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The Role of Computer Games in Chinese Students' EFL Narrative Writing: A Case Study With *The Sims 4*

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Abstract

This single-participant study explores the role of story-rich computer games in an EFL narrative writing course for Chinese university students. In a two-month English writing class using the game *The Sims 4*, a participant received instruction on gameplay techniques and language, completed game quests set by the teacher, wrote 14 narratives based on gameplay events, and received all-encompassing corrective feedback on her writing samples. A pre-test on game vocabulary and two writing pre- and post-tests were also administered. The researchers evaluated the participant's EFL narrative writing performance with an in-depth analysis of linguistic features using NLP tools which included syntax, lexicon, cohesion, and content. A follow-up interview was conducted to complement the results from the writing evaluation and to provide information on the participant's perception and attitude towards the GBW class. Results show that while there was no consistent improvement in the participant's EFL narrative writing performance, the rich stories and contextualized vocabulary in the game contributed to the participant's content and lexicon and helped the participant to better understand how to write narratives.

Introduction

In recent years, studies in game-based language learning (GBLL) have reinforced the positive role of computer games in promoting second language learners' motivation (Papastergiou, 2009), vocabulary acquisition (Wang, 2019; Ashraf et al., 2014), interaction (Peterson, 2011), reading (Schmitt et al., 2018) and communicative competence (Reitz et al., 2016). An increasing number of GBLL studies are indicating fundamental connections between games and writing (Moberly, 2008). In these studies, games have been shown to support students in behavioral (e.g., writing engagement), cognitive (e.g., writing skills), and affective (e.g., writing attitude) domains (Chang et al., 2021). Particularly, with their rich visual, aural, written, spatial, and kinesthetic modes (Colby, 2017), computer games provide students with engaging adventures and stories that can be turned into narrative writing.

In English as a foreign language (EFL) writing classes at Chinese universities, students are primarily exposed to and trained on argumentative writing as this genre is dominant in various important exams. In 2020, a questionnaire on Chinese university students' EFL writing experience showed that the students were minimally exposed to the narrative genre and that their familiarity with writing topics was generally low (Elixir English, 2020). These results were also supported by other studies in China's second language writing classrooms (Qin & Uccelli, 2016; Qin, 2020). Chinese university students are thus an ideal population to explore the role of games in their narrative writing in second language classrooms.

Current game-based writing (GBW) studies report mostly on the psychological and socio-cultural effects of games on the writing process (Reinders & Wattana, 2015). When writing assessments are involved, holistic scoring methods are often employed (Allen et al., 2014) instead of in-depth analyses of linguistic features in learner writing samples of a specific genre. This study therefore aims to explore how a GBW class may influence the EFL narrative writing of Chinese university students by conducting an in-depth analysis of linguistic features in learner writing samples.

Background

Genre and Narrative Writing

Writing studies, particularly second language writing, are closely related to the notion of genre. According to Swales (1981), the term "genre" refers to conventionalized or socially recognized ways of using language within certain discourse communities. Hyland (2007) saw genre as a group of texts that share similar discursal features easily identifiable by members of a community. Sidaway (2006) classified genre into seven major categories: recount, narrative, explanation, information report, procedure, discussion, and exposition. Expositions are also referred to as argumentation or argumentative essays in many studies.

Studies on the writing of native speakers have discovered that there is a certain order of progression in mastering writing genres. Native speakers first master personal genres (e.g., narratives), then move on to factual genres (e.g., procedures), and finally move on to analytic genres (e.g., argumentation) (Martin, 1989). A study by Berman & Nir-Sagiv (2007) further elaborates that the first phase happens around age ten. It is thus assumed that native speakers perform better in personal genres than in analytic genres at least before they have fully mastered analytical writing. However, studies on EFL learners have indicated the opposite: EFL learners tend to perform better on impersonal topics than in personal topics (Wiseman, 2012). A possible explanation is that in rating EFL learner writing, the raters were biased because they treated learners' narratives as lower-level writing and argumentative essays as higher and more

sophisticated writing that requires critical thinking (Jeong, 2017). However, from the socio-cultural perspective, it is more likely that EFL learners are studying writing in formal classrooms where academic English might be more accessible than the colloquial English frequently used in narratives (Chang, 2012). Minimal exposure to the narrative genre may therefore be associated with the lower quality of EFL students' narrative writing. Indeed, when Qin (2020) was comparing the register complexity between narratives and argumentative essays written by EFL students from China, she found that the students tended to use textbook-like words in both genres, indicating a lack of exposure to narrative input.

In studies examining EFL learners' writing, many researchers have shown interest in writing performance and development in specific genres which has thus fueled the popularity of a genre-based approach to teaching writing (Hyland, 2007). However, the majority of empirical studies evaluating EFL writing focused on argumentative writing in academic contexts, while narrative writing was less touched upon (Qin & Uccelli, 2016). The narrative genre is important in writing and serves vastly different communicative functions than the argumentation genre (Paltridge, 2001). A narrative text aims to amuse, entertain, and deal with actual or vicarious experiences in different ways (Gerrot & Wignell, 1994). Therefore, narratives focus on people, their actions, and the unfolding of events in a temporal order, whereas argumentative writing focuses on ideas, claims, and arguments (Berman & Katzenberger, 2004). The substantial differences between the two genres call for teachers to approach them with different teaching methods and supplementary tools.

Evaluation of Narrative Writing

Studies on second language writing generally investigate how certain variables can influence the writing quality of students. Under such a research framework, these studies usually focus on three elements: variables, indicators or evaluation metrics of writing quality, and evaluation tools. Some of the most popular variables include teacher feedback (Bitchener et al., 2005; Ferris et al., 2013), genres/text types (Paltridge, 2014; Qin & Uccelli, 2016), task complexity and planning (Ellis & Yuan, 2004), and media such as computer games (Sheridan & Hart-Davidson, 2008). For indicators of writing quality, researchers have investigated both micro and macro aspects of writing. Micro aspects have included lexical sophistication (Kim & Crossley, 2018), grammar (Truscott, 2007), and even one single feature such as the definite article (Bitchener et al., 2005). Macro aspects, on the other hand, have consisted of syntactic complexity and coherence/cohesion. In terms of evaluation tools, human rating and natural language processing (NLP) tools are the two predominant means of assessment (Kim & Crossley, 2018; Yang et al., 2015). Human raters can be very flexible, generating results through subjective scoring or through manual coding. Beers and Nagy (2009) adopted both subjective rating and manual coding of syntactic features including words per clause and clauses per T-unit (C/T) to examine the relationship between different measures of syntactic complexity and rated writing quality. They concluded that the relationship was dependent on genres and syntactic complexity measures. Meanwhile, the choice of specific NLP tools will depend on the variables and indicators of writing quality in a study. For example, Kormos (2011) utilized Coh-Metrix, a text analysis tool that analyzes texts on over 200 measures of cohesion, language, and readability (Graesser et al., 2004) to investigate the lexical sophistication and cohesion in narratives produced by upper-intermediate foreign language learners in a bilingual secondary school. Results showed that there were major differences between L1 and L2 writers in terms of lexical variety, sophistication, and range.

As a writing genre, the assessment of narrative writing essentially falls under the overall framework for writing evaluation which often includes the analysis of lexical, syntactic, and discourse features (Qin & Uccelli, 2016). Specifically, previous studies have indicated that narrative writing quality is related to length and syntactic

complexity (Ishikawa, 1995) and lexical diversity (Olinghouse & Leaird, 2009). Beers and Nagy (2009) further discovered that C/T is the most effective measure under syntactic complexity in predicting writing quality. For discourse features, Cameron et al. (1995) found that the discourse frequency of cohesive indices, such as logical connectors between sentences, was positively related to writing quality, and thus cohesion is usually included in evaluating narrative writing. Apart from the three general metrics of syntax, lexicon, and cohesion, researchers also add specific writing quality metrics addressing their own particular research questions. For example, if a writing task prioritizes the quality of stories (whether the stories are interesting or engaging to the readers), “content” is a good evaluation metric.

Computer Games and Writing

In recent years, computer games have been widely employed in language education. Some GBL studies use games for incidental learning in an out-of-school context (James & Mayer, 2019; Peterson, 2011) while others try to integrate games into formal instructional settings (Reinders & Wattana, 2014; Wouters & Van Oostendorp, 2013). The games used in these studies include both serious educational games and commercial off-the-shelf games. The differences in games and contexts notwithstanding, a unanimous agreement from the GBL community is the positive influence of computer games on learner motivation (Dunn & Kennedy, 2019). However, when it comes to learning efficiency and achievement of pedagogical goals, results vary (Ghanbaran & Ketabi, 2014; Nakatsuhara et al., 2017).

As mentioned in the previous section, computer games can be a variable in the writing process. Among the myriad of GBL studies, some researchers investigate how computer games can facilitate writing with their rich multi-modal linguistic input. These studies largely fall into two strata, depending on how “writing” is defined. For some researchers, writing in computer games can refer to any input into or influence on gameplay made by the player, not necessarily limited to linguistic forms. In this vein, Moberly (2008) argued games consist of highly symbolic constructs that players are required to read and to make meaning of. In addition, players also need to “write” with actions and ultimately to revise their actions in relation to the game symbols. In this sense, “play” can be seen as a form of writing. In terms of textual input, Johnson (2008) argues that “gamer-authors” compose texts that serve as examples of public discourse and that gamers can realize their authorial agency by engaging in civic participation within games and online gaming communities.

The other stratum is where writing takes on its traditional connotation such as essay writing in language classrooms. In many traditional writing classes, students have little access to the discourse communities that they are writing about or attempting to write within (Colby, 2017), so, as Bartholomae (2005) has argued, students’ writing often takes on a decontextualized meaning. In addition, even if students’ writing could be connected with the material and conditions of a discourse community they are writing about, students often have little influence on those conditions (Colby & Colby, 2008). This means that students may be assigned writing topics they do not relate to, or they are writing on topics they have no control over. That is where computer games hold much potential. With computer games, students directly influence gameplay through decision-making at various points, and writing can be derived from their active involvement. In other words, the engagement in gameplay enhances students’ familiarity with topics within the game, and topic familiarity is a concept that has been shown to promote writing performance, critical thinking, and authorial expertise (Indah, 2017; Salimi & Fatollahnejad, 2012). For example, Sheridan and Hart-Davidson (2008) reported on their experiences using *Ink*, a serious game that addresses exigency, to facilitate literacy learning and engage students in complex rhetorical situations. Similarly, Proske et al. (2014) conducted a large-scale GBW study with 175 students who were randomly assigned to one of four experimental conditions: game-based,

question-based, model-based, and writing-based practice. Results showed that students perceived game-based practice as significantly more interesting and engaging than question-based practice but also highlighted the necessity of interconnecting motivational and instructional design when developing pedagogical approaches for GBW classes.

Despite the huge potential of games in writing courses suggested by the above studies, two important aspects of writing are under-researched. First, many GBW studies do not distinguish genres when integrating computer games into writing, though some have indicated that gameplay can be naturally turned into digital narratives via storytelling (Balaman, 2018). Second, in evaluating learner writing, current studies generally have adopted holistic scoring but do not explore in detail the linguistic features of learner writing. In a study focused particularly on textual cohesion, Chang et al. (2021) reported that the experimental group who wrote in a game environment performed better but also that the game in this study was more of a learning management system with game elements than a real game.

The Present Study

Based on the findings and gaps in relevant GBW studies, the researchers decided to integrate a story-rich computer game into an EFL writing classroom to explore the role of a GBW class on Chinese EFL learners' narrative writing. With the metrics of narrative writing quality discussed in the previous section, the researchers propose the following research question:

How will a game-based writing class influence Chinese EFL learners' narrative writing in terms of lexicon, syntax, coherence, and content?

Methodology

Determining the Game

To ensure the game used in the present study was suitable for narrative writing, the researchers searched for PC games under story-rich categories of “life simulation” and “drama,” and *The Sims 4* (<https://www.ea.com/games/the-sims/the-sims-4>) stood out from a list of candidates. *The Sims 4* is a life-simulation game in the series *The Sims* developed and published by Electronic Arts (<https://www.ea.com/>). In the game, players create characters called “Sims” by designing their appearance and assigning them aspirations and personality traits (see Figure 1). Players control the actions of their Sims in the simulated world and attend to their basic needs, such as housing, food, hygiene, and sleep. The Sims socialize, work, and spend time with family as people do in the real world. There is no ultimate goal in the game and players can try out numerous life possibilities.

Figure 1
Creating a Sim



Note. *The Sims 4* and all screenshots thereof are licensed property of Electronic Arts, Inc.

The Sims 4 is available in many languages including Chinese, English, Japanese, and Spanish. The game provides language learners with rich exposure to language use in daily scenarios. The game further offers visual/written linguistic input, and Sims' utterances in the audio form are in a non-natural language created by the developers. Visual input is triggered in two ways: the Sims' interaction with other Sims or the environment, and pop-up explanatory/notification texts. Input from the former is presented in single words and short phrases while the latter is in complete sentences or paragraphs that often appear when the mouse is hovering over certain items or when notifications pop up. Figure 2 and Figure 3 show the two modes of input.

Figure 2
Sims' Interaction With the Environment



Figure 3
Input From Explanatory/Notification Texts



The Participant

As the researchers planned to conduct an in-depth analysis of linguistic features in learner writing samples, all-encompassing corrective feedback to every sample was required. Considering the enormous time needed for such feedback, the researchers recruited only one participant. The first author also acted as the teacher in the study. The participant (gender=female, age=20, English level=B1 in CEFR) was a sophomore majoring in environmental design in a medium-ranking Chinese university and was taking a summer English class at the English training school where this study took place. Before the study, she reported that she wrote mostly argumentative essays because it was the major genre in English exams in China. Her English teacher at university did not lecture on writing and would only focus on readings in her textbooks. The student, however, reported that she wanted to improve her writing on daily topics. When the researchers asked if she was interested in a GBW class that would target narrative writing, she said she was very interested and provided informed consent for the autonomous use of her data for research purposes.

Study Design

Class Configuration

The duration of the GBW class was two months, including 15 sessions (2 sessions per week). Each session lasted for 2 hours, including a 15-minute break after the first hour. Each session also included teacher instruction on gameplay and language, student gameplay, and face-to-face feedback on writing.

Teacher Instruction. In each session, the teacher introduced new gameplay themes to the participant, including background information, gameplay techniques, and game quests while also lecturing on language input from the game. The student watched the teacher on an extended monitor in real time. For example, on the theme “building a house,” the teacher went through the game guidance on how to construct a house with

the student and taught important words and phrases related to architecture and furniture along the way. The game quest was for the student to draw a floor plan of the house she intended to build, complete the construction, and write a narrative on what her characters did in the house.

Student Gameplay and Writing. After the teacher finished instruction, the student would start playing the game on her own. The teacher then watched through the extended monitor and helped the student when she encountered problems. During gameplay, the student used the camera function in the game to record interesting game clips and screenshots. After class, she sent the materials to her cellphone and wrote game-based narratives at home. A list of the writing topics can be found in Appendix A.

Feedback on Writing. Altogether the student wrote 14 game-based samples. From the second session, the teacher spent an average of 20 minutes of the first hour giving all-encompassing feedback on her writing from the previous session. The feedback was in the form of direct revision based on teacher-student verbal negotiations. Revisions covered the four metrics in the research question. The teacher made modifications in the MS Office word document with the “track changes” feature while the student watched through the extended monitor in real time.

Pre-Tests

Before the class started, the researchers administered a vocabulary pre-test including 50 words randomly chosen from the game and a writing pre-test where the participant watched a non-gaming video of news-style storytelling and wrote about what happened in the video. The vocabulary test was designed to see whether the game vocabulary was too difficult or too easy for the participant. The video in the writing test was about teenagers and sports drinks and was designed to see how the participant would perform in narrative writing with non-game background information.

Delayed Post-Test

Forty-five days after the study, the researchers conducted a delayed writing post-test. The writing task was also a non-game video-based writing task similar to that in the writing pre-test. The purpose was to evaluate the participant's narrative writing performance after the study.

Interview

After data analysis on the writing samples was completed, the researchers conducted a face-to-face follow-up interview with the participant on her learning and writing experience in and attitude towards the GBW class.

Data Analysis

In the vocabulary pre-test, the student was required to report whether she knew a word clearly, vaguely, or not at all. Two points, one point, or zero points were awarded in each case respectively. To ensure accuracy in self-reporting, the student was also asked to write down the meaning of a word in the first two cases so that the researchers could double-check the answers.

In analyzing the writing samples, the researchers decided to combine NLP tools and human rating. For human rating, the researchers chose manual coding over holistic scoring because the former provides much more in-depth analysis of learner writing. The results are presented as descriptive statistics and a revision profile of the learner samples. Based on studies assessing narrative writing (Ishikawa, 1995; Olinghouse & Leaird, 2009) and considering the game element, the researchers determined the

following indices in descriptive statistics: length (word count, number of clauses, and number of T units), syntactic complexity (C/T), and lexicon (lexical diversity and percentage of newly acquired game words). In calculating the proportion of newly acquired words, the participant and the teacher co-decided the number of such words in a writing sample and divided the number by the total number of words in that sample. Other indices were calculated with the web-based version of L2 Syntactic Complexity Analyzer (L2SCA) (<https://aihaiyang.com/software/l2sca/>).

For manual coding, the researchers inductively coded teacher revisions in the learner samples under the four metrics. After that, they reached consensus on the coding tags and coding results through discussion. To determine writing improvement, the researchers chose the indicator of “revision-to-sample ratio,” or normalized revision instances. Specifically, a decreasing trend in the ratio of a certain type of revision indicates that the participant is improving in that specific aspect. In determining the denominator, namely the “sample” in “revision/sample ratio,” the researchers chose the number of T-units in learner samples for syntax and content, as a T-unit is the shortest sentence into which writing can be split and still be grammatically viable (Hunt, 1965); the number of clauses for coherence, as cohesive devices denote transitions at the inter-clausal level (Halliday & Hasan, 2014); and the number of words in learner samples for lexicon.

For the post-interview, the researchers transcribed the interview, identified relevant information, and translated the information into English.

Results

Vocabulary Pre-Test

The participant scored 33 points on the test. There were 8 words she clearly knew, 17 words she knew of, and 25 totally unknown words. This indicates that the game was able to provide the participant with rich new input.

Descriptive Statistics

Table 1 below presents the descriptive statistics of the learner samples. For the game-based writing samples, the descriptive statistics fluctuate among different topics, indicating that the participant did not show consistent improvement. The comparison between the game-based sample and samples in the pre- and post-test (test samples) shows conspicuous differences. Generally, the test samples are shorter in length, of higher C/T, and with larger proportions of newly acquired words from the videos (word count=185 and 275; C/T=2.20 and 1.62; proportion of new words=4.86% and 4.00% respectively). A closer look at the test samples revealed an interesting phenomenon: the participant wrote briefly about the stories but then went on to express her opinions, which made her test samples closer to argumentation. For example, in the latter part of the pre-test, the participant wrote:

In my opinion, teenagers don't usually drink sports drinks. They can drink after finish their sports. teenager don't like water, so parents can add some fresh fruit juice and change the flavour of water. Parents need to help teenagers to build a good living habit and have a good future. [sic]

However, her game-based samples were narratives or at least very close to narratives. In the post-interview, she explained that because the teacher told her it was a test, she naturally wrote as she had done on most exams in China, namely with an argumentative writing style. She also said, “Exam writing is just like that, very difficult

for me. I just don't know what to say." In exams, she preferred longer sentences with complex clauses, as she believed that more complex sentences get higher scores. In addition, she said that she used new words more often on the tests because they were more concentrated in the test videos, while those in the game were sparser and were not shown in the gameplay clips, which made it more difficult to recall them. This point is also supported by her first game-based sample, where the participant introduced the appearance and personal traits of her characters. The proportion of new words (4.23%) is higher than in other samples because the information was highly concentrated in a single game scene.

Table 1
Descriptive Statistics of the Samples

Sample	Length		Syntactic complexity		Lexicon	
	Word count	Num. clauses	Num. T-units	C/T	Lexical diversity	Num. newly acquired words (proportion)
1	307	45	36	1.25	0.68	13(4.23%)
2	263	45	38	1.18	0.63	3(1.14%)
3	269	38	33	1.15	0.64	6(2.23%)
4	442	75	47	1.60	0.50	10(2.26%)
5	354	53	41	1.29	0.54	9(2.54%)
6	346	48	38	1.26	0.49	8(2.31%)
7	370	50	34	1.47	0.53	1(0.27%)
8	310	46	37	1.24	0.64	5(1.61%)
9	349	48	38	1.26	0.76	5(1.43%)
10	275	37	31	1.19	0.57	3(1.09%)
11	293	45	29	1.55	0.58	2(0.68%)
12	398	59	37	1.59	0.75	2(0.50%)
13	434	61	43	1.42	0.54	2(0.46%)
14	419	57	45	1.27	0.59	8(1.91%)
Mean	344.93	50.50	37.64	1.34	0.60	5.50(1.62%)
Median	347.50	48.00	37.50	1.26	0.59	5.00(1.52%)
SD	61.46	9.97	5.11	0.16	0.09	3.63(1.07%)
Pre-test	185	22	10	2.20	0.62	9(4.86%)
Post-test	275	34	21	1.62	0.72	11(4.00%)

Coding Results

Table 2 below shows the coding tags, or indices under the four metrics, that the two raters reached consensus on through discussion.

Under syntax, *structural change* refers to revisions to grammatically correct structures for better text flow. For example, breaking long sentences up into shorter ones or changing the active voice into the passive voice. Grammar modification refers to the correction of grammatical mistakes at both the word-phrasal and clausal levels, such as mistakes in tense or lack of certain sentence components such as the main verb or the object after a transitive verb.

Table 2
Revision Profile—Revision Types

Metrics	Revision type			
Syntax	Structural change	Grammar modification		
Lexicon	Better alternatives	Misuse of words (meaning-wise)		
Content	Repositioning	Deletion	Addition	Rephrasing
Coherence	Temporal sequence	Logical connection	Reference	Others

For lexicon, *better alternatives* refers to replacing words or phrases that were correct but not ideal with more appropriate ones or with those in higher registers. *Misuse of words* refers to words that were used or spelled incorrectly. The ungrammaticality of words is excluded here as it has already been covered in grammar modification under syntax.

For content, *repositioning* refers to transferring a certain section to another place, *deletion* and *addition* to deleting existing information or adding extra information to the content, and *rephrasing* to clarifying confusing or otherwise less expressive content.

For coherence, *temporal sequence* refers to revisions in connectives that indicate order of events, such as “then” and “later.” *Logical connection* refers to non-temporal sequence logical connectors used to link different parts of the text, such as “therefore” and “however.” *Reference* refers to the use of pronouns and nouns to indicate persons or things, inclusive of their possessives, such as “he,” “she,” and “this.” *Other* includes other words or phrases that add logic for better understanding such as “as well,” “either,” or “too.”

Table 3 below presents the frequencies of the revisions and their respective ratios in percentage. A vertical view of the table shows that the participant did not show consistent improvement in these indices as the GBW class progressed. The test samples generally had higher ratios than those in the game-based samples. Despite the lack of evidence for improvement, the coding data provides some good insights into the participant's game-based narrative writing.

The data first highlight grammaticality as the greatest challenge for the participant, which held the highest ranking with a total of 181 revision cases under grammar. The mean ratio of 34.26% indicates that on average there was one grammatical mistake for approximately every three T-units. The researchers further discovered that most of the grammatical mistakes were related to verbs including but not limited to tense, aspect, voice, and transitivity. The following are some examples from the samples.

Example 1

Participant: He always likes be alone.

Revision: He always likes being alone.

Example 2

Participant: She knows he come back and says hello to him.

Revision: She knows he has come back and says hello to him.

Example 3

Participant: She wants drinks a coffee, and she turn on coffee machine.

Revision: She wants to drink coffee, and she turned on the coffee machine.

Table 3
Revision profile—Frequency and ratio of each revision type

Sample No.	Syntax (per T-unit, in %)				Lexicon (Per word, in %)				Content (per T-unit, in %)				Coherence (per clause, in %)			
	Structure	Grammar	Total	Misuse	Alternatives	Total	Repositioning	Deletion	Addition	Rephrasing	Total	Temporal	Reference	Logical connection	Others	Total
1	2 (5.56)	6 (16.67)	8 (22.22)	3 (0.96)	1 (0.32)	4 (1.28)	2 (5.56)	2 (5.56)	0 (0.00)	0 (0.00)	4 (11.11)	2 (4.44)	0 (0.00)	3 (6.67)	2 (4.44)	7 (15.56)
2	2 (5.26)	19 (50.00)	21 (55.26)	4 (1.46)	0 (0.00)	4 (1.46)	0 (0.00)	0 (0.00)	5 (13.16)	4 (10.53)	9 (23.68)	0 (0.00)	3 (6.67)	1 (2.22)	5 (11.11)	9 (20.00)
3	0 (0.00)	9 (27.27)	9 (27.27)	5 (1.74)	0 (0.00)	5 (1.74)	0 (0.00)	1 (3.03)	4 (12.12)	5 (15.15)	5 (15.15)	0 (0.00)	1 (2.63)	1 (2.63)	2 (5.26)	4 (10.53)
4	3 (6.38)	8 (17.02)	11 (23.40)	13 (2.77)	1 (0.21)	14 (2.98)	0 (0.00)	1 (2.13)	2 (4.26)	18 (38.30)	21 (44.68)	2 (2.67)	2 (2.67)	2 (2.67)	1 (1.33)	7 (9.33)
5	2 (4.88)	15 (36.59)	17 (41.46)	8 (2.16)	7 (1.89)	15 (4.04)	0 (0.00)	0 (0.00)	3 (7.32)	10 (24.39)	13 (31.71)	2 (3.77)	5 (9.43)	1 (1.89)	3 (5.66)	11 (20.75)
6	2 (5.26)	14 (36.84)	16 (42.11)	7 (1.94)	1 (0.28)	8 (2.22)	0 (0.00)	1 (2.63)	2 (5.26)	11 (28.95)	14 (36.84)	0 (0.00)	4 (8.33)	2 (4.17)	2 (4.17)	8 (16.67)
7	2 (5.88)	23 (67.65)	25 (73.53)	3 (0.76)	3 (0.76)	6 (1.53)	1 (2.94)	1 (2.94)	9 (26.47)	16 (47.06)	27 (79.41)	0 (0.00)	3 (6.00)	2 (4.00)	4 (8.00)	9 (18.00)
8	2 (5.41)	13 (35.14)	15 (40.54)	9 (2.74)	5 (1.52)	14 (4.26)	0 (0.00)	0 (0.00)	2 (5.41)	10 (27.03)	12 (32.43)	0 (0.00)	1 (2.17)	1 (2.17)	1 (2.17)	3 (6.52)
9	0 (0.00)	14 (36.84)	14 (36.84)	4 (1.11)	4 (1.11)	8 (2.22)	0 (0.00)	3 (7.89)	12 (31.58)	6 (15.79)	21 (55.26)	0 (0.00)	2 (4.17)	0 (0.00)	1 (2.08)	3 (6.25)
10	6 (19.35)	12 (38.71)	18 (58.06)	5 (1.78)	5 (1.78)	6 (2.14)	0 (0.00)	0 (0.00)	8 (25.81)	8 (25.81)	16 (51.61)	0 (0.00)	1 (2.70)	0 (0.00)	1 (2.70)	2 (5.41)
11	5 (17.24)	3 (10.34)	8 (27.59)	4 (1.29)	2 (0.65)	6 (1.94)	0 (0.00)	1 (3.45)	8 (27.59)	9 (31.03)	18 (62.07)	2 (4.44)	1 (2.22)	3 (6.67)	1 (2.22)	7 (15.56)
12	3 (8.11)	11 (29.73)	14 (37.84)	5 (1.23)	5 (1.23)	10 (2.46)	0 (0.00)	1 (2.70)	10 (27.03)	5 (13.51)	16 (43.24)	0 (0.00)	1 (1.69)	2 (3.39)	3 (5.08)	6 (10.17)
13	2 (4.65)	13 (30.23)	15 (34.88)	4 (0.90)	4 (0.90)	13 (2.91)	0 (0.00)	1 (2.33)	7 (16.28)	7 (16.28)	15 (34.88)	1 (1.64)	3 (4.92)	1 (1.64)	0 (0.00)	5 (8.20)
14	6 (13.33)	21 (46.67)	27 (60.00)	3 (0.70)	3 (0.70)	6 (1.40)	0 (0.00)	1 (2.22)	4 (8.89)	8 (17.78)	13 (28.89)	0 (0.00)	0 (0.00)	2 (3.51)	1 (1.75)	3 (5.26)
Total	37 (5.23)	181 (25.60)	218 (30.83)	41 (0.82)	78 (4.55)	119 (2.37)	3 (0.57)	12 (2.28)	73 (13.85)	116 (22.01)	204 (38.71)	9 (1.27)	27 (3.82)	21 (2.97)	27 (3.82)	84 (11.88)
mean	2.64 (7.24)	12.93 (34.26)	15.57 (41.50)	2.93 (0.81)	5.57 (1.52)	8.50 (2.33)	0.21 (0.61)	0.86 (2.27)	5.21 (14.43)	8.29 (22.04)	14.57 (39.36)	0.64 (1.21)	1.93 (3.83)	1.50 (2.97)	1.93 (4.00)	6.00 (12.01)
median	2.00 (5.48)	13.00 (35.86)	15.00 (39.19)	3.00 (0.73)	4.50 (1.38)	7.00 (2.18)	0.00 (0.00)	1.00 (2.27)	4.50 (11.02)	8.00 (21.08)	14.50 (35.86)	0.00 (0.00)	1.50 (2.68)	1.50 (2.65)	1.50 (3.43)	6.50 (10.35)
SD	1.86 (5.67)	5.55 (14.73)	5.83 (15.21)	2.16 (0.63)	3.23 (0.74)	3.96 (0.93)	0.58 (1.63)	0.86 (2.33)	3.77 (11.07)	4.73 (12.23)	6.20 (18.48)	0.93 (1.82)	1.49 (2.90)	0.94 (2.01)	1.38 (2.94)	2.75 (5.57)
Pre-test	2 (20.00)	15 (150.00)	17 (170.00)	3 (1.62)	6 (3.24)	9 (4.86)	0 (0.00)	1 (10.00)	2 (20.00)	3 (30.00)	6 (60.00)	0 (0.00)	1 (4.55)	1 (4.55)	5 (22.73)	7 (31.82)
Post-test	3 (14.29)	10 (47.62)	13 (61.90)	6 (2.18)	3 (1.09)	9 (3.27)	0 (0.00)	0 (0.00)	3 (14.29)	6 (28.57)	9 (42.86)	0 (0.00)	0 (0.00)	0 (0.00)	2 (5.88)	2 (5.88)

The second issue of concern is the participant's expressiveness and clarity, as indicated by *rephrasing* under content. There were 116 revision cases and the mean ratio of 22.04% indicates that there was confusion in less than every five T-units. Another minor issue under content is information inadequacy in stories, as indicated by *addition*. The following are two respective examples.

Example 4

Participant: *However, the neighbor was sleeping and hoped to have an occasion to do it next time.*

Revision: *However, the neighbor was about to go to sleep and said that she would like to go with her another time.*

Example 5

Participant: *Jaden was unhappy so he went back home*

Revision: *The smell made Jaden unhappy, so he went back home...*

Repositioning under content and *temporal sequence* under cohesion were less of a problem for the participant (3 cases and 9 cases in all game-based samples respectively). This indicates that the participant was able to depict the events in an appropriate order with relatively clear indicators of timing. In the feedback, the teacher once told the participant that she should use cohesive devices such as "a moment later" when transitioning to another scene. In later writing samples, the researchers observed repeated use of the phrase. Meanwhile, the participant's use of other cohesive devices was less satisfactory. In some cases, she misused personal pronouns or their possessives. Her use of "this" or "that" also occasionally caused confusion (*reference*). In other cases, she either misused logical connectors or did not know that a logical connector was required (*logical connection* and *others*). The following are relevant examples.

Example 6

Participant: *...she tends to be flirty and may become sad if they don't have any romantic social interactions for a period of time.*

Revision: *...if she doesn't have any romantic social interactions...*

Example 7

Participant: *...[she] continued to sing songs at the karaoke hell. However, she found a man who was singing terribly...*

Revision: *... continued to sing songs at the karaoke machine. There, she found a man who was singing terribly...*

Example 8

Participant: *...Jaden didn't hear a word. Jaden roast hot dog and just care about hot dog that is delicious.*

Revision: *...Jaden didn't hear a word because he was totally focused on roasting delicious hot dogs.*

For lexicon, the biggest issue was with the misspelling of words. The participant made mistakes in the spelling of words ("mop" spelled as "map"), mistook one word for another totally irrelevant word ("attached Kristi's attention" instead of "attracted Kristi's attention") or used inappropriate words whose Chinese translations were what she wanted to convey ("a decadence day" instead of "a day in vain"). In terms of *better alternatives*, some of the alternatives were game words the participant had encountered but failed to recall. For example, in describing an exercise session in a gym, the student wrote, "She was exercising on a running machine," while "treadmill," the better alternative for "running machine," was used in the game.

Learner Perception

To recap her writing experience, the participant said the game provided her with plots that could easily be turned into interesting stories and connected all the words together in a logical way. She was able to learn and use these words thanks to the context. In particular, she credited the feedback she received from the teacher for helping her to improve her syntax and grammatical accuracy: "I used mostly simple sentences at the beginning of this class, and I thought that only one tense is allowed in a narrative. The teacher helped me diversify my sentence structures and correct my grammar" [sic]. Examples of improvements given by the student were the increased use of relative clauses, present and past participles as adverbial phrases, and various tenses to indicate event sequence. Her writing process involved idea-forming in Chinese and translation into English. During the translation process, she constantly encountered difficulties in finding accurate words and expressions in English. However, with game vocabulary, she did not need translation and could directly use them in writing. When asked to compare traditional writing and GBW classes, she said GBW was advantageous in that it offered a scenario where new words were presented in a meaningful and logical way, while traditional classes are more information-intensive and systematic in that they do not require students to explore the teaching points by themselves.

Discussions

Writing evaluation results failed to show any consistent improvement in the participant's EFL narrative writing performance in terms of syntax, lexicon, content, and cohesion throughout the GBW class. However, the game did contribute to content and lexicon in the participant's writing, as the participant had plenty of stories to tell with contextualized vocabulary. Meanwhile, the participant's syntax and coherence did not benefit much from the game. This may be attributed to the nature of games, where players are preoccupied with game quests rather than linguistic features. As Neville (2015) argued in his study with a 3D game, learners immersed in the game environment tend to learn the pragmatics of its virtual spaces but not necessarily the skills of the second language itself. This may also explain the lack of studies on the influence of games in learning grammar, as players pay less attention to syntax.

Though there is no quantitative evidence for improvement, the GBW class did facilitate the participant's writing process and shed light upon the challenges facing her in the narrative genre. In terms of writing facilitation, the participant was highly motivated to share the stories from her gameplay experiences. This corroborates findings from previous research on the positive influence of digital technologies on learning motivation and engagement in writing (Xu et al., 2011). Another interesting discovery is that the game helped the participant to clearly understand the narrative genre, as the participant drifted to the argumentative genre without the help of the game in the pre-test and post-test. This also supports previous research on the influence of digital technologies in learner perspectives towards various writing genres (Elola & Oskoz, 2014). This discovery points to the potential of story-rich games in fostering narrative writing awareness among students. More importantly, the GBW class helped to identify the key issues in the participant's narrative writing. Interestingly, the most notable issues, grammar and clarity, are not specific to the narrative genre. It thus can be inferred that for medium-level students similar to the participant, the difficulties in narrative writing are perhaps not caused by the specific features of the genre but by inadequate grammar mastery and ability to express ideas in English. Therefore, for these students, instruction on narrative writing and possibly on other genres should still focus more on fundamental writing skills such as grammar and clarity before the focus can be shifted to the unique features of a genre.

Further, though feedback was not a variable in the study, evidence against all-encompassing corrective feedback to writing was shown. The teacher in this study checked every word, phrase and sentence in the learner samples and the participant reported learning much from such feedback, particularly in grammar and sentence structures. However, the participant still made similar mistakes in later samples, though not exactly the same mistakes such as repeatedly spelling a word incorrectly. This indicates that the feedback is useful but not cost-efficient. The reason may be that the potential mistakes a learner can make are too broad and unpredictable for corrective feedback to cover. In traditional language classrooms where there are usually dozens of students, it is unlikely that they would receive the amount of feedback that was provided in this study. This also echoes findings from previous studies that corrective feedback for writing should treat specific error types, particularly those discussed in class (Truscott, 1996).

Conclusions

The participant did not show consistent improvement in her narrative writing during the GBW class, but she benefited from the game in terms of lexicon and content. The study also revealed that the difficulties facing the participant and similar students in narrative writing are likely to be basic, non-genre-specific writing skills such as grammar and clarity. It further added evidence to previous studies that discourage all-encompassing corrective feedback for writing.

The most obvious limitation of this study is the small sample size. The results may only be applicable to students of very similar learning backgrounds. For example, when it comes to students of higher English levels, their challenges in narrative writing may not necessarily be basic grammar or clarity but issues specific to the genre itself, such as literary devices including structures, styles, and perspectives. Another limitation is the use of syntactic measures for analyzing EFL learner writing. The calculation of clauses and T-units by NLP tools presumes correct grammar in the text, while results for EFL learner samples may be inaccurate given the grammatical errors in the samples.

For further GBW research, a larger sample size is recommended. Also, given the limited time in a class, teachers may add game-related content such as game walkthroughs as complementary learning materials before or after the class. Gameplay can also be assigned as homework so that the teacher can focus more on language teaching during class time. In this case, studies can also investigate how the larger gaming community including streaming platforms, discussion threads on social media, and game encyclopedias can influence the writing experience and subsequent pedagogical outcomes. More broadly, researchers can also investigate what types of games are suitable for which writing genre and suggest appropriate games and practices to integrate them into the writing classroom. Particularly, the integration of computer games into the academic English curriculum is worth investigating.

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Availability of data

The data that support the findings of this study are openly available in figshare at <http://doi.org/10.6084/m9.figshare.19396910>.

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Appendix A

List of Student Writing Samples and Their Themes

Sample No.	Title	Theme
1	Household introduction	Introducing two family members, Kristi and Jaden
2	A routine day	Describing a normal day in the family
3	Kristi's and Jaden's rooms	Introducing the house and separate rooms for family members
4	A funny night	Two family members spending a night at a local bar
5	A special gym	Kristi and her friend exercising at a local gym
6	An embarrassing trip	Two family members going on vacation in the woods
7	A bad date	Jaden took Kristi out on a date which turned out rather awkward
8	Jaden's death	Jaden was tragically frozen to death in front of the house
9	Surprise	The soul of Jaden came back to haunt the house
10	Kristi's vet clinic	Kristi started a vet clinic in the neighborhood and treated animal patients
11	A day in vain	Kristi slept all day at work
12	Christmas day	Christmas celebration
13	Kristi and Jaden's wedding	Kristi married the spirit of Jaden and the newly-weds held a wedding reception
14	Kristi and Jaden's new house	The couple built a new house and adopted pets and kids