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RESEARCH ARTICLE

Effects of synthesised coded corrective feedback on primary level students' grammatical awareness and self-correction skills

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Abstract - Written corrective feedback (WCF), especially direct and indirect corrective feedback, has been studied repeatedly to solve students' problem of inaccurate writing. The indirect coded corrective feedback (ICCF), which is a more balanced method, is also not exempted from solving this particular problem. Although many ICCF studies have found beneficial impacts, it still lacks understanding, especially on younger students. Therefore, this study aimed to investigate the effects of ICCF that was synthesised with two classes of errors (omission and mis-formation) adapted from the Surface Strategy Taxonomy to determine its effects on primary school students' grammatical awareness and self-correction skills in English writing. This quasi-experimental study was conducted on 60 students (experimental, n = 30; control, n = 30) from an English language centre in Selangor, Malaysia. The results revealed that only the experimental group made significant short-term and long-term improvements in their grammatical awareness and self-correction skills, and they also statistically outperformed the control group. Hence, the ICCF method is more effective than the traditional classroom method in immediately enhancing and retaining students' grammatical awareness and self-correction skills for up to 4 weeks. The theoretical and pedagogical implications of this study are also provided in this paper.

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1. Introduction

In the 21st century, competent English writing skills are one of the most imperative skills to master for global communication (Awang et al., 2021). However, it is also the most challenging skill to learn in the English language (Mehat & Ismail, 2021). Many students find it difficult to write grammatically accurate sentences despite learning English since primary school (Singh et al., 2017). Students often do not pay attention to grammatical accuracy and cannot apply grammatical rules effectively during the writing process, which causes them to omit, misplace, or even unnecessarily add words in writing (Lestari et al., 2020). As a result, students' writing quality deteriorates. Since the 1980s, written corrective feedback (WCF) researchers have been trying to improve students' writing accuracy by studying the different types of WCF (Chow & Soo, 2025). Many research studies have compared direct and indirect corrective feedback, since they are widely used by teachers (Selvarajoo et al., 2023). However, the functions of these two types of feedback have their own problems. For instance, direct corrective feedback is used by directly providing the correct forms to students (Anggunsari & Wahyuni, 2023). This removes the opportunity for students to cognitively engage with the errors and the WCF provided (Boggs, 2019). Conversely, indirect corrective feedback is applied by marking (underlining or circling) the errors without providing the correct answers or additional information (Anggunsari & Wahyuni, 2023). Consequently, indirect corrective feedback may result in confusion and misunderstanding since some students may not have the necessary metalinguistic ability to correct their own errors, particularly lower proficiency students (Zheng & Yu, 2018). As a result, Ekinci and Ekinci (2020) and Doi et al. (2021) suggested indirect coded corrective feedback (ICCF) to mitigate these problems. The metalinguistic information in ICCF provides structured scaffolding that promotes students to notice and understand their linguistic errors. This facilitates identifying the location of the errors and self-correcting them in writing (Rizkiani et al., 2019). Consequently, it has prompted WCF researchers to explore the ICCF field for over a decade, beginning in the 2010s. ICCF investigations mainly include comprehensive and focused ICCF, and recently, ICCF has evolved into the hybrid ICCF. The hybrid ICCF is engineered by strategically integrating ICCF with other pedagogical methods such as teachers' affective comments (Tang & Liu, 2018) and repeated metalinguistic explanation (Ogawa, 2021) to enhance the impact of the feedback.

1.1 Written Corrective Feedback

Written corrective feedback (WCF) is a pedagogical approach to improve students' writing accuracy by informing the students regarding their errors in writing of the target language (Masrul et al., 2024). However, in the early years, Truscott (1996) published an article claiming that WCF often leads to pseudo-learning rather than actual internalisation of the language. Furthermore, he also cautioned that WCF induces risk-aversive behaviour; specifically, students may adopt avoidance strategies to circumvent complex structures in favour of safer linguistic forms to minimise the risks of subsequent correction. Later, Ferris (1999) rebutted these claims and argued that the impacts of WCF required strategic application, including the provision of instruction-focused training and increasing awareness of linguistic inaccuracy for WCF to be effective. Both Truscott's (1996) and Ferris's (1999) arguments make sense because the pseudo-learning and avoidance strategy factors have to be neutralised for WCF to yield positive impacts in developing students' writing

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abilities. Following Ferris's (1999) refutations, research on WCF has gained significant attention, and investigations have continued to the present day because of controversial findings regarding different forms of WCF (Wondim et al., 2024).

1.2 Direct vs Indirect Corrective Feedback

Although direct and indirect corrective feedback methods differ in the extent of feedback provided, both methods have demonstrated positive impacts in improving students' writing according to an earlier critical synthesis of the studies (Karim & Nassaji, 2019). A recent qualitative meta-synthetic study also verified that both feedback types contribute to language learning (Soodmand Afshar et al., 2025). However, if both feedback types are compared for superiority, contradictory findings have emerged instead (Budianto et al., 2020; Karim & Nassaji, 2020; Masrul et al., 2024; Pham, 2021). Therefore, it is difficult to draw a meaningful and consistent conclusion since WCF studies typically consist of varying investigation focuses, populations, WCF types, and research designs (Hyland & Hyland, 2006). Consequently, rather than investing further in comparing direct and indirect corrective feedback, other WCF researchers have begun to investigate the impacts of other WCF types that can result in similar desired learning outcomes (Chow & Soo, 2025).

1.3 Indirect Coded Corrective Feedback

Recent conventional ICCF studies have uncovered the positive impacts of ICCF. For instance, ICCF significantly reduced students' writing errors (Ekinci & Ekinci, 2020). Research comparing ICCF against non-coded methods revealed that providing ICCF significantly increased students' writing accuracy and scores (Doi et al., 2021; Gholaminia et al., 2014; Rizkiani et al., 2019). Furthermore, it enhanced students' self-editing skills more effectively (Ferdouse, 2012). More specific scopes of ICCF investigations, such as the impacts of ICCF on grammatical accuracy, also demonstrated positive outcomes (Saukah et al., 2017), particularly in treating verb tense errors (Salimi & Valizadeh, 2015). However, when ICCF was compared against other feedback methods, it did not demonstrate superior performance. For instance, Muth'im and Latief (2014) found no significant differences between the ICCF, non-coded, and end-sample comment methods in improving students' writing scores on expository genre essays. A closer inspection uncovered that the outcome was plausibly affected by inconsistent writing topics across the tests. As for Balegh (2023) investigation, the non-coded method significantly outperformed the ICCF method in reducing students' overall grammatical errors in opinion-based compositions. This finding contradicted the established hypothesis that more linguistic information would improve the understanding factor of the Noticing Hypothesis (Schmidt, 2010). Although Balegh (2023) did not provide an assessment of this outcome, a potential cause was that the non-coded group may have strategically applied the avoidance strategy during the tests to reduce grammatical errors and achieve better results.

Conversely, comparing ICCF against direct corrective feedback also yielded inconsistent findings. Zareil and Rahnama (2013) reported that direct corrective feedback showed a more significant impact in improving grammatical accuracy over the ICCF method. However, the results were susceptible to statistical errors because of inconsistent sample sizes among the groups. In contrast, Tawfeeq and Abbas (2018) found ICCF more effective for linguistic accuracy. Although the study was more robust by imposing a two-week interval, it still risked measuring mere temporary or pseudo-learning. Since there has been no consensus on the findings, some investigations purposefully limit the scope of feedback by targeting only one or a few linguistic features to address potential cognitive overload issues caused by providing comprehensive feedback (Bitchener, 2019). However, inconsistent findings were also uncovered for these focused ICCF studies. For instance, ICCF was effective in improving conjunction (Lee & Sim, 2019), past tense, and article accuracy (Sherpa, 2021). Regarding the effects on syntactic accuracy, no significant difference was found between the repeated-mediated indirect coded feedback (RICF, required revision of errors based on ICCF codes) and the attention-mediated indirect coded feedback (AICF, required to merely pay attention to the errors based on the ICCF codes without revision) (Nia & Valizadeh, 2021). Conversely, Knowles's (2025) investigation also uncovered findings that contradicted the Noticing Hypothesis, similar to a study reviewed previously. The no-feedback group (ICCF without circling of sentence initial conjunctions, SIC) statistically outperformed the ICCF (ICCF plus circling of SIC), direct, and indirect corrective feedback groups. However, further scrutiny found that the three writing prompts that students could choose were distinctive in power and social difference – variables that inherently introduce varying degrees of task difficulty. Consequently, the design risked yielding confounded results. Therefore, focused ICCF studies also yielded controversial findings, and these findings suggest that different grammatical features (word classes) and research design affect the pedagogical efficacy of focused ICCF. Hence, there has also been no consensus on the findings of ICCF to date.

1.4 Hybrid Coded Corrective Feedback

The paradigm of the conventional ICCF investigation has started to shift since 2018 by engineering the conventional ICCF method with other pedagogical methods, which has created the hybrid ICCF to further enhance the effectiveness of ICCF. As a nascent domain of inquiry, empirical literature on hybrid ICCF remains scarce to date. According to one of the pioneer investigations, there was no significant difference when the integration of ICCF with the affective comments method was compared against the ICCF-alone method in improving 7th Graders' writing performance (Tang & Liu, 2018). However, a replicated investigation found the former method significantly superior for university students (Mujtaba et al., 2020). This suggests that age differences, specifically cognitive readiness, may moderate the effectiveness of the hybrid ICCF. Contrarily, a study found no statistical difference between the integration of ICCF with a single metalinguistic explanation (ME) and the combination with repeated ME on writing accuracy. Instead, the latter group repeated the same mistakes periodically (Ogawa, 2021). A closer inspection found that Ogawa (2021) hypothesised this

outcome was likely caused by the lack of attention demonstrated by the students. However, since it was an action research design, strategic adjustments could be made to eliminate this confounding variable, but they were not reportedly implemented, which may have yielded a different finding. Although the findings of hybrid ICCF were also inconsistent, these findings provided valuable insight regarding a variation of integration techniques that led to different developmental outcomes. Consequently, it would be beneficial to conduct more investigations on different ICCF integration techniques to systematically comprehend the pedagogical impacts.

1.5 Enhancing Grammatical Awareness and Self-Correction Skills with Written Corrective Feedback

Grammatical awareness is the students' ability to notice and reflect on their language learning (Alharbi, 2022). WCF is also used to raise students' grammatical awareness. Studies have reported WCF to be effective in enhancing students' ability to notice their errors and reduce them significantly, which results in improved writing accuracy (Dabboub, 2019). Furthermore, providing tasks such as self-correction of errors in transcription exercises has been shown to enhance students' grammatical awareness. This strengthens students' ability to monitor, identify, and correct errors independently without the teacher's direct intervention (Alizain, 2019). As for self-correction skills, they are the ability to independently revise errors in writing to improve writing accuracy (Fahimi & Rahimi, 2015). The self-correction skill can be enhanced by providing WCF to students, especially indirect CF (underlining or circling of errors), which can increase students' writing performance (Dabboub, 2019). Additionally, it can also be improved with ICCF since the metalinguistic clues inform students about the mistakes, thereby enabling them to correct errors independently (Saukah et al., 2017; Tawfeeq & Abbas, 2018). Therefore, this present study assessed the effects of the synthesised ICCF intervention on the prerequisite cognitive process of grammatical awareness before examining the realised outcome of self-correction skills for a more robust understanding of the intervention.

1.6 Theoretical Framework

According to the Noticing Hypothesis, Schmidt (1990, 2010) postulated that learning does not take place unless the learning input is noticed by the learner. In fact, learners learn more effectively when they pay attention to the input so that the stimulus can be registered in long-term memory. Therefore, Schmidt supports the idea of explicit learning and rejects the hypothesis of learning without awareness. WCF studies, including ICCF, are grounded in this theory, based on the hypothesis that feedback can help students notice, understand, and become more aware of their mistakes in writing to reduce these mistakes in the future (Saukah et al., 2017). Hence, this present study applies the Noticing Hypothesis as guidance to enhance students' grammatical awareness with the provision of synthesised ICCF. Skills Acquisition Theory (SAT) elaborates how people acquire a skill from the initial stage to the advanced proficiency stage (Dekeyser, 2020). Anderson (1982) proposed three stages (declarative knowledge, procedural knowledge and automatisation) of skills acquisition. Firstly, new input of knowledge is provided to students to perform a task during the declarative knowledge stage. Secondly, the knowledge is practised by performing the task repeatedly to proceduralise it in the procedural stage. Thirdly, the students automate the knowledge in the automatisation stage, which develops the knowledge into a functional skill which can be executed more rapidly and efficiently. Hence, the SAT suggests that language use in writing WCF can also be automatised like any other skill through repeated practice. Therefore, this present study triangulates the Noticing Hypothesis and the SAT to investigate the effects of the synthesised ICCF intervention to enhance students' grammatical awareness and self-correction skills.

Although most investigations found ICCF to be generally effective, it still lacks understanding, specifically on younger students at the primary level, which has not been investigated to date (Chow & Soo, 2025). Furthermore, the hybrid ICCF method is still currently underexplored. Although conventional ICCF provides an opportunity for students to cognitively engage with the feedback and error, it lacks essential linguistic information since it typically only informs students regarding 'what' is incorrect without further describing how it is wrong. Therefore, this study intends to provide a more structured and detailed scaffolding of ICCF by purposefully integrating conventional ICCF codes with classes of errors adopted from Dulay et al.'s (1982) Surface Strategy Taxonomy, leading to the creation of the synthesised ICCF intervention. Therefore, this study aims to investigate the effects of this novel synthesised ICCF, grounded in the Noticing Hypothesis and the Skills Acquisition Theory, to understand its extent in promoting students' grammatical awareness and self-correction skills. As a result, the following research questions were derived.

1. How does synthesised ICCF enhance students' short-term and long-term grammatical awareness of verb accuracy in English writing?
2. To what extent does synthesised ICCF improve students' short-term and long-term self-correction skills of verb accuracy in English writing?

2. Methodology

2.1 Research Design

The quasi-experimental design was adopted for this present study, as it was the most appropriate design since it was not feasible to create artificial groups through random sampling (Creswell, 2012). This quasi-experimental design was employed to test the ICCF intervention in a real-world setting, which in this case involved intact classes of primary school-level students from an English language centre who fit the demographic and research objectives of this current study. The

pre-test, post-test, and delayed post-test design was used for this study to determine both the short-term and long-term effects of ICCF on grammatical awareness and self-correction skills of verb accuracy in English writing.

2.2 Research Participants and Context

This study was conducted at an English language centre in Selangor, Malaysia, that prepares students for the Cambridge English Qualifications exams that align with the Common European Framework of Reference (CEFR). This study used purposive sampling because the demographic (upper primary ESL learners) of the students from four intact classes matched the research purposes, which specifically focused on assessing the pedagogical efficiency of the synthesised ICCF intervention on upper primary school-level students. A total of 64 primary students (aged 10 to 12) who were enrolled in the English course for the preparation of the CEFR A2 level exam were initially recruited for this study. They were divided equally into 2 groups (experimental = ICCF method; control = traditional classroom method). However, 4 students were excluded from data analysis because of attendance inconsistency and attrition from the centre. The remaining 60 students (experimental, n = 30; control, n = 30) completed the experiment as planned, and their data were analysed to obtain answers for the two research questions of this study. Before the study, ethical approval was obtained from University Malaysia Sarawak (UNIMAS). Subsequently, consent letters were sent to the managing director of the language centre and the parents of the research participants to obtain permission to conduct the study. The research participants were also informed about the purpose of the study and reassured that there were no consequences regardless of their performance throughout the entire investigation. They were also allowed to withdraw from the study without any consequences. Furthermore, assurance was given to the participants, specifically related to privacy and personal data protection. Consequently, all participants were assigned pseudonyms to represent them in all data analyses and reports.

2.3 Equivalence of Abilities of the Experimental and Control Groups

After the homogeneity of variance for the experimental and the control groups was met, the pre-test scores between the two groups were compared statistically to determine their grammatical awareness and self-correction skills before the start of the experiment. Grammatical awareness was assessed by the number of successfully identified errors in the written texts, whereas self-correction skills were measured by successful self-corrections of the previously identified errors. Both parametric (independent samples t-test) and non-parametric (Mann-Whitney U test) tests were used since there was a combination of both normally and non-normally distributed data. The between-group results for grammatical awareness revealed that there was no statistical difference between the experimental and the control groups for both parts of the pre-tests (Part 1, $p = .608 > .05$; Part 2, $p = .349 > .05$.) As for self-correction skills, similar findings were found (Part 1, $p = .799 > .05$; Part 2, $p = .843 > .05$). Therefore, the results suggest that both the experimental and control groups had the same level of grammatical awareness and self-correction skills before the commencement of the experiment.

2.4 Research Instruments

The format of the tests was adapted from part 6 (grammar cloze) of the Reading and Writing A2 Flyers primary-level exam paper from the Young Learners English (YLE) Cambridge examination, which aligns with the CEFR. The original exam requires the students to fill in five missing word classes, such as verbs, articles, prepositions, pronouns, etc., in a given text. In this study, the tests were modified, and students had to self-identify grammatical errors and perform self-correction. This allowed for a more rigorous assessment of the effectiveness of the synthesised ICCF intervention on improving grammatical awareness and self-correction skills, specifically at the post-writing stage. Moreover, only to-be verbs and verb form errors were selected to examine the effects of this new intervention on the two dependent variables mentioned. Since verbs are treatable errors which are more rule-governed (Ferris, 2011; Sherpa, 2021), they are more suitable for younger students to strategically minimise cognitive load to negate a potential confounding variable. This enables students to focus only on identifying and correcting errors, increasing the accuracy and reliability of data interpretation.

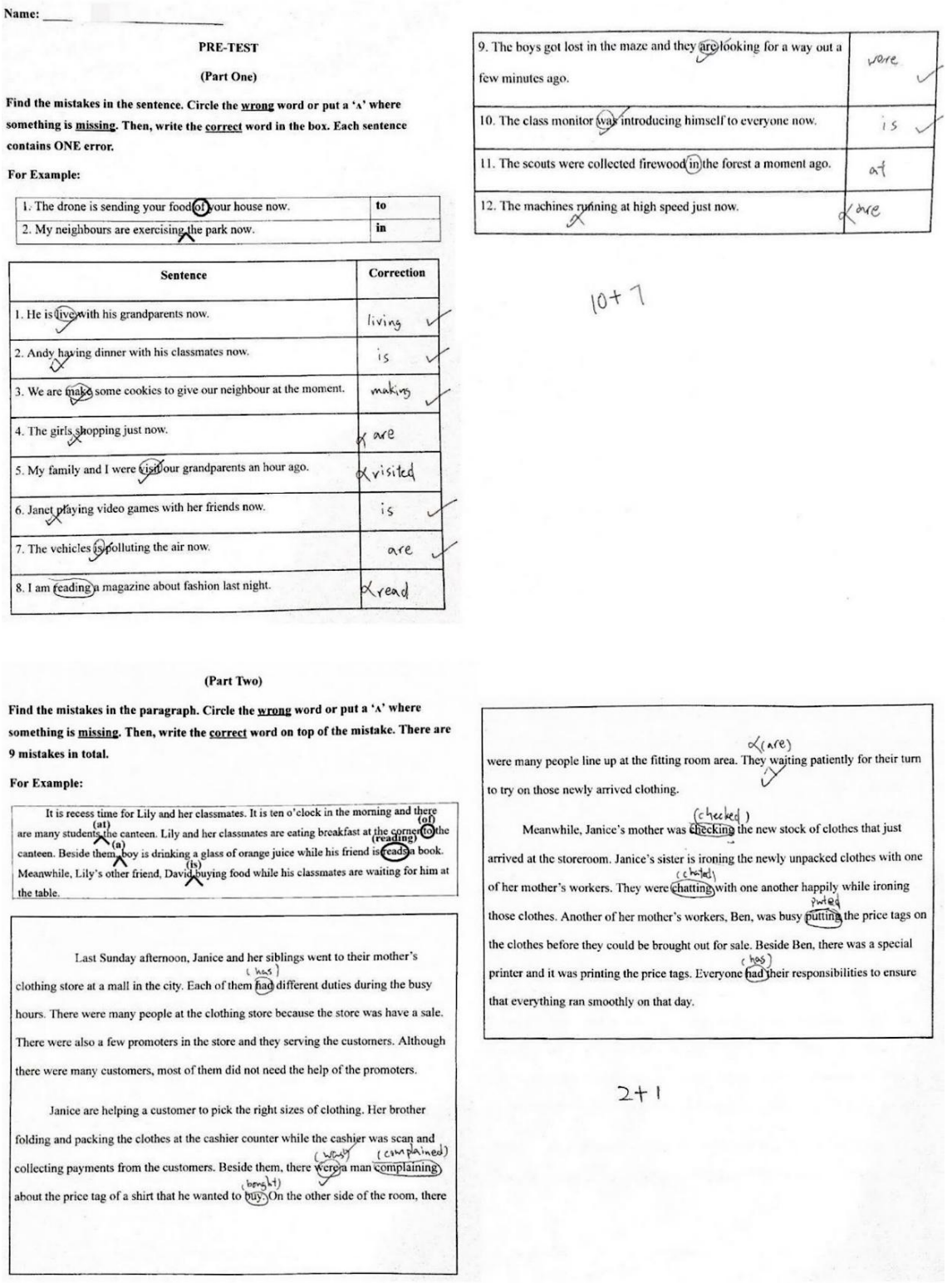
The design of the tests (pre-test, post-test and delayed post-test) in this study did not follow the conventional way of requiring students to write a piece of writing, as in other ICCF studies in the literature (see Figure 1 for sample test). Instead, the present study students were all given readily written English texts to identify and self-correct verb errors within 30 minutes. The purpose of this design was to isolate the post-writing stage to examine the mechanism of the ICCF for a more robust assessment, rather than measuring the entire writing process like other WCF studies, which may be affected by confounding variables such as cognitive load and fatigue. Furthermore, employing this design also neutralised the avoidance strategy where students adopt a safer writing approach to reduce errors in writing for a higher score, as Truscott (1996) cautioned against – which often leads to statistical errors during the interpretation of the WCF mechanism effectiveness itself. Each test was separated into two parts (Part 1, individual English sentences; Part 2, English essays). After the tests, the total number of successful identifications of the verb errors for each test part (Parts 1 and 2) was totalled to determine the students' level of grammatical awareness for RQ1. As for self-correction skills, the process was similar, whereby the total number of successful self-corrections of verbs for both test parts was totalled separately for RQ2. All three tests (pre-test, post-test and delayed post-test) were validated by three subject matter experts in the field of English language teaching at the primary school level. Additionally, a pilot study was conducted with 11 students from other classes who shared the same demographic background. All three tests and the other instruments, inclusive of the worksheets, were pilot tested. Adjustments were made to the format and instructions of the instruments before they were utilised for the main study.

2.5 Procedure of the Experiment

As shown in Figure 2, the research was conducted over a period of 10 weeks. Initially, both the experimental and the control groups were administered a pre-test to obtain their initial results. Next, the experimental group were provided a lesson on ICCF training to educate them about the practical usage of the code combinations. Subsequently, the two groups underwent four treatment sessions at the beginning of Week 3. During the treatment stage, both the experimental and the control groups were given a worksheet for each 1-hour lesson. The structure and design of the tasks in the worksheet were similar to the design of the tests. However, there was a difference in the worksheet between the experimental group and the control group (see Figure 3 for sample worksheets).

Figure 1

Sample Test



Name: _____

PRE-TEST

(Part One)

Find the mistakes in the sentence. Circle the wrong word or put a 'ʌ' where something is missing. Then, write the correct word in the box. Each sentence contains ONE error.

For Example:

1. The drone is sending your food your house now.	to
2. My neighbours are exercising the park now.	in

Sentence	Correction
1. He is live with his grandparents now.	living
2. Andy having dinner with his classmates now.	is
3. We are make some cookies to give our neighbour at the moment.	making
4. The girls shopping just now.	are
5. My family and I were visit our grandparents an hour ago.	visited
6. Janet playing video games with her friends now.	is
7. The vehicles is polluting the air now.	are
8. I am reading a magazine about fashion last night.	read

9. The boys got lost in the maze and they are looking for a way out a few minutes ago.	were
10. The class monitor was introducing himself to everyone now.	is
11. The scouts were collected firewood in the forest a moment ago.	at
12. The machines running at high speed just now.	are

10+7

(Part Two)

Find the mistakes in the paragraph. Circle the wrong word or put a 'ʌ' where something is missing. Then, write the correct word on top of the mistake. There are 9 mistakes in total.

For Example:

It is recess time for Lily and her classmates. It is ten o'clock in the morning and there (at) are many students the canteen. Lily and her classmates are eating breakfast at the corner (of) the canteen. Beside them, (a) boy is drinking a glass of orange juice while his friend is reads (reading) a book. Meanwhile, Lily's other friend, David (is) buying food while his classmates are waiting for him at the table.

Last Sunday afternoon, Janice and her siblings went to their mother's clothing store at a mall in the city. Each of them had (has) different duties during the busy hours. There were many people at the clothing store because the store was have a sale. There were also a few promoters in the store and they serving the customers. Although there were many customers, most of them did not need the help of the promoters.

Janice are helping a customer to pick the right sizes of clothing. Her brother folding and packing the clothes at the cashier counter while the cashier was scan and collecting payments from the customers. Beside them, there were (was) a man complaining (complained) about the price tag of a shirt that he wanted to buy (bought). On the other side of the room, there were many people line up (are) at the fitting room area. They waiting patiently for their turn to try on those newly arrived clothing.

Meanwhile, Janice's mother was checking (checked) the new stock of clothes that just arrived at the storeroom. Janice's sister is ironing the newly unpacked clothes with one of her mother's workers. They were chatting (chatted) with one another happily while ironing those clothes. Another of her mother's workers, Ben, was busy putting (putted) the price tags on the clothes before they could be brought out for sale. Beside Ben, there was a special printer and it was printing the price tags. Everyone had (has) their responsibilities to ensure that everything ran smoothly on that day.

2+1

Figure 2

Procedure of the Experiments

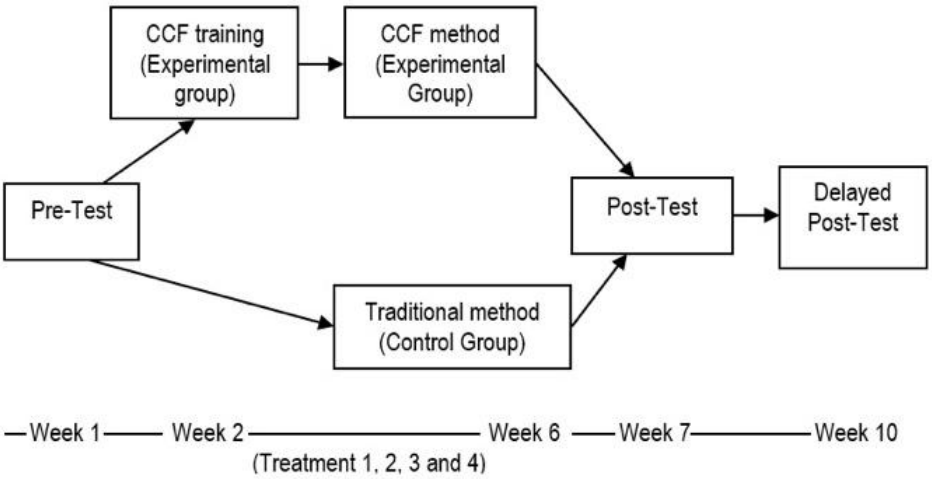
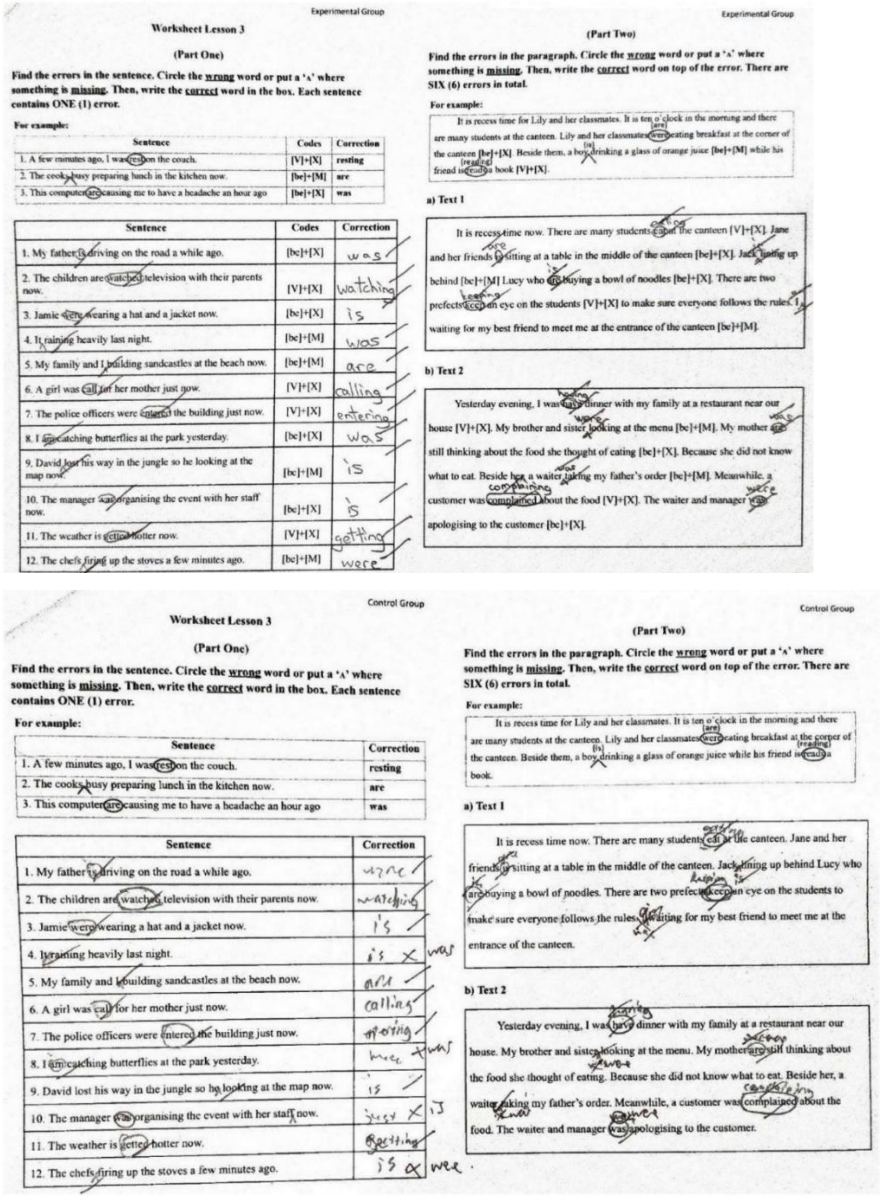


Figure 3

Sample Worksheets



Experimental Group

Worksheet Lesson 3

(Part One)

Find the errors in the sentence. Circle the wrong word or put a '^' where something is missing. Then, write the correct word in the box. Each sentence contains ONE (1) error.

For example:

Sentence	Codes	Correction
1. A few minutes ago, I was rest on the couch.	[V]+[X]	resting
2. The cook busy preparing lunch in the kitchen now.	[be]+[M]	are
3. This computer are causing me to have a headache an hour ago	[be]+[X]	was

Sentence	Codes	Correction
1. My father is driving on the road a while ago.	[be]+[X]	was
2. The children are watched television with their parents now.	[V]+[X]	watching
3. Jamie were wearing a hat and a jacket now.	[be]+[X]	is
4. It raining heavily last night.	[be]+[M]	was
5. My family and I building sandcastles at the beach now.	[be]+[M]	are
6. A girl was call for her mother just now.	[V]+[X]	calling
7. The police officers were entered the building just now.	[V]+[X]	entering
8. I am catching butterflies at the park yesterday.	[be]+[X]	was
9. David lost his way in the jungle so he looking at the map now.	[be]+[M]	is
10. The manager was organising the event with her staff now.	[be]+[X]	is
11. The weather is getter hotter now.	[V]+[X]	getting
12. The chefs firing up the stoves a few minutes ago.	[be]+[M]	were

Experimental Group

(Part Two)

Find the errors in the paragraph. Circle the wrong word or put a '^' where something is missing. Then, write the correct word on top of the error. There are SIX (6) errors in total.

For example:

It is recess time for Lily and her classmates. It is ten o'clock in the morning and there are many students at the canteen. Lily and her classmates were eating breakfast at the corner of the canteen [be]+[X]. Beside them, a boy drinking a glass of orange juice [be]+[M] while his friend is reading a book [V]+[X].

a) Text 1

It is recess time now. There are many students eat the canteen [V]+[X]. Jane and her friends is sitting at a table in the middle of the canteen [be]+[X]. Jack lining up behind [be]+[M] Lucy who are buying a bowl of noodles [be]+[X]. There are two prefects keeping an eye on the students [V]+[X] to make sure everyone follows the rules. I am waiting for my best friend to meet me at the entrance of the canteen [be]+[M].

b) Text 2

Yesterday evening, I was have dinner with my family at a restaurant near our house [V]+[X]. My brother and sister looking at the menu [be]+[M]. My mother are still thinking about the food she thought of eating [be]+[X]. Because she did not know what to eat. Beside her, a waiter taking my father's order [be]+[M]. Meanwhile, a customer was complained about the food [V]+[X]. The waiter and manager were apologising to the customer [be]+[X].

Control Group

Worksheet Lesson 3

(Part One)

Find the errors in the sentence. Circle the wrong word or put a '^' where something is missing. Then, write the correct word in the box. Each sentence contains ONE (1) error.

For example:

Sentence	Correction
1. A few minutes ago, I was rest on the couch.	resting
2. The cook busy preparing lunch in the kitchen now.	are
3. This computer are causing me to have a headache an hour ago	was

Sentence	Correction
1. My father is driving on the road a while ago.	was
2. The children are watched television with their parents now.	watching
3. Jamie were wearing a hat and a jacket now.	is
4. It raining heavily last night.	was
5. My family and I building sandcastles at the beach now.	are
6. A girl was call for her mother just now.	calling
7. The police officers were entered the building just now.	entering
8. I am catching butterflies at the park yesterday.	was
9. David lost his way in the jungle so he looking at the map now.	is
10. The manager was organising the event with her staff now.	is
11. The weather is getter hotter now.	getting
12. The chefs firing up the stoves a few minutes ago.	were

Control Group

(Part Two)

Find the errors in the paragraph. Circle the wrong word or put a '^' where something is missing. Then, write the correct word on top of the error. There are SIX (6) errors in total.

For example:

It is recess time for Lily and her classmates. It is ten o'clock in the morning and there are many students at the canteen. Lily and her classmates were eating breakfast at the corner of the canteen. Beside them, a boy drinking a glass of orange juice while his friend is reading a book.

a) Text 1

It is recess time now. There are many students eat at the canteen. Jane and her friends is sitting at a table in the middle of the canteen. Jack lining up behind Lucy who are buying a bowl of noodles. There are two prefects keeping an eye on the students to make sure everyone follows the rules. I am waiting for my best friend to meet me at the entrance of the canteen.

b) Text 2

Yesterday evening, I was have dinner with my family at a restaurant near our house. My brother and sister looking at the menu. My mother are still thinking about the food she thought of eating. Because she did not know what to eat. Beside her, a waiter taking my father's order. Meanwhile, a customer was complained about the food. The waiter and manager were apologising to the customer.

Table 1

Definitions of the Code Combinations

Codes	Definitions
[be]+[M]	A verb 'to-be' is missing (omission).
[be]+[X]	A verb 'to-be' is wrong (mis-formation).
[V]+[X]	An action word has the wrong form (mis-formation).

The experimental group was provided with the synthesised ICCF intervention within the worksheets (see Table 1). As depicted in Table 1, only two classes of errors (omission and mis-formation) were adopted from Dulay et al.'s (1982) Surface Strategy Taxonomy. Since these error types typically occur for to-be verbs and verb forms, they were more suitable for assessing the pedagogical effects of the intervention and for minimising students' cognitive load. Conversely, the control group was not given any codes to inform them about the errors that existed in the texts. However, rather than providing no feedback at all, the traditional classroom method was employed by conducting conventional lectures and discussions after they completed the worksheets for ethical purposes. Additionally, these students were subsequently provided the full set of the synthesised ICCF worksheets at the end of the experiment for them to benefit from the study. After that, a post-test was administered to both groups in Week 7 to collect data to determine the short-term effects of the treatments on grammatical awareness and self-correction skills. Lastly, a delayed post-test was given to both groups in Week 10 to obtain data to determine the long-term effects of the treatments for both dependent variables.

3. Results

3.1 Short-Term Effects of ICCF on Grammatical Awareness

Table 2 shows the descriptive statistics for the short-term effects of the treatments on grammatical awareness for both the experimental and control groups. The means of the experimental group have increased for both Part 1 and Part 2 of the pre-test from 9.93 (SD = 1.66) and 5.60 (SD = 1.98) to 11.67 (SD = 0.55) and 7.30 (SD = 1.09) in the post-test, respectively. As for the control group, the mean scores for Part 1 and Part 2 of the pretest have only increased slightly from 9.73 (SD = 1.55) and 5.13 (SD = 1.85) to 9.87 (SD = 1.38) and 5.17 (SD = 1.29) in the post-test, respectively, which only showed very small changes. Subsequently, the results were verified statistically to determine the short-term effects of the treatments on grammatical awareness. The Wilcoxon Signed-Rank Test was used since the data were not normally distributed. As shown in Table 3, the results for the experimental group revealed statistical significance for both Part 1 ($W = 5.50$, $p < .001$) and Part 2 ($W = 6.00$, $p < .001$) of the tests. Conversely, the control group showed no statistical significance for both parts of the tests (Part 1, $W = 94.50$, $p = .425$; Part 2, $W = 156.00$, $p = .858$). Subsequently, the post-test scores of the experimental group were compared statistically against the control group's to determine the true short-term effects of ICCF on grammatical awareness. The Mann-Whitney U test results, as shown in Table 4, reveal that there were significant differences between the two groups for both Part 1 ($U = 98.00$, $p < .001$) and Part 2 ($U = 101.00$, $p < .001$) of the tests, with large effect sizes observed across both parts (Part 1, $r = .70$; Part 2, $r = .68$).

Table 2

Descriptive Statistical Results: Short-term Effects on Grammatical Awareness

Test Part	Group	*n*	Pre-Test		Post-Test	
			Mean	Standard deviation	Mean	Standard deviation
Part 1: Individual English Sentences	Experimental	30	9.93	1.66	11.67	0.55
	Control	30	9.73	1.55	9.87	1.38
Part 2: English Essays	Experimental	30	5.60	1.98	7.30	1.09
	Control	30	5.13	1.85	5.17	1.29

Table 3

Wilcoxon Signed-rank Test Results: Short-term Effects on Grammatical Awareness

Test Part	Group	Median		*W*	*Z*	Significance (2-tailed)
		Pre-Test	Post-Test			
Part 1: Individual English Sentences	Experimental ($n = 30$)	10	12	5.50	-4.13	< .001
	Control ($n = 30$)	10	10	94.50	-0.73	.425
Part 2: English Essays	Experimental ($n = 30$)	6	7	6.00	-3.58	< .001
	Control ($n = 30$)	5	5	156.00	-0.18	.858

Table 4

Mann-Whitney U Test Results: Short-term effects on Grammatical Awareness

Test Part	Medians of the Post-Tests	*U*	*Z*	Significance (2-Tailed)	Effect Size (*r*)
Part 1: Individual English Sentences	Experimental ($\tilde{x}$ = 12) vs Control ($\tilde{x}$ = 10)	98.00	5.44	< .001	0.70
Part 2: English Essays	Experimental ($\tilde{x}$ = 7) vs Control ($\tilde{x}$ = 5)	101.00	5.25	< .001	0.68

3.1 Long-Term Effects of ICCF on Grammatical Awareness

Table 5 presents the descriptive statistics for the long-term effects of the treatments on self-correction skills for the experimental and the control groups. According to the results of the experimental group, the means of both Part 1 and Part 2 of the pre-tests increased from 9.93 (SD = 1.66) and 5.60 (SD = 1.98) to 11.77 (SD = 0.50) and 6.80 (SD = 1.22) in the delayed post-tests, respectively. As for the control group, there was an increase for Part 1 of the pre-test from 9.73 (SD = 1.55) to 10.17 (SD = 1.42) in the delayed post-test. However, the result for Part 2 showed a slight decline from 5.13 (SD = 1.85) in the pre-test to 5.07 (SD = 1.62) in the delayed post-test.

Table 5

Descriptive Statistical Results: Long-term Effects of Grammatical Awareness

Test Part	Group	*n*	Pre-Test		Delayed Post-Test	
			Mean	Standard deviation	Mean	Standard deviation
Part 1: Individual English Sentences	Experimental	30	9.93	1.66	11.77	0.50
	Control	30	9.73	1.55	10.17	1.42
Part 2: English Essays	Experimental	30	5.60	1.98	6.80	1.22
	Control	30	5.13	1.85	5.07	1.62

Table 6

Wilcoxon Signed-rank Test Results: Long-term Effects on Grammatical Awareness

Test Part	Group	Median		*W*	*Z*	Significance (2-tailed)
		Pre-Test	Delayed post-tests			
Part 1: Individual English Sentences	Experimental (*n*=30)	10	12	0	-4.29	< .001
	Control (*n*=30)	10	10.5	86.00	-1.32	.177
Part 2: English Essays	Experimental (*n*=30)	6	7	34.00	-3.00	.003
	Control (*n*=30)	5	5	115.00	0.37	.705

Table 7

Mann-Whitney U Test Results: Long-term Effects on Grammatical Awareness

Test Part	Medians of the Delayed post-tests	*U*	*Z*	Significance (2-Tailed)	Effect size (*r*)
Part 1: Individual English Sentences	Experimental ($\tilde{x}$ = 12) vs Control ($\tilde{x}$ = 10.5)	128.00	5.10	< .001	0.66
Part 2: English Essays	Experimental ($\tilde{x}$ = 7) vs Control ($\tilde{x}$ = 5)	181.50	4.04	< .001	0.52

Afterwards, statistical tests were used to compare the pre-test and delayed post-test results to determine the long-term effects of the treatments for both groups. Since the data were not normally distributed, the Wilcoxon Signed-Rank test was used. As shown in Table 6, the experimental group showed statistical significance for both Part 1 (W = 0, p < .001) and Part 2 (W = 34.00, p = .003) of the tests. As for the control group, both Part 1 (W = 86.00, p = .177) and Part 2 (W = 115.00, p = .705) of the tests were not statistically significant. Subsequently, a statistical comparison of the delayed post-tests between the experimental and control groups was conducted to determine the real long-term effect of ICCF on grammatical awareness. Firstly, Part 1 of both groups' delayed post-tests was compared with the Mann-Whitney U test.

As presented in Table 7, there was a significant difference (U = 128.00, p < .001) between the experimental and the control groups with a large effect size (r = .66). As for Part 2, there was also a significant difference (U = 181.50, p < .001) between the two groups with a large effect size (r = .52).

3.2 Short-Term Effects of ICCF on Self-Correction Skills

The descriptive statistics for the short-term effects of both treatments on self-correction skills are shown in Table 8. The experimental group showed an increase in the means of both Part 1 and 2 in the pre-test from 7.97 (SD = 2.21) and 3.90 (SD = 2.22) to 10.47 (SD = 1.57) and 7.23 (SD = 1.14) in the post-test, respectively. As for the control group, there was a negligible difference since the means for both Part 1 and 2 of the pretests increased only slightly from 8.23 (SD = 1.87) and 3.50 (SD = 1.94) in the pre-test to 8.53 (SD = 1.28) and 3.87 (SD = 0.94) in the post-test, respectively. Although both groups showed short-term self-correction improvements, the results were statistically validated. The Wilcoxon Signed-Rank test was selected since the data were not normally distributed. As presented in Table 9, the results for the experimental group showed statistical significance for Part 1 (W = 11.00, p < .001) and Part 2 (W = 5.00, p < .001) of the tests. In contrast, the control group showed no statistical significance for both Part 1 (W = 81.00, p = .121) and Part 2 (W = 107.00, p = .213) of the tests. Subsequently, the post-test scores between the experimental and control groups were statistically compared to determine the true short-term effects of ICCF on self-correction skills. As depicted in Table 10, the Mann-Whitney U test revealed that there was a statistical difference (U = 154.50, p < .001) between both groups for Part 1 of the tests, and the effect size was large (r = .57). As for Part 2, there was also a statistical difference (U = 12.00, p < .001) between them with a large effect size observed (r = .84).

Table 8

Descriptive Statistical Results: Short-term Effects on Self-correction Skills

Test Part	Group	*n*	Pre-Test		Post-Test	
			Mean	Standard deviation	Mean	Standard deviation
Part 1: Individual English Sentences	Experimental	30	7.97	2.21	10.47	1.57
	Control	30	8.23	1.87	8.53	1.28
Part 2: English Essays	Experimental	30	3.90	2.22	7.23	1.14
	Control	30	3.50	1.94	3.87	0.94

Table 9

Wilcoxon Signed-rank Test Results: Short-term Effects on Self-correction Skills

Test Part	Group	Median		*W*	*Z*	Significance (2-tailed)
		Pre-Test	Post-Test			
Part 1: Individual English Sentences	Experimental (*n*=30)	8	11	11.00	-4.37	< .001
	Control (*n*=30)	8	9	81.00	-1.48	.121
Part 2: English Essays	Experimental (*n*=30)	3	7	5.00	-4.51	< .001
	Control (*n*=30)	3	4	107.00	-1.23	.213

Table 10

Mann-Whitney U Test Results: Short-term Effects on Self-correction Skills

.	Medians of the Post-Tests	*U*	*Z*	Significance (2-Tailed)	Effect Size (*r*)
Part 1: Individual English Sentences	Experimental ($\tilde{x}$ = 11) vs Control ($\tilde{x}$ = 9)	154.50	4.43	< .001	0.57
Part 2: English Essays	Experimental ($\tilde{x}$ = 7) vs Control ($\tilde{x}$ = 4)	12.00	6.54	< .001	0.84

3.3 Long-Term Effects of ICCF on Self-Correction Skills

Table 11 shows the descriptive statistical results for the long-term effects of the treatments on self-correction skills. For the experimental group, both the mean scores of Parts 1 and 2 of the pretests increased from 7.97 (SD = 2.21) and 3.90 (SD = 2.22) to 10.67 (SD = 1.47) and 6.20 (SD = 1.75) in the delayed post-test, respectively. As for the control group, the mean score for Part 1 showed a small increase from 8.23 (SD = 1.87) in the pre-test to 8.83 (SD = 1.66) in the delayed post-test. However, the results for Part 2 showed a slight drop from 3.50 (SD = 1.94) in the pre-test to 3.30 (SD = 1.15) in the delayed post-test. Subsequently, statistical tests were used to compare the pre-tests and delayed post-tests to determine the long-term effects of the treatments for both the experimental group and the control group. Since the data for the experimental group were not normally distributed, the Wilcoxon signed-rank test was used for both Part 1 and Part 2 of the tests. According to Table 12, the within-group results were statistically significant for both Part 1 (W = 0, p <

.001) and Part 2 (W = 18.50, p < .001) of the tests for the experimental group. As for the control group, only Part 1 was analysed using the paired samples t-test since the data were normally distributed. As revealed in Table 13, the result was not statistically significant (t (29) = -1.92, p = .065). For Part 2, the result was similar. As depicted in the previous table (Table 12), the Wilcoxon Signed-Rank test results reveal that it was also not statistically significant (W = 151.00, p = 0.409).

Table 11

Descriptive Statistics Results: Long-term Effects on Self-correction Skills

Test Part	Group	*n*	Pre-Test		Delayed Post-Test	
			Mean	Standard deviation	Mean	Standard deviation
Part 1: Individual English Sentences	Experimental	30	7.97	2.21	10.67	1.47
	Control	30	8.23	1.87	8.83	1.66
Part 2: English Essays	Experimental	30	3.90	2.22	6.20	1.75
	Control	30	3.50	1.94	3.30	1.15

Table 12

Wilcoxon Signed-rank Test Results: Long-term Effects on Self-correction Skills

Test Part		Group	Median		*W*	*Z*	Significance (2-tailed)
			Pre-Test	Delayed post-tests			
Part 1: Individual Sentences	English	Experimental (*n* = 30)	8	11	0	-4.70	< .001
Part 2: English Essays		Experimental (*n* = 30)	3	6	18.50	-4.10	< .001
		Control (*n* = 30)	3	3	151.00	0.80	.409

Table 13

Paired Samples t-test Results: Long-term Effects on Self-correction Skills

Test Part		Group	Mean and Standard Deviation		*t*	df	Significance (2-tailed)
			Pre-Test	Delayed Post-Test			
Part 1: Individual Sentences	English	Control (*n* = 30)	*M* = 8.23 *SD* = 1.87	*M* = 8.83 *SD* = 1.66	-1.92	29	.065

The delayed post-test scores of both the experimental and the control groups were then compared with the Mann-Whitney U test to determine the true long-term effects of ICCF on self-correction skills. As shown in Table 14, the between-groups results for Part 1 were statistically different (U = 184.50, p < .001) with a large effect size (r = .51). The result for part two was also similar, as the two groups were statistically different (U = 86.50, p < .001) with a large effect size (r = .70).

Table 14

Mann-Whitney U Test Results: Long-term Effects on Self-correction Skills

Test Part	Medians of the Delayed Post-Tests	*U*	*Z*	Significance (2-Tailed)	Effect Size (*r*)
Part 1: Individual English Sentences	Experimental ($\tilde{x}$ = 11) vs Control ($\tilde{x}$ = 9)	184.50	3.98	< .001	0.51
Part 2: English Essays	Experimental ($\tilde{x}$ = 6) vs Control ($\tilde{x}$ = 3)	86.50	5.45	< .001	0.70

4. Discussion

The present study investigated the short-term and long-term effects of synthesised ICCF on primary school students' grammatical awareness and self-correction skills in English writing. The answers to the two research questions were identified and are discussed as follows. The results of this study uncovered evidence supporting the use of integrating ICCF with Dulay et al.'s (1982) Surface Strategy Taxonomy to improve students' short-term and long-term grammatical awareness (RQ1) and self-correction skills (RQ2) regarding verb accuracy in English writing. The results indicated that only the experimental group made significant short-term improvements after the four-treatment period and that the effects were retained after four weeks for both short and long English texts (Part 1: individual English sentences; Part 2: English

essays of the tests). Additionally, the experimental group also statistically outperformed the control group. Furthermore, the effect sizes between both groups were observed to be large. Hence, these results indicate that the synthesised ICCF method is significantly more effective in promoting cognitive engagement between the feedback and errors, and it has a more accelerated pedagogical impact. These results demonstrated the students' longitudinal improvements of grammatical awareness and self-correction skills.

Before comparing the findings with other studies in the literature, it is imperative to note that this study isolated the post-writing stage to provide a more robust examination of the effectiveness of the synthesised ICCF intervention. Consequently, only the effectiveness of the intervention's mechanism was compared rather than the whole writing process. Firstly, the findings of this study corroborate the study by Rizkiani et al. (2019), which found ICCF to be significantly more effective than non-ICCF. However, evaluating the efficacy of ICCF on overall writing scores without a more focused scope made it difficult to identify specific improvements since overall writing scores typically include multiple linguistic domains. Concerning the longitudinal effects of ICCF, Doi et al. (2021) uncovered similar findings. The ICCF group significantly enhanced the students' self-editing skills, which improved their grammatical accuracy in producing a new draft. Additionally, the effects were retained effectively after one week. Although the time gap was limited to one week, the present study extends this scope by validating the retainability of ICCF after a month of delay. This finding is particularly crucial for understanding the true impacts of the intervention, as a mere one-week interval may be insufficient to determine whether actual learning has taken place to mitigate what Truscott (1996) notoriously postulated as pseudo-learning. Conversely, when compared with Sherpa's (2021) investigation, mixed findings were uncovered. The ICCF method did not demonstrate superior efficacy in retaining its effects compared with the other two methods (direct and no feedback). Nonetheless, it was significantly more effective in achieving immediate improvements in the accuracy of targeted grammatical features in writing, which is similar to this study. However, the robustness of Sherpa's (2021) statistical results was limited as the effect size was not investigated. This is because the between-group statistical result ($p = .046$) only marginally met the arbitrary $p < .05$ threshold. Therefore, an effect size analysis may have provided a clearer picture of the magnitude of the immediate effects and the retention effects of ICCF, although the latter did not show a statistically significant result.

Although some investigations found ICCF to be more advantageous to a certain extent, there were studies that contradicted the findings of this present study. For instance, Nia and Valizadeh (2021) found no significant differences between the RICF and the AICF methods in terms of retention efficacy. This outcome was plausibly affected by the prolonged intervention period of eight treatment sessions, which unexpectedly led to skill maturity and a ceiling effect. This may have given the control group (AICF) sufficient practice, which is crucial for skill development according to Anderson's (1982) skill acquisition theory. The prolonged practice potentially allowed the AICF group to successfully transition their declarative knowledge across the procedural knowledge and automatisation stages. Therefore, irrespective of the feedback methods, sufficient practice will eventually develop a skill. Consequently, this present study has strategically reduced the practice sessions by half (4 sessions). This allowed the comparisons of the treatments to demonstrate that ICCF is a more efficient feedback pedagogy that can achieve significant accelerated effects compared to the traditional classroom method. Furthermore, the findings of this present study also contradict the study by Balegh (2023), which demonstrated a divergence from the Noticing Hypothesis by uncovering the less awareness-stimulating non-coded method as superior to the ICCF method. As discussed previously in the literature, this phenomenon was hypothesised to be attributed to what Truscott (1996) warned of as the avoidance strategy adopted by the students to strategically manipulate the outcome of their results. This present study neutralised this confounding variable by providing fully written texts that contain errors for students to self-identify and self-correct across the entire experiment. Furthermore, this also increased the validity and reliability of the findings since all students were assessed based on the same quantity across the tests.

Knowles's (2025) findings also conflicted with those of the present study, and the findings even revealed a significant departure from established trends. The control group (ICCF with no SIC) statistically outperformed the three treatment groups (ICCF plus circling of SIC; direct; indirect). Although Knowles (2025) took measures to mitigate confounding variables, the writing prompts across the entire investigation were found to be inconsistent. The first writing prompt topic, 'a boss ', presented a wide power and social distance compared to the other two (a classmate; a new roommate). This factor may significantly influence the task execution methods and efficiency (Taguchi, 2007). Therefore, Knowles (2025) results differed because this present study standardised this specific dependent variable by providing the same written tasks to all the students across the experiment to neutralise this particular confounding variable. Through the lens of theoretical analysis, the findings of this present study align with and further extend the existing landscape of Schmidt's (1990, 2010) theory of the Noticing Hypothesis. The synthesised ICCF enhances students' noticing, which improves their grammatical awareness as the metalinguistic information triggers their metalinguistic awareness. This factor encourages students to become cognitively engaged (notice and understand) with the feedback and errors more effectively before conducting revisions. This corroborates Schmidt's (1990) claim that it is imperative for a learning input to trigger learners' attention, awareness and understanding for effective learning to take place.

Furthermore, the empirical evidence also supports and contributes to Anderson's (1982) three stages of the Skill Acquisition Theory. The experimental group students received sufficient declarative knowledge at the first stage (the declarative knowledge stage) by receiving synthesised ICCF, which provided them with meaningful metalinguistic scaffolding to address the errors. Subsequently, this knowledge was proceduralised at the second stage (the procedural stage) through repetitive practice during the treatment period. After that, the knowledge transited to the final stage (the

autonomous stage), which subsequently formed a functional self-correction skill that required less cognitive effort and time to retrieve it from memory. Therefore, the ICCF method demonstrated a more accelerated pedagogical efficacy in developing students' self-correction skills as compared to the traditional classroom method. Consequently, this present investigation has also derived a key pedagogical implication. Teachers are encouraged to apply the synthesised ICCF to both shorter English texts, such as individual sentences, and longer English texts, like essays, to enhance their students' grammatical awareness and self-correction skills. This is because ICCF provides opportunities for students to cognitively engage with their feedback and errors by referring to the metalinguistic clues provided (Saukah et al., 2017). As a result, students can notice, pay more attention (Van Beuningen, 2010) and self-correct their errors, which can potentially increase their writing accuracy and performance (Ekinci & Ekinci, 2020). Additionally, ICCF also offers flexibility for teachers to develop different codes for different word classes. They can also target the word classes that are problematic for students in their writing. Furthermore, teachers can also combine the regular codes for word classes with different classes of errors from Dulay et al.'s (1982) Surface Strategy Taxonomy, such as errors of omission, mis-formation, addition and misordering. By combining codes this way, students, particularly younger or lower-proficiency students, can be guided with more detailed linguistic information to notice and self-correct their grammatical errors more effectively, since they generally require more structured scaffolding.

5. Conclusion

This study employed the quasi-experiment design to investigate the effects of the newly developed synthesised ICCF method on primary school students' grammatical awareness and self-correction skills, specifically at the post-writing, editing stage. For four instructional lessons, the experimental group was treated with the synthesised ICCF method while the control group was treated with the traditional classroom method. The statistical results revealed that only the experimental group demonstrated significant short-term and long-term improvements in both grammatical awareness and self-correction skills, which align with the Noticing Hypothesis and Skill Acquisition Theory. Moreover, the ICCF group also statistically outperformed the control group, with large effect sizes observed. Therefore, it can be concluded that the synthesised ICCF method is significantly more effective in enhancing students' cognitive engagement between the metalinguistic feedback and errors in writing. Additionally, it is a more accelerated pedagogical WCF method. Consequently, it significantly boosts grammatical awareness and self-correction skills immediately, and the effects can be retained for up to four weeks. Similar to any research study, this present study has its limitations. The first limitation concerns the sample size, as each group was relatively small (n = 30). Although the sample size exceeded the minimum threshold of 15 for a causal-comparative study, it is recommended that future studies increase the sample size to strengthen the statistical power and external validity. This is because a larger sample size would increase confidence in the causal claim of the synthesised ICCF method.

Furthermore, the generalisability of the findings in this study is limited to the current research context (primary school). It is recommended that future studies replicate this study in different contexts (secondary school or university), since differences in context could affect how students respond to feedback. Additionally, it is also recommended that the study be replicated with students of different age groups to determine how they process and respond to this newly developed synthesised ICCF method. Finally, the scope of this study focused only on the post-writing, editing stage, attempting to improve students' grammatical awareness and self-correction skills with the synthesised ICCF intervention. Consequently, the findings of this study are limited to the aforementioned stage of writing, rather than addressing overall writing skills, which typically involve all three stages.

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The authors declare no conflicts of interest.

CRediT Authorship Contribution Statement

Chow Chin Hui: Conceptualisation; Data curation; Formal analysis; Investigation; Methodology; Writing – original draft
Soo Ruey Shing: Formal Analysis; Validation; Supervision; Writing – review & editing
Dean Yeo Kai Liang: Conceptualisation; Investigation; Supervision; Writing – review & editing

Availability of Data and Materials

The data supporting this study's findings are available on request from the corresponding author.

Generative Artificial Intelligence Declarations

The authors used Grammarly and Gemini to assist with language editing, grammar checking, and improving readability. The AI tools did not contribute to the study design, data collection, data analysis, interpretation of findings, or the generation of scientific content. All outputs generated by AI were carefully reviewed, verified, and edited by the authors, who take full responsibility for the accuracy, integrity, and originality of the manuscript.

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