students showed different levels of engagement with feedback influenced by individual factors such as writing proficiency level, motivation, knowledge, trust, and their beliefs about the feedback. Informed by this theoretical framework, the participants' behavioral engagement was examined based on the time they spent revising and their strategies to make revisions (Ellis, 2010; Chen et al., 2022; Han & Hyland, 2015). Both participants who received teacher feedback were behaviorally engaged with the WCF. However, Mona invested more time and energy and was more motivated to revise her

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essays. She also used more strategies to help her understand and revise the errors; thus, she showed greater behavioral engagement than the moderately-engaged student, Ali. The analysis of data collected from section 2 showed that the highly-engaged student (Ava) outperformed the minimally-engaged student (Shiva) in all three dimensions. Behaviorally speaking, despite having opportunities to complete multiple drafts, Shiva revised her essay only one time while Ava revised her draft more than 5 times. Inconsistent with prior research on student engagement with AWCF in which higher-proficient students show higher engagement with feedback (Zhang & Hyland, 2018), the findings of this study demonstrated that the limited writer was more actively engaged than the modest writer who was reluctant to respond to "machine feedback" as she indicated. This confirms prior research indicating that trust-related issues determine the success or lack of engagement with WCF delivered by teacher or AWE (Feng et al., 2016; Zhai & Ma, 2021). Shiva's limited number of revisions and her minimal engagement with AWCF may be attributed to her distrust and negative attitude toward AWE or her lack of understanding of the AWCF. In contrast, the other three students indicated their trust and esteem for their respective sources of WCF, and all of these students demonstrated greater engagement. A student's trust and respect for the source of feedback appear to be essential for ensuring adequate engagement with feedback.

The participants' cognitive engagement with feedback was examined in terms of the revision acts performed and their depth of processing (Chen et al., 2022; Jiang & Yu, 2022; Koltovskaia & Mahapatra, 2022; Zhang & Hyland, 2018). In section 1, the results demonstrated that while both participants revised the errors successfully and showed 100% error awareness, Mona utilized various revision acts to revise her essay; hence, she was more cognitively engaged with teacher WCF than Ali. Ali appeared to use the teacher's feedback more as reminders to help him edit; whereas, Mona used the feedback as an impetus for learning underlying grammatical rules. In section 2, Ava conducted multiple revision acts and showed 86% error awareness; she was not aware that Writing Mentor incorrectly identified an error in her writing. Conversely, Shiva was not willing to spend adequate time or make multiple revisions and showed less cognitive engagement with AWCF, and generally less understanding than Ava of how to use Writing Mentor's feedback to correct errors. Taken together, findings are in line with prior research showing that cognitive engagement with WCF, regardless of the source, differs among students (Han & Hyland, 2015; Jiang & Yu, 2022; Tian & Zhou, 2020). Further, findings indicate the need for students using AWE to have access not only to initial training but ongoing support to ensure they understand how to utilize and benefit from AWCF (see Chen et al., 2022).

With respect to affective engagement, both participants in Section 1 showed deep affective engagement with teacher feedback. Hence, consistent with previous findings (Ferris & Hedgcock, 2014; Hyland & Hyland, 2006; Zhang & Hyland, 2018) the students believed that teacher feedback was very helpful in improving the accuracy of their writing. In section 2, Ava held a positive attitude and emotions toward AWE and she also trusted and accepted the AWCF,

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which furthered her deep affective engagement. Conversely, while Shiva demonstrated a positive attitude toward Writing Mentor for its unique affordances (immediacy and flexibility), she did not trust or accept the AWCF and thus demonstrated minimal affective engagement with feedback. As Shiva's case reveals, cognitive and affective dimensions interact to influence engagement with WCF.

Taken together, findings indicate that, while students are likely predisposed to trust and accept WCF from teacher sources, the same predisposition may not be true for trusting and accepting WCF from AWE sources. Were AWE to be used as a source of feedback within EFL courses, it is important that instructors share information about the accuracy of the system to help students gain trust and acceptance with this technology. Also, our findings indicate that EFL students may benefit from not only learning the technical aspects of using AWE, but also learning how to read, consider, and respond to the automated feedback it provides. Teachers should consider modeling this process and simultaneously verbalizing their thinking (i.e., think-aloud modeling) to help students acquire this procedural knowledge. Furthermore, not only should instructors provide initial training to students, but they should also provide ongoing support to ensure students understand how to utilize AWE effectively. Instructors should also consider combining their feedback with AWCF. This may not only aid students in developing trust and acceptance of the AWCF, but research indicates that the combination of teacher and automated feedback is more effective than either on its own (see Li, 2022; Link et al., 2020; Liu & Yu, 2022; Wilson & Czik, 2016; Zhang & Hyland, 2022).

Limitations and future research

Since student engagement with feedback is a highly significant concept in L2 writing, more studies are needed to examine various facets of student engagement. The present study found that students' writing proficiency was not consistently associated with their level of engagement with WCF – the limited writers appeared more engaged than the modest writers, but not always. However, since the students in the present study were at intermediate writing ability (limited and modest writers), future studies may consider students with more distinct differences in writing ability (extremely limited or highly proficient writers). Perhaps writing ability will be a stronger factor influencing feedback engagement in that situation. Further, future research should also consider adding other measures to assess students' writing proficiency level, such as a measure of writing knowledge (e.g., Wilson & Wen, 2022), particularly linguistic knowledge (i.e., knowledge of the English writing conventions) and procedural knowledge (i.e., knowledge of how to use feedback to revise and edit a text). Perhaps a measure of writing knowledge would more proximally relate to how students engaged with WCF from different sources. In addition, other student factors, such as gender, should be explored as potential sources of individual differences in students' engagement with WCF.

Future research may also examine a follow-up essay and see whether students "learned" from their experience and make the same types or frequency

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of errors as they made in the first essay. Future studies may also focus on developing ways of better training students to interpret and utilize AWCF that would influence student engagement.

Finally, study findings indicate that student engagement seems to be influenced by the interaction of individual factors (e.g., trust, acceptance, beliefs, motivation) with contextual factors, such as the source of feedback. This important finding should be examined in future research that exposes the same students to multiple sources of feedback, particularly both the teacher WCF and AWCF. Given the idiosyncratic nature of students' feedback engagement, perhaps when students receive feedback from multiple sources, this will maximize their engagement. Future research should explore this possibility.

Conclusions

This qualitative multiple-case study explored four Iranian English majors' behavioral, cognitive, and affective engagement with WCF provided either by a teacher or an AWE system called Writing Mentor. A systematic analysis of four students' engagement with teacher WCF and AWCF provides insights into the complex nature of student engagement with feedback. There are differences in how individual students engage with feedback; hence, the participants in this study are characterized as highly engaged, moderately engaged, and minimally engaged learners. This classification summarizes how each learner engaged with feedback and enables us to compare different types of students.

Since student engagement is malleable, a pedagogical implication of the study findings is that there are ways that teachers can improve their delivery of WCF to help students engage with WCF more effectively. In addition, teachers should train students to use AWE tools effectively, emphasize their advantages, and inform them about their limitations. This may bolster behavioral and affective engagement with AWE. An additional pedagogical implication is that, given the highly individual nature of feedback engagement, it may be necessary to combine teacher WCF and AWCF to ensure that each student experiences a form of feedback that works for them. Indirect or minimal WCF (i.e., teacher WCF in this study) or more elaborated and explicit WCF (i.e., the AWCF in this study) interacts with individual factors such as motivation to write, motivation to succeed in the course, existing linguistic knowledge, and beliefs about and trust in the role of teachers and AWE systems in education. All these factors influence student engagement, and hence, there is likely no "one size fits all" approach to giving feedback to students. Future research should explore whether a combination of approaches (i.e., simple markup, directions, queries) and feedback sources (i.e., teacher, AWE, peer) helps more students deeply engage with WCF. It is possible that such a combination will e.

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Appendix A

Student interview guide for Section 1 (teacher WCF); adopted from (Zhang & Hyland, 2018)

1. Please tell me about your experiences with English writing and written feedback. What sources of feedback do you usually receive on your writing?
2. What were your first impression and your general perceptions of the teacher feedback?
3. You just finished the assignment, could you talk about the assignment? Did you have any difficulty when you wrote the assignment?
4. Could you share with me some information about the course?
5. Were you satisfied with the overall score and the end comment? Why?
6. What did you think of the overall score? Did you pay much attention to the scores?
7. What did you think of the corrective feedback in your assignment? Was it helpful?
8. How did you make use of the teacher feedback in revision?
9. How much time did you spend in revising your drafts? Why?
10. What was your emotional reaction to the teacher feedback? Can you give any examples?
11. Did you experience frustration with teacher feedback? Can you give any examples?
12. Did your perceptions of teacher feedback change over time? Why?
13. How did you make revisions after receiving teacher feedback? Can you give any examples?
14. Why didn't you address this problem identified by teacher feedback?
15. Why did you delete this error or this part identified by the teacher feedback?
16. Why did you substitute this word or phrase?
17. Why did you add this word, phrase or sentence here?

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18. Why did you make the organizational change?
19. Why did you rewrite this part?
20. Did you use any strategies in the revision process? What was the process like?
21. Do you have any additional comments?

Appendix B

Student interview guide for Section 2 (Writing Mentor); adopted from (Zhang & Hyland, 2018)

1. Please tell me about your experiences with English writing and written feedback. What sources of feedback do you usually receive on your writing?
2. When did you start to use the Writing Mentor in your English writing? Why did you use it?
3. What were your first impression and your general perceptions of the Writing Mentor/teacher feedback?
4. You just finished the assignment, could you talk about the assignment? Did you have any difficulty when you wrote the assignment?
5. Could you share with me some information about the course?
6. Were you satisfied with the overall score and the end comment? Why?
7. What did you think of the overall score? Did you pay much attention to the scores?
8. What did you think of the corrective feedback in your assignment? Was it helpful?
9. How did you make use of the Writing Mentor/teacher feedback in revision?
10. Could you talk about the number of times you used the Writing Mentor to help you revise the same essay? Did you use it more than one time? (after the first revision)
11. How much time did you spend in revising your drafts? Why?
12. What was your emotional reaction to the Writing Mentor/teacher feedback? Can you give any examples?
13. Did you experience frustration with the Writing Mentor/teacher feedback? Can you give any examples?
14. Did your perceptions of the Writing Mentor/teacher feedback change over time? Why?
15. How did you make revisions after receiving the Writing Mentor/teacher feedback? Can you give any examples?
16. Why didn't you address this problem identified by the Writing Mentor/teacher feedback?
17. Why did you delete this error or this part identified by the Writing Mentor/teacher feedback?
18. Why did you substitute this word or phrase?
19. Why did you add this word, phrase or sentence here?

20. Why did you make the organizational change?
21. Did you use any strategies in the revision process? What was the process like?
22. Do you consider it an advantage to have the opportunity to choose what kind of feedback you receive from the Writing Mentor?

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Appendix C

Essay writing scoring rubric

Score = 21–25: Your essay: – Fully addresses all parts of the task. – Includes all the moves of an argument including argument claim and data, counterargument claim and data, as well as rebuttal of the counterargument and data. – The introduction clearly states or implies the writer's thesis or position on this topic as well as the likely counterargument. – Uses particularly well– chosen evidence to support your ideas as well as to refute the counterargument. – Organizes and develops ideas logically with clear, insightful connections among them – Demonstrates sentence structure and variety that enhances your emphasis – Displays facility and clarity in choice of language – Uses grammar and mechanics correctly and demonstrates understanding of correct usage
Score = 16– 20: Your essay: – Sufficiently addressed all parts of the task. – The essay may lack at least one of the moves such as rebuttal, rebuttal data, counterargument, counterargument data, etc. – The introduction states or implies the writer's thesis or position on this topic and may include the likely counterargument. – Uses relevant evidence to support your ideas and to refute the counterargument – Organizes and develops ideas with clear connections among them – Demonstrates variety in sentence structure – Displays competency in word choice – Uses grammar and mechanics correctly and demonstrates understanding of correct usage
Score = 11–15: Your essay: – Addresses the task only partially; the format may be inappropriate at places. – The essay lacks two or moves of an argument such as rebuttal, rebuttal data, counterargument, counterargument data, etc. – The introduction does not clearly state or imply the writer's thesis or position on this topic and may lack the likely counterargument. – Uses somehow adequate evidence to support your ideas and to refute the counterargument (if any) – Organizes and develops your ideas with some control – Uses sentence forms adequately, but without the most effective possibilities in structure and variety – Demonstrates an adequate vocabulary – Displays control of the basics of grammar, usage, and mechanics, but may have errors
Score = 6–10: Your essay: – Responds to the task only in a minimal way or the answer is irrelevant for the most part – The essay may include only two or three major moves and may not sound like an argument throughout; it may not include the counterargument/rebuttal and relevant data. – The introduction lacks a thesis, stated or implied, or fails to take a position clearly and adequately – Could use more support and discussion; no or inadequate counterargument/rebuttal data – Could demonstrate more control in the development and organization of ideas – Needs sentences with adequate variety and structure – Could improve upon word choice or language – Has incorrect grammar, usage, or mechanics

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Score = 1–5:
Your essay:
- Barely responds to the task.
- The essay includes only one or two arguments which may or may not be supported by data; it does not sound as an argumentative writing.
- The introduction lacks a thesis, fails to take a position; no counterargument
- Fails to provide evidence – any or enough reasons or details
- Does not develop ideas or is organized weakly
- Has sentence structures that are not correct or appropriate
- Uses words that sometimes confuse rather than communicate meaning
- Contains many errors in grammar, word usage, and sentence structure