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FROM THE EDITOR

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Which first, technology or pedagogy? This perennial question has been with us since the very beginning of research into CALL applications. The rapid development of technology, for instance, the Internet and multimedia at the onset of the Web 1.0 stage in the late 1990s, content remixing, open source, collaborative applications of the Web 2.0 state or social-collaborative Web of today, all driven research into how language teachers and curriculum developers should plan teaching with the support of technology. In many cases, technology was actually the starting point for serious and systematic scientific reflection and investigation.

On the other hand, there have been numerous calls to take pedagogy to the forefront, pinpointing that more careful learning design, tried-and-tested classroom activities, as well as task sequences should be in the focus of CALL practitioners, with computer-based tools serving the pedagogical purposes.

As evidenced by this month's issue of *Teaching English with Technology*, both of these approaches are still equally valid for researchers from all over the world, however, the second seems to be more prevalent. First of all, computer-based learning environments, such as *Moodle*, still need careful examination and empirical verification. This is what **Ruba Fahmi Bataineh** and **Mais Barjas Mayyas** from Jordan propose in their contribution "The Utility of Blended Learning in EFL Reading and Grammar: A Case for Moodle". Having examined the effect of Moodle-enhanced instruction on Jordanian EFL students' reading comprehension and grammar performance, the authors conclude that since the experimental group outperformed the control group in both reading comprehension and grammar, there is a marked effect of the learning environment.

In a similar vein, **Lucas Kohnke** from Hong Kong takes a selected website, *Photofunia*, as the starting point for lesson design, showing how it can be successfully integrated in language and literacy instruction.

A more general view of the affordances offered by ICT for language instruction is adopted by **Wen Zinan** (China) and **George Teoh Boon Sai** (Malaysia), who investigated foreign language students' perceptions of their Information and Communication Technology (ICT)-based College English Course. It appeared that ICT-supported learning was more effective compared to the traditional learning environment; it provided freer learning environment, less restricted communication, more time flexibility and more self-scheduled study plan ensuring learner-centeredness and learning autonomy.

Taking pedagogy first, **Roziana M. Rosli** and **Faizah Idrus** (Malaysia) examine the validity of the concept of cybernated storytelling, seeking to measure students' readiness in using technology-aided applications in telling their stories. The researchers also investigate how cybernated storytelling could encourage them to communicate more in groups.

A similar focus on the learning process and activity design is represented in a contribution by **Joanna Pitura** and **Dagmara Chmielarz** from Poland, who aim at verifying the instructional design merging gamification, CLIL and online learning in developing key competences in an upper-secondary school. The results of the study, quite promisingly, show educational and emotional gains, suggesting the motivational effect of technology-mediated gamification in learning.

Finally, the use of technology for linguistic study and materials development is demonstrated in the paper "A Corpus-Based Analysis of the Most Frequent Adjectives in Academic Texts" by **Galip Kartal** (Turkey). Owing to determination of the most frequent adjectives used in academic texts and investigation whether these adjectives differ in frequency and function in social sciences, technology, and medical sciences, language instructors are shown how to provide learners with corpus data to improve their language proficiency and the correct use of adjectives.

We wish you good reading!

A CORPUS-BASED ANALYSIS OF THE MOST FREQUENT ADJECTIVES IN ACADEMIC TEXTS

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Abstract

Based on a mega corpus, The Corpus of Contemporary American English (COCA), this study aims to determine the most frequent adjectives used in academic texts and to investigate whether these adjectives differ in frequency and function in social sciences, technology, and medical sciences. It also identifies evaluative adjectives from a list of a hundred most frequently used adjectives. A total of 839 adjectives, which comprises the list of frequently used adjectives in COCA, were searched using a search engine. 334 of the adjectives were found to appear more frequently in the academic sub-corpus than in other sub-corpora (spoken, fiction, magazine, and newspaper). There was only one adjective that was used more frequently in technology and medical sciences than in social sciences. Some adjectives were very dominant in a specific discipline of academic texts. The frequency of evaluative adjectives in most frequently used 100 adjectives was also listed. It is found that almost 40% percent of the adjectives are evaluative. The results of the study were discussed in terms of frequency effects in language learning and writing in the foreign language as providing learners with corpus data may improve language knowledge and the correct use of adjectives.

1. Introduction

Wiebe (2000) argues that corpora have been used to obtain linguistic knowledge in natural language processing. Thus, the linguistic knowledge on adjectives can be gathered from available corpora. The focus is on the evaluative adjectives as the knowledge of the evaluative language may be beneficial for text categorization and summarization (Wiebe, Bruce, Bell, Martin, & Wilson, 2001). Evaluation, in this study, is used as defined by Hunston and Thompson (2000), who see evaluation as a means of expressing the speaker or writer's attitude and feelings toward the language they produce. There are many linguistic features that can make a sentence evaluative; however, adjectives are the most frequently used and important tool for evaluating a sentence (Marza, 2011). In another study on evaluative and

speculative language, Wiebe et al. (2001) found that the type of subjectivity was more evident in adjectives than in modals and adverbs.

This study is motivated by four facts. First, previous corpus-based studies on adjectives were done with relatively small corpora (Marza, 2011; Samson, 2006). In their literature review on frequency effects in second language acquisition, Kartal and Sarigul (2017) concluded that the number of the studies investigating the frequency effects via mega corpora is rare. Therefore, exploring adjectives in a mega corpus such as COCA might be useful. Second, previous research has proved that a corpus-based study on evaluative adjectives may help increase foreign language students' awareness of adjective types and usage tendencies in different registers. Third, providing students with real data (corpus data) may improve language knowledge and the correct use of adjectives. Last, frequency helps to quantify the usefulness of a word.

2. Background to the study

2.1. Frequency and usefulness

Although frequency in the input is not the only predictor of the usefulness of a word, the literature shows that frequency and usefulness are strongly related to each other. There are some criteria to determine the usefulness of a word. These include frequency, range, availability, coverage, learnability, and opportunism (White, 1988). According to Nation and Waring (1997, p. 17), frequency information ensures that "learners get the best return for their vocabulary learning effort." Thus, frequency seems to be the most appropriate measure to decide on the usefulness of a word.

2.2. Evaluative adjectives

Evaluation is an "elusive concept" (Hunston & Thompson, 2000), which is sometimes called "appraisal" (Martin & White, 2005) or "stance" (Conrad & Biber, 2000; Hyland, 2005). The fluctuation in terminology is a result of an abundance of parameters used to conduct evaluation. According to Hunston and Thompson (2000), evaluation refers to judgments, feelings, or viewpoints about something. They also delineate three functions of evaluation: expressing an opinion, maintaining relationships, and organizing discourse. Expressing an opinion is a way to understand the value system of the speaker. Secondly, evaluation acts as a bridge between writer and reader. This relationship can be used for manipulation, hedging, and politeness. Finally, evaluation acts as a discourse organizer. In other words, evaluation not

only builds relationships and conveys values, but also helps coherence (pp. 6-9). As Hyland (1998) believes, evaluation is important for interpersonal metadiscourse. As metadiscourse improves coherence in a passage (Aidinlou & Vafaee, 2012), the use of evaluation plays a significant role in the effectiveness of a text. Evaluative adjectives are also important in discourse (Samson, 2006).

Previous research about evaluative adjectives has focused on written and spoken academic genres, particularly research articles, textbooks, and spoken lectures (Samson, 2006; Swales & Burke, 2003). Samson (2006), for instance, conducted a small corpus study in economic discourse and found that evaluative adjectives have more than one function at the same time and that they differ across genres and registers. The functions were "interacting with readers by underscoring the crucial points in their texts and to promote the economists' findings by asserting that theirs is a correct interpretation of the topics" (p. 243). Swales and Burke (2003) found that adjectival evaluation is used more frequently in the spoken register by investigating evaluative adjectives in different academic registers. Stotesbury (2003) investigated 300 articles published in 51 journals, including 100 articles in humanities, social sciences, and natural sciences. He found that there were more evaluative attributes in articles in humanities and social sciences than in natural sciences. In addition, evaluative adjectives in articles in economics were more numerous than in linguistics articles.

So far, adjectives have been categorized according to morphological, functional, syntactic, semantic, and pragmatic criteria. Kerbrat-Orecchioni's (1980) classification of adjectives, for instance, relies on pragmatic criteria (see Table 1).

Table 1. Classification of adjectives (Kerbrat-Orecchioni 1980)

Objective	**Subjective**		
	Emotional	**Evaluative**	
		Non-axiological	**Axio-logical**
Single/married Male / Female	Sad _ _	Cold _	Bad _

Kerbrat and Orecchioni (1980) define non-axiological evaluative adjectives, which have a gradual nature without any subjective emotional bias. Axiological adjectives, on the other hand, reflect the speaker's positive or negative judgment.

After analyzing evaluative adjectives in a corpus, Marza (2011) concluded that "some evaluative dimensions are seen to be more central than others in the genre under study and those recurrent, emphatic lexical patterns of an evaluative nature clearly characterize this kind

of discourse." Hewings (2004) grouped evaluative adjectives into eight categories after completing a corpus-based analysis. The categories are listed below with positive and negative examples:

a. Interest (*interesting, tedious*)
b. Suitability (*good, odd*)
c. Comprehensibility (*clear, confusing*)
d. Accuracy (*true, wrong*)
e. Importance (*useful, meaningless*)
f. Sufficiency (*sufficient, small*)
g. Praiseworthiness (*impressive, disappointed*)
h. Perceptiveness (*sophisticated, unaware*)

2.3. Subjectivity and adjectives

The term 'subjectivity' is used to express opinions and evaluations (Wiebe, 1994). Evaluation and speculation are two main types of subjectivity (Wiebe et al., 2001). According to Wiebe and her colleagues, evaluation includes emotions, judgments, and opinions. Speculation is uncertainty. News reporting and forums, in which opinions are expressed, are suitable for subjectivity tagging (Wiebe, 2000) and the use of gradable adjectives plays a crucial role while determining subjectivity.

According to Wiebe, (2000) identifying linguistic clues to determine subjectivity requires comprehensively-coded tools for subjectivity tagging. Similarly, Bruce and Wiebe (2000) found a statistically significant correlation between the existence of an adjective and subjectivity in a sentence. Leech (1989) points out that after nouns and verbs, adjectives is the largest word class in English. Hunston and Sinclair (2000) found a positive relationship between evaluation and adjective behavior.

3. The study

3.1. The aims of the research

This study focuses on academic texts in COCA because "academic writing has gradually lost its traditional tag as an objective, faceless and impersonal form of discourse and come to be seen as a persuasive endeavor involving interaction between writers and readers" (Hyland, 2005, p. 174). The research questions addressed in this study are as follows:

1. Which adjectives are used most frequently in the academic sub-corpus of COCA?
2. Are there any differences between social sciences and technology and medical sciences in terms of frequency and functions of evaluative adjectives?
3. How many of the frequent adjectives in academic texts are evaluative?

3.2. The corpus

This study utilized the Contemporary Corpus of American English (COCA), a contemporary and genre-based corpus. The corpus covers the years between 1990 and 2012. COCA was used for this research because it is free to access, and it is a mega corpus which includes over 450 million words. This means that it has very comprehensive and highly representative data. In addition, its contemporariness, representativeness, genres, and size are all outstanding when compared with other corpora available.

COCA includes five main sub-corpora: spoken, fiction, magazine, newspaper, and academic. The academic sub-corpus has about 83 million words, and the data are obtained from 148 academic journals. The academic part includes history, education, geography/social science, law/political science, humanities, philosophy/religion, science/technology, medicine, and miscellaneous.

3.3. Selection of adjectives

The Corpus of Contemporary American English can be searched using its search engine. However, the totality of data for a specific word category cannot be reached from the search engine. So, the first 5,000 most frequent words in the COCA corpus were taken from http://www.wordfrequency.info, a website which supplies frequencies of words within many corpora. A free list of the 5,000 most frequent words in COCA was used, and 839 of the words in this list were adjectives. In other words, 17% of the most frequent words in COCA are adjectives (see Figure 1). Then, from this list of 839 adjectives, the ones most frequently used in the academic division were extracted. The new list, which is the focus of this study, included 334 adjectives.

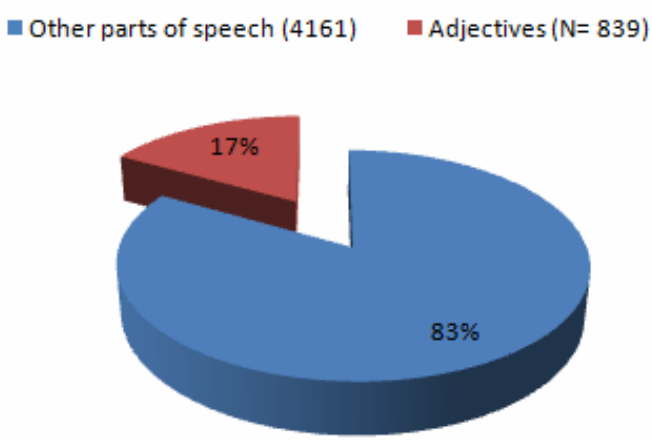

Figure 1. Frequency of adjectives and other parts of speech in the 5,000 most frequent words in COCA

3.4. Results and findings

3.4.1. Research Question One: *Which adjectives are used most frequently in the academic sub-corpus of COCA*?

The results of this corpus-based study revealed that 334 of the 839 adjectives in COCA were more frequently used in the academic sub-corpus when compared to adjectives used in spoken language, fiction, magazines, and newspapers (see Figure 1). In other words, almost 40% of the most frequently used 839 adjectives are mostly found in the academic sub-corpus of COCA. The list of the first one hundred most frequently found adjectives in the COCA academic corpus is provided in Appendix 1.

If we have a look at Hyland (2005) and Bruce and Wiebe (1999), we can conclude that the results of the first research question of this study are not unexpected. Hyland stresses the new feature of the academic text. According to him, academic language is shifting from neutral to a more persuasive way. One of the more important ways of persuasion is using evaluation. In addition, Bruce and Wiebe found a significant relationship between evaluation and adjectives.

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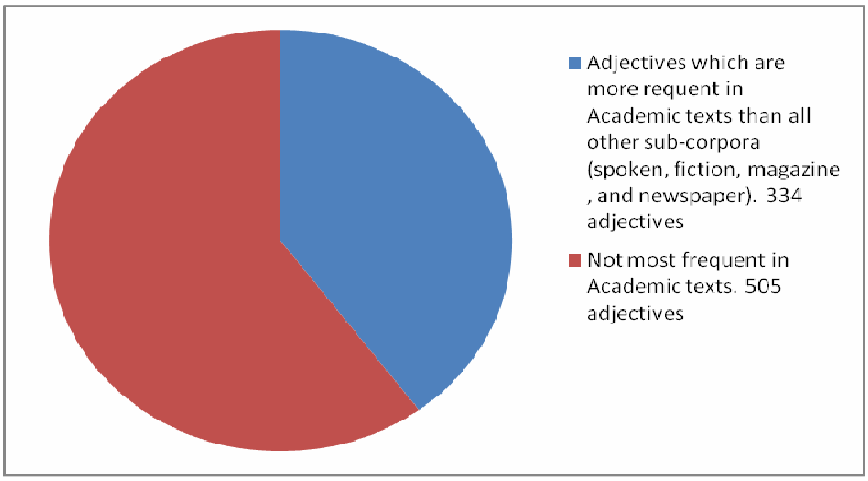

Figure 2: The distribution of 839 frequent adjectives in Academic texts

3.4.2. Research Question Two: *Are there any differences in social sciences and technology & medical sciences in terms of frequency and function of evaluative adjectives*?

All the adjectives which are more frequently found in the academic register were used more in social sciences (history, education, geography/social science, law/political science, humanities, philosophy/religion) than in medicine and technology. The only exception was *environment*, which is used 11,872 times in social sciences and 21,992 times in science/technology and medicine. Appendices 2 and 3 provide the most 100 frequent adjectives in social sciences and science/technology/medicine respectively.

Every fifth adjective (1st, 5th, 10th et al.) within the fifty most frequently found adjectives in academic texts were analyzed with some examples from the corpus. Hence, a total of 11 adjectives were analyzed in depth (see Table 2).

Table 2. The adjectives which were analyzed in depth

Order	Adjectives
1st	*other*
5th	*political*
10th	*united*
15th	*significant*
20th	*international*
25th	*environmental*
30th	*major*
35th	*specific*
40th	*religious*
45th	*low*

50th *traditional*

The most frequent adjective was *other* in academic texts. It was used more frequently in science/technology than any other academic divisions of the corpus. Some examples are:

1) …in a conceptual trough that encourages such yearning for unknown and romanticized greener pastures of **other** times.
2) …in one zone, so that they could really be considered as species of the **other** zone.

It should be noted that, although *other* is used 27,805 times in the science/technology discipline, it is not always used as an adjective. For example;

3) …, in common chimpanzees, males and females have sets of hierarchy independent of each **other**,

The fifth most frequent adjective was *political*. As it can be guessed, the adjective *political* was used in history and law/political sciences much more than in others. It was used only 462 times in medicine, and it was frequently used with the noun *system*.

4) Data manipulated by supercomputers are the lifeblood of the modern **political** system.

The next adjective (10th) was *united*. Again, it is used mostly in history and law/political sciences. What makes it very frequently used the word is the fact that it is the official name of America: The *United States of America*. Most of the usage is related to the country's name. *United Nations* is in second place. However, *United* is sometimes used in different ways:

5) "The shoeworkers, pianomakers, barbers, hotel and restaurant workers and United Textile Workers likewise kept out new immigrants,…"

Significant was the fifteenth most frequently used adjective. When taking a close look at its usage in the corpus, it can be observed that it was mostly used in education and medicine where it is commonly used to report findings of statistical analysis in education. For example;

6) # **Significant** differences have been found between males and females on control…
7) There was a modest but **significant** increase in the plasma concentrations of vasopressin during upright tilt in patients.

The adjective *international*, with 3,780 usages was the 20th most frequently used an adjective. It was used more in history and law/political sciences than others. The adjective *international* is used mostly before the nouns like monetary system, commercial, relations, standards, etc. The examples are as follows:

8) This made the development of a common view of **international** relations even easier.
9) …a synthetic unit, like SDRS, has been proposed as the basis for the **international** monetary system.

The most 25th most frequent adjective was *environmental*. It was the only one that was used more frequently in science/technology and medicine than social sciences (history, education, geography/social science, law/political science, humanities, philosophy/religion). It was used in science and technology over 16,000 times.

10) This reduced pressure on **environmental** resources over large areas.
11) **Environmental** movements cannot prevail until they convince people that clean….

In the current order, the next adjective was *major*. It was mostly used in history and medicine. When the real data is analyzed, it can be easily observed that the adjective is generally related to a research report in the history discipline. Here are some examples from each one:

12) The **major** goals for this first research handbook for social studies were to capitalize
13) …from or about teachers at all levels, and the dearth of significant and reliable **major** studies conducted on a regional scale in accord with well-known research…

The adjective *specific*, which is used 28,082 times in academic texts, was used more frequently in education and geography/social sciences, for instance:

14) …elementary and secondary school teachers have a strong liberal arts foundation, as well as specific training in teaching.
15) …flights a week is the measure of interaction or demand for air service from a **specific** city.

The adjective *religious* is used 25,083 times in the academic sub-corpus. As it can be foreseen, it was used mostly in philology and religious disciplines. *Tradition* is the most commonly used noun with *religious*. Here are some examples from the religious context:

16) Torah as fanaticism and blood-and-conquest, versus modernity (and possibly other **religious** traditions) as peaceable.
17) … his point is important. It explains the difference between, for example, the **religious** life of a North Asian people and the religious experience of its shamans; …

The next adjective is *low* with a usage frequency of 23,943. It is used more in geography/social sciences (7,036) and science/technology (4,856) than other disciplines.

18) Eastern Apacheria is a mountainous, arid environment dominated by the Chihuahuan desert at **low** elevations and pine forests at high ones.
19) By maintaining a **low** metabolism and temperature, the cluster of Himalayan honey bees can reduce its food requirements.

The last adjective (50th) is *traditional*. Interestingly enough, this adjective was almost equally distributed across all disciplines of the academic context. Its usage frequency in history, education, geography/social sciences, and humanities were very close to each other.

20) More **traditional** research continues with topics that deal with the teachers' use of questions at various.
21) **Traditional** sit-down restaurants are by-passed in favor of standardized, packaged fare.

22) LeBlanc and Jan McCrary, in a 1983 study, presented two dozen excerpts of **traditional** instrumental jazz to fifth and sixth-grade students…

The analysis of eleven adjectives (every fifth adjective, 1st, 5th,10th) that are on the list of most frequently used 50 adjectives in the academic texts of COCA revealed that these adjectives have different frequencies and functions in the disciplines of the academic register. This finding is consistent with the results of Stotesbury (2003) to some extent. He found that evaluative attributes in humanities and social sciences are used more frequently than in the natural sciences.

3.4.3. Research Question Three: *How many of the frequent adjectives in academic texts are evaluative*?

The frequency rate of the first 100 adjectives was evaluated and with the evaluative adjectives extracted. There were 35 evaluative adjectives (e.g., *important, significant, difficult*).

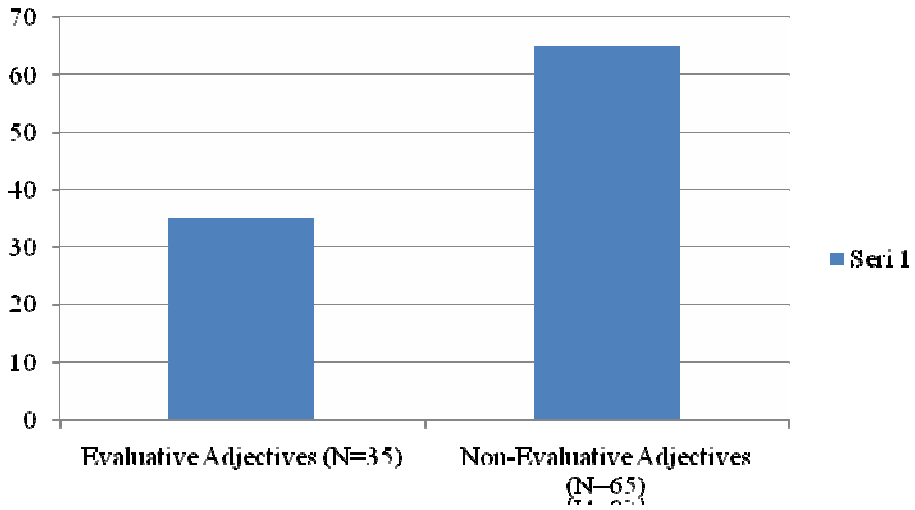

Figure 3: Frequency of evaluative and non-evaluative adjectives in most frequent 100 adjectives

In Marza's (2011) study, who investigated an "untagged corpus of websites owned by both independent hotels and hotels belonging to chains from the United Kingdom and the USA" (p. 105), it was found that 130 of the adjectives in 290 adjective types were purely evaluative from 2000 top frequency types. In other words, 45.2% of all adjectives were evaluative. The present study found very similar results. Out of 839 preliminarily taken adjectives from the top 5,000 frequent words in COCA, 334 of the adjectives were evaluative. The percentage of evaluative adjectives was 39.80%, only 6 percent below the percentage in Marza's study.

4. Discussion and conclusion

This study investigated adjectives with the help of a mega corpus, COCA. The initial research hypothesis was that some adjectives would be more frequent in academic register than in the other sub-corpora of COCA. 17% of the most frequent 5000 words in COCA were adjectives. The corpus analysis revealed that almost 40% percent of the most frequent adjectives were most frequent in academic texts. In addition, the disciplines of the academic register were grouped into two categories: a. social sciences (history, education, geography/social science, law/political science, humanities, philosophy/religion); and science/technology, medicine. There was only one adjective which was more frequent in science/technology, medicine than in social sciences.

It is important for foreign language learners and writers to know which adjectives are frequently used. Thus, EFL learners should be guided to reach authentic use of linguistic items. From this point of view, it can be concluded that providing learners with a list that shows the most frequent adjectives and their functions would be an effective way of helping learners to use those adjectives appropriately.

This study revealed that almost 40% percent of the adjectives in the COCA corpus are evaluative ones. Thus, while using evaluative adjectives in research papers, EFL writers can utilize the appropriate use for any genre and register. Moreover, the use of correct evaluative adjectives is not only important for the genre and the register of the text but also for the correct understanding of the message. In other words, this corpus-based study on evaluative adjectives may increase learners' awareness of adjective types and usage tendencies in different registers.

Previous research has revealed that evaluative adjectives constitute a coherent semantic and syntactic class (Quirk, Greenbaum, Leech, & Svartvik, 1985; Kertz, 2006). There was little focus on the semantic and syntactic analysis of the target adjectives. A further study on these frequent adjectives may focus on semantic and syntactic functions of evaluative adjectives. By this means, the language learners may profit better.

Note

A former version of this paper was presented at the International Conference on the Changing World and Social Research I, held in Vienna-Austria on August 25-28, 2015.

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Appendix 1. 100 most frequent adjectives in Academic texts of COCA

No	Adjectives	Frequency	No	Adjectives	Frequency	No	Adjectives	Frequency
1	Other	180834	**35**	Specific	28084	**68**	Historical	19069
2	Only	125201	**36**	Common	27839	**69**	Limited	18468
3	Social	100402	**37**	Available	27167	**70**	Primary	18301
4	Used	77200	**38**	Personal	25620	**71**	Female	18177
5	Political	69783	**39**	Various	25114	**72**	Strong	18052
6	American	67498	**40**	Religious	25086	**73**	Appropriate	17372
7	Public	61539	**41**	Potential	24827	**74**	Due	17268
8	Important	60541	**42**	Associated	24772	**75**	Negative	17260
9	National	59151	**43**	Positive	24340	**76**	Average	17258
10	United	59147	**44**	Academic	24098	**77**	Standard	17132
11	Different	58797	**45**	Low	23943	**78**	Modern	17064
12	High	55667	**46**	African	23508	**79**	Male	17051
13	Human	49509	**47**	Total	23399	**80**	Content	16584
14	Economic	48643	**48**	Increased	23333	**81**	European	16547
15	Significant	44642	**49**	Special	22984	**82**	Basic	16389
16	General	41300	**50**	Traditional	22800	**83**	Complex	15600
17	Individual	39291	**51**	Educational	22592	**84**	Moral	15459
18	Early	38933	**52**	Foreign	22451	**85**	Direct	15444
19	Given	37902	**53**	Natural	22348	**86**	Legal	15407
20	International	37380	**54**	Certain	21716	**87**	Patient	15397
21	Local	35114	**55**	Sexual	21660	**88**	Developing	15310
22	Physical	34878	**56**	Central	21605	**89**	English	15207
23	Cultural	34713	**57**	Effective	21514	**90**	Additional	15197
24	Present	34096	**58**	Critical	20885	**91**	Indian	15171
25	Environmental	33999	**59**	Necessary	20496	**92**	Ethnic	15005
26	Military	33588	**60**	Involved	20486	**93**	Main	14906
27	Likely	32768	**61**	Difficult	20175	**94**	Independent	14865
28	Possible	32758	**62**	Clear	19843	**95**	Overall	14863
29	Future	32037	**63**	Global	19532	**96**	Multiple	14848
30	Major	30800	**64**	Professional	19469	**97**	Previous	14789
31	Following	29663	**65**	Western	19173	**98**	Successful	14526
32	Particular	28644	**66**	Private	19109	**99**	Popular	14406
33	Current	28123	**67**	Middle	19079	**100**	Poor	14406
34	Similar	28108						

Appendix 2. 100 most frequent adjectives in social sciences (history, education, geography/social science, law/political science, humanities, philosophy/religion)

No	Adjective	Frequency	No	Adjective	Frequency	No	Adjective	Frequency
1	Other	133268	**35**	African	21061	**68**	European	13803
2	Only	91482	**36**	Foreign	20417	**69**	Strong	13683
3	Social	87227	**37**	Academic	19979	**70**	Ethnic	13634
4	Political	62366	**38**	Common	19759	**71**	Global	13595
5	American	56680	**39**	Similar	19704	**72**	Negative	13493
6	United	49348	**40**	Current	19371	**73**	Legal	13457
7	Used	47883	**41**	Sexual	18979	**74**	Limited	13398
8	Important	45653	**42**	Educational	18861	**75**	Moral	13395
9	Public	45598	**43**	Traditional	18764	**76**	Natural	13204
10	National	44116	**44**	Positive	18681	**77**	Appropriate	12892
11	Different	42113	**45**	Special	18372	**78**	Content	12783
12	Economic	41772	**46**	Various	18347	**79**	English	12686
13	High	37967	**47**	Central	16938	**80**	Basic	12547
14	Human	37762	**48**	Certain	16873	**81**	Chinese	12385
15	Significant	32677	**49**	Historical	16640	**82**	Key	12296
16	General	31213	**50**	Potential	15991	**83**	Popular	12188
17	Cultural	31209	**51**	Western	15891	**84**	Primary	12161
18	Individual	30706	**52**	Low	15734	**85**	Native	11956
19	International	29594	**53**	Critical	15697	**86**	Environmental	11872
20	Early	29322	**54**	Private	15398	**87**	Independent	11705
21	Physical	28504	**55**	Involved	15335	**88**	Civil	11691
22	Given	28180	**56**	Middle	15306	**89**	Due	11599
23	Present	26087	**57**	Necessary	15259	**90**	Direct	11423
24	Local	24834	**58**	Effective	15241	**91**	Written	11264
25	Likely	24099	**59**	Available	15223	**92**	Visual	11209
26	Religious	23825	**60**	Professional	15023	**93**	Poor	11073
27	Future	23362	**61**	Female	14925	**94**	Average	11004
28	Possible	22997	**62**	Increased	14711	**95**	Mental	10975
29	Particular	22469	**63**	Difficult	14587	**96**	Standard	10970
30	Military	22179	**64**	Total	14489	**97**	Main	10910
31	Major	21987	**65**	Modern	13891	**98**	Successful	10872
32	Following	21619	**66**	Indian	13840	**99**	Previous	10675
33	Specific	21266	**67**	Male	13813	**100**	Complex	10589
34	Personal	21101						

Appendix 3. 100 most frequent adjectives in science /technology and medicine

No	Adjective	Frequency	No	Adjective	Frequency	No	Adjective	Frequency
1	Other	39831	**35**	Common	6887	**68**	Initial	3960
2	Used	27347	**36**	Present	6869	**69**	Central	3938
3	Only	26331	**37**	American	6678	**70**	Complete	3924
4	Environmental	21992	**38**	Specific	6182	**71**	Relative	3913
5	High	15692	**39**	Economic	6088	**72**	Biological	3900
6	Different	14464	**40**	Average	5931	**73**	Previous	3802
7	Public	13412	**41**	Various	5920	**74**	Special	3800
8	National	13343	**42**	Clinical	5823	**75**	Strong	3694
9	Important	13152	**43**	Primary	5767	**76**	Direct	3682
10	Significant	11451	**44**	Effective	5742	**77**	Certain	3675
11	Patient	11436	**45**	Physical	5675	**78**	Technical	3626
12	Available	11017	**46**	Standard	5673	**79**	Active	3623
13	Military	10869	**47**	Global	5585	**80**	Main	3544
14	Social	10462	**48**	Due	5389	**81**	Negative	3511
15	Local	9500	**49**	Scientific	5291	**82**	Mechanical	3445
16	Human	9287	**50**	Additional	5281	**83**	Professional	3387
17	General	8845	**51**	Positive	5268	**84**	Basic	3361
18	Possible	8591	**52**	Particular	5067	**85**	Personal	3348
19	Total	8586	**53**	Mass	5018	**86**	Nuclear	3331
20	United	8445	**54**	Key	4994	**87**	Estimated	3313
21	Potential	8415	**55**	Political	4885	**88**	Traditional	3301
22	Increased	8273	**56**	Difficult	4792	**89**	Successful	3177
23	Natural	8265	**57**	Multiple	4768	**90**	Long-term	3166
24	Given	8227	**58**	Developing	4739	**91**	Useful	3107
25	Early	8056	**59**	Limited	4651	**92**	Existing	3081
26	Current	8022	**60**	Involved	4639	**93**	Original	3030
27	Major	7916	**61**	Necessary	4554	**94**	Alternative	2994
28	Likely	7818	**62**	Overall	4526	**95**	Genetic	2976
29	Low	7786	**63**	Complex	4510	**96**	Content	2934
30	Similar	7724	**64**	Normal	4485	**97**	Agricultural	2924
31	Future	7435	**65**	Critical	4296	**98**	Regional	2922
32	Individual	7402	**66**	Increasing	4188	**99**	Experimental	2910
33	Following	7205	**67**	Appropriate	4118	**100**	Industrial	2907
34	International	7174						

CYBERNATED STORYTELLING: REVITALISING STORYTELLING ACTIVITIES FOR SECONDARY SCHOOL STUDENTS

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Abstract

Storytelling is one of the most common activities used in teaching English proficiency to language students. It is widely accepted as a teaching technique by many educators because it engages students in learning. This study seeks to examine students' readiness in using technology-aided applications in telling their stories. It also investigates how cybernated storytelling could encourage them to communicate more in groups. This qualitative study involved 35 secondary school students, selected based on purposive sampling technique, from a multi-ethnic secondary school in Malaysia. After having initial exposure to cybernated storytelling video production, the students were divided into small groups and required to engage in developing a cybernated storytelling video for a period of 90 days using the English language. While engaging in the activity, students were expected to communicate orally in face-to-face meetings and in writing using WhatsApp (WA) and Facebook (FB) platforms. Their WA and FB entries were compiled and analysed thematically besides interview responses which were collected during the group interview. The findings point to how technology aided language learning could be a strong support in enhancing students' English communication skills.

1. Introduction

Storytelling has emerged over the last few decades as a powerful teaching and learning activity that engages both teachers and students. There are also numerous studies on how storytelling helps to enhance the learning attitude and motivation of students (Burns & Snow, 1999; Lee, 2012; Meskill, 2005). However, in Malaysian secondary schools, little attention has been paid to how storytelling, with the help of cyber or online social network, could be used to enhance students' language proficiency and the communication skills inside as well as outside the classroom.

Classroom teaching in Malaysia is mainly characterised by the teacher-centered approach, with drills and chalk-and-talk methods being the most common. “Drilling using past-year examination questions, work sheets, and exercise books” (Ambigapathy, 2002, p. 16) leaves little room to practice oral communication in class environment.

Since communication terrain has changed dramatically over the last decade, the mode of storytelling has evolved from digital to ‘cybernated storytelling’. The term ‘cybernated’ is introduced in this study. The word, ‘cyber’ can be denoted as computer-generated setting in the Internet environment. Based on WordNet 3.0, Farlex clipart collection by the Princeton University (2012), the term ‘cybernate’ means “to control a function, process, or creation by a computer”. As a focus of this research, cybernated storytelling means storytelling which does not only use the digital form to tell stories but also has students collaborate via popular networking sites such as Facebook as well as internet-based communication platforms such as WhatsApp.

2. Literature review

Storytelling has long been used as one of the learning styles to enhance language learning among students. Mehrnaz (2013) cited a few research studies that combined storytelling and class activities. He emphasized that teachers have been using storytelling to promote communication skills (Barker & Gower, 2010; Pennington et al., 2003; Robin, 2006; Sadik, 2008), encourage critical thinking (Browne & Keeley, 2007; Forneris et al., 2009); obtain good academic achievement (Henning et al., 2005; Shiva & Moosa, 2015) and foster learners’ motivation (McDrury & Alterio, 2003). Considering these benefits, teachers are eager to adopt this approach in language teaching (Blas & Paolini, 2013; Dreon et al., 2011; Ohler, 2013).

Storytelling could also inspire students to learn English. Friday (2014) found a great number of benefits for classroom teaching. In his studies, he concluded that (a) stories are distinctively part of everyday experience, in any language. Hence storytelling is a common endeavour to connect between world cultures, regardless of literacy rates. (b) In storytelling, students convey their messages effortlessly, thereby assisting the development of their communication skills. (c) When their friends appreciate the stories that they presented, students’ self-esteem and confidence level are boosted. (d) Learners have the liberty to take charge of their learning and make language errors, hence allowing them to discover the language on their own.

Past studies into the benefits of using social network and internet based communication are abundant. Ratcham and Firpo (2011) said that learning can be enhanced, as communication using the platforms is less stressful than in a classroom environment (Ibrahim & Khalid 2014). Besides that, students' writing performance can be improved by using Facebook as a platform for collaborative writing (Siti Shuhaida & Nooreen, 2014). As for usage of WhatsApp, a study conducted by Yeboah and Ewur (2014) indicated that the students preferred using the application for communication.

3. The study

3.1. The outline of the study

This study explores whether cybernated storytelling is accepted or rejected by students when it is introduced in the classroom. Not many teachers and students have been exposed to cybernated storytelling although they have experienced using social networking sites for other purposes.

The participants of this study were thirty-five Form Four students in a school in Kuching. The students came from multiracial backgrounds. Most of the students communicated with one another in English as the language is widely spoken at school and at home. They were briefed on how to go about preparing the storytelling video in a workshop, as shown in Figure 1.

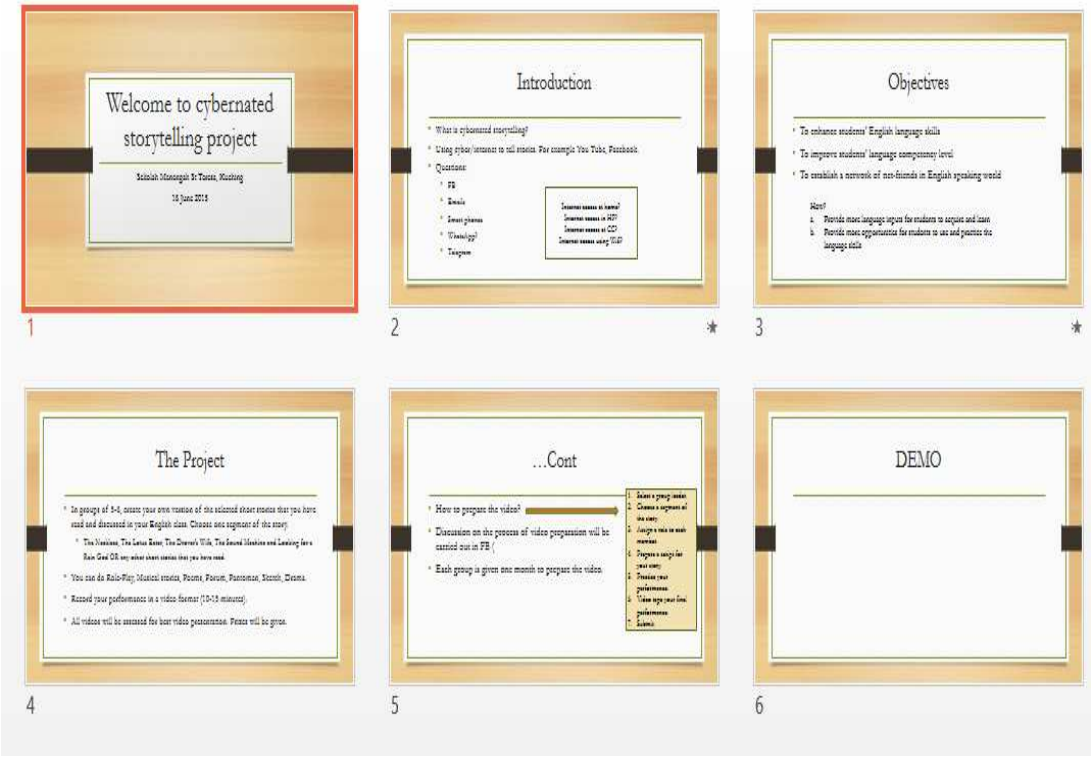

Figure 1. The process of conducting cybernated storytelling

Finally, the students were briefed on the discussion platforms, WA and FB, which they would be engaged in during the study period. These two platforms were created for closed group only. In WA platform, they would participate in a discussion facilitated by the researcher. That discussion focused on the process they engaged in throughout the activity. FB, on the other hand, featured a discussion among the students about their video project. Students shared pictures of their activities. They would also uploaded preliminary videos to FB for their group members to preview and comment on. Once the group members were satisfied with the video, they uploaded final copies for evaluation. Then, the students were interviewed to determine their perception of the activities. Data from the audio taped interview were transcribed and later coded, as illustrated in Figure 2. The coding is used for each student's responses from the interviews.

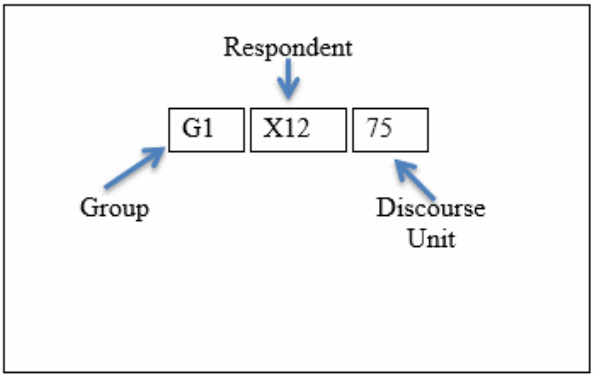

Figure 2: Coding identifier for students

3.2. Findings

This study was conducted to determine how much students know about storytelling, to what extent they engaged in it, and how they view it. As the interview responses were extended and detailed, they were organized into several categories so that the results were more comprehensible and relevant to the study. The thematic categories are concept of storytelling, storytelling as class and school activities, students' views in storytelling activities and students' understanding of cybernated storytelling. Table 1 lists the themes of the interviewed responses.

Table 1. Themes derived from students' interviews

Themes (semi-structured interviews)
4.1. Concept of storytelling
4.2. Storytelling as class and school activities
4.3. Students' views on storytelling activities
4.4. Students' understanding of cybernated storytelling

3.2.1. The concept of storytelling

When the students were asked about their understanding of storytelling, all of them were able to describe it well although with some variations. It was not difficult for them to explain what storytelling is all about as most of them have had some experiences with it.

G1:X6: 4 made a comment on what a storytelling is:

…telling stories about er…anything.

Student G2: X22:220 added:

We always tell and listen to stories…about what we eat…aaarr…what movies we watched…and many many more….right. I think that's part of storytelling.

Besides everyday stories that they listened to, students also stated that storytelling is a personal experience as they listened to stories from the elderlies and friends. Usually, the stories are narrated by their parents and siblings at home for personal reasons.

G1: X2:2 commented that:

When I was small, my mother always…give me…told me bedtime stories, and I like it very much.

G2: X17:248 added:

Stories before I go to sleep…those are stories that I remember.

They are also used to exchange stories among friends, either in classes or outside classes. This sharing of stories is a common phenomenon in social interaction. One of the responses was given by G2: X16:204:

My friends and I always share stories while waiting for parents to fetch us from school

A further addition was made by G2: X29:206

….we share stories in Facebook a lot.

A comment came from G2: X24:204

I'm not sure if gossip is storytelling but….we do that a lot..hihi.

These findings are parallel to the definition of storytelling by Roney (2008) as the act of sharing stories or a series of events, and as a medium of communication. In fact, the students mentioned that families and friends were the ones who usually involved in the storytelling activities.

Briefly, all students know what storytelling is all about. As the students' excerpts showed, they had the knowledge or understanding of what storytelling is. It was defined as an everyday occurrence which they experienced as they were growing up. It can also be added that storytelling activities can bridge not only the world of the classroom and home but

also the classroom and the world beyond. This is because stories provide a common thread that can help unite families and can improve relationship between teachers and their students.

3.2.2. Storytelling as class and school activities

Unlike storytelling outside the classroom, storytelling activities in the classroom are carried out by teachers mostly for learning purposes. In fact, such activities are more focused. Most of the storytelling activities, whether narrated by the teachers or shared by the classmates, are linked to language practice and communication enhancement. This has been mentioned by Fredericks (1997), who argued that storytelling as part of class activity can promote speaking as well as listening skills. This is further illustrated by the tasks mentioned by the students during the interviews, including role play in forms of short sketches, dramas, or stage performances which were all conducted as class and school activities. Below are some illustrations mentioned by the students regarding storytelling activities conducted in class and at the school level.

G1: X1:12 commented:

…as presentation in class…

A further illustration of the activity was made by G1: X1:10

When I was in form one, my teacher made sure…aaa..we have storytelling session..I think every Friday before class began..that was very interesting.

Another excerpt taken from the interview from G2: X17:230

Storytelling and…and plus acting in front of the class. We had that a lot earlier year..and yes, that was exciting. Hmm…Yeah, we practice a lot for the sketch.

More class activities were conducted as mentioned by G2: X13:210

Our English teacher…eerr asked us to prepare short sketch for our class activities based on our short story we learned when we were in form three. We had fun!

Another example of a storytelling activity was conducted by the teacher herself. Even though the example given was not from a language class, it can be seen that teachers who teach other subjects, besides English, found storytelling to be effective for the students.

As told by G2: X16:238:

My History teacher…mmm would give us mmmm a lot of historical stories class. We thought that it was storytelling with benefits.

While storytelling is popular as a class activitys, as gathered from the interviews with the students, these language activities conducted during class hours were only viewed by

classmates and the teacher. School activities, however, are mostly events conducted involving a larger audience, for instance, a storytelling competition during 'English Day' or storytelling presentations during 'Teachers' Day'. Specifically on the English Day, the school runs a storytelling competition in which students would go on the stage to present their storytelling individually or in a small group during the morning assembly.

This was mentioned by G2: X26:218 during the interview:

A storytelling competition where a student will tell a story during assembly.

To add, G1: X1:14 also indicated her participation in a storytelling activity:

I remember AA when me in primary school, we had a storytelling competition in school. Haa..of course, my class win..eh won..

Besides competition, the students were also involved in activities conducted in school level. As mentioned by G2: X22:222:

…is giving a summary of a book that we have read part of storytelling? Yes? Then we did that a lot during Minggu membaca (Reading week). We had to present some more..

When engaged in video-making activities in small groups, students practice their English language to improve their competency, increase self-confidence, and develop their personal talents. Other students who observe the storytelling presentations acquire new vocabulary, sentence structures, pronunciation of words, and intonation of voice projections. Students reported that they enjoyed watching their friends' presentations. This was clear in statements obtained during the interviews. A student, G2: X14:228, was delighted to watch her friends' presentations as she could get some clues on how to present well. According to her:

I enjoyed to watch my friends…aarr when they are presenting in front. I can learn a lot from the presentations. Like what? How to present, their words…

In summary, when asked about class storytelling, almost all of the students mentioned that they have experienced and learned from it. This substantiates the teachers' recognition of the benefits of storytelling activities to their students.

3.2.3. Students' views on storytelling activities

From the interviews carried out, it was evident that the majority of the students appreciated the fact that they managed to participate in storytelling activities whenever their teachers conducted the activities throughout their school years. When students were asked how they viewed storytelling as a whole, they expressed their eagerness and enthusiasm about engaging

in storytelling activities. They stated that they enjoyed the storytelling activities and felt that they were beneficial to them. In most cases, the students appreciated the fact that they were able to participate in the storytelling activities which helped to boost their self-confidence, improve their attitude toward the language, and enhance their language skills. The students were asked to give their views on what they thought of the storytelling activities that they were involved at school during the interview.

G1: X12:24 had this to say:

We students enjoy acting (storytelling) in front of the class Yes…true…scared at the beginning but…but…I practiced a lot…and..and…after the presentation…ahhh..it felt like aahhhhh…I want to do it again.

Another comment akin to the earlier comment came from X2: X14:226

As for me..kan…I was actually a very shy person when I was in the lower form, but then my Bahasa teacher forced me to participate in the storytelling competition…since then kan…no turning back.

It is clear that students relished participation in class storytelling activities. The next question that was asked was whether the students managed to get benefits from participating in this activities. The first response was from G2: X15:23, who mentioned that she managed to get some benefits from observing her friends' presentation:

You know what? Aaa when I listened to my friends, I also got a lot of things like how to pronounce some words, how to be brave talking in front of other people hihi and many more.

Other students immediately added to the points regarding the gains of the storytelling activities. G1: X12:22 claimed that:

I think.. especially since ..aa..when we tell a story mean we talk in front of others…I mean arr that helps a lot arr my confidence when presenting.

Another addition came from G2: X19:242

I remember when I was in form two, my English teacher had a storytelling writing competition. We sure did improve our English!

G1: X1:18 made another comment on how her involvement in the storytelling activity developed her language skill:

I have this favorite teacher when I was in year 6..He likes to tell stories..which we kinda enjoyed.Aahhh what I want to say is that when he told the stories and there are some words I don't know, we will find the words in the dictionary. I think I learned a lot of new words from his stories.

Students also talked about the effects storytelling had on them personally. The following comment was taken from a WA platform ST3 (Storytelling Group 3):

04/07/2015, 14:20 - Roziana M Rosli: Hi girls! What's going on this weekend?ðŸ˜ƒ

04/07/2015, 14:26 - ST3AifaSyaima: We are going to do the video next week...because one of our friend went to johor...so we need to do it next week..ðŸ˜

04/07/2015, 14:34 - Roziana M Rosli: That sounds great! Next week should be ok.

04/07/2015, 14:34 - ST3AifaSyaima: ðŸ˜ ðŸ‘ ðŸ‘

04/07/2015, 14:35 - Roziana M Rosli: While waiting for next week to come,I have a question for you to ponder today.

04/07/2015, 14:36 - ST3AifaSyaima: Oh..sure...

04/07/2015, 14:38 - Roziana M Rosli: What do you think of storytelling activities? Have any you participated in any? And did you get any benefits from it?

4/07/2015, 19:01 - ST3DelvinYong: Hello, Mdm Roziana,I did! It was an awesome experience. I learnt a lot

4/07/2015, 19:02 - Roziana M Rosli: Great! Like what?

4/07/2015, 19:02 - ST3DelvinYong: Like how to present in front..like the presentation skills

4/07/2015, 19:02 - ST3DelvinYong: Oh you know, the eye contact, how to start. I remember my teacher told me all those stuff.

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4/07/2015, 19:03 - Roziana M Rosli: Great. Anyone else?
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Figure 3. Excerpts from ST3 conversation via WA regarding storytelling as school activities

The analysis of the WA chat (see Figure 3 above) paralleled analysis of the interviews. Students spoke of the benefits of 'English Day' which was organised by the English society of the school. It seemed that the school had a clear plan for polishing the students' English language proficiency and communication skills.

In short, the students appreciated the fact that they were able to participate in the storytelling activities as the activities appeared to help them improve themselves academically and at the same time, boost their self-confidence. The students also indicated that they had enjoyed the activities and found them fun but challenging.

3.2.4. Students' understanding of cybernated storytelling

The definition of conventional storytelling was clearly understood by the students as discussed above. However, their understanding of the meaning of cybernated storytelling is still undetermined. When asked during the interview if they could elaborate their understanding, most students were able to do so. G2: X15:78 commented that:

> *I think ok it's the same ok like storytelling but somebody tell the story in the internet.*

G1: X9:16 made a similar comment:

> *Just like digital storytelling…aarr…but like using internet.*

Another comment that is parallel to the earlier comment came from G1: X13:18:

> *This you know..arr.. kind of storytelling can be seen in FB or You Tube*

G1: X3:20 continued the discussion by adding:

> *I kinda like storytelling using cyber because it is more interesting*

From the excerpts shown above, it can be seen that the majority of the students could interpret the meaning of 'cybernated'. They also acknowledged that they found cybernated storytelling interesting, and they liked it. Only a few students replied that they were not aware of the term 'cybernated'. For instance, G2: X10:216 stated that:

> *I am not sure when it comes to cybernated…eerr never heard the word before*

Another comment was made by G2: X12:223 as follows:

> *What? Cyber? What is that?*

However, when probed further, they could grasp the meaning of the term ‘cybernated’ eventually. In short, most of the students were actually in-the-know regarding the term ‘cybernated’ as they could relate to what they have experienced or involved in their everyday class activities.

Figure 4: Screen shots of students’ videos

4. Discussion

As transpires from the findings of the present study, the students seemed to have a good knowledge of what storytelling is, in terms of conventional/traditional, digital and cyber. Most of them had to a certain extent experienced it or been involved in all types of storytelling activities. Initially, students varied in their descriptions of storytelling i.e., retelling of a story, bedtime story as well as gossip. Although Friday (2014) defined storytelling as many things, i.e., “the story of your day, the story of your life, workplace gossip, and the horrors on the news”, this research found that there were two types of storytelling: one is informal, narrated in leisure mode for non-academic purpose; while the other is formal, a more classroom-based activity for academic purposes.

It was learned that the students who were involved in the cybernated storytelling task found it to be very interesting. This is parallel to the study conducted in Rice University’s School Literacy and Culture Project, where the respondents also mentioned that they found storytelling interesting and they discovered that involvement in storytelling activities helped

improve their English literacy (McCraig, 2013, Roziana et al. 2016). The study also demonstrated that students enjoyed storytelling activities, akin to a study conducted by McCraig (2013). When a storytelling activity is put into the learning context, especially when the activity brings some kind of reward, students are motivated to engage and participate fully. Students enjoyed this non-threatening activity as they had no fear of making mistakes in their speeches among their own group members. Typically, multiple skills were highlighted as factors affecting students' participation and communication delivery. The factors highlighted are comparable to Robin's (2008) research, which discussed the 21st century skills important for student development.

Based on the analysis of the interview responses, students proved to be aware of the benefits that they acquired from participating in the storytelling activities. Their understanding of the differences between storytelling at home and in class was nothing new. However, they were aware that in the classroom the language used was more formal and academic. They understood that the narrative language in storytelling organized by the class should be more structured and formal. This corroborates the findings of Friday (2014), who discovered vast benefits of storytelling for classroom teaching. In most of storytelling activities conducted in class, students expressed the stories as naturally conducted, hence were able to enhance and polish up their language proficiency as well as communication skills. Students in this study felt that they had more freedom to take risks and make mistakes, thus enabling them to explore the language on their own creatively. Similarly, Eisner (2007) and Idrus (2012) found that when their students were allowed to share their stories outside of the traditional form, they tended to develop greater creativity. On top of that all, Mehrnaz (2013) mentioned that "storytelling is an effective means of creative expression, as people can organize their thoughts and make sense of the world through creating a story" (p. 8).

Moreover, when engaging in cybernated storytelling activities, students were found to be more interested and motivated. As 21st century learners, they were more inclined to do activities related to the Internet. Technological gadgets are entertainment to them. When these gadgets were used in an appropriate context of learning, students might find learning fun, thus, the technologies offered useful benefits for the learning process. Similar conclusion ws reached by earlier studies, those of Boster et al. (2004), Hibbing and Rankin-Erikson (2003) & Williams (2011), who found comparable related outcome of the advantages of storytelling with the addition of technology and the Internet.

5. Conclusion

It can be deduced that all types of storytelling contributed to numerous benefits to students. As Robin (2008) mentioned storytelling enhances multiple communication skills and engages students as well as teachers in activities pertaining to improving language. Consideration of comprehensible input as mentioned by Krashen (2009) in his SLA theory is relevant in this context. Students' language ability can be enhanced when language input is comprehensible. Whether input is comprehensible or not depends on the context of the language being used. In this cybernated video storytelling project, language input was relevant and meaningful as it was employed in a specific context.

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THE UTILITY OF BLENDED LEARNING IN EFL READING AND GRAMMAR: A CASE FOR MOODLE [1]

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Abstract

This study examines the effect of Moodle-enhanced instruction on Jordanian EFL students' reading comprehension and grammar performance. The study uses a quasi-experimental, pre-/post-test design. A purposeful sample of 32 students, enrolled in a language requirement course at a Jordanian state university, was randomly divided into an experimental group (n=17) and a control group (n=15). The former used blended learning in which Moodle supplemented in-class instruction whereas the latter used in-class instruction only. Using means, standard deviations, ANCOVA and MANCOVA, the analysis revealed that the experimental group outperformed the control group (at $\alpha = 0.05$) in both reading comprehension and grammar.

Keywords: EFL; grammar instruction; Moodle; reading comprehension

1. Introduction and background

With the growing use of technology in education, institutions of higher learning shoulder the responsibility of availing teachers and students alike of the technological infrastructure for improved teaching and learning (Felix, 2003). Research to date (e.g., Ally, 2004; Baniabdelrahman, Bataineh & Bataineh, 2007; Bataineh & Baniabdelrahman, 2006; Fisher, Higgins & Loveless, 2006; Harris, Mishra & Koehler, 2009) suggests that technology is a catalyst for teaching and learning, as it supports users with innovative, learner-paced opportunities for learning (Fisher, Higgins & Loveless, 2006).

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Recent studies (e.g., Al-Maini, 2011; Bahrani, 2011; Bataineh & Bani Hani, 2011; Blake, 2013; Erben, Ban & Castañeda, 2008; Gilakjani, 2014; Ilter, 2009; Levine, Ferenz & Reves, 2000; Stanley, 2013; Ybarra & Green, 2003) also suggest that technology is advantageous in language teaching and learning, as it creates authentic contexts (e.g., Blake, 2013; Gilakjani, 2014; Stanley, 2013), offers information about the language, creates communicative communities with other language users (e.g., Stanley, 2013), and facilitates the learning of the four language skills (e.g., Erben, Ban & Castañeda, 2008). Technology has also proved instrumental for teachers' delivery of knowledge and skills in a manner which suits their learners' needs (e.g., Morales & Windeatt, 2015). It is also a key to autonomous language learning (e.g., Benson & Voller, 2014; Lin, 2009; Salehi & Salehi, 2012; Wang & Vásquez, 2012; Zhao, 2003), not to mention constituting a tool for fostering teacher and learner motivation (e.g., Gilakjani, 2014).

Blended learning does not have a unanimous single definition (Jonas & Burns, 2010; Marsh, Pountney, & Prigg, 2008; Stacey & Gerbic, 2008). However, it is generally defined as learning which "combines face-to-face instruction with computer mediated instruction" (Graham, 2006, p. 27) or the thoughtful fusion of face-to-face and online learning experience (Garrison & Vaughan, 2008). It encompasses both in-class instruction and Internet-based teaching, as various teaching and learning methods (e.g., lecture, discussion, guided practice), modes of delivery (face-to-face vs. computer mediated), and modalities (e.g., synchronous vs. asynchronous) come together to improve teaching and learning.

The Modular Object Oriented Dynamic Learning Environment (henceforth, Moodle) is believed to be the world's most popular Learning Management System (LMS) for both learning and training in various disciplines, probably because it is user-friendly, open source, and free to download (Lambda Solutions, 2017). Moodle fosters traditional instruction through the provision of opportunities for further learning and teacher feedback outside the boundaries of the classroom (Al-Busaidi & Al-Shihi, 2010; Brandl, 2005; Cole and Foster, 2007; Coskun & Arslan, 2014; El-Seoud, Al-Khasawneh & Awajan, 2007; Soliman, 2014).

Researchers (e.g., Abu Naba'h, 2012; Lin, 2009; Nedeva, Dimova & Dineva, 2010; Nozawa, 2011; Wu, 2008) also suggest that Moodle is instrumental for language teaching and learning. It is believed to help learners develop their general language skills, pronunciation, vocabulary, and grammar (Levy, 2009; Lin, 2009). Moodle also helps teachers better manage their courses and communicate, both synchronously and asynchronously, with their students (Wu, 2008). Furthermore, it potentially enables learners not only to acquire knowledge and skills but also to transfer what they learn to other contexts (Nedeva *et al*., 2010).

Similarly, empirical research has shown Moodle as advantageous for EFL learners' proficiency and achievement in tertiary education (Alavi & Keyvanshekouh, 2012; Dwaik, Jweiless & Shrouf, 2016; Stanley, 2007; Sun, 2014; Zeng & Takatsuka, 2009). More specifically, Moodle is reported to contribute significantly to reading comprehension (Hsieh & Ji, 2013; Tsai & Talley, 2014; Yang, Gamble, Hung & Lin, 2014), and grammar performance (Plomteux, 2013; Şahin-Kızıl, 2014).

Moodle is used by most Jordanian universities to supplement traditional classroom instruction. Local research (e.g., Al-Shboul, Rababah, Al-Saideh, Betawi, & Jabbar, 2013; El-Seoud *et al*., 2007) reports favorable results for Moodle use in Jordanian universities. Jordan University of Science and Technology (JUST), from which the sample of the research is drawn, has used the LMS since 2007. The entire faculty and student population have access to Moodle through their institutional usernames and passwords. A detailed user manual, for both instructors and students, is also available on JUST website.

In traditional academia, instructors disseminate information face-to-face through lectures and discussion. However, not only can technology integration save precious class time, but it can also help instructors create interactive and collaborative opportunities to engage learners and improve learning. In other words, web-based resources untiringly disseminate information to learners at their own pace and convenience to achieve comprehension, competence, or mastery (Farrington, 1999).

However, despite serious efforts towards technology integration in this and other Jordanian universities, several barriers do exist. More often than not, the cost of technological innovations, which may prohibit their adoption in customarily resource-limited state universities, is easier to overcome than academic traditions (e.g., faculty-centered instruction) which often prevent instructors from using more learner-centered, computer-based instructional strategies. Similarly. limited logistic support to enable faculty to take full advantage of technology often inhibits large-scale technology integration into their teaching.

2. The current study

2.1. Problem, purpose, questions, and significance of the research

There seems to be a consensus among researchers that Moodle is beneficial in improving students' language proficiency (e.g., Abu Naba'h, 2012; Levy, 2009; Lin, 2009; Nedeva *et al.*, 2010; Nozawa, 2011; Wu, 2008). However, the current research is exploratory in nature, and generalizations are not sought.

According to Blake, Wilson, Cetto and Pardo-Ballester (2008), Brandl (2005), Coskun and Arslan (2014), and Al-Jarf (2005), courses that are a mixture of in-class and online instruction (e.g., Moodle) are effective for developing English language proficiency. However, these researchers have noticed a general reluctance for Moodle utilization among Jordanian language instructors despite adequate technological infrastructure. Some instructors used Facebook and WhatsApp instead of Moodle even though these do not provide users with the same services Moodle does. Hence, the researchers designed a treatment using Moodle supplementation to in-class instruction to examine its effect on EFL students' reading comprehension and grammar performance at Jordan University of Science and Technology.

To achieve the purpose of this study, the following questions are addressed:

1. Are there any statistically significant differences between the experimental and control group students' reading comprehension, which can be attributed to Moodle supplementation?
2. Are there any statistically significant differences between the experimental and control group students' grammar use, which can be attributed to Moodle supplementation?

The review of the literature has shown that much research examines teachers' use of technology across basic and tertiary education (e.g. Abbad, Morris & De Nahlik, 2009; Al-Ghazo, 2008; Al-Jarf, 2005; Al-Shboul & Alsmadi, 2010; El-Seoud *et al.*, 2007; Mashhour & Saleh, 2010; Muflih & Jawarneh, 2011). However, to the best of these researchers' knowledge, no research has been conducted on the effect of Moodle supplementation on EFL learners' reading comprehension and grammar performance at Jordanian universities. Thus, even though the study is exploratory in nature and, hence, generalizability is not sought, its findings are hoped to contribute to the research on the role of Moodle supplementation in EFL learning in tertiary education in Jordan.

2.2. Sampling, methods and procedure

Two sections of English 111, a general university requirement at JUST in the first semester of the academic year 2016/2017, were selected purposefully to ensure that both are taught by the same instructor. With a flip of a coin, one section was randomly assigned to the experimental group and the other to the control group. The experimental group consisted of 17 students from various fields of study, and the control group consisted of a similar sample of 15 students. *New Cutting Edge (Intermediate)* was the textbook taught in this course. The control group received only in-class instruction whereas the experimental group received in-class instruction and Moodle supplementation.

Based on the review of the literature, the researchers designed a reading pre-/ post-test and a grammar pre-/post-test to gauge potential effects of the two levels of the treatment, in-class instruction on one hand and in-class instruction and Moodle supplementation on the other. The validity of the instruments was established by an expert jury of EFL university professors whose recommendations were considered in amending the final versions of the tests.

The reliability of the test was also established by administering them to a sample of 10 students which was excluded from the main sample of the study. The reliability coefficient amounted to 0.84 for the reading pre-/post-test and 0.82 for the grammar pre-/post-test. The pre-tests were administered to the sample before the treatment began and the post-tests immediately after the conclusion of the treatment.

2.3. The treatment: Instructing the experimental and control groups

Both the control and experimental groups were taught by the original course instructor to ensure that they received the same in-class instruction. She covered the prescribed six modules for the semester per the guidelines of the Teacher's Book. However, for the purposes of the study, the second researcher supplemented only four of the six modules for the experimental group who had unlimited access to Moodle inside and outside the classroom.

Each of the four modules was allocated two weeks (approximately 6 hours). Over these six hours, the instructor first taught the reading text and helped students answer questions (e.g., about new vocabulary, main topic, general and specific details) in both *the Student's Book* and *the Activity Book*. Each reading text and its exercises were taught over two one-hour sessions. The instructor usually read or asked the questions, and the students answered them.

The remaining four sessions were allocated to grammar. The instructor explained the grammar topic per the guidelines in *the Activity Book*, supporting the rule with examples before coaching the students to do the exercises in the textbook.

At the onset of the treatment, the second researcher organized a Moodle tutorial for the participants of the experimental group. They were also reminded of the link to the step-by-step user manual on the Student Services section of the university website (https://elearning.just.edu.jo/course/view.php?id=15).

The participants were instructed to view the material posted on Moodle at the beginning of each week over the course of the treatment. Both the instructor and second researcher explained that this material is supplementary to the in-class reading comprehension

and grammar instruction. The second researcher was always on hand for both academic and technical support. She accessed Moodle at least twice a day to answer questions, reply to grammar forums, check students' logs and Moodle-related activity, thank active students, and urge less active students to participate.

Specific grammar points, based on the table of contents of the textbook (viz., *Past Simple tense, Past Continuous tense, Present Simple tense, Present Continuous tense, Future Simple tense,* and *comparative and superlative adjectives*) formed the content of the treatment. The reading comprehension skills of *scanning, skimming, building powerful vocabulary,* and *looking for the topic* were also targeted.

The instructional content was posted on Moodle to supplement face-to-face classroom instruction for the experimental group only. PowerPoint slides and multiple-choice self-assessment tests, on both reading and grammar, were posted weekly. In addition, a grammar activity on the topic of the week was posted on the Forums component of Moodle for the students to communicate with the second researcher and their fellow students.

2.4. Findings of the study

The findings of this research are presented per its research questions. To answer the first question, which sought potential statistically significant differences (at $\alpha=0.05$) between the experimental and control group students' reading comprehension which can be attributed to Moodle supplementation, a timed reading comprehension pre/post-test was administered. The students' mean scores and standard deviations on the pre-/post- tests were calculated, along with the adjusted mean scores and the standard errors on the post-test based on the differences between the two treatments, in-class instruction and in-class instruction with Moodle supplementation, as shown in Table 1.

Table 1. Means, adjusted means and standard deviations of students' scores on the reading comprehension pre-test and post-test

Group	Skill	PRE		Post		Adjusted	Standard
		Mean	SD	Mean	SD	Mean	Error
	Scanning	4.26	1.03	4.53	0.91	4.39	0.22
	Looking for the main topic	2.86	1.30	3.33	1.29	3.31	0.34
Control	Building powerful vocabulary	2.80	1.42	3.66	1.34	3.94	0.36
Experimental	Skimming / Scanning	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Reading (Overall) / Looking for the main topic	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	Building powerful vocabulary	3.82	1.55	5.11	1.53	4.87	0.33
	Skimming	2.94	1.34	4.05	1.47	3.94	0.33
	Reading (Overall)	13.82	4.23	16.62	4.31	18.54	0.81

Table 1 shows observed differences between the mean scores of the two groups on all four skills. The mean scores of *scanning*, *looking for the main topic*, *building powerful vocabulary*, *skimming*, and *overall reading comprehension* on the reading comprehension pre-test amounted to 4.26, 2.86, 2.80, 2.60, and 12.53 for the control group and 3.70, 3.25, 3.82, 2.94, and 13.82 for the experimental group, respectively.

Table 1 further reveals observed differences in the adjusted mean scores on the post-test of the experimental and control group in the four reading skills and overall reading comprehension, in favor of the experimental group. To determine whether these differences are statistically significant (at α=0.05), MANCOVA was used, as shown in Table 2.

Table 2. MANCOVA of students' scores on the reading comprehension post-test

Skill	**Source**	**Sum of Squares**	**df**	**Mean Squares**	**F**	**Sig.**	**Partial Eta Squared**
Scanning	Way	6.074	1	6.074	9.716	*0.004	0.272
	Error	16.253	26	0.625			
	Corrected Total	25.875	31				
Looking for the main topic	Way	5.841	1	5.841	3.852	0.060	0.129
	Error	39.425	26	1.516			
	Corrected Total	62.219	31	62.219			
Building powerful vocabulary	Way	5.150	1	5.150	3.162	0.087	0.108
	Error	42.347	26	1.629			
	Corrected Total	79.875	31				
Skimming	Way	7.623	1	7.623	4.679	*0.040	0.153
	Error	42.360	26	1.629			
	Corrected Total	75.719	31				
Reading (Overall)	Way	98.237	1	98.237	10.253	*0.004	0.283
	Error	249.106	26	9.581			
	Corrected Total	577.500	31				

Table 2 shows statistically significant differences (at α=0.05) in the students' post-test scores in *scanning*, *skimming* and *overall reading comprehension*, in favor of the experimental group (F=9.716, 4.679, 10.253; df=31,1; P=0.004, 0.040, 0.004).

The second research question sought statistically significant differences (at α=0.05) between the mean scores of the grammar post-test between the experimental and control group students, which can be attributed to Moodle supplementation. The mean scores and standard deviations on the pre-/post-tests, along with adjusted mean scores and the standard deviations of the post-test scores based on the differences between the two treatments, were calculated as shown in Table 3.

Table 3: Means, standard deviations, adjusted means, and standard errors of students' scores on the grammar pre-/post-test

Group	**Pre-**		**Post-**		**Adjusted Mean**	**Standard Error**
	Mean	**SD**	**Mean**	**SD**		
Control	5.86	4.65	7.93	4.81	8.62	0.81
Experimental	7.23	4.64	11.52	5.83	10.92	0.76

Table 3 reveals a difference in the adjusted mean scores of the experimental and control groups, with a difference of 2.30, in favor of the experimental group. ANCOVA was used to analyze students' scores to determine whether the variance between the adjusted means on the grammar post-test is statistically significant (at α = 0.05), as shown in Table 4.

Table 4: ANCOVA of students' scores on the grammar post-test

Source	**Sum of Squares**	**df**	**Mean Squares**	**F**	**Sig.**	**Partial Eta Squared**
Way	41.10	1	41.10	4.18	0.05*	0.12
Error	284.78	29	9.82			
Corrected Total	972.21	31				

Table 4 shows a statistically significant difference in students' mean scores on the grammar post-test (F= 4.18; df= 31; P= 0.05), in favor of the experimental group.

3. Discussion, implications, and recommendations

The first research question addressed the effect of Moodle on the students' reading comprehension. The results revealed a statistically significant difference in scanning, skimming, and overall reading comprehension in favor of the experimental group. This improvement in reading comprehension may be readily attributed to the slides and self-

assessment in which the students engaged throughout the treatment. The researchers have been keen on sending students who did the tests private thank-you notes to encourage them to continue accessing Moodle.

On the slides, students read about the skill itself and used the knowledge they gained to answer questions on the reading texts. They also had access to an answer key to the exercises on the slides and to extra practice through hyperlinks to exercises on the web. They could also do as many self-assessment tests as they wanted after at least half an hour to allow them the opportunity to reread the slides and check the required information.

The scores of all attempts were recorded, and students could review their answers before submitting the test. Similarly, both correct and incorrect answers could be viewed immediately after submission. The immediate feedback and self-pacing capabilities of Moodle not only reduced learning time but also contributed to increased confidence, better attitudes, and a sense of accomplishment towards learning (Koedinger *et al.*, 1997), hence, improved reading comprehension.

Most students viewed the slides more than once. These recurrent views suggest that the slides not only provided students with the opportunity to control their own learning and decide what, when and where to study but also engaged them in their own learning. Out of the four targeted skills, *scanning*, with 62 views for the slides and 81 for the self-assessment, received the highest students' interest, followed by *skimming* with 34 views for the slides and 52 for the self-assessment.

These results are consistent with those reported by Levine *et al.* (2000), Dreyer and Nel (2003), Tsai and Talley (2014), Sun (2014), Yang *et al.* (2014), and Banditvilai (2016), which all report a positive effect for Moodle and online learning on reading comprehension.

The second research question addressed the potential effect of Moodle on the students' grammar performance. The results revealed a statistically significant difference in the students' grammar scores in favor of the experimental group. One possible explanation for these students' superior performance is their active engagement as they studied slides, did self-assessment, and posted in forums.

PowerPoint slides were regularly posted on Moodle to supplement the grammar material covered in class. These slides covered the basic structure and use in addition to providing hyperlinks to extra information, activities and quizzes, and YouTube videos on each grammar point. The students were keen on viewing these slides. For example, the *Present Simple* and *Present Continuous* folder was viewed 107 times, the *Past Simple* and

Past Continuous 60 times, *comparative and superlative adjectives* 53 times, and *future forms* 18 times.

The slides also contained self-assessment, complete with answer keys. One test was posted on each of the topics covered in class. Students did these tests and got feedback immediately after submission of responses. The students were also allowed unlimited attempts, which enabled them to get even more grammar practice. More specifically, the *Present Simple* and *Present Continuous* tests received 144 views and 34 attempts, *Past Simple* and *Past Continuous* 56 views and 20 attempts, *comparative and superlative adjectives* 55 views and 19 attempts, and *future forms* 49 views and 17 attempts.

The researchers also posted on each grammar topic covered in the class in the grammar forums. Most students engaged actively in the forums. What was especially beneficial was the students' ability to view any discussion and their peers' replies, which encouraged them not only to post replies but also to learn from their peers' errors which were corrected by the research team. For example, *Forum 1, Practising the Present Simple,* received 113 views and *Forum 2, Practising the Present Continuous,* 66 views.

The results of this study were in line with the general conclusions drawn from other studies (e.g., Hsieh & Ji, 2013; Nagata, 1996; Plomteux, 2013; Şahin-Kızıl, 2014), which asserted the effectiveness of Moodle in learning grammar. These researchers claim that research such as the one at hand is instrumental for increasing instructors' awareness of the utility of Moodle, and other LMSs, in EFL teaching and learning. Even though no generalizations are sought from the research, it seems to suggest that Moodle supplementation of face-to-face instruction is a catalyst for language learning.

The researchers have experienced first-hand the original instructor's enthusiasm for Moodle supplementation. She candidly expressed her interest in Moodle-enhanced instruction which, albeit expected by the University, is hard to implement given the relatively heavy teaching loads, large classes, and lack of logistic support. She has corroborated research findings (e.g., Gichoya, 2005) that merely having the technological infrastructure is inadequate for technology to fulfill its promise to higher education if the human resource infrastructure is not addressed.

Thus, it is the recommendation of this study that training of faculty and students alike be considered a priority at institutions with reasonably advanced technological infrastructure. Otherwise, technology remains more a luxury than a catalyst and a requirement for better academic performance.

It is also the recommendation of this research that similar investigations be conducted with a larger scope, in both sampling and duration, on reading comprehension, grammar, and other language aspects to corroborate the current findings and increase their potential generalizability.

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REMIX LITERACY:
A PICTURE IS WORTH A THOUSAND WORDS

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Target Audience: Intermediate

Time: 90 min

Class Location: regular classroom and/or computer room

Language / Skills Focus: writing, speaking

Linguistic learning objectives: by the end of the lesson, students have been able to:

- practise conditionals, especially 2nd conditional
- practise "used to" for past habits/regular activities

Non-linguistics learning objectives: by the end of the lesson, students will

- consider reasons for using visuals
- create a visual billboard
- become familiar with using visuals

Materials: Internet access, class forum/blog, polls, printer

Summary

This lesson will introduce the website *Photofunia* (http://photofunia.com/) as an excellent tool in terms of incorporating the 4Cc of 21st century learning. By using remix literacy, we are able to help our students become critical thinkers, communicators, collaborators and creators in a fun, engaging and motivating approach. *PhotoFunia* is a creative website where students can insert themselves into billboards using their own images. Example of effects are Valentine's Day, Christmas, Billboards, Galleries, Celebrities, Professions, Movies, to only name a few. This creative website brings out a playful attitude in both teachers and students which is one of the essential characteristics of creativity, to think outside of the box, and is especially important teaching 21st century learners.

Stage	Procedure	Time	Interaction
Teacher Preparation (outside of class)	a) Go to PhotoFunia http://photofunia.com/ b) Browse through the different effects and choose one that will work with your students. c) Upload your photo and then click "Go". d) Save your new image. e) Post your new image to the class Forum. f) Create a forum poll using built in function to your Forum or *Poll Everywhere*/*Google Forms*, *Kahoot*, etc) - *What ghastly deeds "I/Teacher" have done to deserve this treatment.* g) Write 3 paragraphs of *where "I/teacher" explains his innocence* and post them in the Forum. h) Alternatively: Print out the poster. *Example:* 	20 min	N/A
Warm –up / Introduction	Ask students to log on to the class Forum and read the greeting message (where the teacher outlines the aims and procedure for today's lesson). a) Teacher also verbally explains the task displaying the poster. b) Ask students: *Why do we have wanted posters?* Elicit different reasons. c) Write the students' suggestions on the board.	10-15 min	Whole class
Pre-Writing Stage 1	Ask students a) to examine the sample image and the corresponding paragraphs uploaded by their teacher (see teacher preparation) b) to answer the Forum poll *what ghastly deeds "I/Teacher" have done to deserve this treatment* c) to read 3 paragraphs *where "I/teacher" explains his innocence* d) to answer a Forum Poll asking which of the 3 paragraphs they think are the most persuasive and include a short answer why e) to visit *PhotoFunia* and look at the various Billboards to acquaint themselves with the website f) to use the *Breaking News* Billboard Alternatively: Distribute sample image and paragraph as a handout for a-d.	25 min	N/A
Pre-Writing Stage 2	Ask students: a) to explain their forum poll answers (display Forum Poll answer on the board) b) to explain which paragraph was the most persuasive	5 min	Student-teacher

	(display Forum Poll answer on the board) c) write the students' suggestions on the board Alternatively: Ask students to answer on *Paddle* or *Lino*.		
Pre-Writing Stage 3	Ask students: a) *Why are people on the News?* Elicit different reasons b) write the students' suggestions on the board Alternatively: Ask students to answer on *Paddle* or *Lino*.	5 min	Student-teacher
Writing Stage 1	Ask students a) to insert their own photo into the *Breaking News* Billboard and download the image b) to write a short paragraph (50 words) *what would "you" do if you won the lottery"* or, *if "you" were on the news, what would you be famous for?*  c) to post their image and their paragraph on the class Forum.	20 min	Student (online)
Writing Stage 2	Ask students a) to browse and read their classmates postings b) to give peer feedback and correction c) to comment on 1 -2 Forum entries. Students should comment on the creative aspects of their peers writing. For example, *anything surprising, similar to theirs, something they haven't thought of*, etc. d) to award peers with stars/badges for the best creative writing Alternatively: Have students pass around their poster and write a paragraph on paper.	20 min	Student-student (online)
Follow-up 1 / Outside of Class	Teacher will a) write brief individual comments on each S's Forum entry in addition to a summary of today's activities on the class forum (Teacher will primarily focus on the language aspects of the writing). b) award stars/badges on the Forum for the most accurate and creative writing.	15 - 20 min	Teacher-student (online)
Follow-up 2 / Next Lesson	Ask students a) to read comments posted by their teacher b) revise their entries c) to give a 2-3 min presentation on their poster	20 min	Teacher-student (online)

STUDENTS' PERCEPTIONS OF THEIR ICT-BASED COLLEGE ENGLISH COURSE IN CHINA: A CASE STUDY

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Abstract

This study investigated foreign language students' perceptions about their Information and Communication Technology (ICT)-based College English Course (CEC) in China. The research used a five-point Likert-scale questionnaire based on Simsek (2008). A factor analysis confirmed the construct validity of the questionnaire and 6 factors were delineated. 200 non-English majors who responded mentioned that ICT was well integrated into the CEC. They reported that the ICT-based CEC gave them a good environment for independent learning and they were more motivated to learn English as they had more opportunities to communicate, interact and cooperate with other students in English using authentic language in a variety of contexts. They found learning was more effective compared to the traditional learning environment; it provided freer learning environment, less restricted communication, more time flexibility and more self-scheduled study plan ensuring learner-centeredness and learning autonomy.

Keywords: ICT-based English Course; College English Course; Computer-Assisted Language Learning

1. Information and Communication Technology in English language teaching in China

College English is a compulsory English course for non-English majors in Chinese universities. In China, English is taught as a foreign language (EFL) in a community where the medium of instruction and communication is not English (Hu & McGrath, 2012; Guo, 2014). The rapid development of Information and Communication Technology (ICT) has brought about significant changes in language learning and teaching in China (Chien & Liou, 2002). Realizing the potential brought about by ICT, the Ministry of Education in China

conducted an unprecedented teaching and learning reform based on ICT technology in the teaching of College English in 2003.

Initiatives taken by the Ministry of Education included, among others, the publication of five computer and network-assisted college English textbooks in 2003, the issuance of the Teaching Requirements for College English Curriculum (TRCEC) in 2004, a nation-wide selection of 180 universities as computer and network-assisted experimental schools in 2004, a further selection of 65 demonstration universities based on the results of the computer and network-assisted College English teaching reform practices in 2007 and the development of 42 national-level model courses in 2009. The TRCEC is a national policy aligned with contemporary educational thinking based on integrative Computer-Assisted Language Learning (CALL). It defines College English teaching and learning as a system; based upon foreign language teaching and learning theories, embodying English language knowledge acquirement, language-using skills practice, learning strategy cultivation and cross-cultural communication ability by multi-teaching modes and means. The TRCEC (Ministry of Education of China, 2004, p.3) states that "each university, in the light of the actual situation, works out its own goals and designs its own CEC system in accordance with the curriculum."

The university in this study took an active part in this reform and became famous for its state-level College English Teaching Reform Demonstration Centre in 2007. With the advent of TRCEC (2004), five computer/internet-based textbooks came into being under the supervision of the Ministry of Education. This university adopted the New Horizon College English (NHCE) textbook, published by the Foreign Language Teaching and Research Press. A new and student-centred teaching/learning environment was created to replace the traditional chalk-board and face-to-face teaching/learning mode. Figure 1 shows the NHCE on-line teaching and learning system which included teaching administration, interactive teaching and learning, teaching assessment online courses, learning tools and autonomous learning resources, testing centre, teaching assistant and user guide.

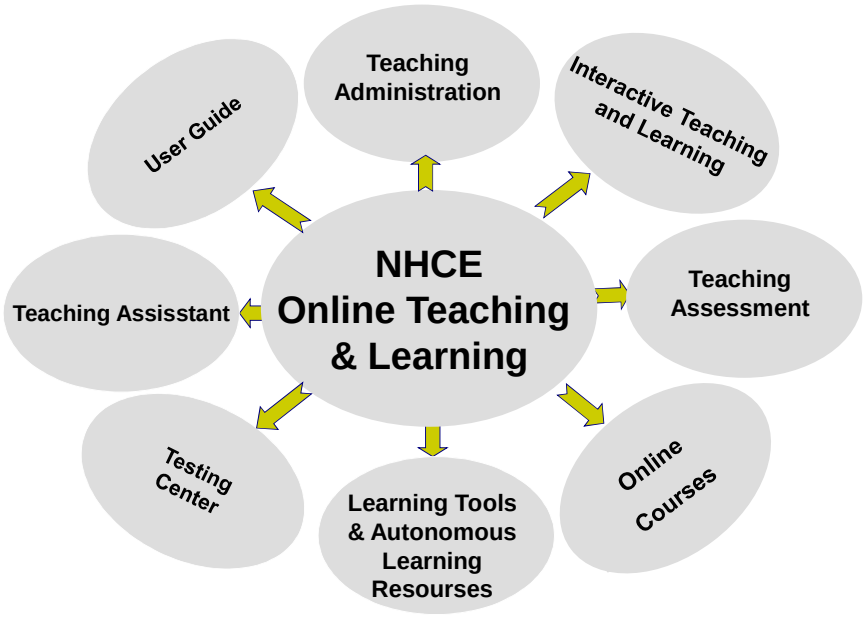

Figure 1: The New Horizon College English online teaching and learning system

It featured the use of two important technological developments – multimedia computers and the Internet. Multimedia computer technology allows text, graphics, sound, animation and video to be accessed on a single computer. It entails hypermedia that provides an authentic learning environment with easily integrated skills, allowing students to work at their own pace of learning and facilitating a primary focus on the content, without sacrificing focus on language forms or learning strategies (Warschauer, 1996). Although integration of skills (e.g. listening with reading) may be involved in using multimedia, it seldom involves integrating meaningful and authentic communication into all aspects of the language learning curriculum. Fortunately, the Internet allows language learners to communicate directly, inexpensively and conveniently with other learners of the target language 24 hours a day. This communication can be synchronous or asynchronous, composing messages at their time and pace through such tools as email or chatting tools (Warschauer, 1996). As Shen, Yuan and Ewing (2014) reported, almost all materials used in Chinese EFL classrooms have been provided with online support courses for classroom teaching and learning, and students' independent learning and self-assessment. Other than using the online resources provided by New Horizon College English, the students were also free to trawl the net, visit social media websites like Facebook and access other websites of their liking. Thus, the teaching and learning process embraces announcements, online questioning, online assignment, classroom forums, group learning, appointment for face-to-face teaching and e-mail to improve the teaching-learning environment of the CEC in this university. The teaching software system is different from

traditional teaching materials. It is multi-functional, encompassing systematic teaching and learning materials suitable for both multimedia and classroom-based approaches. It emphasizes the combination of student-centred learning in classroom and autonomous learning after class with their teachers' support. Web-based teaching management systems are also widely used to save teacher time and improve management efficiency (Hu & McGrath, 2012).

2. Constructivism and computer-assisted language learning

Social constructivism advocates a desirable learning environment in which dynamic interaction occurs between teachers, students and tasks, providing opportunities for learners to construct their understanding through interaction with others. Social constructivists stress that learning is active, contextual and social; therefore, the best method is collective-learning where the teacher is a facilitator and guide (Tinio, 2002). In contrast to traditional classrooms where teachers use a linear model and one-way communication, social-constructivist learning is more personalized, student-centered, nonlinear and learner-directed (Cagiltay, Yildirim & Aksu, 2006). In the literature on ICT in teaching, 'constructivist practices' refer to student-centred learning, necessitating teacher-student and student-student collaboration and co-construction of knowledge. This contrasts with teacher-centred practices, which involve explicit instruction, knowledge transmission, linear knowledge development and more directly observable learning outcomes (Levin & Wadmany, 2005; Chen, 2008; Killen, 2009).

Computer-Assisted Language Learning (CALL) can be defined as any specifically-designed or generic software and any form of ICT-supported medium used to promote language learning (Towndrow & Vallance, 2002). It is based upon the theory of constructivism by Bruner (1966) and Piaget (1970) who believe the roles of teacher and student should change accordingly. A teacher is no longer the traditional knowledge provider, but an organizer and facilitator. A student is never a passive knowledge receiver, but an active learner and a meaning constructor. Four important elements which help to complete this transition are learning environment, cooperation, conversation and meaning construction.

Warschauer (1996) investigated students' participation in electronic discussion in a composition class during ESL instruction in comparison with face-to-face instruction. Learners found the electronic conversation environment to be more comfortable than face-to-face communication and their positive attitude towards the electronic environment contributed to increased participation in conversations. Altun (2005) studied EFL Turkish students' attitudes towards the integration of multimedia and Internet technologies in language

teaching. Message boards were useful for communication and the students viewed communication with the teacher via computer to be less effective than communication in the ICT integrated classroom. Simsek's (2008) study evaluating students' attitudes towards ICT use in a reading skills course in Turkey found that despite the difficulties the students faced, they were satisfied with the application of ICT in their reading course and they developed a positive attitude towards online courses. Zhong (2005) conducted a comparative study of ICT instruction and traditional instruction at the National University of Defence Technology (NUDT). Second-year non-English majors found ICT use had a positive effect on English learning and countered problems such as low interest, lack of opportunities for communication and insufficient reading materials in the traditional teacher-centred instruction. Dong's (2005) research showed students had a very positive evaluation of CALL and took a relatively higher interest in the Internet and CALL classes. They had higher mean values than the non-CALL-class in terms of autonomous learning, the efficiency of learning, effects of learning and flexibility in learning. The new teaching and learning mode improved the students' listening, speaking, communicating and cooperation skills.

Although ICT-based teaching has many advantages over the traditional teaching approach, there are still some problems related to the application of ICT in English teaching and learning contexts (Liou, 2000; Yang, 2001). For instance, the unavailability of technical support in the use of ICT can cause students to experience difficulties in language learning; resulting in learning anxiety and cognitive disorientation. These conditions can induce negative attitudes towards the use of ICT in educational contexts. Also, Chien and Liou (2002) found that in a web-based English learning environment some EFL learners had difficulties with electronic communication because of their slow typing speed and limited English proficiency. Additionally, there is a lack of systematic empirical evaluation assessing the effectiveness of ICT application to support language learning (Zhao, 2003). Also Tri and Nguyen (2017) highlighted that Caruso, Kravik and Morgan's (2004) study found that only 12.7% of the students stated that ICTs improved their learning process. Moreover, Rabah's (2015) study showed that participants highlighted the following challenges in the integration of ICT in Quebec schools: lack of supporting school leadership, inconsistent investments in ICT equipment, infrastructure and resources as well as the need for additional professional development and support. Iyengar and Byker (2014) also stressed that many innovative ICT programs and ICT-based teacher education program need further research to test the impact of these programs. In addition Lim, Yan and Xiong (2015) stated that the contents, learning models, strategies and assessments of the courses in China are usually decided by the

individual university and that the course quality is often questioned by educational experts as with low emphasis on technology integration. Furthermore, Hu and McGrath (2011) found that limited ICT skills and pedagogic expertise were obstacles to the use of ICT in English language teaching. The majority of teachers who held positive attitudes towards ICT use in English teaching and the national reform reported their enthusiasm was waning in the light of inadequate support and training.

3. The study

3.1. The outline of the present research

The present study aimed to fill the gap by conducting a case study to address the following research question:

- What are the EFL students' perceptions about the extent of ICT integration into the CEC at this university in Northeast China and the feasibility of its application for English language learning?

Samples of this study were selected using stratified random sampling. The population of the CEC at this university for 2011 was 2057. The participants were 200 freshmen and sophomores. All were non-English majors from natural science, liberal arts, economics, principles of management and electrical engineering disciplines. They accounted for 10% of the total population (Gay & Diehl, 1992). Table 1 shows there were 37 natural science, 17 liberal arts, 51 economics, 39 principles of management and 56 electrical engineering students.

Table 1. Students' discipline of study

Major	**Freshmen**		**Sophomore**		**Total**
	Male	**Female**	**Male**	**Female**	
Natural science	3	0	10	24	37
Liberal arts	11	0	5	1	17
Economics	16	23	11	1	51
Principles of Management	13	18	4	4	39
Electrical engineering	7	9	20	20	56
Total	50	50	50	50	200

3.2. Procedure

A five-point Likert-scale questionnaire adapted from Simsek (2008) was administered to all the participants by their teachers at the end of their CEC in December. The questionnaire had been piloted on 100 students (who were excluded from the main study). After piloting, the questionnaire was duly amended and analysed for reliability and validity. Table 2 shows Spearman's rank correlation coefficients between the total score of each subscale (degree of confidence is 1%), indicating that the items of each subscale can explain the content of the factors.

Table 2. Spearman's rank correlation coefficient of the subscales

		Attitude towards ICT
PQ17	Pearson Correlation	.855(**)
PQ18	Pearson Correlation	.882(**)
PQ19	Pearson Correlation	.869(**)
PQ20	Pearson Correlation	.714(**)
		Attitudes towards teaching materials
PQ21	Pearson Correlation	.872(**)
PQ22	Pearson Correlation	.814(**)
PQ23	Pearson Correlation	.843(**)
PQ24	Pearson Correlation	.831(**)
PQ25	Pearson Correlation	.740(**)
PQ26	Pearson Correlation	.805(**)
PQ27	Pearson Correlation	.818(**)
PQ28	Pearson Correlation	.808(**)
PQ29	Pearson Correlation	.866(**)
PQ30	Pearson Correlation	.864(**)
		Self-learning capability
PQ31	Pearson Correlation	.797(**)
PQ32	Pearson Correlation	.868(**)
PQ33	Pearson Correlation	.883(**)
PQ34	Pearson Correlation	.819(**)
		Motivation to learn
PQ35	Pearson Correlation	.846(**)
PQ36	Pearson Correlation	.853(**)
PQ37	Pearson Correlation	.875(**)
PQ38	Pearson Correlation	.867(**)
		Interaction with other students

PQ39	Pearson Correlation	.878(**)
PQ40	Pearson Correlation	.862(**)
PQ41	Pearson Correlation	.888(**)
PQ42	Pearson Correlation	.753(**)
		Cooperation with other students
PQ43	Pearson Correlation	.903(**)
PQ44	Pearson Correlation	.900(**)
PQ45	Pearson Correlation	.803(**)
PQ46	Pearson Correlation	.799(**)

** Correlation is significant at the 0.01 level (2-tailed)

Cronbach's alpha of the 30 statements in this scale was 0.951, which indicated that the internal consistency of this scale was excellent.[1] Cronbach's alphas of the six subscales are shown in Table 3. Every subscale's Cronbach's alpha was greater than 0.85, showing that the internal consistency of the scale was good, and all six subscales and 30 statements were retained.

Table 3. Reliability results for the six subscales

	Cronbach's Alpha	**N of Items**
Attitude towards ICT	.851	4
Attitudes towards teaching materials	.948	10
Self-learning capability	.861	4
Motivation to learn	.883	4
Interaction with other students	.867	4
Cooperation with other students	.873	4

A factor analysis was conducted to determine the construct validity of the questionnaire. The result of Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test was 0.881 and Bartlett's test of sphericity χ^2 test was 2418.271 (degree of freedom is 435), and the level of significance was (p=0.000<0.001). It is generally acknowledged that KMO>0.8 is suitable for

[1]Internal consistency is unacceptable: Cronbach's Alpha<0.5； Internal consistency is poor: 0.5≤ Cronbach's Alpha<0.6； Internal consistency is questionable : 0.6≤Cronbach's Alpha<0.7; Internal consistency is Acceptable : :0.7≤Cronbach's Alpha<0.8; Internal consistency is good: :0.8≤Cronbach's Alpha<0.9; Internal consistency is excellent :Cronbach's Alpha≥0.9. (J.P.Gilford, Psychometric Methods,2nd ed. NY:McGraw-Hill,1954).

factor analysis[2], so it passed Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity test. Six factors were extracted to maximize the variance rotation of the initial data. Table 4 shows that the factor load capacity of the 30 statements attributing to their own factor as greater than 0.6 and the factor load capacity of 30 statements attributing to the other factors as smaller than 0.6. The results show the questionnaire has achieved the criteria of convergent validity and discriminant validity and that every item in the questionnaire has correlation with the six factors and passed the project correlation analysis test, reliability and validity test.

Table 4. Factors concerning students' perceptions of the ICT-based CEC

Factor	**Statement**	**Communality**	**Factor load**	**Name of factor**	**% of Variance**	**Cumulative %**
F_1	21 22 23 24 25 26 27 28 29 30	0.557-0.824	0.558-0.816	Attitudes towards teaching materials and knowledge acquisition	22.268	22.268
F_2	31 32 33 34	0.647-0.822	0.672-0.832	Students' self-learning capability	11.315	33.583
F_3	43 44 45 46	0.638-0.835	0.684-0.885	Cooperation with other students	10.728	44.312
F_4	35 36 37 38	0.711-0.802	0.595-0.816	Students' Motivation to learn	10.411	54.723
F_5	39 40 41 42	0.672-0.799	0.745-0.801	Interaction with other students	10.306	65.029
F_6	21 22 23 24	0.681-0.780	0.676-0.742	Students' attitude towards ICT	9.175	74.204

[2] Kaiser's standards of the results: KMO>0.9 is very suitable for factor analysis；KMO>0.8 is suitable for factor analysis；KMO>0.7 is quite suitable for factor analysis；KMO<0.6 is little suitable for factor analysis ；KMO<0.5 is not suitable for factor analysis.

Table 4 shows the 'attitudes towards teaching materials and knowledge acquisition' factor had ten items compared to five items in each of the other five factors; so five items with low factor load capacities were deleted. Item 23 (factor load capacity was 0.698), item 24 (factor load capacity was 0.662), item 25 (factor load capacity was 0.558), item 26 (factor load capacity was 0.658), item 28 (factor load capacity was 0.648) were deleted to make the sections of the questionnaire more balanced. The final version had 25 items left, the original item number was retained for easy comparison. Items 21, 22, 27, 29 and 30 were grouped to constitute a new factor named 'teaching materials and knowledge acquisition'.

Table 5. Spearman's rank correlation coefficient

		Attitudes towards teaching materials and knowledge acquisition
Item21	Pearson Correlation	.809(**)
Item22	Pearson Correlation	.847(**)
Item27	Pearson Correlation	.794(**)
Item29	Pearson Correlation	.799(**)
Item30	Pearson Correlation	.855(**)

** Correlation is significant at the 0.01 level (2-tailed)

The reliability and validity of the corrected scale were retested. Table 5 shows Spearman's rank correlation coefficient between the factor of 'attitudes towards teaching materials and knowledge acquisition' (confidence coefficient is 1%) as acceptable and the items reflecting the factor of 'teaching materials and knowledge acquisition' sufficiently. The retest reliability of the corrected scale shows Cronbach's alpha at 0.935, indicating high reliability.[3] Cronbach's alpha for 'attitudes towards teaching materials and knowledge acquisition' and its items was 0.820, which meant that the factor should be maintained.

The data were also analysed using the Kaiser-Meyer-Olkin test and the Bartlett's test. The KMO measure of sampling adequacy test was 0.859 and the Bartlett's test of sphericity χ^2 test was 1819.838 (degree of freedom is 300), with good level of significance ($p=0.000<0.001$). It is generally acknowledged that KMO>0.8 is suitable for factor analysis, so the data of the corrected scale passed the Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett's test of sphericity. A factor analysis was conducted and six factors

[3] Cronbach's Alpha internal consistency: $\alpha \geq 0.9$ presents excellent, $0.9 > \alpha \geq 0.8$ presents good, $0.8 > \alpha \geq 0.7$ presents acceptable, $0.7 > \alpha \geq 0.6$ presents questionable, $0.6 > \alpha \geq 0.5$ presents poor, $0.5 > \alpha$ presents unacceptable.

were extracted to maximize the variance rotation of the initial data as shown in Table 6. The results show the factor load capacity of the 25 items attributing to their own factor was greater than 0.6 and the factor load capacity of the 25 items attributing to the other factors was smaller than 0.6. This indicates that the corrected questionnaire met the criteria of convergent validity and discriminant validity. The results show that every item in the questionnaire has correlation with the six factors, namely, the student's attitude towards ICT; the student's attitude towards teaching materials and knowledge acquisition; the student's self-learning capability; the student's motivation to learn, the student's interaction with others and the cooperation among the students in the questionnaire have all passed the project correlation analysis test, reliability and validity test. The final version of the questionnaire was used to examine the students' perception of the ICT-based CEC of this university.

Table 6. Factors concerning the students' perception of the ICT-based CEC

Factor	**Statement**	**Communality**	**Factor load**	**Name of factor**	**% of Variance**	**Cumulative %**
F_1	21 22 27 29 30	0.739-0.811	0.650-0.805	teaching materials and knowledge acquisition	15.587	15.587
F_2	31 32 33 34	0.648-0.808	0.710-0.830	students' self-learning capability	13.635	29.223
F_3	43 44 45 46	0.652-0.840	0.689-0.891	cooperation with other students	12.564	41.787
F_4	35 36 37 38	0.722-0.811	0.623-0.836	students' motivation to learn	11.980	53.767
F_5	39 40 41 42	0.679-0.800	0.751-0.805	interaction with other students	11.776	65.544
F_6	17 18 19 20	0.714-0.812	0.694-0.769	students' attitude towards ICT	10.343	75.887

3.3. Results and findings

The data highlighted two issues; (a) the ICT facilities provided for the students (Items 5-7) and (b) the application of ICT by teachers in the CEC (Items 8-16). Figure 2 shows 98.5% of the students reported the university had language labs (Item 5), 75% of the students stated the

computers in every language lab were connected to the Internet (Item 6) and 78.5% of the students agreed that they could gain access to computers easily in the university (Item 7). The students perceived that the university provided them with adequate ICT facilities for their CEC.

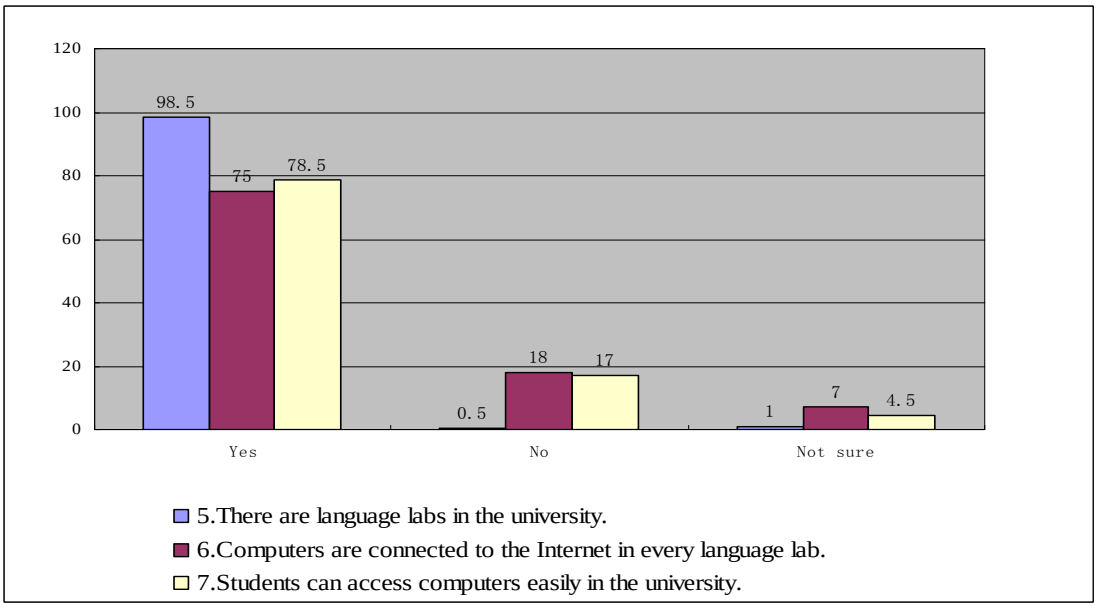

Figure 2. Perceptions of the students regarding the provision of ICT facilities

Students' responses to Items 8 to 16 concerning the teachers' application of ICT in the CEC are summarized in Figure 3.

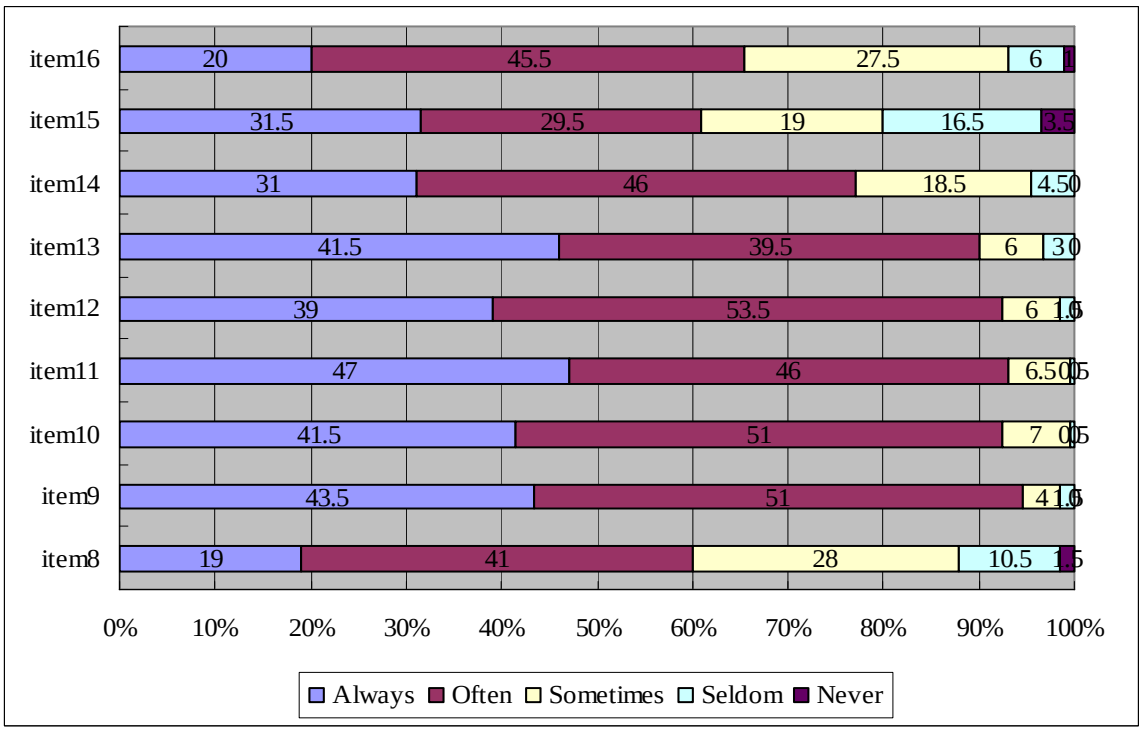

Figure 3. Teachers' application of ICT in the CEC

60% of students reported a response of *always* and *often* to Item 8: *I can find technical support when using a computer at the university*; 94.5% of students reported a response of *always* and *often* to Item 9: *My English teacher uses ICT resources during teaching*; 92.5% of students reported a response of always and often to Item 10: *My English teacher recommends us to use online resources in my study*; 93% of students reported a response of *always* and *often* to Item 11: *My English teacher uses ICT to explain texts in class*; 92.5% of students reported a response of *always* and *often* to Item 12: *My English teacher uses ICT to help students learn independently*; 82% of students reported a response of *always* and *often* to Item 13: *My English teacher uses ICT to organise classroom discussions*; 77% of students reported a response of *always* and *often* to Item 14: *My English teacher assigns tasks required to be completed using ICT*; 61% of students reported a response of *always* and *often* to Item 15: *My English teacher contacts us through e-mail*; 65.5% of students reported a response of *always* and *often* to Item 16: *My English teacher has online discussions with us*.

Figure 4 shows the total score of the students' perceptions about the ICT application in the CEC. The mean score was 98.31 and the standard deviation of the total score was 12.08. Most students were positive towards the ICT-based CEC.

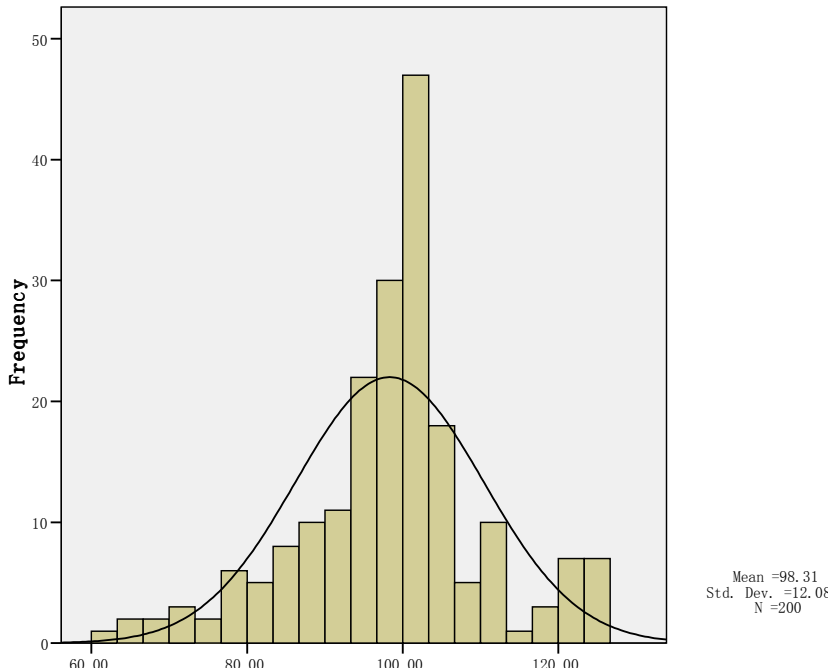

Figure 4. Total score of the EFL students' perceptions about the ICT application in the CEC

This section presents the students' perceptions of ICT use in the CEC according to the six factors.

a) Figure 5 summarizes the results obtained via items 17 to 20 regarding the students' attitude towards the use of ICT in the CEC.

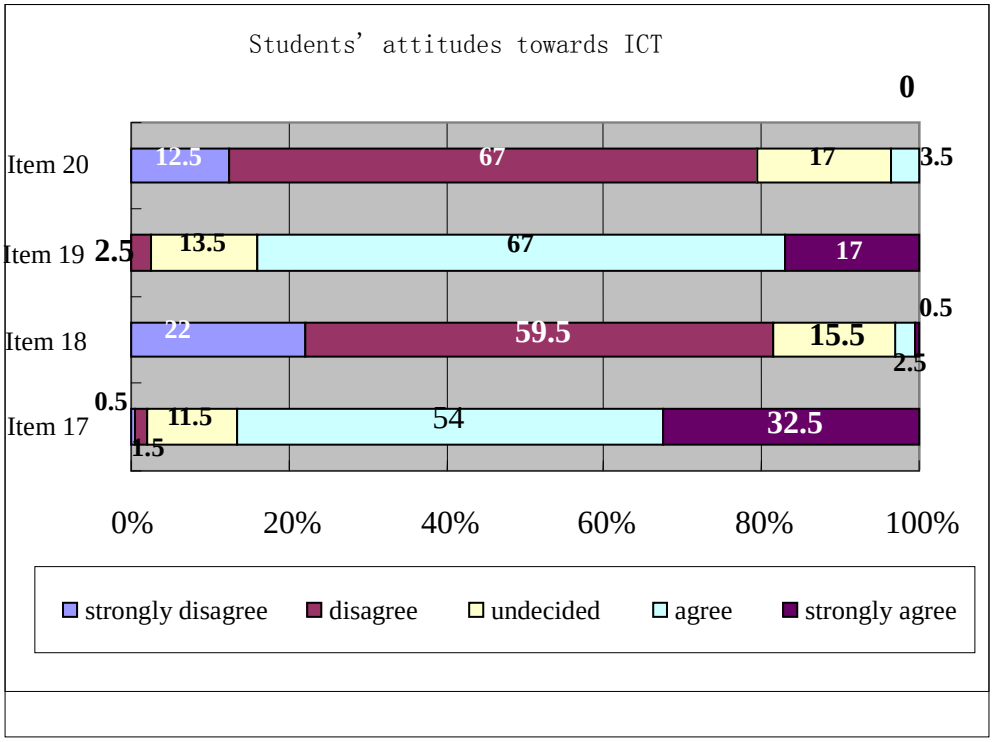

Figure 5. Students' attitude towards the use of ICT in CEC

86.5% of students strongly agree and agree with Item 17: *I have a positive attitude towards the use of ICT technology for learning*. 81.5% of students strongly disagree and disagree with Item 18: *I don't want teachers to increase the use of ICT in the CEC*. 84% of students strongly agree and agree with Item 19: *The ICT-based CEC is worth my time and energy*. 79.5% of students responded *strongly disagree* and *disagree* to Item 20: *I prefer to study in traditional face-to-face teaching environment*. Most students preferred the ICT-based CEC environment to the traditional learning environment (the mean score for item 18 was 4.00 and the mean score for item 20 was 3.89).

b) Figure 6 summarizes the results obtained via Items 21, 22, 27, 29 and 30 concerning the students' attitudes towards the CEC teaching materials and knowledge acquisition.

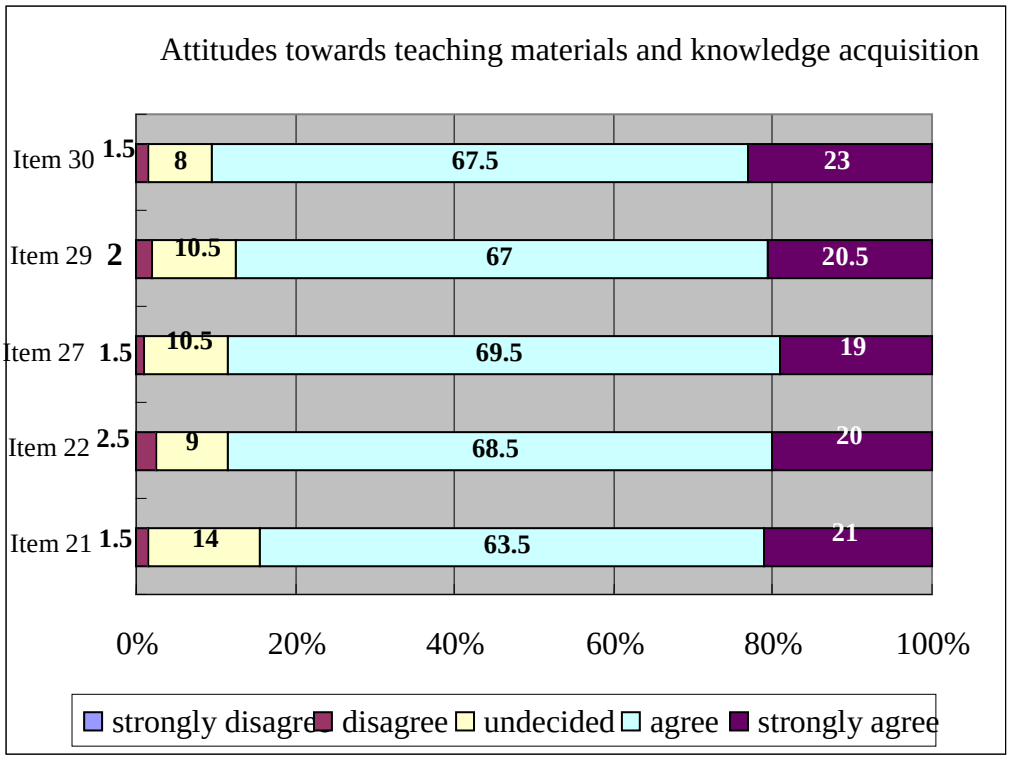

Figure 6. Students' attitude towards the CEC teaching materials and knowledge acquisition

84.5% of the students chose *strongly agree* and *agree* in Item 21: *The use of ICT in the CEC increased my knowledge about English language*. 88.5% of students responded *strongly agree* and *agree* to Item 22: *The use of ICT in the CEC enabled me to learn more about foreign cultures*. 88.5% of the students indicated *strongly agree* and *agree* to Item 27: *The amount of information input in ICT environment is bigger than that in traditional context*. 87.5% of the students responded *strongly agree* and *agree* to Item 29: *The use of ICT in the CEC provides me with more access to learning English*. 90.5% of the students chose *strongly agree* and *agree* to Item 30: *The use of ICT in the CEC offers me a lot of rich and authentic English materials*.

c) Figure 7 summarizes the results obtained via Items 31 to 34 regarding the student's self-learning capability in the ICT-based CEC.

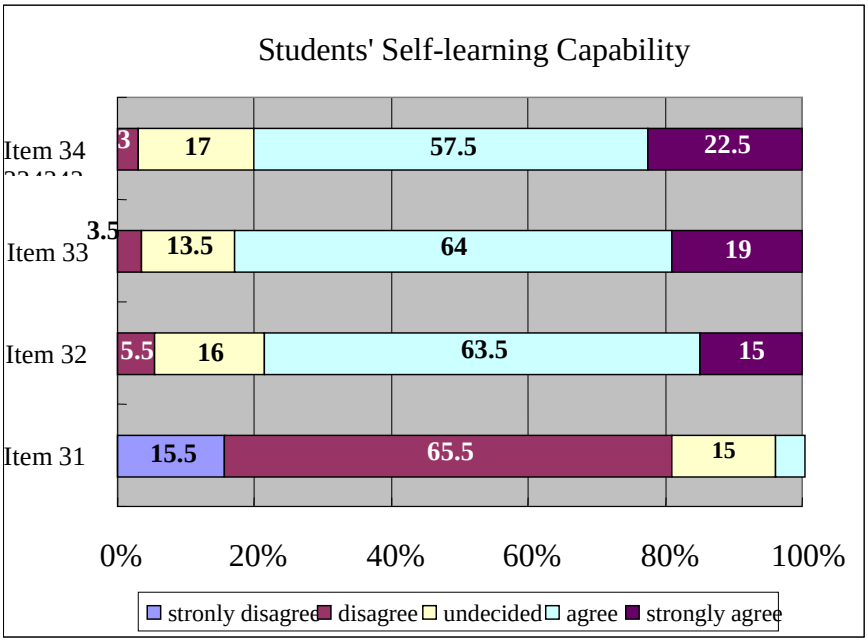

Figure 7. Student's self-learning capability

81% of students responded *strongly disagree* and *disagree* to Item 31: *the ICT-based CEC is not helpful in enhancing my self-learning capability*. 79.5% of students reported *strongly agree* and *agree* to Item 32: *the ICT-based CEC allows me to learn at my own pace*. 83% of students chose *strongly agree* and *agree* when answering Item 33: *Computers and the Internet help me learn English more independently*. 80% of students strongly agree and agree with Item 34: *When I meet problems in learning English, I would like to find solutions on the Internet or in other reference books by myself.*

d) Figure 8 summarizes the results obtained from Items 35 to 38 regarding the student's motivation to learn in the ICT-based CEC.

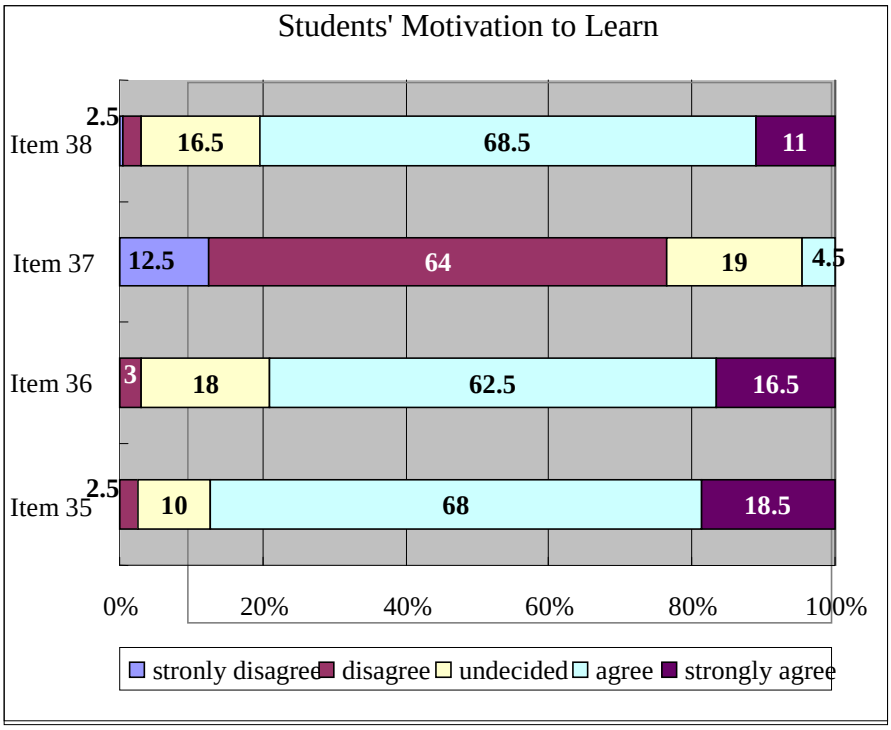

Figure 8. Student's motivation to learn

86.5% of students strongly agree and agree with Item 35: *The use of ICT makes classroom activities more interesting*. 79% of students chose *strongly agree* and *agree* when answering Item 36: *I feel more motivated when learning English in the ICT-based CEC environment*. 76.5% of students selected *strongly disagree* and *disagree* when answering Item 37: *I can't concentrate on my study when learning English in the ICT-based CEC environment*. 79.5% of students reported *strongly agree* and *agree* for Item 38: *The use of ICT in the CEC improves my participation in classroom activities*.

e) Figure 9 summarizes the results obtained from Items 39 to 42 regarding the student's interaction with other students in the ICT-based CEC.

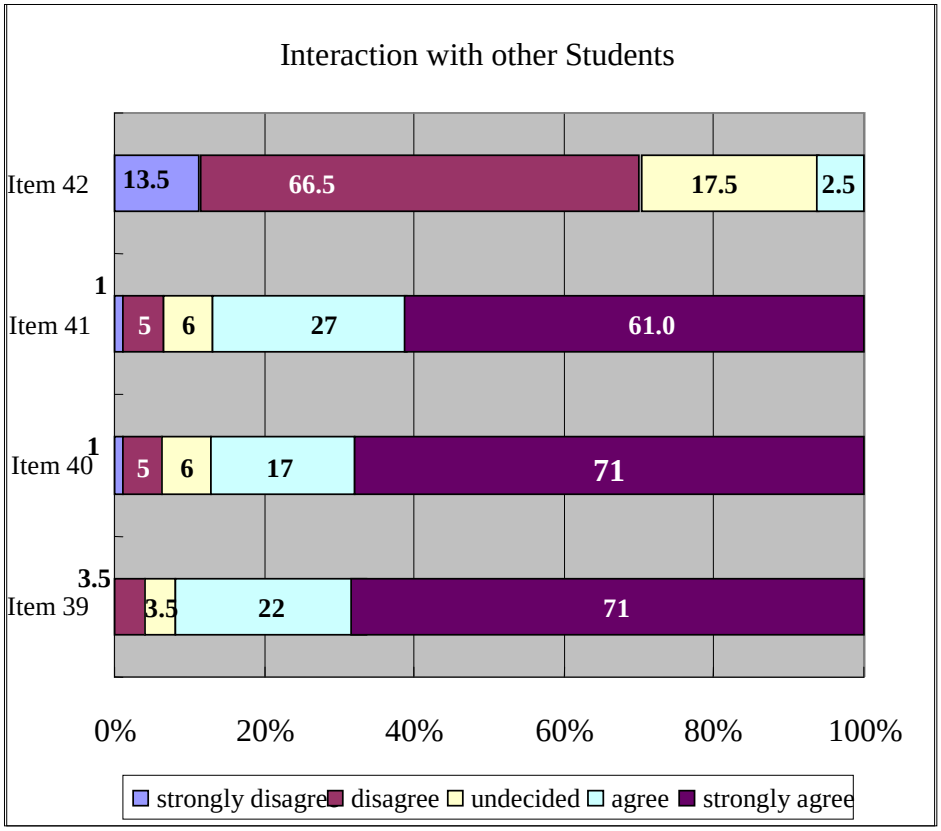

Figure 9. Student's interaction with other students

93% of students chose *strongly agree* and *agree* when answering Item 39: *I felt comfortable in asking questions in the ICT-based CEC environment*. 88% of students reported *strongly agree* and *agree* in Item 40: *I often share information and ideas with other students in ICT-based CEC*. 88.0% of the students responded *strongly agree* and *agree* to Item 41: *I communicate well with other students in the ICT-based CEC*. 80% of students selected *strongly disagree* and *disagree* in Item 42: *I have problems getting help in the ICT-based CEC environment*.

f) Figure 10 summarizes the results obtained from items 43 to 46 regarding the cooperation among the students in the CEC.

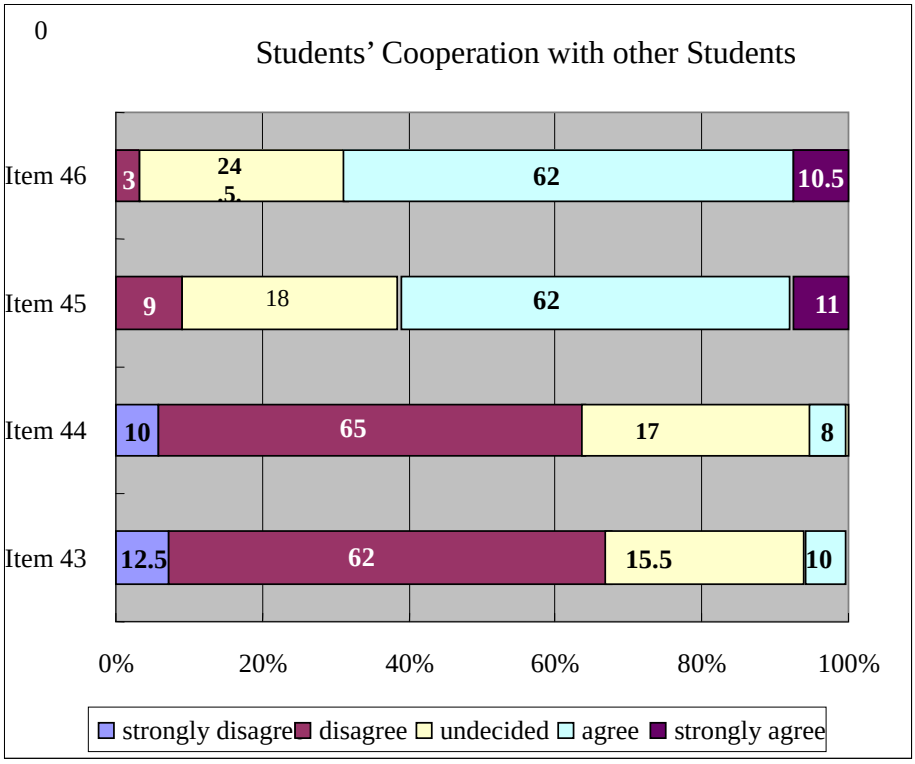

Figure 10. Cooperation among the students

74.5% of students reported *strongly disagree* and *disagree* for Item 43: *ICT-based instruction provides me with fewer opportunities to cooperate with other students*. 75% of students responded *strongly disagree* and *disagree* when answering Item 44: *The ICT-based CEC is not helpful in developing teamwork among students*. 73% of students indicated *strongly agree* and *agree* in response to Item 45: *Working on group projects is easier in the ICT-based CEC*. 72.5% of students chose the responses of *strongly agree* and *agree* to Item 46: *I feel more confident when learning with other students in ICT-based CEC*.

4. Discussion

In the students' opinion, ICT was well integrated into the CEC with easy access to computers, the Internet and technical support. The students' contact with the target language and culture increased in two aspects: a) ICT resources, such as English language knowledge, cultural information and communication devices supported by ICT and b) the application of ICT by teachers in the teaching process. The CEC teachers applied ICT frequently in their classes and outside class time to explain texts, assign learning tasks, organise classroom activities, communicate with students and participate in students' online discussion to facilitate learning. The ICT facilities and resources created a good environment for the CEC at this university

and made the students' learning more efficient using authentic language in a variety of contexts ensuring learner-centeredness and learning autonomy. Similarly to Warschauer's (1996) findings, the students were positive towards investing their time and energy in the ICT-based CEC.

The ICT-based CEC provided a lot of information to the students. They could choose suitable English learning materials for their own learning. Teachers also exposed students to the foreign cultures related to the English language using the Internet, broadcasting technologies and ICT resources. This is important because students need to learn a language in the context of the culture. The students gained access to a variety of information, methods, approaches and resources in the ICT-based CEC, which were suitable to the students' learning style and made them interested to learn English at their own pace. After classes, the students could learn English anywhere or any time with CDs or online materials; they were able to obtain learning materials they were interested in and find help when they encountered learning problems. ICT enabled the students to navigate and monitor their learning process to meet their learning needs.

The students developed the ability to take charge of their own language learning which researchers agree will ultimately lead to language learning proficiency success (Ablard & Lipschultz, 1998; Zhang & Li, 2003). Self-learning capability is related to successful learner characteristics and language learning is affected by attitude and motivation. The students' positive attitude and higher motivation made them more willing to participate in learning activities compared to the traditional English learning environment. The students were more comfortable while asking questions, sharing information and ideas with other students and getting help to communicate in the ICT-based CEC. The ICT-based CEC provided opportunities for the students' cooperative learning activities and helped develop teamwork. Both face-to-face cooperative learning and online team work could be conducted, providing the teachers with more freedom and options to design and arrange group projects. It was easier for the students to work with other students and they were more confident when learning with others. Students asked more questions of different kinds in cooperative learning than in a traditional teaching environment (Deen, 1987). Cooperative learning is preferred in foreign language teaching and learning for it can ensure optimum opportunities for interaction and at the same time cultivate the students' team spirit. Studies in language acquisition show that the learning opportunities provided by learner-learner interaction play a positive role in language learning (e.g. Ohta & Amy, 1996, Soler, 2002). Social interaction is a means for language learning as language is transmitted and created in learner-learner interaction

(Seliger, 1977). When students take the initiative to ask questions and search for help, authentic communicative opportunities are created for meaningful learning. Research has indicated that students are overwhelmed by the great amount of information provided by ICT (Chien & Liou, 2002, Simsek, 2008, Srijittra, 2010). However, the CEC students did not admit any concentration loss while learning English in their ICT-based CEC. Most students reported they could choose the right English materials which were suitable for them to learn the English language and they were not influenced by the variety of information offered by ICT. The ICT-based CEC promoted communicative competence, which helped the students develop a positive perception and habits in using ICT resources to help them learn the English language.

5. Final conclusions and recommendations for further research

In conclusion, the study showed the EFL students at this university in China stated that ICT was well-integrated into the CEC. The teachers used computers, the Internet and other ICT technologies to provide a well-conducted ICT-based CEC. The students were positive towards the application of the ICT-based CEC. It provided ample atmosphere with a learner-centred classroom and was preferable to a traditional teaching environment as it enabled the students to learn independently. The ICT-based CEC provided them with much learning materials for knowledge acquisition and tools for carrying out other authentic tasks related to English language learning. This learning environment helped to break the spatial and temporal boundaries of the traditional face-to-face English language class and allowed the students to learn whatever they wanted anytime or anywhere using the ICT resources. The ICT-based CEC provided freer learning environment, freer communication, more time flexibility and more self-scheduled study plan. ICT can be likened to a treasure of College English teaching resources to the students.

To be able to conduct ICT-based courses successfully, the students' enthusiasm for ICT should be encouraged so that they can accept and appreciate the integration of ICT in the teaching of the course. This is because experience strongly influences perception (Glover, Ronning & Bruning, 1990). Hence, sufficient ICT facilities and technical support must be properly implemented to facilitate constructive learning that is student-centred (Warschauer, 1996). In addition, English language teachers conducting ICT-based courses need to be competent facilitators because they are vital in facilitating their students' learning. This is in agreement with Vijayalakshmi's (2017) study, which stressed that teachers need to be trained not only in teaching but also in using various technologies in language instruction. Teachers

need to realize that face-to-face interactions between the teachers and students and between peers, as well as online interactions between the teacher and students play a significant role in determining the success of their learning. As such, teachers need to be fully committed in their classes as well as actively participate in the students' online ICT activities, such as forums, emails and chat rooms. They should facilitate the learning of the English language via proper planning and implementation of language learning activities that specifically create an authentic learning environment allowing for self-paced learning for the students. We concur with Guo's (2014) conclusion that teachers have to learn the computer and network techniques well, otherwise they will encounter some difficulties and problems in using ICT to teach English.

As regards limitations of the current study, its participants were 200 non-English-major students of the same university; therefore, the research findings may not be generalisable to other university students in other regions of China.

Future studies can employ other instruments, in-depth interviews and verbal reports to gain a better understanding of the language learners' perceptions of application of ICT in the language classroom. The studies can expand on the range of the sample by including students from other universities in China. Future research can also focus on the teachers of the College English Course to investigate the teachers' perceptions about the ICT-based College English Course. A replicated study could also be conducted among learners with different cultural and learning environments to investigate the differences that might exist based on different cultural backgrounds.

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"CREATING A COMIC STRIP IS VERY CREATIVE AND THANKS TO IT WE LEARN AND REMEMBER" – STUDENT PERCEPTIONS OF A BIOLOGY CHALLENGE IN A GAMIFIED EXTRACURRICULAR CLIL PROJECT

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Abstract

Upper-secondary school students must prepare for adult life, which – among others – entails acquiring relevant skills and discovering their own potential. Efforts at European and national levels have been made to ensure that students gain the competences, the so-called key competences, which facilitate functioning in the modern world. However, in Polish upper-secondary schools their overall development may be problematic as schoolwork is heavily exam-oriented. In order to address this challenge, a study was undertaken, the aim of which was to investigate the usefulness and feasibility of applying gamification to an extracurricular CLIL project intended to develop key competences in an upper-secondary school. The paper reports on one part of this study, i.e. on how a biology challenge (two tasks) was designed, implemented and evaluated. The results show educational and emotional gains, suggesting the motivational effect of gamification in learning.

Keywords: gamification; CLIL; upper-secondary school; motivation; technology

1. Introduction

Upper-secondary students, as every other age group, constitute a group of learners with unique needs, cognitive abilities and challenges specific to this developmental stage. Among the tasks young people face is that of preparing for adult life, which entails acquiring the relevant competences, deciding upon their own future, discovering their own potential, etc. (Filipiak & Siadak, 2014). Various European and national initiatives have been undertaken to ensure that students gain the competences which facilitate functioning in the modern world. as

"key competences", they have been identified and highlighted in educational policy documents, including the Polish Core Curriculum (Szpotowicz, 2009/2010) and are as follows: communication in the mother tongue, communication in foreign languages, mathematical competence, basic competences in science and technology, digital competence, learning to learn, social and civic competences, a sense of initiative and entrepreneurship, and cultural awareness and expression (*Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning*, 2006). Needless to say, these are of special significance for upper-secondary school students as their personal and professional success in adulthood is – to a great extent – determined by these competences.

In practice, the overall development of all these competences may constitute a challenge in Polish upper-secondary schools as schoolwork is oriented towards school-leaving exam preparation. Regrettably, important life skills, such as digital literacy, teamwork, as well as using English for communicative purposes may not be given due attention. Consequently, Polish students are well-prepared for taking exams in particular school subjects but they may not be appropriately equipped to tackle the real social, political, economic, and cultural challenges that adult life entails. Therefore, in search of a solution, it is proposed that extracurricular programmes integrating content and language learning (encompassing the competences areas listed above), which complement the obligatory schoolwork, could be taken into consideration.

The CLIL (Content and Language Integrated Learning) approach to teaching refers to "all types of provision in which a language different to the language of schooling is used to teach certain curriculum subjects other than languages themselves" (European Commission/EACEA/Eurydice, 2017, p. 55). CLIL has been viewed as beneficial to language teaching because students are provided with more language teaching "without increasing the overall instruction time, or taking away lessons from other curriculum subjects" (European Commission/EACEA/Eurydice, 2017, p. 14). Research conducted to study the impact of CLIL programmes on language competence (e.g. Lahuerta, 2017; de Diezmas, 2016; Gené-Gil, Juan-Garau & Salazar-Noguera, 2015, Navés, 2011; Várkuti, 2010) and content (e.g. Ouazizi, 2016; Gregorczyk, 2012, Stohler, 2006) points to educational gains with regard to both language and content. Therefore, it appears that there are incentives to apply the CLIL approach in upper-secondary schools with the aim of providing additional educational programmes that cater for the development of key competences, i.e. the accumulation of knowledge across the school curriculum (science, mathematics, social studies) and the development of skills (English language, digital literacy, teamwork, learning to learn).

However, the question arises as to how to achieve long-term student engagement in extracurricular activities, bearing in mind the fact that they are not compulsory.

Gamification and its principles in designing learning experiences offer a promising perspective in addressing the problem of student motivation. As Christo Dichev and Darina Dicheva (2017) put it, "[t]here are several assumptions underlying the usefulness of gamification in educational context, such as gamification is motivating, gamification is engaging, gamification can improve attendance and participation" (p. 26). Hence, it may seem that content and language integrated learning could be framed in gamification in order to boost student willingness to participate and to maintain their engagement in the activities that are outside obligatory schoolwork. The next section considers gamification and its possible application in designing motivational CLIL learning experiences in an upper-secondary school.

2. Theoretical framework of gamification in language education

Gamification is defined as "the use of game design elements in non-game contexts" (Deterding, Dixon, Khaled, & Nacke, 2011, p. 10) and in education gamification has been defined as "the use of game elements in a learning environment" (Simões, Redondo, & Vilas, 2013, p. 3). Additionally, according to Su and Cheng (2015), gamification is "[t]he use of game design elements and game mechanics in nongame contexts in order to engage people and solve problems" (p. 269). Gamification was originally applied in business to foster e.g. customer loyalty and employee performance, followed by its use in other domains such as health, the environment and education (Dichev & Dicheva, 2017; Simões et al., 2012). Gamification has to be distinguished from other related concepts, such as "a play" and "a game". Matallaoui, Hanner and Zarnekow (2017) explain that playing involves doing something freely in order to experience joy and excitement, without having to follow strict rules, while gaming "represents a rule-based and goal-oriented form of playing" (p. 6).

It is important to note several principles that guide the design of a gamified system. Most importantly, gamification requires (1) defining goals (i.e. providing a purpose for the game) and (2) rules of the game, (3) providing feedback on how the players are performing and (4) encouraging participation in the game (Matallaoui et al, 2017). Additionally, engaging players in achieving the goals involves considering mechanics, dynamics and aesthetics in the design. Game mechanics are "the particular components of the game, at the level of data representation and algorithms" (Hunicke et al., 2004), such as points, leaderboards, levels, an achievement system (Matallaoui et al, 2017, pp. 8-9). Game dynamics describe "the run-time

behavior of the mechanics acting on player inputs and each others' outputs over time" (Hunicke et al. 2004) and include: rewards, status, achievement, self-expression, competitions, altruism (Matallaoui et al., 2010, p. 10). Aesthetics refer to "the desirable emotional responses evoked in the player, when she interacts with the game system" (Hunicke et al. 2004).

Gamification is underpinned by a number of theories that explain player motivation and engagement. Accordingly, behaviourism and self-determination theory will be featured next as the most relevant to the current article.

Conditioning theories related to behaviourism dominated psychology in the second half of the twentieth century (Dörnyei, 2001). The focus was on explaining behaviour in terms of responses to stimuli, where positive and negative reinforcement, reward and punishment were important in human behaviour, including learning. It was believed that people were motivated extrinsically, which was epitomised in grades and praise in education or salary and promotion in work contexts (cf. Werbach & Hunter, 2012; Dörnyei, 2001). The current - cognitive - approach views motivation as a function of an individual's attitudes, thoughts and beliefs (Dörnyei, 2001). A prominent example within this strand is the self-determination theory (SDT), developed by Edward L. Deci and Richard M. Ryan. It is a theory of human motivation that puts emphasis on three basic psychological needs that promote intrinsic motivation, i.e. competence, relatedness and autonomy (Ryan & Deci, 2000). As Deci, Vallerand, Pelletier and Ryan (1991, p. 327) write:

> Competence involves understanding how to attain various external and internal outcomes and being efficacious in performing the requisite actions; relatedness involves developing secure and satisfying connections with others in one's social milieu; and autonomy refers to being self-initiating and self-regulating of one's own actions.

In contrast to extrinsic motivation that was accentuated in behaviourism, intrinsic motivation is highlighted in STD and is claimed to appear when humans feel the urge to fulfil these basic human needs (Ryan & Deci, 2000). Applied to education, SDT focuses on facilitating student interest in learning and self-confidence as learners (Deci et al., 1991).

The assumptions of both theoretical perspectives need to be considered in the process of gamification design in an upper-secondary school, to accommodate both extrinsic and intrinsic motives. The use of game elements, such as points, badges, levels and leaderboards are viewed from a behaviourist perspective as forms of reinforcement, which can foster the extrinsic motivation of students. However, in order to create a satisfying internally-driven learning experience and to achieve appropriate learning outcomes, the activities and tasks

undertaken in the game must address the students' needs for competence, autonomy and relatedness – only then will they be perceived as relevant, meaningful and enjoyable, guaranteeing longer-lasting engagement.

Gamification has been a popular trend, yet mixed results have been reported on its application in educational settings, which is reflected in a recent study conducted by Dichev and Dicheva (2017) – a metaanalysis of 63 theoretical and empirical articles published between 2014 and 2015 dealing with gamification in education. The results show that most studies (N=44) were conducted at university level, fewer studies (N=7) in K-12 education. Among the gamified subjects are: computer science and information technology, maths, multimedia/communication, medicine, biology, psychology, and languages. The following types of learning activities were gamified: whole courses, exercises, collaboration/discussion forums, projects/labs, tests, etc. The studies under scrutiny investigated the influence of gamification on student learning, perception, engagement and motivation, as well as social outcomes. It appears that the results concerning the effects of gamification are inconsistent – there were studies that reported positive effects, as well as those in which the results were inconclusive or supported by insufficient evidence. The authors of the metaanalysis conclude as follows:

> (i) The practice of gamifying learning has outpaced researchers' understanding of its mechanisms and methods, (ii) Insufficient high-quality evidence exists to support the long-term benefits of gamification in educational context, and (iii) The understanding of how to gamify an activity depending on the specifics of the educational context is still limited (Dichev & Dicheva, 2017, p. 25).

These findings are rather worrying, indicating that the full potential of gamification has yet to be realised in education. It becomes apparent that applying leaderboards and points within the course or activity will not be sufficient in creating a successful learning experience. It is essential that educators-designers have appropriate skills and knowledge of gamification design and the methodology of designing for learning, as well as knowledge of the curricular goals and the socio-psychological context of the target group. This increases the chances to design gamified activities that will appropriately target educational goals in a specific context.

Innovative learning activities need to be evaluated in order to make valid claims about their effectiveness or pedagogical value (Półturzycki, 1998). This is especially relevant in light of the discussion above – gamified educational activities need to undergo a process of evaluation in order to provide evidence informing theory and practice. The ARCS motivation model developed by John M. Keller constitutes a useful frame of reference for evaluating

designed learning activities. It is posited that the ARCS model comprises the factors that have an effect on the motivation to learn. The factors are as follows: (1) Attention – relates to stimulating and maintaining the learners' interest, (2) Relevance – concerns meeting the learners' goals and needs, (3) Confidence – refers to the learners' sense that they will succeed in completing the task, and (4) Satisfaction – indicates internal or external gains. The ARCS model emphasizes that by catering for attention, relevance, and confidence in an activity, achieving learner motivation is possible. It is also claimed that in order to obtain a long-lasting motivation to learn, learners need to experience satisfaction with the learning outcomes. It is important to note that satisfaction can be affected by factors that are both external (rewards, grades, etc.) and internal (better self-esteem, positive interactions with people, completing challenging tasks that increase the sense of competence) (Keller, 2009, pp. 45-46).

3. The current study

3.1. Background and focus

The data reported in this article come from a larger research project conducted in the 2016/2017 academic year by two educational organisations i.e. the Student Society SNEC at the Institute of Modern Languages of the Pedagogical University of Cracow and the 21st Kołłątaj Secondary School in Warsaw, Poland [Polish: XXI Liceum Ogólnokształcące im. Hugona Kołłątaja w Warszawie]. The cooperation brought the "Hatters" project into existence and involved the design, development, implementation and evaluation of a learning experience, the aim of which was to investigate the usefulness and feasibility of applying gamification to an extracurricular CLIL project developing key competences in upper-secondary school. English language and technology play a major role in the project – English is the language of communication and technology makes learning and project execution possible.

As mentioned earlier, the "Hatters" project emerged as a gamified project-based extracurricular activity. While designing this learning experience, efforts had been made to ensure that students would be provided with the opportunities to develop the competences that would enable them to live successfully in a knowledge society. Game elements and principles (goal, mechanics, dynamics, aesthetics) were employed in the project design to achieve long-term student engagement, which primarily involved creating the storyline, rules and adopting the appropriate technology (cf. Schell, 2015), as discussed below.

Storyline in the "Hatters" project. The Smart Hatter, the main protagonist, lives in the Smart Castle and owns the Magic Hats. The Hats have most extraordinary powers – they serve their Masters, called the Hatters. Once a Master casts a spell on a Magic Hat, it serves them by performing its Master's wishes. Unfortunately, the Hats are temporarily unavailable because they have been captured by Grifftonn, a strong, malicious and very smart monster with five heads, each of which is a specialist in one area: history, biology, mathematics, languages, or social studies. Luckily, due to a deficit in one chromosome, his power is weakened when humans perform smart acts (such as learning English vocabulary, using digital tools), acts of kindness, creativity, etc. in his vicinity. Therefore, to get the Magic Hats, contestants need to complete five challenges (to fight each head) and perform acts of smartness, such as cooperation, innovation, inspiration, etc. Once all five challenges are completed, all Grifftonn's heads are disabled and the Hats can be taken for use. The Smart Castle, which consists of five Chambers and the Hall of Hats, has extraordinary powers too. Walking from Chamber to Chamber, the humans' level of smartness increases, but only those who are smart enough can pass through all the Chambers, complete the challenges, and reach the treasure – the Magic Hats. As the Smart Hatter does not speak the contestants' mother tongue, English must be used as a medium of communication. More details on the project website can be found at http://smarthatter.weebly.com.

Mechanics and dynamics in the "Hatters" project. Students battle Grifftonn in teams, each team consisting of 5 students from different classes, each student specialising in one school subject: history, biology, maths, Polish (language and culture), or social studies. They engage in completing five challenges[1], one challenge assigned per month, each one involving the preparation of an online "product", such as a multimedia presentation, a comic, a report, etc. Completing each challenge requires creativity, cooperation, problem-solving and innovativeness in how the students approach the problem. The results (presentations, comic strips, reports, etc.) are prepared in English, using open-source online tools and posted on teams blogs. The results (presentations, reports, etc) are assessed taking three criteria into

[1] Challenge 1 History. "Kraków – a magical place". Teams participate in a location-based game and prepare multimedia presentations about Kraków.
Challenge 2 Biology. "Facts and myths in bioscience". Teams conduct a study on vaccinations or birdfeeding, conclusions are presented as comic strips.
Challenge 3 Maths. "Stinginess or thriftiness". Teams analyse fuel combustion or car loans, conclusions are presented on Google Slides.
Challenge 4 Polish. "Truth about us saved on walls and in literature". Teams write online columns about Warsaw murals or online books based on a story by L. Kołakowski.
Challenge 5 Social studies. "According to the law of [date]… – Know your rights". Teams prepare online reports on the rights of Polish school-leaving exam-takers or on the rights of Polish citizens concerning the work of Members of Parliament.

consideration: substantive (factuality, originality and creativity in approaching the task, etc.), English language and teamwork. The award to be gained is the title of "the Hatter" – the finalists receive hats, which when worn allow magic forces to influence their school teachers during the 2017/2018 school year.

Technology in the "Hatters" project. Technology plays a crucial role in the project (cf. Cope & Kalantzis, 2017). Among others, it enables communication during the project and facilitates the development of digital competence, learning to learn, teamwork, the English language, and subject knowledge. With regard to communication, website and blog builders are employed to provide information about the project, successive challenges and team results. What is more, teams are urged to communicate online via *Google Docs*, *Skype*, *Google Hangouts*, etc. while working on the project. Various open source digital tools (apps, online platforms, authoring tools, etc.) are suggested for creating their projects: *Adobe Spark* (https://spark.adobe.com/), *Storyboard That* (http://www.storyboardthat.com/), *Google Docs*, *Google Forms*, *Google Slides* and others. The teams learn how to use each tool on their own by viewing *YouTube* tutorials. Their "products" are displayed on the teams' blogs. Each member's engagement in the execution of the task is also described on teams' blogs.

Organisation of the project. The project was targeted at first-graders and student participation was voluntary as the project was an extracurricular activity in the 2016/2017 school year. In November 2016, 25 students-contestants were recruited to the project, who were then assigned to one of five teams, each of which had five members. Each team collectively devised a name for the team, elected a team leader and a chronicler (blogger). The implementation of the project began on December 1st 2016 and lasted throughout the remainder of the school year. Each month the teams dealt with a challenge related to a different school subject. The biology challenge came second in the project (the order of the challenges was motivated by the subject teachers-designers' availability) and was performed by the teams in January 2017. It needs to be noted that January marks the end of the first school semester in Poland, which entails a lot of tests and homework. Unsurprisingly, this is usually considered a very difficult month within the school year – students tend to be exhausted and unwilling or unable to engage in additional work at school.

The present article focuses on how the biology challenge (two tasks) was designed, implemented and evaluated. This process was undertaken by two Polish educators, an academic teacher at the Pedagogical University of Cracow (Project leader and Researcher 1) and a biology teacher at 21st Kołłątaj Secondary School in Warsaw (Researcher 2), the authors

of this article. Specifically, the study examines the students' perceptions of the biology challenge (i.e. one of the tasks) and the following questions guided the investigation:

1. How do the students rate the biology task regarding its usefulness, difficulty, satisfaction and interest?
2. Which features of the task make it useful or difficult and which create satisfaction?
3. What, in the students' opinion, are the learning outcomes?
4. How do the students rate the biology task as a whole?

It is hoped that the reported results will provide evidence for the educational value of the gamified activities, thus enriching didactic theory and offering valuable insights to school teachers, educational researchers and policymakers.

3.2. Procedure - biology challenge design and implementation

The problems that were selected to be addressed in the biology challenge relate to contemporary biological and social issues and concern the majority of the population, not just a small group of scientists and nature lovers. It was assumed that the students would benefit from exploring and verifying certain views that may go against rational and scientific knowledge. The first problem that was considered was the attitude to vaccination that is gaining in popularity among the public. There is a growing trend not to vaccinate, despite the fact that scientific sources clearly indicate that refusing immunization puts people's health and even lives at risk (Bonanni, 1999, pp. 120-125; Marchewska, Majewska & Młynarczyk, 2015; http://www.who.int/mediacentre/factsheets/fs286/en/). The other issue revolved around feeding wild birds, especially in winter. Unfortunately, by using unsuitable food (e.g. bread), people can do more harm than good (Bocheński, Ciebiera, Dolata, Jerzak & Zbyryt, 2013; Czujkowska & Kruszewicz, 2014). As a result, the challenge entitled "Facts and Myths in Bioscience" was created. The aim of the first task, "Vaccinations – facts and myths," was to confront popular beliefs concerning vaccinations with medical knowledge. The second task, "Feeding wild birds – facts and myths," necessitated confronting popular beliefs on feeding wild birds with bioscientific knowledge. The teams were to choose only one task.

In each of the tasks the students were to design and conduct a survey (at least 20 people) on the selected topic and then compare the results with the scientific facts. Expert knowledge on the subjects was gained by interviewing scientists and/or doctors and by researching and obtaining professional information from relevant literature. The conclusions gained from confronting the views and beliefs with modern scientific knowledge were to be presented in the form of an online comic strip. To prepare and conduct the survey, as well as

the comic strip, the students were encouraged to use online tools such as *Google Forms*, *Storyboard That* or *Stripgenerator* (http://stripgenerator.com/). Links to tutorials in English were added so that the students could learn how to use them (English was the language used in the tutorials). Assessment criteria for the tasks were as follows: compliance with the topic, accuracy of the survey questions, appropriate terminology, language accuracy (English), appropriate conclusions, the aesthetics and logic of the comic strip organisation, volume – 6-10 frames/cells, creativity and originality in the approach to the topic. A deadline for submission was assigned, with team leaders and chroniclers reminded of their duties. The full text of the biology challenge is available on: https://goo.gl/fXUZp6.

Information about the challenge was published on the project website at the beginning of January 2017. In order to introduce an element of surprise, access to the challenge was through a QR code. The teams worked towards the completion of their projects for three weeks and submitted links to their blogs (where the links to their comic strips were published) via email to the Smart Hatter (Researcher 1) prior to the deadline. While pursuing their biology challenge, the contestants worked in the teams formed at the start of the project.

All five teams completed the biology challenge by submitting their online comic strips, with an example presented below (Figure 1). What is more, based on blog entries, we know that all the team members were involved in the task execution.

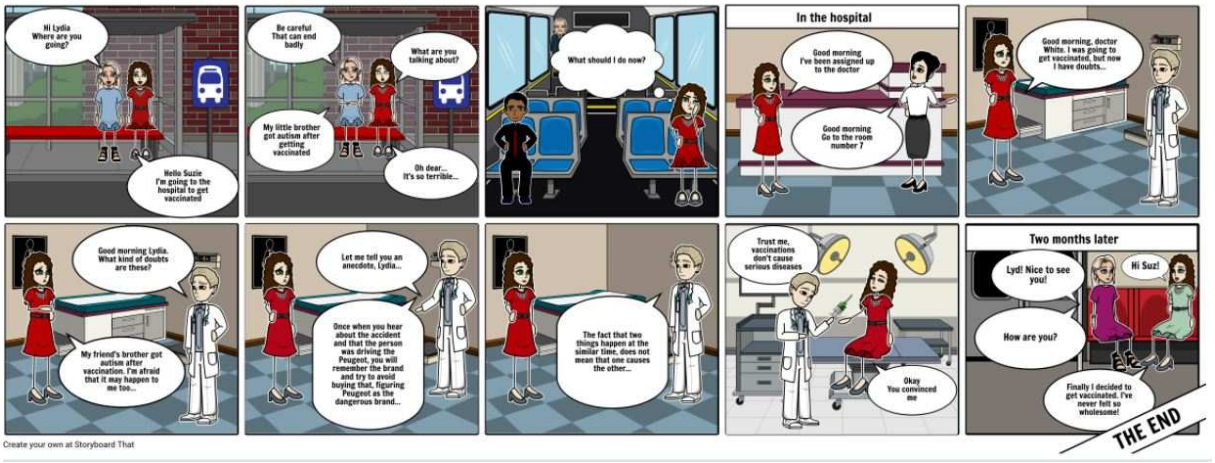

Figure 1. "Lydia's dilemma" by Highfliers. Taken from:
https://www.storyboardthat.com/portal/storyboards/highfliers/corp-public/lydia-s-dilemma

It became evident that only one team completed the task by contacting an expert. To gain an objective scientific view, they went to a lecture on vaccinations and antibiotics in the Copernicus Science Center (Warsaw, Poland). After the lecture they talked to the professor

conducting the lecture. The result of their work was a comic strip that illustrates correctly drawn conclusions. Other teams decided to find the necessary scientific knowledge on their own (from literature)[2]. The results of these teams were weaker. Their comic strips contained substantive errors (e.g. erroneously included information about the presence of bacteria and viruses in the vaccines) or a complete misunderstanding of the problem (a focus on the issue of not feeding birds instead of on the issue of feeding birds with wrong kind of food, like bread). However, interestingly, the surveys of these groups were prepared correctly. Therefore, incorrectly drawn conclusions are related to an insufficient understanding of the topic. Direct contact with a specialist, as well as the ability to inquire and explain certain issues are likely to prevent such errors.

3.3. Study participants

The sample consisted of 21 first-grade students (out of the total project participants N=25; boys N=10, girls N=15) from the 21st Kołłątaj Secondary School in Warsaw. Four students did not participate in the evaluation of the challenge because they were absent from school on that day. Online questionnaires could solve this problem but due to the students' workload at that specific time, the researchers accepted that not all the students were able to complete their evaluations.

3.4. Data collection

The data were collected in January 2017, two days after the deadline for the task submission. Project participants who were present at school on that day were gathered in a classroom and given pen-and-paper questionnaires[3]. This procedure was not new to them – one month earlier they had participated in the evaluation of the history challenge.

Six variables were considered in the study: (1) task usefulness, (2) task difficulty, (3) task satisfaction, (4) interest in the task, (5) perceived learning outcomes, and (6) overall task evaluation. A self-report pen-and-paper questionnaire was designed to collect data. Polish was used in the questionnaire to avoid language problems and to allow respondents to freely express their opinions.

Four variables, i.e. *task usefulness*, *task difficulty*, *task satisfaction*, and *interest in the*

[2] The design of the study does not allow us to find out whether they had difficulty reaching the specialists.

[3] This mode of data collection was preferred as the school computer laboratory, which would allow online administration of the questionnaires, was not available. Use of the students' mobile phones had been considered but as it was not certain whether all the students would have their mobile phones on that day, pen-and-paper questionnaires were used to ensure an appropriate response rate.

task were measured using the questions specifically designed for the study. While designing the items we drew on the Motivational Design Matrix which includes four dimensions: Attention, Relevance, Confidence, Satisfaction (Keller, 2010, pp. 261-270). The questions in the questionnaire were formulated as follows: "How useful / difficult / satisfying / interesting was the biology task?" The participants were asked to respond using the five-point Likert-type response scale: 1 – "not at all" to 5 – "very". To obtain more information about each variable, the respondents were asked to explain their reasons.

The *perceived learning outcomes* variable was investigated by one open-ended question "What did you learn while doing the biology task?". The *overall task evaluation* variable was measured by "How do you evaluate the biology task overall?". The responses were collected by means of a five-point scale, ranging from 1 – "poor" to 5 – "very good". An additional open-ended question "Why do you think so" was added to gain more understanding of the respondents' ratings.

3.5. Results and findings

Mean results for the participants' evaluations (N=21) of task usefulness, task difficulty, task satisfaction and interest in the task are shown in Figure 2. On average, the respondents rate all the aspects as moderate to good – the mean value of task usefulness in the sample is M=3.43, task satisfaction M=3.52 and interest in the task M=3.48. Task difficulty is rated as rather low to moderate M=2.90. The standard deviation values ranging from SD=1.18 to SD=1.50 show that participants differed markedly in their ratings.

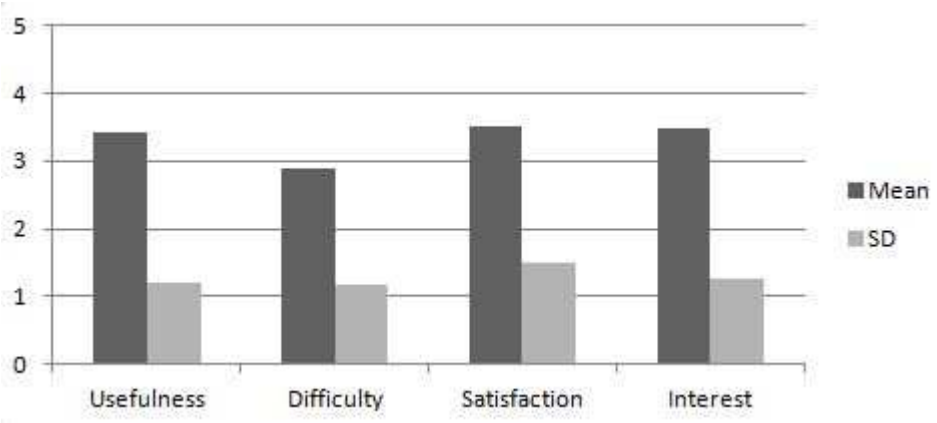

Figure 2. Means and standard deviations in the sample (N=21); 1-5 scale: 1 – not at all, 5 – very

Task usefulness. Many respondents indicated that they had learnt some or a lot of new

facts related to biology (7 respondents) and how to use an application for making comic strips (1 respondent). One participant felt that the task would facilitate schoolwork in the future. In five respondents' opinions not much or nothing was learned because the information was not new to them. The topic was not considered useful by one respondent.

Task difficulty. Those participants who rated the task as easy explained that the information was readily accessible, the task was not complicated, it was enough to get involved and spend some time doing it. What was a bit difficult for some participants was finding and/or approaching people in the street in order to recruit survey participants. Finding information from a reliable source and checking if it is still up-to-date also required some effort, in the respondents' opinions. Finally, it was also pointed out that the task was (very) time-consuming.

Task satisfaction. Enjoyment, i.e. having fun while collecting survey data and preparing the comic strip, was indicated by four respondents. For two respondents, working with people or with the team constituted a source of satisfaction. Two study participants liked the outcome – their comic strip. The task brought satisfaction to the participants who were interested in biology. No satisfaction was reported when the subject (biology) was not considered to be interesting or because the survey prepared by the teams was not treated seriously by their respondents. No satisfaction was associated with the reported fact that the task itself was not challenging (1) or uninteresting (1).

Learning outcomes. When asked what they had learned while doing the biology task, five respondents reported that they had learned about vaccines, as well as about people's opinions about them. Four students learned more about feeding birds and actual practices. Four students declared that they had discovered interesting applications for creating online surveys and comic strips. Two students indicated that they had learned that teamwork could be difficult when team members do not contribute to the work. One student reported learning that people do not use reliable sources of information. Finally, one student declared they had learned nothing new.

Overall task evaluation. Two respondents did not provide their answers unequivocally (e.g. "4/5") so their answers could not be entered into the data set. For this reason there were N=19 with regard to this variable. Quite surprisingly, the mean for the overall task evaluation is higher (M=4.16) compared with the other variables and the respondents provided less varied responses (SD=0.83) (Figure 3). As illustrated in Figure 4, the respondents most often rated the tasks as "very good", i.e. 5 on a 1-5 scale, followed by those who gave it a rating of 4. These who rated it 3 were the least frequent in the sample.

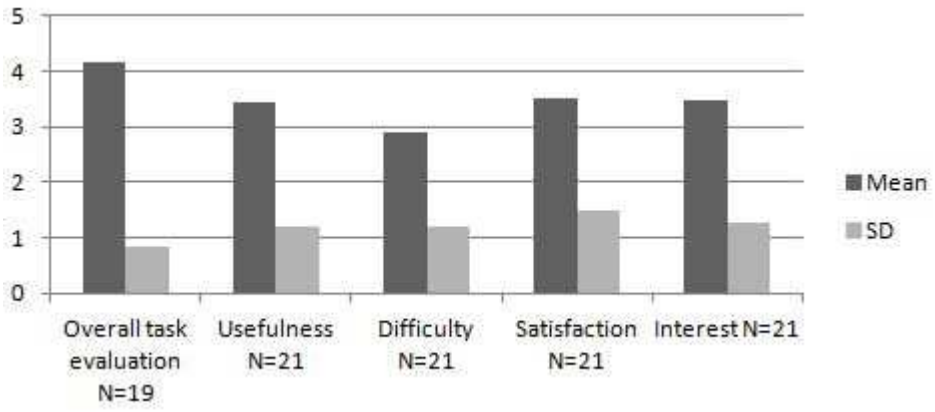

Figure 3. Means and standard deviations in the sample; 1-5 scale: 1 – not at all, 5 – very

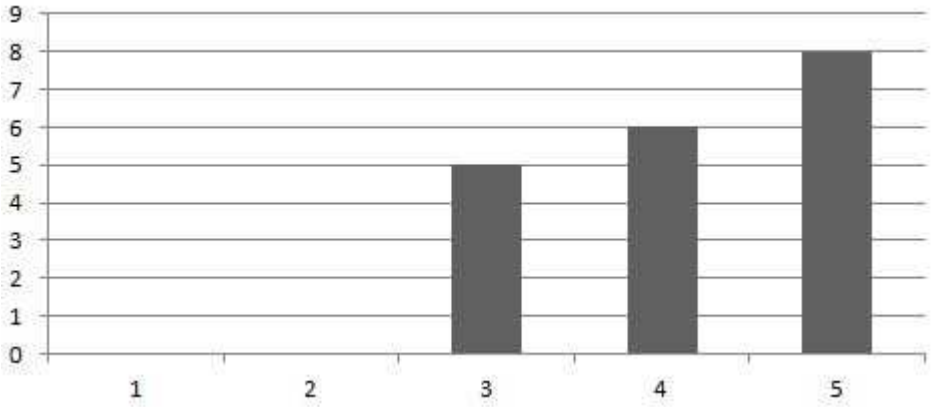

Figure 4. Overall task evaluation. Frequencies of responses (N=19); question: *How do you rate the biology task on the whole*? 1-5 scale: 1 – poor, 5 – very good

When asked to explain the rating, five participants highlighted interaction with other people: a doctor, strangers (in the street), and/or the team. Three students indicated that they had learned how to use new applications (*Google Forms* and/or *Storyboard That*). Also three students stated that the task was interesting. Two students liked the idea of making a comic strip "because creating a comic strip is very creative and thanks to it we learn and remember" (authors' translation). Two students declared they had broadened their content knowledge (biology). One student stated that they had fun. On the negative side, six students declared that the topic was not interesting or they were not interested in biology. Individual students felt that the task was awkward, required preparation or covered a lot of material. Finally, one student felt they could not show their full potential.

4. Discussion

The aim of this paper was to investigate the scope of gamified extracurricular CLIL activities

for developing key competences in upper-secondary school. In particular, we wanted to find out whether the theory-inspired biology tasks would be motivating and meaningful to students, ensuring their engagement in a non-compulsory educational activity.

Based on the results, it becomes evident that the students were willing to undertake work outside the classroom. It is clear that it is possible to engage students in additional educational initiatives, even though they were burdened with obligatory schoolwork. It seems that the students were driven by a feeling of fun, curiosity, as well as a sense of community and achievement. These appear to be strong motivating forces behind student engagement.

Secondly, we notice that technology plays a significant part in the students' learning experiences. The study participants appreciated the opportunities to learn and use new digital tools. Interestingly, we observed that students, initially not familiar with the tools (*Google Forms* and/or *Storyboard That*), learned how to use them on their own by watching the suggested *YouTube* tutorials and managed to successfully use them in the execution of the tasks. Hence, it appears that, by adopting digital solutions, teachers can provide new opportunities for student work, as well as an attractive space for creative problem-solving (biological in this case).

Next, it became clear that it is worth introducing students to other sources of knowledge (apart from a teacher and a textbook) as meeting with a specialist seems to have been essential in drawing the correct conclusions. The example of the other teams, however, shows how important it is to scaffold students' work and to prepare them for the use of other sources of knowledge. In the tasks performed, we observed that they had read the literature related to the given topic, but they had problems with interpreting it correctly.

Students did not refer to the English language in their responses while evaluating the tasks. Surprisingly, it was never mentioned that using English constituted a problem, nor was it said that they had learned anything to do with English. The skills connected with using language for project purposes appears to be transparent, eluding the students' attention while executing challenging social activities, where the focus is primarily on content, and not on language. It may be speculated that the extracurricular activities and tasks, such as those presented in this paper, have the potential to afford upper-secondary school students with an environment which facilitates implicit language learning, serving a complementary function to the explicit language instruction provided in a language class.

On the negative side, six students declared that the topic was not interesting or they were not interested in biology. This lack of interest is probably a sign of certain social trends as the problems involved in the challenge have social and environmental significance. An

awareness of the need for vaccination is the foundation of the social health of the population. Additionally, an understanding of the environment within a city (e.g. by appropriate feeding birds) is essential to maintain biodiversity in metropolises. As a society, we do not attach much importance to these issues, which may have negative consequences in the future. That is why it is so important to discuss these topics with young people, who will – among others – decide in 5 or 10 years whether to vaccinate their own children.

The results show that the challenge on the whole is evaluated favourably, even though specific dimensions are given lower ratings. It is speculated that this is caused by gamification, where two kinds of motivation came into play: external (leaderboards, points, competition, etc.) and internal (the need for relatedness, autonomy and competence). As a consequence, the individual students within the teams acted together, and this included the students who were not particularly interested in biology. This might have led to the emergence of group dynamics that enhanced the perception of the task.

Finally, the major limitation of the current study needs to be acknowledged. Not all the students out of the total N=25 participated in the evaluation of the challenge, which slightly narrows our understanding of the students' perceptions. It appears that, despite organisational and time constraints, adequate ways must be sought to ensure access to the perspectives of all the participants in order to gain insight into their learning experiences. This would provide more comprehensive results.

5. Pedagogical implications and final conclusions

Certain suggestions can be put forward on the basis of the results obtained in the study:

- Teachers should not refrain from engaging in activities that integrate different areas of knowledge (e.g. computer science, English and biology). This allows for the practical use of the skills acquired by the students and influences the motivation to learn.
- It is worth giving students more freedom within active learning and skill acquisition. With appropriate motivation, students use a wide variety of sources of knowledge. It is necessary, however, to support this process – the teacher should verify the sources of knowledge and monitor the students' work.
- Clear assignment of the responsibilities within the groups probably contributed to the increase in work efficiency. By assigning each student a task such as a leader, a chronicler, etc. we ensure the contribution of all the team members.

The biology challenge in the "Hatters" project required the contestants, among others, to use the English language, technology and online resources, as well as to think creatively,

analyze data and draw conclusions. Not all the teams dealt appropriately with the task at the substantive level. Nevertheless, all the students took an active part in the challenge, successfully using technological tools and presenting their results in English. It is hoped that these results shed some light on the use of gamification in upper-secondary schools, serving as evidence that gamified systems have the potential to promote student motivation and engagement in long-term non-compulsory educational activities.

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