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Predicting Academic Achievement

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Abstract

This paper reports the findings of a study that sought to examine the factors that influence academic achievement at Sultan Qaboos University (SQU) in the Sultanate of Oman. The study investigated the extent to which English language proficiency could predict academic achievement. It also looked into the relationship between gender and college and academic success. The sample consisted of 857 undergraduate students from three cohorts, 2010, 2011 and 2012. The data included students' English language placement test scores and grade point averages. The results showed a strong relationship between English language proficiency and academic success. Language proficiency was found to predict 13.5% of academic performance. Gender and college were also found to affect achievement. The study showed that the three factors, language proficiency, college, and gender, collectively account for 24% of students' university success. However, gender was found to have the strongest predictive effect among them. This implies that there are many other factors that come into play. The findings of this study demonstrate the complexity of academic success

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and pave the way for future studies that could probe into the various aspects of college study.

Keywords: Academic competence, academic success, foundation programmes, intensive English language programmes, language proficiency

Introduction

Much has been written about the relationship between language proficiency and academic achievement. Most higher education institutions that use English as the medium of instruction demand that students demonstrate a certain level of English proficiency before they are allowed to enroll in academic courses. It is believed that students will not be able to function in their degree courses without a certain minimum level of English. Students who fall short of the required proficiency level are subjected to intensive English language tuition. However, there has been a debate about the relationship between English proficiency and academic success and the extent to which such programmes actually help learners cope with the rigorous demands of the content-area courses. Research has shown *conflicting* results about the impact of such preparatory instruction.

There are several reasons that prompted this study. First, there were several research studies on the relationship between language proficiency and academic success but the findings were not conclusive. Therefore, this study was another attempt towards understanding the factors that could predict learners' success in higher education and perhaps influence the conclusions one way or another. Second, to the best of the researcher's knowledge, there has been no published research on this topic in the Sultanate of Oman. The region where the study took place has its own characteristics that make it unique. In other words, preparatory or foundation programs are being increasingly used as a pre-requisite to academic study by many higher education institutions. This particularly applies to the Arabian Gulf region where the proficiency level of school leavers is deemed inadequate for academic study and therefore students are exposed to intensive preparatory instruction.

Moreover, the study examined the construct of academic achievement in relation to three different factors. The researcher measured the effect of each factor individually and collectively with the other factors. This helped establish a more profound understanding of the different variables involved in academic achievement.

In addition to this, the present study tried to quantify the effect of the different factors on academic achievement. This does not seem to have been done before.

The present study set out to investigate the extent to which English language proficiency could predict academic achievement. It also explored the relationship between gender and college and academic success.

Theoretical background

One important reason language programmes fail to prepare students well for academic study is that there is often a lack of understanding about what the term ‘language proficiency’ entails. Cummins (1980, 1984, and 1992) was one of the first scholars to provide a conceptual explanation of language proficiency. His framework has been useful and influential in this regard. He states that the construct of language proficiency is complicated and poorly defined. He distinguishes between two levels of language proficiency; a surface and deep level (see Figure 1 below). The surface level contains the visible quantifiable formal aspects of the language such as pronunciation, grammar, and vocabulary and it is referred to as Basic Interpersonal Communicative Skills (BICS). It deals with the type of language used in everyday communication such as knowledge, basic understanding, and application in concrete situations. On the other hand, the deep level is the Cognitive Academic Language Proficiency (CALP) which deals with the less visible features such as semantics and function or with “the manipulation of language in de-contextualized academic situations” and includes analysis, synthesis, and evaluation (Cummins, 1984, p. 137). Cummins argues that cognitive skills are more important for academic success than basic skills and warns that a learner’s ability to converse in the target language should not be taken as an indication of his/her ability to function in academic courses.

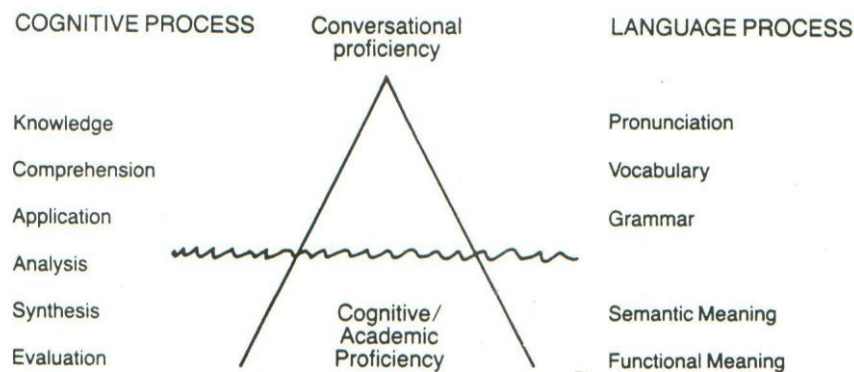


Figure 1. Surface and Deeper Levels of Language Proficiency

Cummins argues that ESL students are usually assessed on their ability to perform context-embedded and cognitively undemanding tasks, giving the assessor or the teacher a false prediction of the actual proficiency level of the learner. He notes that the reason many ESL students fail to grasp higher level language skills is because their first encounter in the language classroom is context-reduced and unrelated to their own experiences. He argues that learners first need a certain level of general language skills to be able to function in advanced and context-reduced situations. He argues that the fact that ESL students function rather well in interpersonal situations but fail to function appropriately in academic settings shows the significance of the distinction between conversational and academic aspects of the language. He believes that it takes a learner a much longer time (5-7 years) to acquire academic language than conversational language. A similar prediction has been made by other researchers (see for example, Collier, 1987 and Light, Xu and Mossop, 1987). Collier notes that it takes 5-7 years to acquire academic skills and that “there is no shortcut to the development of cognitive second language proficiency and to academic achievement in the second language” (1987, p. 638).

In addition, Cummins (1992, p. 22) believes that L1 has a strong impact on L2 development. He argues that L1 and L2 are interdependent and that there is a “common underlying proficiency” between the two languages. According to Cummins, even if the two languages have different superficial features, they share the same conceptual basis (see Figure 2 below). Therefore, experience in one language can aid or hinder acquisition of the other language at both levels of proficiency. Cummins states that there is a threshold level for L1 to aid the cognitive and academic development of L2 but it is still not known where that level really starts. Jordan (1997) presents three scenarios of L1 transfer: (1) students already possess

sophisticated academic and study skills from their L1 and all they need is to be able to transfer these skills to L2; (2) students have a reasonable repertoire of skills from L1 but due to differences they are unable to use them. In this case students need a special training on certain academic conventions; and (3) students' L1 skills are poor and not likely to aid L2 development, requiring intensive skill training in L2.

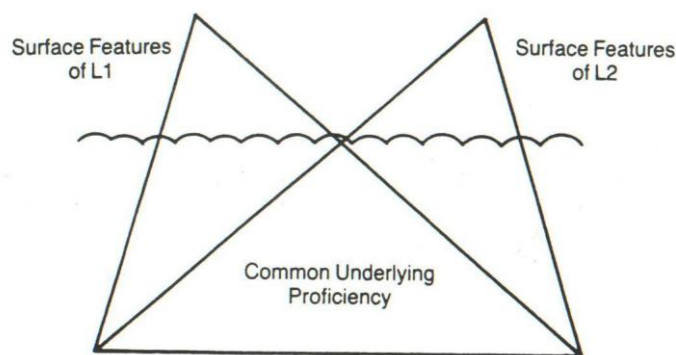


Figure 2. *The Dual Iceberg Representation of Bilingual Proficiency*

Another proposal was given by Spolsky (1989) in what he called the “preference model of language proficiency”. Spolsky argues that individuals can be proficient in the target language in different ways. Some people can speak the language in interpersonal situations but cannot use it in academic tasks. Thus, according to Spolsky, different individuals have different features of language proficiency at varying degrees. In other words, the preference model implies that students learn the target language for different purposes and that a student who possesses general language knowledge may not be able to function well in academic situations that require academic variety of the language.

Saville-Troike (1984) introduced the term “academic competence”. According to Saville-Troike, academic competence consists of at least three major components, namely (1) language proficiency, (2) subject-area knowledge, and (3) study/academic skills; and that students should be given enough training in each of these areas. Adamson (1990) notes that the reason many ESL students are not successful in academic study is that academic skills are not taught well in ESL courses. He illustrates that in traditional EAP classrooms students take notes on a passage that has already been understood and adapted. The teacher deliberately provides contextual cues to the learner, making the task of language learning “cognitively undemanding” (Snow, Met and Genesee, 1989, p. 203). Although these activities may be necessary

for training students on academic skills, they do not really prepare students for the challenging demands of the real world, according to Adamson (1990).

However, despite these research findings about the importance of academic language proficiency, many preparatory programmes continue to adopt traditional approaches to language teaching, ignoring the fact that learners need language not to learn about it but to be able to use it functionally. As Stoller (1999, p. 10) notes, “Though their EAP students have well-defined academic aspirations and an urgent need to prepare for the content-learning demands of mainstream courses, many IEPs [intensive English programmes] continue to endorse the discrete-skills approaches that came into vogue in the 1970s.” Mohan (1986) asserts that ESL/EFL students fail to learn the language because of lack of connection between language and content. He notes that: “In subject matter learning we overlook the role of language as a medium of learning. In language learning we overlook the fact that content is being communicated” (p. 1).

Language proficiency as a predictor of academic success

The relationship between English language proficiency and academic achievement has been researched extensively. Overall, the connection was found to be positive. There have, however, been a few cases of inconsistency. Mason (1971) conducted an experimental study to test the assumption that English proficiency norms are predictors of academic success and that intensive programmes are the best way to develop English language proficiency. The study involved two groups of intermediate and advanced students who were divided into an experimental group of nine and a control group of fifteen. The treatment group was given exemption from taking language classes and went straightforward into the academic programme, while the control group took EFL courses prior to the academic courses. Both groups were given a battery of pre- and post-tests at the end of the first semester. At the end of the entire school year, the GPAs were recorded. No significant differences were found in the results from the pre- and post-tests. Also, there were no significant differences between the students' GPAs in the two groups. The GPAs of the experimental group were slightly higher but the difference was not significant. Mason concludes that students should be given the choice to enter the academic programme without imposing the language requirement. He reasons that even if their language proficiency is low, many EFL students are psychologically ready to take on academic tasks and be

immersed in the academic environment. However, in the experiment, the students in the control group were able to make up for the significant differences in aural comprehension and writing that were found on the pre-test scores. This might show that the language programme was probably successful in filling those gaps. However, Mason argues that this improvement could have been made without the EFL training, perhaps by attending the academic programme. However, the study did not attempt to answer this question.

In their qualitative study, Christison and Krahnke (1986) surveyed ESL learners' attitudes towards intensive study in the United States using structured interviews. Eighty international students studying at five different US universities participated in the study. The results showed that 97% of the subjects thought that their language skills improved as a result of the intensive programmes. However, the majority of them agreed that the improvement was in their general English ability and not academic ability. More positive results were achieved by Leki and Carson (1994). The researchers surveyed the attitudes of 128 ESL students from two American state universities by a means of a questionnaire. The subjects were asked how the former language courses prepared them for their content courses. The majority of students said that they benefited from the language instruction. They were also quite pleased with their academic performance. However, the students demanded that the language programme focus on more specified academic topics and library and critical thinking skills.

Light and Teh-Yuan (1991) investigated the relationship between proficiency test scores and academic performance of 56 Soviet students in a summer programme at Middlebury College. The subjects were given a writing test and TOEFL exam at the end of the intensive language programme. They also completed a questionnaire about self-rating their language ability on ten academic tasks and predictions of academic success. At the end of the first fall semester in the academic programme, the researchers reviewed the students' GPAs and compared them with the results from the two tests and the questionnaire. The results showed a significant correlation between the students' summer programme TOEFL and writing test scores and their GPAs in the fall semester. The TOEFL scores also correlated with the number of course credits earned by the subjects. In addition, the researchers found a significant correlation between the TOEFL scores and the students' ratings of their language skills and also their predictions of their academic success. However, it was noticed that the mean

TOEFL score for the subjects was 462 and 43 students had a TOEFL score below 547. The researchers note that despite their low TOEFL scores, the students managed to succeed in the first semester and earn an average GPA of 3.4. Thus, they remark, it would have been difficult to predict the learners' success solely based on their TOEFL scores.

Maleki and Zangani (2007) investigated the relationship between English language proficiency and academic achievement of Iranian EFL students. The researchers compared the students' scores in a standardized English proficiency test with their GPAs. The researchers found a positive correlation between proficiency and academic achievement. It should be pointed out here that in this study the subjects were students majoring in English translation and so English is instrumental in such a discipline and hence the positive relationship that the study found.

Fakeye (2014) investigated the connection between English proficiency and academic performance of 200 senior secondary school Nigerian students. The researcher measured the impact of English proficiency on three content-area subjects: English, mathematics, and biology. The results showed a significant positive relationship between students' language proficiency and academic performance. More recently, Racca and Lasaten (2016) investigated the relationship between the English language proficiency and academic performance in science, mathematics and English of 216 grade 8 students in the Philippines. The researchers found a significant relationship between proficiency and academic achievement in the three subjects. However, this was not the case in another recent study in the region by Dev and Qiqieh (2016) who looked into the relationship between English language proficiency and academic achievement of students in the Abu Dhabi University, in the United Arab Emirates. The findings revealed that language proficiency did not have any direct impact on students' academic achievement.

Graham (1987) reviewed several studies that revealed inconsistent findings about the relationship between language proficiency and academic achievement. He discusses two major reasons for this inconsistency, namely the definition of academic achievement and the predictive value of proficiency tests. As for the former, Graham states that in most educational institutions GPA is the only indicator of the learners' academic ability. However, he argues that GPA is not always a valid indicator of the learner's academic ability because it does not reflect the number of courses taken and many of the grades are based on the teacher's subjectivity and sympathy with the

learner. As for the predictive value of language tests, Graham asserts that although the language test might be valid for language proficiency, it may not necessarily be valid for academic achievement. He reasons that many proficiency tests are based on linguistic items, making their validity to assess learners' communicative competence questionable. For Graham, the relationship between language proficiency and academic achievement is complex, whether achievement is measured by many indicators or only by GPA. The language proficiency is only one factor in academic success and there are many factors that can influence a learner's achievement such as motivation and attitude towards the target language. Graham warns that language test scores should not be allowed to "play a disproportionate role in admission decisions" (p. 516). He suggests that every institution have its own cut-offs for language requirements and base its decisions on an extensive study of the learners' performance in academic courses and in consultation with college faculty members.

Graham's findings are related to the impact of language proficiency on academic achievement in general. However, there is now evidence that the influence of language proficiency may vary depending on the academic discipline. Light et al. (1987) found that language proficiency is less important in hard sciences and more in humanities and social sciences. The researchers reviewed transcripts and TOEFL scores of 376 ESL students studying at State University of New York at Albany (SUNYA). The mean TOEFL score was 561 (SD = 46) and the mean for the first semester GPA was 3.40 (SD = .054). Light et al. found a significantly stronger correlation between academic success and language achievement for students in humanities, fine arts, and social science than for those in science, math, or business. They also noted that there was no significant difference in academic achievement between students with TOEFL scores below 550 and those above 550. In fact, further analyses of the data indicated that students with TOEFL scores below 550 obtained higher GPAs than those with TOEFL scores in the range 550-569. The finding about the discriminatory effect of the proficiency test also appeared in Light and Teh-Yuan's (1991) study described above. They found that the correlation between TOEFL scores and academic achievement was significantly higher in the humanities majors than in the sciences. In light of these findings, the researchers contend that one should look at variables other than language proficiency tests and GPAs. They list a number of factors that can affect academic achievement, such as students' motivations and teachers' evaluations.

Other researchers have raised concerns about the content and methodology of the language programme itself as being irrelevant to the students' needs. With regard to content, it has been noticed that traditional language courses utilize general materials and topics which are not directly related to any discipline. In their study, Flowerdew and Miller (1997) examined the issue of authenticity in academic listening textbooks. They compared lecture transcripts with listening texts from different ESL textbooks. The analysis showed that the texts used in teaching lecture comprehension lacked essential features in real-life lectures such as redundancy, personalization, rhetorical questions, etc. The researchers suggest that all of these features should be incorporated in the ESL/EFL curriculum to prepare students more effectively for their content courses. Flowerdew (1994) remarks that knowledge about the lecture discourse is not only necessary for course designers but also for lecturers themselves; that is, it enables them to plan their lectures in a more effective way.

The study

Context

Sultan Qaboos University (SQU) is a government university in the Sultanate of Oman. It was established in 1986. School graduates compete quite strongly to enrol in this prestigious higher education institution. There are nine colleges namely, college of medicine and health sciences, college of nursing, college of science, college of engineering, college of agriculture and marine sciences, college of economics and political science, college of education, college of law, and college of arts and social sciences. The total number of students at SQU is around 17,000. The students are predominately Omani citizens who are speakers of the Arabic language.

In the Omani school system, English is taught as a subject starting in grade 1. The rest of the school subjects are taught in Arabic. The language of instruction at SQU and in many higher education institutions in Oman is English. At SQU, programmes are taught in English (medical and hard sciences and some of the humanities majors), Arabic (in humanities majors), or English and Arabic (in some of the humanities majors). A large number of the school graduates who enrol in higher education institutions fall below the target English level and are required to take intensive English courses. Students are often given an English placement test that

determines their proficiency level and the amount of English instruction they need to meet the admission criteria. The Sultanate of Oman introduced general foundation programmes (GFPs) in all higher education institutions. GFPs consist of four main strands, English language, mathematics, information technology and study skills. According to the Oman Academic Accreditation Authority (formerly known as Oman Accreditation Council) (2008), which is the authority responsible for creating and overseeing the implementation of the general foundation programme standards:

A General Foundation Programme is a formal, structured programme of study licensed in the Sultanate of Oman and provided by a licensed higher education institution (HEI). It is designed to prepare students for their post-secondary and higher education studies. It precedes the first formal year of higher education study. It is only required for students who do not otherwise meet all the entrance criteria for the first year of their post-secondary and higher education. ...It is general in disciplinary scope, thereby preparing students for a wide variety of subsequent post-secondary and higher education programme options. It is not precisely 'higher education', but nonetheless falls within the ambit of the Oman Accreditation Council. (p.6)

GFPs focus on the development of learners' linguistic, numeracy, computing, and study skills. This is bridged by a set of standards that describe the minimum competencies that learners are expected to demonstrate at the end of the programme to be able to start their academic study at any higher education institution (HEI) (Al-Busaidi and Tuzlukova, 2013b). Carrol, Razvi, Goodliffe and Al Habsi (2009) describe the standards:

These outcomes are not achieved by chance, but are the result of carefully planned and executed formal programmes of study. Therefore, the standards also address the minimum structural and resourcing requirements. Standards are not curricula. It is the responsibility of each HEI to develop the curriculum, teach and assess students, and review and improve its GFP curriculum in line with the requirements of these standards. (p. 4)

Thus, the standards serve as a framework for higher education institutions to develop their foundation programmes. Each institution has the liberty to decide about the programme structure, duration, assessment techniques, etc., as long as it provides evidence that it has met all standards in the four areas.

The foundation programme at SQU started in year 2010 – 2011. The programme at SQU is managed by the Language Centre and the Foundation Programme Office. The Language Centre is responsible for the English courses while

the foundation programme office manages the math and IT courses. The foundation programme consists of four main components: English language, mathematics, information technology (IT) and study skills. The table below gives an overview of the courses offered at the foundation programme. The English strand consists of six proficiency levels ranging from beginner to upper intermediate. Every two levels are taught in one course in one semester. The math component contains two courses while there is only one IT course. Students in English-medium and bilingual majors are required to pass all foundation programme components. However, students in Arabic-medium majors must pass the two math courses and the IT course and two English courses designed specifically for them. The language of instruction and assessment of the math and the IT courses is English for English-medium and bilingual majors and Arabic for Arabic-medium majors. Table 1 below gives an overview of the courses at the GFP at SQU.

Table 1: An overview of the courses at the GFP at SQU

Courses	Number	Teaching hours	Colleges/ majors
English language	Three courses/six levels	18hours/week	English-medium and bilingual majors
Mathematics: English and Arabic versions)	Two courses	4 hours/week	All colleges
Information technology: English and Arabic versions)	One course	4 hours/week	All colleges
Study skills	Integrated in all courses	Integrated in all courses	All colleges

When students are given admission into the university, they sit three placement tests in the English language, mathematics, and IT. Students who score

high in the placement test are given an exit test that decides if they can be exempted from a certain foundation programme component. Students can also be exempted from IT and English requirements if they present international certificates (ICDL certificate for IT and Band 5 IELTS or 500 TOEFL for English). Students are allowed to take math and/or IT courses after passing English level 3. The rationale behind this is to allow low-level students time to devote to the learning of the English language before taking other courses. Students are given up to two academic years to fulfill all foundation programme requirements. An academic year in the foundation programme consists of fall, spring, and summer semesters.

To the researcher's best knowledge, there has been no previous research that investigated this relationship at Sultan Qaboos University. As the only government university and one that is looked upon as the premier higher education in Oman, such research will have implications to the higher education sector in the nation. The present study sought to answer the following research questions:

1. To what extent does English language proficiency predict academic achievement at Sultan Qaboos University?
2. What other factors may influence academic achievement?

The sample

The sample consisted of students from three student cohorts 2010 – 2011, 2011 – 2012, and 2012 – 2013. The study was based on existing data. The data included English language placement test results and grade point averages (GPA) in college courses. This was obtained from the students' registration database from the Deanship of Admission and Registration at SQU. The sample consisted of 857 students. It was drawn from a total of 9192 students admitted to the university in the three cohorts. The students were randomly selected. Table 2 shows a breakdown of the total number by cohort and gender.

Table 2: Student numbers in the three cohorts

Cohort	Males	Females	Total
2010 – 2011	1394	1368	2762
2011 – 2012	1530	1594	3124
2012 – 2013	1578	1728	3306

Grand total	9192
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he reason for choosing three placement levels was that they represent three intervals in the proficiency continuum, beginner, middle, and high. The total number of the sample was 857, which was about 12% of the students who were placed in the six English levels from the three cohorts, which was 7242. Some students were exempted from foundation courses. This happens when students submit an IELTS certificate of Band 5 or pass the exit test. Table 3 shows the student numbers in the sample per cohort.

Table 3: Distribution of students in the sample by cohort

Cohort	Frequency	Percent
2010 - 2011	236	27.5
2011 - 2012	264	30.8
2012 - 2013	357	41.7
Total	857	100.0

The decision to use the English placement test as opposed to the math or IT tests is due to the fact that English placement testing is more established. The English placement test has existed for over 15 years and it has evolved considerably over these years. The test was developed internally by the Assessment Unit at the Language Centre in consultation with international testing experts. The test consists of four main sections, namely grammar, language use (i.e. language in context), reading, and listening. The test items range from multiple choice, cloze text, error correction, and short answer questions. The total mark is 110 divided among the four sections. Writing and speaking are not part of the placement test due to practical reasons. More than 3000 students take the test every year on the same day. The Language Centre has conducted several internal studies on the reliability and validity of the placement test. The test was found to be reliable and valid for the purposes of placing students into the different levels of the foundation programme. Over the years, there have been very few cases of misplaced students, demonstrating the reliability of the test.

In addition, the English placement offers a wider and more accurate continuum as it spreads students across six proficiency levels, compared to the math

placement test that splits students into groups and the IT test that puts them into one group. The math and IT tests were only introduced in 2010 when the foundation programme was implemented.

Results

In this section, I shall first describe the descriptive statistics and then move to the inferential ones.

Descriptive statistics

The students were almost equally divided between levels 3 and 5, with less than 10% placed in Level 1. This is rather a normal distribution at SQU, as most of the students tend to cluster in the middle and upper levels.

Table 4: Distribution of students by level

Proficiency level	Frequency	Percent
Level 1	75	8.8
Level 3	410	47.8
Level 5	372	43.4
Total	857	100.0

As a rule, the lower the level the more time students spend in the English language area of the foundation programme. Thus, Level 1 students normally spend one year and one semester, Level 3 students spend two semesters, and Level 5 students spend one semester. However, it is possible that a few of the students in the sample stayed longer due to failure, but it was technically very difficult to verify that.

Moving to the grade point average (GPA) distribution, the students' cumulative GPAs were clustered into four groups for the ease of analysis, as shown in Table 5. SQU adopts the credit system whereby courses are given credits based on their value. The GPA is out of 4. The GPA's ranging from 2.0 to 2.99 constitute more than one third.

Table 5: Distribution of students by GPA

GPA groups	Frequency	Percent
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GPA between .0 and .99	67	7.8
GPA between 1.0 and 1.99	135	15.8
GPA between 2.0 and 2.99	525	61.3
GPA between 3.0 and 3.99	130	15.2
Total	857	100.0

Academic performance in this study was based on the cumulative GPA at the end of spring semester of 2014 when the data was gathered.

I also looked into the student distribution by gender and college. The data shows that the number of male and female students is almost equal (see Table 6). This reflects the University's policy giving male and female students equal opportunities to pursue their higher education. However, the slight increase in the number of the male students could be due to the fact that more female students tend to be exempted from the foundation English programme than male students.

Table 6: distribution of the students by gender

Gender	Frequency	Percent
Male	470	54.8
Female	387	45.2
Total	857	100.0

As the Table 7 depicts, students in College of Arts and Social Sciences and College of Science each represent about 20% of the sample, while Nursing and Medical students have less than 3%. This is reflective of the annual intake where certain colleges offer a wider range of programmes at the BA/BSc, MA/MSc, and PhD levels than others.

Table 7: Distribution of students by college

College	Frequency	Percent
College of Economics and Political Science	131	15.3

College of Arts and Social Sciences	170	19.8
College of Law	61	7.1
College of Agriculture and Marine Sciences	119	13.9
College of Science	149	17.4
College of Education	57	6.7
College of Nursing	20	2.3
College of Engineering	124	14.5
College of Medicine and Health Sciences	25	2.9
Total	856	99.9
Missing System	1	.1
Total	857	100.0

Inferential statistics

This section reports the analysis of the relationship between students' scores in the English language placement test and their GPAs. I have also examined the impact of gender and college on academic achievement. This was carried out in order to obtain a more accurate picture about the factors that could predict students' academic achievement.

The results showed a positive correlation between language proficiency and academic achievement ($r=0.367$, $n=857$, $p=0.000$). That is, as language proficiency increases so does academic performance (as shown in the table below).

In light of the positive correlation between language proficiency and academic achievement, I decided to examine the effect of the gender and college variables. The GPA of male and female students was compared using an independent sample t-test. The test revealed that the mean GPA of females (Mean = 2.68, SD = 0.56) was significantly higher than the mean for males ($M = 1.94$, $SD = 0.82$) ($t = 14.970$, $df = 855$, $p = .000$) (see Table 8). That is to say, females tend to do better in college courses than their male counterparts.

Table 8: Independent samples t-test results

Independent Samples Test		
	Levene's Test for Equality	t-test for Equality of Means

		of Variances								
		F	Sig.	t	df	Sig. (2- tailed)	Mea n Diff eren ce	Std. Error Differ ence	95% Confidence Interval of the Difference	
									Lower	Upper
GP A	Equal variances assumed	48.16 2	.000	- 14.97 0	85 5	.000	- .742 37	.0495 9	- .8397 0	- .6450 4
	Equal variances not assumed			- 15.51 3	82 7.0 59	.000	- .742 37	.0478 5	- .8363 0	- .6484 3

Finally, students' GPAs were checked based on their respective college using an independent samples t-test. For this purpose, the colleges were combined into two groups: humanities and sciences. The humanities group consisted of three colleges: education, law, economics and political sciences. The science group contained five colleges, namely medicine, nursing, engineering, science, agriculture and marine sciences. The relationship was found to be significant. The mean of the humanities colleges was higher than that of the sciences colleges (2.34 and 2.21 respectively). The difference was found to be significant, $t(854) = 2.43, p = .015$.

After measuring the relationship between academic performance and each of the independent variables, I conducted regression analysis to see the predictability effect of the three variables on academic achievement. I used linear regression for this purpose.

To examine how each one of these variables contributes to the prediction of GPA, I first entered College as a predictor into the regression equation. As can be seen in Table 9, College was a significant predictor of GPA but with a low percentage of explained variance ($R(2) = 0.007$). In the next step, I added gender into the equation. When the effect of gender was added into the equation, the college became none significant. The effect of gender was significant and it contributed a good percentage in explaining the variance in GPA ($R2 = 0.207$). Finally, I examined the

effect of language proficiency in GPA in the third step. It was clear that language proficiency was a significant predictor of GPA over and above the effects of both college and gender, though gender stayed as a significant predictor in this third step. The explained variance increased significantly from 0.207 to 0.240 after adding language proficiency into the equation.

The model showed that the three variables have a 24% predictability value. This value was found to be statistically significant according to the ANOVA test, $F(3,852) = 89.718, p <.0005$ (see Table 9). In other words, the three independent variables collectively explain 24% of the variability of academic achievement.

Table 9: Coefficients table

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.346	.040		59.364	.000
	College	-.134	.055	-.083	-2.431	.015
2	(Constant)	1.936	.045		42.980	.000
	College	.012	.050	.007	.235	.815
	Gender revised	.744	.051	.457	14.681	.000
3	(Constant)	1.477	.087		16.883	.000
	College	-.032	.050	-.020	-.646	.518
	Gender revised	.582	.056	.357	10.332	.000
	English Placement Test Scores	.010	.002	.206	6.072	.000

a. Dependent Variable: GPA

Discussion

The results indicate that there is a significantly positive correlation between language proficiency and academic achievement. That is, the more proficient students are in English, the more likely they will succeed in their content area courses. This is consistent with some of the previous research on the relationship between language proficiency and academic achievement (for example, by Light and Teh-Yuan,

1991). The present study found that language proficiency can predict academic performance 13.5% of the times. This relatively low predictive value of language proficiency explains the disparity in the findings of the previous studies that investigated the relationship between proficiency and academic success that were cited early in this paper.

At SQU, more than half of the students are normally placed in the lower and middle levels. This suggests that a large number of students come with an average proficiency which may not be adequate for the demands of the university. Based on the findings of the present study, the lower the language level at entry is, the more difficult academic study is likely to be. SQU students who are placed in middle and low levels need, on average, a year to a year and a half to complete all foundation programme requirements. In her unpublished report, Al-Shihi (2013) looked at the completion rate at the GFP at SQU for the same three-year period that is covered by the current study. The report states that over the last three cohorts (2010-2011, 2011-2012, 2012-2013) less than 2% of the students were exempted from the foundation programme requirements upon admission. This means that 98% of the students need foundation courses. This suggests that there is a gap between the knowledge and skills that students acquire from school and those required at the university. This requires an extensive comparison between the content of the school curriculum and the university requirements.

The study also showed a strong relationship between college and academic achievement. The students in the humanities colleges seem to do slightly better than their counterparts in the hard sciences colleges. This could be attributed to the fact that many of the majors in the humanities colleges are taught in Arabic and English. Students are normally more able to comprehend subject matter in their mother tongue. Another possible reason is the differences in the nature of the course requirements between the two types of colleges. This certainly requires further study.

The present study also revealed that female students outperformed the male students in college courses. This is consistent with similar studies on the subject (see for example Osman, Al-Barwani, Al-Mekhlafi and Abusheiba, 2014 and Islam, 2014). Osman, Al-Barwani, Al-Mekhlafi and Abusheiba (2014) conducted a large scale study attempting to identify the reasons behind the low achievement of male Omani students. The study targeted 8000 students from across the Sultanate. The researchers

found that girls outperform boys by an average of 10% in subjects such as science, mathematics, information technology, and Arabic and English languages.

Another recent study conducted by Islam (2014) examined the influence of socio-economic, demographic, familial, students' individual scholastic and institutional factors on academic achievement at SQU. The sample consisted of 585 from 2008 – 2010 cohorts from six colleges at SQU. The researcher found that girls outperformed boys in university courses. This was attributed to several reasons, such as motivation, girls being more study oriented, level of attendance, and time spent in study.

At SQU, one possible explanation for the low achievement of male students is their living conditions. The university provides on campus accommodation for female students only. Male students live off campus and have to commute every day. The accommodations where these students live are not ideal for studying as students tend to live in very crowded apartments where there are normally no places for private studying. Transportation is another big challenge facing male students who have to commute to campus every day. There is no public transportation available. Students have to rely on taxis to bring them to and from campus, but due to the rather remote location of the university from the main residential and commercial area, taxis are not readily available on campus when students have to go back to their residences. The inappropriate accommodation and inefficient transportation have also resulted in more male students having attendance problems as they find it extremely difficult to find reliable transport to bring them to the university on time, as Al-Shihi (2013) mentioned in her report. Female students, on the other hand, are given accommodation on campus with a convenient shuttle bus system. The library, computer labs, and other services are within walking distance for girls. These reasons probably explain the big difference in performance between girls and boys. According to Al-Shihi (2013), SQU female students tend to complete the programme at a faster rate. Gender differences are widely acknowledged by researchers across the globe (see for example, Eisele, Zand and Thomson, 2009; Larson, Stephen and Wu, 2014).

Finally, the study has shown that the three independent variables, language proficiency, college and gender can predict 24% of students' academic achievement. Out of the three independent variables, gender has the strongest impact and college the weakest impact. The results also imply that there are other factors that explain 76% of the academic achievement. These variables could be related to the learners

themselves, course requirements, among other variables. Similarly, the students' achievement in the other two subjects of the foundation programme, that is, mathematics and IT, probably has some impact on academic success, something that was beyond the scope of this study. These findings indicate that academic success is multifaceted and cannot be easily predicted by the factors that are normally considered, that is, language proficiency. Non-academic factors can also influence academic achievement. These factors include motivation, acculturation, communication skills, self-efficacy, social activity and study skills, among other factors (Comfort, 2013). As Al-Husseini (2006, p.44) argues, foundation programmes should help students with their 'transition and integration needs'. These needs are related to the students' adaptation to the new learning environment.

The *content* of the foundation programme will probably have an impact on students' preparedness for academic study. There is ample research indicating the usefulness of preparatory programmes on students' academic achievement (see for example, Soares, Guisande, Almeida and Paramo, 2009). It would also be a good idea to investigate the role of the foundation programme at SQU on preparing students for the rigors of academic study.

Conclusion

The study has shown a strong correlation between language proficiency and academic achievement. Language proficiency was found to predict 13.5% of academic performance. The study also revealed that college and gender play a role in predicting students' performance in content-area courses. Unlike previous studies that predominately focused on the relationship between language proficiency and college achievement, this study investigated the impact of factors other than English language proficiency on academic success. The results showed that academic achievement is complex and cannot be easily explained by language proficiency alone. The three independent variables that were examined in the current study account for 24% of academic success. Gender was found to have the strongest predictive effect among them. This is probably due to the differences in achievement between male and female students. This phenomenon while it is not particular to this region, has been found to be quite evident, probably due to differences in study methods, life style, etc.

There are clearly other factors that contribute to students' performance in the content-area courses. More in-depth investigation is certainly needed to better

understand the requirements of academic study. Non-academic factors such as living conditions may also have a role in influencing students' academic performance. These factors equally need to be investigated.

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The Effect of a Thinking Maps[®]-Based Instructional Program on Jordanian EFL Tenth-Grade Students' Critical Reading Skills³

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Abstract

As critical reading is a process of active reader involvement, learners interact with the author's exposition and potentially construct conceptual understanding of its content, a process for which Thinking Maps[®] is a potential catalyst. This study examines the potential effect of an instructional program based on Thinking Maps[®] on Jordanian EFL tenth-grade students' critical reading skills. It further probes the perceived effectiveness of Thinking Maps[®] in developing their critical reading skills. Both quantitative and qualitative data were sought by means of a pre-/post-test and a semi-structured interview. The findings reveal statistically significant differences in the students' critical reading skills in favor of the experimental group. The qualitative analysis of the interview reveals that the participants perceived Thinking Maps[®] as highly effective. Some implications and recommendations for EFL practitioners and future researchers are put forth.

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Keywords: Critical reading, EFL, Thinking Maps® (TMs)

Introduction

Reading is essential for learning both first and additional languages and content areas alike (Carrell, 1998; Grabe, 1991), as it helps learners build their vocabulary (Stahl, 1998), further their language development (Martin-Chang & Gould, 2008), better their academic success (Butler, Urrutia, Buenger & Hunt, 2010), improve their learning skills (Carrel, Gajdusek, & Wise, 1998), better their chances at future employment (Deutsch, 2005) and, eventually, better their quality of life (Al-Damiree & Bataineh, 2016).

Research, both in Jordan (e.g., Al-Barakat & Bataineh, 2008; 2011; Alqadoumi, 1995; Bataineh & Al-Barakat, 2009; El-Maleh, 2006) and beyond (e.g., Rapp, Broek, McMaster, Kendeou, & Espin, 2007; Roehl & Shiue, 2013; Taguchi, Takayasu-Maass, & Gorsuch, 2004) suggests general weakness in reading among foreign language learners at both school and tertiary levels, which has instigated a plethora of studies which seek instructional practices to improve reading in particular and other language skills in general (e.g., Belet & Dal (2010) on storytelling, Carrell, Pharis, & Liberto (1989) on metacognitive strategy training, and Drucker (2003) on strategy learning).

Critical reading has received much attention from researchers and educational practitioners alike (e.g., Andrews, 2001; Okeke, 2010; Zhou, Jiang, & Yao, 2015) as a means for readers to keep abreast with the exponential increase in information (partly brought about by technology) which has made critical reading skills more important than ever before. Critical reading skills help students analyze, synthesize, and evaluate reading matter, as they grasp cause and effect relationships, compare ideas, and become aware of reading purposes (Abd Kadir, Subki, Jamal, & Ismail, 2014).

Nonetheless, as essential as critical reading skills are for learners across proficiency levels, research suggests that learners generally lag in these skills (e.g., Abd Kadir et al., 2014; Bataineh & Zghoul, 2006; Zhou et al., 2015), just as they do in reading comprehension skills (e.g., Grabe, 2009; Hedgcock & Ferris, 2009; Koda, 2005). Thus, effective strategies for teaching critical reading may potentially have a double effect on learners' reading comprehension and critical reading skills alike.

Critical reading skills have been classified differently by different scholars (e.g., Abu Sarhan, 2014; Amro, 2004; Al-Oqaili, 2007; El-Maleh, 2006; Flynn, 1989). For example, whereas Flynn (1989) classified the main critical reading skills into analyzing, synthesizing, and evaluation, Amro (2004) and Al-Oqaili (2007) classified them into the six main skills of annotating, previewing, outlining, taking inventory, summarizing and analyzing. El-Maleh (2006), on the other hand, outlined eight critical reading skills: drawing inferences based on cause and effect, distinguishing facts and points of view, analyzing basic elements of a short story, connecting the reader's experience with the current one, comparing and contrasting, identifying the reader's purpose, identifying the different aspects of the short story and evaluating the short story. More recently, Abu Sarhan (2014) divided critical reading skills into distinguishing main and supporting ideas, distinguishing causes and effects, identifying similarities and differences, distinguishing facts and opinions, and making generalizations and inferences.

To lighten up the cognitive demands on the participants, only the first four critical reading skills have been targeted in the current research. EFL learners have been reported to find *receptive processing*, to which distinguishing main and supporting ideas, causes and effects, similarities and differences, and facts and opinions has been found easier than productive processing, to which making generalizations and inferences can be ascribed, which is consistent with empirical research findings (e.g., Huijie, 2010; Nasrollahi, Krishnasamy, & Mohd Noor, 2015), which place the latter at the top of a hierarchical structure of skills. These four skills, along with their performance indicators, are outlined below:

1. Distinction between main and supporting ideas, as behaviorally indicated by (i) recognizing the main idea of the text, (ii) identifying supporting ideas, and (iii) identifying the thesis statement;
2. distinction between cause and effects, as behaviorally indicated by (i) identifying sentences/phrases denoting the cause and (ii) identifying sentences/phrases denoting the effect;
3. distinction between fact and opinion, as behaviorally indicated by (i) identifying sentences/phrases which express facts and (ii) identifying sentences/phrases which express opinions; and

4. identification of similarities and differences, as behaviorally indicated by (i) identifying sentences/phrases which denote similarities and (ii) identifying sentences/phrases which denote differences.

As critical reading is a process in which readers engage actively (as opposed to their traditional role of passive recipients), learners need to interact with the reading text to reconstruct its author's intended meaning. However, most EFL students lack the awareness of critical reading (e.g., Zhou, Jiang, & Yao, 2015) and, thus, resort to literal reading with very little active processing (Chen & Chen, 2015), which ultimately dwarfs any potential development in their critical reading ability. In other words, critical readers go well beyond (literal) reading as they reflect on what they read rather than take it at face value (Lewis, 1991).

Thinking Maps[®] (TMs), first introduced by Hyerle in the nineties of the twentieth century, is an instructional strategy used to promote metacognition and improve achievement. TMs has been defined as a set of explicit visual representations of thinking processes which fosters life-long learning. It comprises eight fundamental thinking skills (viz., defining in context, describing, comparing, contrasting, classifying, whole/parts, sequencing, cause and effect, and relationships between entities) defined and animated through maps which synthesize three types of visual tools (viz., brain storming webs, graphic organizers, and thinking processes) used by learners and teachers alike as a common visual language for thinking and learning across whole learning communities (Hyerle, 2004).

TMs has also been reported as a “useful tool for helping younger students with the process of building conceptual understandings of disciplinary content and, consequently, promoting their achievement” (Abi-El-Mona & Adb-El Khalick, 2008, p.298). In other words, not only has TMs been found to positively affect student achievement (e.g., Ball, 1998; Long & Carlson, 2011; López, 2011), but also to potentially promote higher order thinking (Weis, 2011) and helps students become independent life-long learners. TMs also allows students to be more involved in the learning process, “as it forces them to map out their thought process on paper, which leads to an increase in connections between content and experience” (Long & Carlson, 2011, p. 2).

TMs is grounded by brain-based learning research (Caine & Caine, 1994), as students use the maps as a concrete means to see abstract ideas in a personally meaningful manner (Hyerle & Yeager, 2000) which facilitates understanding through

organizing information and seeking meaning within prior knowledge, hence linking isolated bits of information into holistic systems (Hyerle, 1995) and allowing students to construct their own networks of knowledge (Hyerle, 1996). It provides learners with opportunities to construct knowledge by forming patterns of information, to transfer their thinking processes to content learning, and to promote their own metacognition (Hyerle, 1995).

Each of Hyerle's eight maps has its specific purpose: (1) the *circle map* enables learners to find important information about a topic, (2) the *bubble map* is meant for describing and identifying the main attributes of the text, (3) the *double bubble map* allows learners to visually compare and contrast ideas, (4) the *tree map* helps learners classify the main idea, supporting ideas, and details, (5) the *brace map* is used for relating the ideas in a text, (6) the *flow map* enables learners to order events, cycles, actions, directions, and processes and solve multi-step problems, (7) the *multi-flow map* helps in determining causes and effects, and (8) the *bridge map* helps learners understand analogies and conceptual metaphors (Hyerle, 2004; Hyerle & Yeager, 2000).

TMs has been reported to have six merits in the EFL classroom (Holzman, 2004). They are easy for students to use, sensitive to students' individual differences, easy to be owned once they are taught, suitable for all ages and proficiency levels, and readily usable for assessing students' learning in various content areas.

Starting in 2003, with the first five-year Education Reform for Knowledge Economy project (ERFKE), Jordanian Ministry of Education introduced new curricula which emphasize critical thinking, problem-solving, self-learning, and higher intellectual skills (Ministry of Education, 2006). Thus, TMs may be a particularly useful tool for helping Jordanian learners to develop their thinking abilities, build conceptual understanding of subject matter, and consequently, better their achievement.

Problem, Purpose, Questions, and Significance of the Study

The latest curricular reforms in the Jordanian educational context have come to expect more from the learner than just mastering the subject matter. Calls have been made to take the learner a step further from mere content mastery to the ability to use this content in new situations. Not only are Jordanian learners required to use critical and higher order thinking skills to synthesize learned matter, teachers are also required to

select appropriate instructional strategies to ensure that “all students achieve learning goals that emphasize higher order and critical thinking and go beyond memorizing facts and information” (Ministry of Education, 2006, p. iv).

Nevertheless, the current authors, both experienced language education practitioners, are disheartened not only by their personal day-to-day observations but also by the research reports that most Jordanian primary through secondary stage students are essentially poor readers (e.g., Al-Barakat & Bataineh, 2008; 2011; Al-Damiree & Bataineh, 2016; Al Regeb, 2009; Bataineh & Al Barakat, 2009). For example, Al Regeb (2009) claims that Jordanian secondary stage students face substantial difficulty in identifying the main idea of the reading text, identifying supporting information, relating reading content to background knowledge, identifying the author’s point of view, identifying relationships among ideas, drawing conclusions from the text and explaining the author’s purpose.

These researchers claim that TMs is a potentially significant resource for improving teaching and learning in the Jordanian EFL context. In fact, maps are addressed as a specific outcome as early as the sixth grade: “It is expected that students will create a mind map/a chart of the main idea and the supporting details in simple reading materials” (Ministry of Education, 2006, p.34). Thus, it is the purpose of this research to examine the effect of a TMs-based instructional program (specimen in Appendices 4 & 5) on Jordanian tenth-grade students’ critical reading skills in English. More specifically, the study seeks answers for the following questions:

1. Are there any statistically significant differences (at $\alpha = 0.05$) in the students’ critical reading performance, which can be attributed to the teaching strategy (conventional vs. Thinking Maps[®])?
2. What are the participants’ opinions about the effectiveness of the Thinking Maps[®]-based instructional program in developing their critical reading skills?

This study derives its significance from its novelty in topic and scope. The demand for the promotion of critical and higher order thinking in the Jordanian EFL context (Ministry of Education, 2006) has brought about a lot of attempts to seek alternative and/or supplementary instructional strategies to improve students’ language proficiency. As Thinking Maps[®] has been reported to support not only critical and higher order thinking (Weis, 2011) but also reading comprehension (e.g., Curtis, 2001; Hickie, 2006; Hyerle, 1993; Long & Carlson, 2011; Matt-Kawryga, 2001), this study examines its effectiveness in promoting critical reading which, to the

best of these researchers' knowledge, has not been previously attempted in Jordan or elsewhere. The findings are hoped to have implications for the Jordanian Ministry of Education and other stakeholders (e.g., teachers, curriculum designers) with respect to developing students' critical reading skills.

Review of Related Literature

Whereas research on the effectiveness of Thinking Maps® on general reading performance is abundant, research on the effectiveness of Thinking Maps® on critical reading is virtually non-existent. The authors have not been able to locate a single study which relates Thinking Maps® to critical reading, which has instigated the current research and is hoped to be its contribution. Thus, the review below is limited to the effect of Thinking Maps® on reading on one hand and the research on critical reading on the other.

Ball (1998) investigated the effects of thinking maps on reading scores of 92 community college students, using a performance test and a questionnaire. The results showed statistically significant differences in the students' reading performance attributed to Thinking Maps®. Similarly, Jeary (1999) investigated the effect of Thinking Maps® on 78 fourth grade students' achievement in reading, mathematics, and language. Using the Stanford Achievement Test and an interview, he reported no significant gain in the students' achievement which can be attributed to Thinking Maps®.

Hickie (2006) examined the relationship between Thinking Maps® instruction and fifth-grade students' achievement in reading/language and mathematics over a two-year period. Seventy third-grade students from two elementary schools in Tennessee comprised the sample of the research. The findings revealed a significant effect for Thinking Maps® on reading/language but none on mathematics. Along the same lines, Diaz (2010) investigated the effect of Thinking Maps® on 300 school children's achievements in reading and mathematics, using the Florida comprehensive assessment test. No effects on students' achievement were found for Thinking Maps®.

Russell (2010) investigated the effect of Thinking Maps® on the reading comprehension of 80 American elementary school students. Using Texas Growth Index Scores and surveys, the results revealed no significant gains in the students' comprehension which may be attributed to Thinking Maps®. Similarly, El-Nahrawy (2014) explored the effect of Thinking Maps® on developing the reading

comprehension skills of 56 Egyptian secondary school students. Thinking Maps[®] were reported to have a positive effect on developing reading comprehension skills.

To sum up, mixed results have been reported on the effectiveness of Thinking Maps[®] on reading, for while some research reveals a significantly positive effect for Thinking Maps[®] on reading and/or achievement (e.g., Ball, 1998; El-Nahrawy, 2014; Hickie, 2006), other studies reveal that Thinking Maps[®] do not have any significant effect on reading comprehension or achievement (e.g., Diaz, 2010; Jeary, 1999; Russell, 2010).

Amro (2004) examined the effect of critical reading strategies on 200 tenth-grade students' reading achievement at the UNRWA schools of North Amman Department of Education, Jordan. He sought to create authentic critical reading experiences in the reading classroom to foster genuine inquiry, evoke discussion, and develop critical reading. The findings revealed marked weaknesses in the students' critical reading ability and the teachers' attention to critical reading. Along the same lines, El-Maleh (2006) examined the effectiveness of literature circles-based program on developing 99 secondary-stage students' critical reading. She reported statistically significant gains in the participants' critical reading skills. Similarly, Alslaiti and Megdadi (2012) examined the effect of a function-based program on 56 tenth-grade students' critical reading skills. The findings revealed statistically significant differences in the students' critical reading in favor of the experimental group.

Along the same vein, Al-Oqaili (2007) assessed 196 Jordanian EFL tertiary-level students' critical reading abilities. The findings revealed weaknesses in students' critical reading skills across class levels and in male students more than their female counterparts. Similarly, AlBalushi and Osman (2013) assessed 280 Omani tenth-grade students' critical reading skills. They reported a marked weakness in the students' critical reading, and significant differences in achievement in favor of high achievers and female students.

As seen above, research on critical reading abounds (e.g., Amro (2004) on the effect of critical reading on achievement and El-Maleh (2006) on the effect of literature circles on critical storytelling and critical reading), but, to the best of these researchers' knowledge, none exists that relates TMs to critical reading in the first, second, or foreign language, which has been the driving force behind this research. The current researchers attempt to make a contribution, albeit meager, to the existing literature in an area that has not been addressed previously.

Subjects, Instrumentation⁴, and Data Collection

The study adopts a quasi-experimental design to examine the potential effect of a TMs-based program on Jordanian EFL tenth-grade students' critical reading skills. Both quantitative and qualitative data were collected by means of a critical reading pre-/post-test (Appendices 1 & 2) and an interview (Appendix 3).

Two intact tenth-grade sections (n= 57) were purposefully chosen from Jabal Tareq Basic School for Boys in Zarqa First Directorate of Education during the second semester of the academic year 2014/2015. With a simple toss of a coin, the two sections were randomly distributed into an experimental group (n=28), taught by Thinking Maps[®], and a control group (n=29) taught per the prescribed guidelines of the Teacher's Book.

The pre-/post-test consisted of two reading texts followed by 16 multiple-choice questions which cover the four critical reading skills targeted in the research (Appendix 2). The pre-/post-test was administered at the onset and the conclusion of the treatment to gauge any potential gain in critical reading ability and provide grounds for comparison.

To collect more information about the effectiveness of the instructional program, a random sample of 15 students was drawn from the experimental group to be interviewed. The interview schedule (Appendix 3) comprised of four questions, the first three of which address the effectiveness of the treatment while the fourth asks for suggestions to improve the program. The 10-15- minute interview was semi-structured and conducted at the school immediately after the treatment. The interviews were recorded, with the participants' consent, transcribed, and later analyzed for common themes.

The validity of the pre-/post-test and interview schedule was established by a jury of ten university professors, supervisors, and experienced teachers whose feedback was used to amend the instruments in terms of appropriateness for purpose and target group and clarity of expression. Similarly, the reliability of the pre-/post-test was established by piloting it on a sample of 15 tenth-grade students, which was excluded from the sample of the study. A test-retest was administered with a two-week interval,

⁴ For copies of the complete instruments used in the study, contact the corresponding author at rubab@yu.edu.jo.

and the correlation between the first and the second administrations amounted to 0.81, which was deemed appropriate for the purpose of the research.

The researchers redesigned content from the prescribed textbook, *Action Pack 10*, per Thinking Maps[®] into a set of 12 lesson plans with 24 specific activities which comprised the program, checked for validity by a jury of professors of curriculum and instruction and evaluation and measurement. Both the experimental and control groups were taught by the second researcher. Prior to the treatment, he met with the participants to introduce the TMs and the treatment. The treatment comprised 24 activities which spanned 12 class sessions over a period of two months (March-May 2015). The two-passage pre-/post-test was administered at the onset and the conclusion of the treatment to gauge any potential gain in critical reading ability and provide grounds for comparison.

Instructing the Experimental Group

The teacher started the treatment by introducing TMs by first outlining its aims and uses and then modeling its use by drawing maps for certain content from their textbook. The participants themselves were then asked to draw maps, both individually and in groups under the watchful eye of the teacher.

As the participants listened to an introduction about TMs, the program itself, and the desired outcomes of the treatment, they showed enthusiasm and asked a lot of questions about TMs and what they would gain from the treatment. Several participants talked about their past experiences in reading English and the problems they face in comprehension.

During the treatment, appropriate timing for each activity was determined as the participants used TMs to practice the critical reading skills of distinguishing main and supporting ideas, facts and opinions, and causes and effects and identifying similarities and differences in the assigned reading texts.

As the participants worked, independently and in groups, on their TMs, the teacher assisted them and provided feedback as needed. The activities were all essentially learner-centered and the teacher acted as an aide and a facilitator of learning.

Instructing the Control Group

The teacher taught the students by following the instructions of the Teacher’s Book. In every reading session, the teacher presented the topic of the reading text, asked the students to answer the comprehension questions at the end of the text and then provided feedback. Per the guidelines of the Teacher’s Book, students are required to answer comprehension questions individually, and pair (or small group) work is reserved for verbal interaction purposes.

Findings and Discussion

The presentation of the findings and their interpretation is done per the questions of the research.

The First Research Question

To answer the first question, which seeks to identify potentially statistically significant differences (at $\alpha = 0.05$) in the students’ critical reading performance which can be attributed to the teaching strategy (conventional vs. Thinking Maps®), means and standard deviations were calculated for the students’ overall scores on the pre- and post-test, as shown in Table 1.

Table 1: Means and standard deviations of the students’ scores on the pre- /post-test

Teaching method	N	Critical Reading Skills Pre-test (Covariate)		Critical Reading Skills post-test	
		Mean	SD	Mean	SD
		Conventional	29	4.62	2.09
TM	28	5.36	2.00	9.29	4.02

Table 1 shows observed differences in the participants’ critical reading mean scores on the post-test. To determine whether or not these differences are significant, one-way analysis of covariance (ANCOVA) was calculated for the students’ critical reading scores on post-test, as shown in Table 2.

Table 2: ANCOVA of the students’ scores on the critical reading post-test

Source	of	Sum of	df	Mean	F	Sig.	Partial
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Variance	Squares		Square			η^2
Critical Reading Pretest (Covariate)	80.47	1	80.47	6.46	0.01	0.0722
TMs	192.36	2	96.18	7.72	0.00	0.1568
Error	1034.28	83	12.46			
Total	1360.44	86				

Table 2 shows significant differences (at $\alpha = 0.05$) in the students' mean scores on the post-test for both the conventional and TMs groups. To determine the direction of this significance, the adjusted means and standard errors of the students' scores on the post-test were calculated, as shown in Table 3 below.

Table 3: Adjusted means of the students' performance on the critical reading post-test

Teaching method	Adjusted Mean	SE
Conventional	5.80	0.66
TMs	9.23	0.67

Table 3 shows observed differences between the adjusted means and standard errors in the two groups' performance on the critical reading post-test. Since the treatment is multi-leveled (on account of the four critical reading sub-skills), the Bonferroni test for post comparisons was used to determine the overall significance of the adjusted means of the participants' scores on the post-test, as shown in the Table 4.

Table 4: Bonferroni post hoc test of students' scores on the post-test

Method		Conventional	TM
Bonferroni	Adjusted		
	Mean	5.80	9.23
Conventional	5.80		
TMs	9.23	3.42	

Table 4 shows significant differences between the adjusted means of the conventional and TMs groups, in favor of the latter.

The findings of the first research question reveal that the participants' overall critical reading performance in the Thinking Maps[®] instruction group was better than

their counterparts in the control group as statistically significant differences (at $\alpha = 0.05$) were found in favor of the former. The analysis suggests that Thinking Maps[®] instruction has had a positive effect on the students' critical reading skills, partly because the maps not only are easy to use, but also lend themselves readily to students across proficiency levels. Thinking Maps[®] has helped the participants organize their ideas and read critically to be better able to distinguish main and supporting ideas; facts and opinions; and causes and effects, not to mention to identify similarities and differences in the reading texts.

The activities of the program were also novel to the participants and engaging enough for them to want to get involved, which resulted in improved critical reading performance for the Thinking Maps[®] instruction group. At the onset of the treatment, the participants were not familiar with Thinking Maps[®] instruction, but as the treatment progressed, they became accustomed to, and quite taken by, this strategy so much so that many of them started using it in their learning of other subjects.

These researchers claim that the appeal and effectiveness of Thinking Maps[®] derives from enabling learners to organize their ideas in a manner which enforces their ability to read critically. The participants gradually gained the ability to distinguish main from supporting ideas, facts from opinions, causes from effects, and similarities and differences in the reading texts.

Moreover, the role of the participants has become prominent as the center of the learning process. Thinking Maps[®] is essentially learner-centered, as the learner analyzes, synthesizes, and evaluates his/her ideas and recalls them visually with the help of the teacher whose role is more of a facilitator than the definitive source of knowledge.

These findings are consistent not only with those of the research which found a positive effect for Thinking Maps[®] on reading comprehension (e.g., Ball, 1998; Long & Carlson, 2011; López, 2011), but also with the research which highlighted the utility of critical reading skills in the foreign language reading classroom (e.g., Abd Kadir et al., 2014).

The Second Research Question

The second question, which sought students' opinions about the effectiveness of the treatment in improving their critical reading skills and their suggestions to improve the program and/or its implementation, was answered through interviewing 15

students from the TMs group. The participants' opinions were generally positive, as they asserted that the treatment has had a noticeable positive effect on their critical reading ability.

The analysis of the participants' responses showed that not only did they believe that the treatment has helped them develop their critical reading, but also that integrating this or a similar program into the curriculum would prove both beneficial and effective for student learning, as shown in the excerpts below:

"I like it when we work in groups to fill the map. All students should learn how to use Thinking Maps® [YZ_6]."

"The Thinking Maps® strategy opens my eyes to learn English differently and interestingly [FS_13]."

"I did not use most of the critical reading skills, but now I feel I am capable of using them all with the Thinking Maps® strategy [AQ_14]."

"Although I have never heard of such strategies before, I can use Thinking Maps® easily to read critically [HAS_10]."

"I enjoyed drawing the maps and finding the main idea and the supporting ideas to place them on the map [HH_7]."

"I used not to enjoy reading the texts to find the answers, but now I love to draw the maps and look for the answers [OS_11]."

Understandably, some participants favored certain maps to others, but the consensus has been that, regardless of their map of choice, Thinking Maps® was favorably viewed as a catalyst for learning, as shown in the excerpts below:

"I like them all but I favor the tree map. It is easy, and it helps me organize my ideas [AB_1]."

"I like the tree map which helps me organize my ideas into main and supporting ideas [HH_7]."

"My favorite is the tree map. I think it is good for learning both English and Arabic [JS_5]."

"The bubble map is my favorite. Now, I am using it all the time to generate more ideas [ZA_12]."

"I like the bubble map. With it, I can read the text and find the answers easily [HZ_3]."

"I like to use the double bubble map to show the differences in the text [EH_4]."

“I particularly like the multi-flow map. I find it very easy to use [YA_8].”

These responses, coupled with the participants’ active engagement and positive attitudes towards the activities of the program, attest to the effectiveness of Thinking Maps® not only in reading instruction, but also in other subject matters, as also evident in the following interview excerpts:

“Thinking Maps® are not only useful for English, I have started to use them for other subjects as well. I find them very helpful for visualizing my ideas and organizing them [YA_8].”

“I think the Thinking Maps® strategy should be taught to us before tenth grade because it helps me learn and enjoy myself during various activities with my friends [HH_7].”

“Thinking Maps® should be in the book [AB_1].”

“We should study Thinking Maps® all the time [JS_5].”

“We should study Thinking Maps® in all subjects [HZ_3].”

These researchers are heartened by the participants’ responses, which, coupled with the quantitative data collected through the tests, evidence the effectiveness of TMs in developing critical reading skills.

Conclusions and Implications

Although the literature suggests positive effects for TMs on students’ metacognition, reading and general achievement, these researchers could not locate any research, in Jordan or abroad, on the effect of TMs on critical reading skills. Thus, even though the current research is sound in design and procedure, especially that it offers both quantitative and qualitative evidence, it is inadequate to provide generalizations about the potential effect of TMs on EFL students’ critical reading. Further research, incorporating more variables, additional instruments, and a longer duration, is needed before any definite conclusions could be drawn.

The findings of the study have given rise to some pedagogical implications, most important amongst which is for EFL teachers to make use of TMs to foster their students’ metacognitive and critical reading skills. Teachers are called upon to design activities geared specifically to foster their students’ critical reading skills (e.g., summarizing, analyzing, and predicting) and their ability to grow as critical readers.

Teachers may need training on the implementation of TMs to ensure their ability to empower their students to consciously incorporate it into their day-to-day

learning routines. This would involve the Ministry of Education which has had an exemplary track record as the executor of training for innovative education.

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Appendix 1

Table of Specifications for the Critical Reading Pre-/Post-Test

Skill	Performance indicator	Question Number
Differentiating main and supporting ideas	Identify the main idea of the text. Identify the supporting ideas. Identify the thesis statement.	1, 9 3, 11 12
Differentiating causes and the effects	Identify the causes sentences or phrases. Identify the results sentences or phrases.	6 4, 13
Identifying similarities and differences	Identify the sentences the shows the similarity. Identify the sentences the shows the differences.	2, 14 7, 15
Differentiating facts and opinions	Identify the sentences or phrases that show facts. Identify the sentences or phrases that show opinions.	8, 10 5, 16
Total	9	16

Appendix 2

The Critical Reading Test

Text A: Have Fun and Keep Fit⁵

Many people especially the parents of teenagers, do not want their children to spend too much time playing computer or video games, because, they say, it makes them lazy and unfit, now a company is making a new kind of game which builds up player's muscles as they play.

The majority of people who play normal computer and video games now use their thumbs and fingers to press little buttons. But to use the new system players have to move the whole top part of their bodies. They actually control the game by moving a shoulder- high joystick.

The game's designers say that traditional exercise machines, like the ones in gyms and fitness centers are incredibly boring to use. People get tired of them very quickly and so they don't exercise for very long. If they use one of the new joysticks, they can improve their level of fitness by playing their favorite game. Playing builds up their muscles by pulling or pushing the giant joystick. The company which makes the new equipment says people can use it in their homes or at the gym.

1. The main idea of the text is _____.
 - a. spending too much time on computer
 - b. the disadvantages of using computer games
 - c. the new kind of games
 - d. how to build your muscles.
2. The writer uses the word *majority* to refer to _____.
 - a. people use computers
 - b. a lot of people use computers
 - c. no one uses computers
 - d. some people use computers
3. The writer mentions gym and fitness center as a/ an _____.
 - a. opinion
 - b. supporting idea
 - c. thesis statement
 - d. fact
4. The result of spending too much time on computer _____.
 - a. has a bad effect on children's health
 - b. has a good effect on children's health
 - c. helps children to play
 - d. makes children feels happy
5. One of the opinions in the text is _____.
 - a. old games are boring
 - b. playing build up your muscle
 - c. players use their thumbs and fingers
 - d. parents don't want their children to spend too much time on computer

⁵ Source of texts: Johnson, E. (2013). *Action Pack 10*. York Press

6. If they use one of the new joysticks, they can improve their level of fitness by playing their favorite game is a/an _____.
 - a. fact
 - b. opinion
 - c. comparison/contrast
 - d. cause/ effect

7. The following statements agree with the sentence" The company which makes the new equipment says people can use it in their homes or at the gym" **except** _____.
 - a. The company makes the equipment easy to use
 - b. The equipment can be played in one place
 - c. The new equipment will be enjoyable
 - d. The company works in the new equipment

8. A company is making a new kind of game which builds up the players' muscles as they play. This sentence is a/an _____.
 - a. fact
 - b. opinion
 - c comparison/contrast
 - d. cause/effect

Text B: Alternative Power

For several years, countries around the world have been looking for new energy sources to replace fossil fuels when they eventually run out. The country which makes the most use of solar power is Japan the Denmark uses more wind power than other country. Now Britain, with its long coastline, is trying to lead the world in wave power technology.

Experts say that in future, the sea, with its wave and tide energy, could provide enough power for the whole planet. Twenty wave farms could supply electricity to a city the size of Edinburgh, with its population of 450,000.

Scientists are working on the "Wave Hub" this is a testing device which will be located in the sea 15 km from the south-west coast of Britain and will cover 20 square kilometers. It will produce 30-40 megawatts of electricity every year. One of the greatest advantages of wave farms, which are very unpopular with some people who say they "spoil the countryside". However, there are some disadvantages to wave machines: the machines are just below the surface of the sea and so could be a danger to ships.

9. The main idea of the text is _____.
 - a. finding new resources
 - b. Britain uses wave power
 - c countries around the world
 - d. the advantages and disadvantages of wave power

10. "The country which makes the most use of solar power is Japan" is a/an _____.
 - a. fact
 - b. opinion
 - c. supporting idea
 - d. cause and effect

11. "Twenty wave farms could supply electricity to a city the size of Edinburgh" is a/an _____.
- a. fact
 - b. opinion
 - c. supporting idea
 - d. cause and effect
12. The reason behind writing the article is _____.
- a. to focus on Japan and Denmark
 - b. to focus on other energy resources
 - c. to focus on wave power
 - d. to focus on wave hub
13. The result of running out of energy resources is _____.
- a. to use wave power
 - b. to use fossil fuels
 - c. to look for new resources
 - d. to stop using energy resources
14. We agree with the writer in _____.
- a. the importance of energy resources
 - b. using solar power as Japan
 - c. using wind power as Denmark
 - d. the disadvantages of wave power
15. All the information about Britain is true except _____.
- a. it uses wind power
 - b. it has a long coastline
 - c. it leads the world in wave power
 - d. it is not far from the testing device
16. One of the opinions in the text is _____.
- a. Denmark uses wind power
 - b. wave power is unpopular
 - c. Edinburgh has a population of 450,000
 - d. Japan uses solar power

Appendix 3

The Interview Schedule

1. Have you found the instructional program useful? How so?
2. Which thinking maps have you particularly found useful? Why?
3. How has the Program helped you improve your critical reading skills?
4. Do you have any suggestions to improve Program?

Appendix 4

Sample of the Program Schedule: Weeks 1-4

Week	Day	Behavioral Indicators	TM Type	Duration
1	1	Identify the main idea of the text.	Tree	45 minutes
	2	Identify the supporting ideas. Identify the thesis statement.		45 minutes
	3	Identify the sentences / phrases that show facts. Identify the sentences/phrases that show opinions.		45 minutes
2	1	Identify the causes sentences or phrases. Identify the effects sentences or phrases.	Multi-flow	45 minutes
	2			45 minutes
	3			45 minutes
3	1	Identify the sentences that show the similarity.	Bridge	45 minutes
	2			45 minutes
	3			45 minutes
4	1	Identify the sentences that show the differences	Double bubble	45 minutes
	2			45 minutes
	3			45 minutes

Appendix 5

Sample Program Content: Week 1

Days One and Two

Time: 45 minutes (per day)

Objectives:

By the end of the lesson, students are expected to:

- identify the main idea of the text.
- identify supporting ideas.
- identify thesis statement.

Materials: Student Book, Activity Book, pictures, whiteboard, worksheet (thinking maps)

important information you
come across.

Polar Bears and Penguins

Not many people have the chance to visit the North and South Poles. However, if you had the opportunity to visit the Poles, they would appear similar – both are places of extreme cold. 5 If you went **there** in winter, you would probably experience severe snowstorms. However, both are also places of spectacular beauty, with their frozen landscapes of snow, ice and icebergs. 10 If you went on a special adventure boat trip when you visited, you would be able to observe the unique wildlife of these places, like polar bears, penguins and seals. You would be unlucky if you didn't see any seals.

The polar bear lives in the cold, snowy Arctic 15 lands in the North Pole. It has a thick layer of fat underneath its skin and this helps to keep it warm. It also has a thick layer of fur all over **its** body,

including the soles of its feet, which allows it to swim in the coldest seas without feeling the cold. Beneath the fur the skin is black, so it absorbs heat. Polar bears are excellent swimmers. Their nostrils can close so they can swim underwater and between the ice floes to look for seals, **their** favourite food.

25 Unlike polar bears, penguins live in the South Pole and many live in Antarctica. Penguins keep warm with thick skin and lots of fat under the skin. Penguins have dark coloured feathers on their back, which absorb heat from the sun to keep **them** warm. Like polar bears, penguins 30 are excellent swimmers. **They** have webbed feet and streamlined bodies for powerful and fast swimming. They have different diets, but in general, they all eat a variety of small fish.

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Procedures

1. The teacher draws eight maps on the board. He/she encourages students to talk about them by asking the following questions:
 - a. What do you think these are?
 - b. How can these maps be useful to you?
 - c. Are they easy to draw?
2. The teacher defines the *thinking maps* strategy and explains when and why it is used. He/ She explains that *thinking maps* is a teaching/learning strategies

which aims at developing and making learning meaningful by enabling learners to better recall the information through visualization.

3. The teacher asks the following questions:
 - a. Where do *Polar Bears and Penguins* live?
 - b. What do you think helps these animals live there?
4. The teacher asks students to read the text carefully *Polar Bears and Penguins*.
5. The teacher distributes a worksheet that explains the importance of identifying the main idea, supporting idea and the thesis statement in comprehending the text and how to locate them in a text as follows:

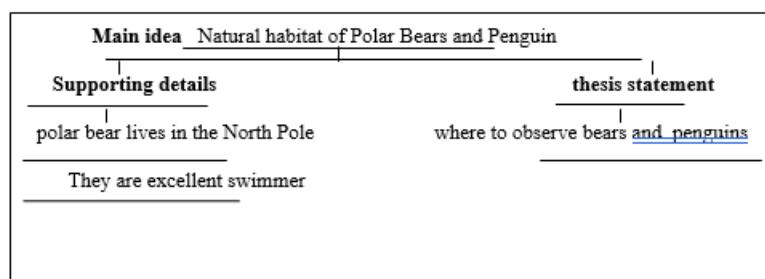
Main idea: the point of the passage, minus all the details. It is usually a sentence: the first sentence.

Supporting idea: the idea which supports the main idea.

Thesis statement: a sentence or two sentences which summarize the argument or analyze what follows in the text. The thesis statement is the narrowing of the overall main idea.

6. The teacher writes the following questions on the board and asks students to answer them.
 - a. What is the main idea of the text?
 - b. What are the supporting ideas?
 - c. What is the thesis statement?
7. The teacher discusses the answers with the students. He/ She explains that using a Tree Map is very useful to classify, sort and distinguish between the main idea and the supporting details. He/ She explains that the first line is the place for the title or the topic of the passage. The second line is the place for the categories in which the students can write the main category and the lines that follow are the subcategories in which the students can write what belongs or is linked to the main category.

Tree Map



8. The teacher asks the students to work in groups of five to identify the main idea, the supporting details and the thesis statement and to label them on the *tree map*.
9. The teacher discusses the answers with the students and provides feedback.

Day Three

Time: 45 minutes

Objectives:

By the end of this lesson, students are expected to:
differentiate between facts and opinions.

Materials: Student Book, pictures, whiteboard, worksheet (tree map)

A TRIP TO ANTARCTICA

Do you know a place where it is day for six months of the year? Do you also know where ice and weather, not clocks and calendars, determine when and where people travel?

If you visit Antarctica on one of our adventure trips, you'll discover a continent that has incredible beauty. Antarctica is the southern continent and is surrounded by the Atlantic, Pacific and Indian Oceans.

If you come on one of our fascinating trips, your adventure will begin with a flight to Argentina. From there, you will travel with our guide to Ushuaia, the most southerly city in the world, and join our special ship.


On the way to the South Pole, our ship passes through amazing scenery. If you go on deck, you will see huge icebergs, as well as whales, seals and many different sea birds. Our team of experts will be there to help you if you have any questions.

Passengers go on trips every day if it's sunny. One of our most popular trips is to Half Moon Island. Passengers can also spend an afternoon at the boiling hot springs of Deception Island.

There is a lot of time to enjoy your trip because it's light for twenty-four hours a day during the summer in the Antarctic. A boat trip to Antarctica is an unforgettable experience.

Please remember:

- Our boat trips are from November to February. (We don't take passengers to Antarctica unless it is summer there.)
- You need warm clothes if you come!
- Don't get too close to the wildlife: some animals attack if you come near them.
- There are no banks in Antarctica. If you want to buy something, you'll need some money.
- If you book before 1st September, you'll get a free visit to the Amundsen-Scott research base.



Procedures

1. The teacher asks the students to read the title and to look at the picture.
2. The teacher asks the following questions
 - a. What do you know about the northern and southern hemispheres?
 - b. Do you know a place where a day lasts six months of the year? If yes, what is it?
3. The teacher tells the students to read and complete the Table with information from the text.

Antarctica	
Location	Answer: in the south pole.
Weather	Answer: cold.
Day and night cycle	Answer: it's light 24 hours a day during summer.
Boat trip	Answer: from November to February.
Wildlife	Answer: there are whales, seals and many different birds.

4. The teacher discusses the answers with students and provides feedback.
5. The teacher asks if the answers are facts or opinions.
6. The teacher asks the students for the difference between facts and opinions.
7. The teacher draws *a tree map* on the board.
8. The teacher asks the students to read the text silently again and identify the facts and the opinions in the text.
9. Students then work in pairs to classify and write the facts and opinions on the *tree map*.

Possible answer:

Tree Map

A Trip to Antarctica	
Facts	Opinions
Antarctica is the southern continent	incredible beauty
Ushuaia is the most southerly city	it is an unforgettable experience

10. The teacher discusses the answers with the students and provides feedback.

Examining the Effectiveness of Formative Assessment in English Vocabulary Learning of Senior High School Students in China

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Abstract

The present research aims to explore the effectiveness of formative assessment in the learning of English vocabulary of senior high school students in China. Formative assessment was implemented in experimental group while the traditional assessment methods were adopted in control group in this study. Various formative assessment activities (i.e., group discussion, self-assessment, peer-assessment and peer dictation) were carried out in the experimental group. The vocabulary tests, questionnaire, observation, interview and portfolios were conducted in the research. It was concluded that the English vocabulary level of students from the experimental group had been significantly improved in the vocabulary posttest ($M=106.15$) compared with their performance in the pretest ($M=103.26$, $p=.00<.05$), which indicated that formative assessment was effective to enhance these Chinese students' vocabulary learning. The study also found that formative assessment facilitated learning autonomy, motivation and confidence of Chinese students. Most students held positive opinions toward formative assessment, and formative assessment was perceived as helpful for English vocabulary teaching and learning. Some instructional strategies (i.e., group work, comprehensible comments, interactive feedback) were suggested to enhance students' competence in English vocabulary learning.

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Introduction

Test is the major way of assessment to evaluate whether a student has mastered what he/she has learned in foreign language teaching in China. The traditional standardized tests are misused as the equivalent of assessment. These tests tend to focus on competition and learning products rather than students' progress, personal development and affective needs, which are vital factors in language learning. Standardized tests mainly pay attention to linguistic and logical-mathematical intelligence and encourage superficial and rote learning. Test scores are considered as criteria of students' intelligence and determine whether students could go to the higher level of education. Under this circumstance, students are more likely to concentrate on memorizing knowledge and preparing for exams according to the way knowledge would be tested. Teachers, on the other hand, focus their attention on the increase of test scores. The assessment is teacher-based and is opposite to the idea of student-centered. As stated in the *Standards of English Curriculum* (2011), one of the objectives of English teaching in China is to cultivate and strengthen students' interest, attitude and motivation. Teachers should focus on the development of students' independence and confidence in English learning. English language instructional goals cannot be achieved unless the ways of assessment is changed and improved. A more humanistic and dynamic assessment system is in the great need to assess English learners properly and promote English teaching qualities and constant development of English learners in China.

Evaluation theories in foreign countries had not been introduced to China until 1980s. In the recent years, formative assessment has begun to receive attention and researchers focus on the relationship between formative assessment and foreign language learning. Formative assessment conforms to the requirements of *Standards of English Curriculum* and has attracted increasing attention in the related research areas. Vocabulary learning is the foundation of second language acquisition (Lewis, 1993). There are some studies on the relationship between English language learning (esp., English vocabulary learning) and formative assessment (Guo & Yang, 2003; Huang, 2002; Wang & Xie, 2004). But researchers, teachers as well as students continue to experience difficulty in developing effective strategies for vocabulary learning. Most students consider vocabulary learning as a headache because it is demanding and in need of good memory. Most of them lose motivation and interest in vocabulary learning. Formative assessment encourages students to take responsibility

for their own learning and involves students actively in learning and teaching process. It can arouse students' interest and motivation in English vocabulary learning. There are few studies on English vocabulary learning from the perspective of assessment. Among the studies on formative assessment in English language learning, applying formative assessment to improve a specific aspect of English language learning is much less in the whole literature. The present study aims at exploring the effectiveness of formative assessment in English vocabulary learning in China.

Literature Review

“Formative assessment” was first proposed in the development of educational evaluation by American philosopher Scriven in his classic essay *The Methodology of Evaluation* (Scriven, 1967). Bloom (1971) first adopted formative assessment in many educational evaluation experiments and used the term in the meaning which is generally accepted nowadays. Formative assessment has many different names, such as classroom-based evaluation, classroom assessment, school-based assessment and portfolio assessment. Black and William (1998) defined formative assessment as:

All those activities undertaken by teachers and by students in assessing themselves which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged. Such assessment becomes formative when the evidence is actually used to adopt teaching to meet students needs. (p.8)

Teachers should be skillful in using “various assessment strategies and tools such as observation, student conferences, portfolios, performance tasks, prior knowledge assessments, rubrics, feedback, and student self-assessment” (Hammerness & Darling-Hammond, 2005, p. 391). But between 1960s and 1970s, Lynch (2001) pointed out that formative assessment still played a subsidiary role with summative assessment taking the major place. In the 1980s many scholars began to turn to do some research on the comparison of formative assessment and summative assessment with focus on the differences between them (e.g., Bachman, 1981; Brown, 1989; Long, 1984). Summative assessment, the product-oriented evaluation, is often regarded as a traditional objective test (Atkin & Coffey, 2003). Bloom (1971) defines summative assessment as those tests given at the end of teaching for the purpose of grading. It is usually conducted at the end of a course or a certain work to make judgment about what a student has remembered or learned, or the quality of learning according to certain standards. There is no immediate and timely feedback for

teachers and students to make improvement from summative assessment. There was once a metaphor about the distinction between formative assessment and summative assessment made by Cooper. Cooper (1997) states that when the cook tastes the soup, it is formative assessment; when the customer tastes the soup, it is summative assessment. In formative assessment students take responsibilities for their own learning and formative assessment is used as a diagnostic way to improve students' learning. Formative assessment could provide timely feedback for teachers and learners whereas the effects of summative assessment are usually negative since it emphasizes grade, ignores students' learning process, and provides information for decision makers, not for instructors to decide how to improve students' learning. In the 1990s, there were increasing scholars starting to pay attention to the link between formative assessment and teaching and learning (e.g., Weir, 1993; Wiggins, 1993). Black and William (1998) published papers which were regarded as a landmark of formative assessment. It also made formative assessment a focal area and helped to advance the reform of assessment in many countries.

Most research focused on the application of formative assessment in the higher education level and found the positive effects of formative assessment on teaching and learning (e.g. Chen, Kettle, Klenowski, & May, 2013; Suarez-Balcazar, et al., 2011). Studies also presented problems in college English teaching assessment by ways of observations and informal interview and introduced characteristics and methods of formative assessment (i.e., observation, self-assessment, group work, interview and peer-assessment) (Guo & Yang, 2003; Huang, 2002; Wang & Xie, 2004). The empirical studies (Burner, 2016; Chen, Kettle, Klenowski, & May, 2013; Hwang & Chang, 2011; Ng, 2014) conclude that formative assessment if used correctly has a positive impact on student learning and formative assessment was especially helpful for students who had not performed well in the study. But formative assessment is rarely used in studies on vocabulary learning (Allen, 2002; Coady & Huckin, 2001; Nation, 2004; O'Malley & Chamot, 2001; Schmitt, 2000) despite the extremely important role played by vocabulary in language learning. These studies focus on vocabulary learning strategy (O'Malley & Chamot, 2001), second language vocabulary acquisition (Coady & Huckin, 2001), vocabulary teaching and learning (Schmitt, 2000; Nation, 2004), techniques in vocabulary teaching (Allen, 2002), influential factors in vocabulary learning (Laufer, 1990) and mental lexicon (Jiang, 2000). Nation (2001) also put forward three processes of learners' remembering

words. They are noticing, retrieval and generative use. If words were processed deeply they were most likely to be stored in long-term memory. The frequent occurrence of a word facilitated words remembering. Theoretically speaking, formative assessment enhances memory of vocabulary and promotes vocabulary learning in the whole learning processes since formative assessment in classrooms make students be fully exposed to new vocabulary items through timely feedback and interactive assessment activities and repeated use of new-learned words in different context helps students to master the use of vocabulary. However, fewer studies on vocabulary explore the effectiveness of formative assessment in English vocabulary learning. This study thus intends to bridge the gap in the field of English vocabulary learning.

Theoretical Framework

Humanistic psychology explores the physical, intellectual and emotional aspects and how these factors interact with each other to affect the development of a person. Humanistic approaches focus on individuals' self-actualization, and put emphasis on the importance of the inner world of a person. They believe attitudes and motivation are significant in personal development. Maslow (1970), one of the key proponents of humanism, points out that the essence of education is to develop human potential especially the potential of being a real self-actualizing person. According to humanistic theory, learning is student-centered, and teacher's role is that of a consultant, a promoter, an encourager and a facilitator. Teaching should encourage students to act independently. The humanistic theory considers the development of learners' autonomy as the goal of learning (Rogers, 1951). Self-assessment instead of the complete external assessment is advocated in humanism. Students know their own learning process much better than others. They should take the responsibility in their learning assessment.

Constructivist theory is a branch of cognitive psychology. Nowadays it enjoys popularities in foreign countries. Piaget (1964, 1973, 1985, 1995) is one of the founders of constructivism. According to the theory, students' learning does not rely on teachers' instruction, but through the essential meaningful way constructed to build and under certain social cultural background. The teacher is a consultant and facilitator instead of a controller of classrooms and a person who only teaches knowledge. Students are not passive knowledge-receivers. They are responsible for

processing information and constructing the meaning by themselves. Williams and Burden (1997) pointed out that students should actively get involved in perception of language input and participate in classroom tasks.

Similar to humanism, constructivist theory also puts emphasis on individual's learning process. According to Vygotsy's (1978) constructivists' views of learning, learning is a process of constructing knowledge and meaning; interactions create meaning. Students actively receive, interpret information and construct new knowledge in communications and interactions with their experience. Teachers should not be the controller in students' learning process, and what they should do is to encourage students and to provide opportunities for them to actively construct cognitive structures and knowledge. The whole constructing process is student-centered. Assessment, according to constructivism, focuses on personal development of students. Formative assessment helps students to build up their own knowledge structures. It pays attention to students' self-reflection and self-assessment in which students could get confidence and interest as well as awareness of their own strengths and weaknesses, progress and achievement. This research aims to investigate the effectiveness of formative assessment in English vocabulary learning of senior high school students in China. Formative assessment was applied into the vocabulary learning of students from experimental group. Questionnaires about vocabulary learning and formative assessment were completed by the experimental group at the beginning as well as the end of the research. Both experimental group and control group completed vocabulary pre-test and post-test. Other assistant instruments and survey were also conducted in the research to answer research questions. The specific research questions are as follows:

1. Is formative assessment effective to enhance English vocabulary achievement of senior high school students?
2. Is formative assessment helpful to improve these students' autonomy and interest in vocabulary learning?
3. What are students' opinions about formative assessment in English vocabulary teaching?

Methods

Participants

Two classes, Class Seven and Class Eight, as participants, were chosen from a senior high school of a northeast city in China. Class Seven was the control group and Class Eight was the experimental group. There were a total number of 93 senior high school students participating in this study. There were 46 students in the control group, and 25 of them were female. The number of students in the experimental group was 47, of whom the number of female was 24.

Both experimental group and control group attended the English course taught by the same teacher with the same textbook and teaching materials. The textbook used for this course was *New Senior English for China*, published by People's Education Press. The teacher was well trained and equipped with the knowledge of formative assessment. The teacher used different teaching assessment methods in the two groups, with formative assessment applied in the experimental group while traditional summative assessment used in the control group during one fall semester. The formative assessment related activities or methods implemented in the experimental group included small group discussion, picture description, story narration, composition writing, word-formation knowledge introduction and related skills training, peer dictation, peer assessment, self-assessment, and English learning strategy training (i.e., memory strategies: help learners store and retrieve new information, such as grouping, creating mental linkages, applying images and sound, reviewing, and employing action; metacognitive strategy: help learners to regulate their learning, such as planning, self-evaluating and monitoring one's errors or learning process). These activities were adopted because they can raise students' interest and motivation, encourage students to interact with peers, interpret new information, get involved in their own learning, develop potentials to be autonomous learners, and actively construct cognitive structures and knowledge, which not only conform to the requirement and principles of formative assessment but also involve all factors advocated in humanism and constructivist theory. Self-assessment and peer-assessment were used in particular to evaluate and build up students' own knowledge structure and help them to learn from interactions with peers. Different research methods were used including vocabulary tests, questionnaire, observation, interviews, and portfolios.

Vocabulary Test

Both experimental group and control group attended vocabulary pre-test and post-test (See Appendix I). The pre-test was carried out before the research to ensure that all students were tested in the similar conditions. The pre-test explored whether students from control group and those from experimental group had equivalent English vocabulary level. The post-test examined the effects of application of formative assessment on vocabulary learning achievement.

The validity and reliability of the vocabulary test was checked against the entrance examination paper. With the Cronbach Coefficient Alpha test, the results of the tests showed a reliability of .89. A value of .70 or higher was considered evidence of reliability (Becker, 2000).

Questionnaire

According to the purpose of the research, a formative assessment questionnaire was conducted in experimental group to explore whether formative assessment was helpful to improve learners' autonomy and interest and to examine students' opinions about vocabulary teaching activities and formative assessment methods. Forty-seven questionnaires were handed out, and 47 were collected. The valid percent was 100%. The questionnaire was divided into three parts, each containing three questions and in addition with two questions especially for post-questionnaire. The first part (question 1-3) was about students' attitude towards English vocabulary learning and their interest in the learning. Part two (question 4-6) was about students' autonomy in the vocabulary learning, and the third part (question 7-9) involved teaching and learning methods of vocabulary. All these questions were the same in the pre-questionnaire and post-questionnaire. Two more questions were particular for post-questionnaire because they were about students' attitudes toward the application of formative assessment in English vocabulary teaching. There were three alternative choices for each question for students to choose one of them to show their feelings and perceptions about vocabulary learning ranging from 1 ("agree") to 3 ("disagree"). The question items in the questionnaire were designed in the language of Chinese so that students could completely understand these questions. The Cronbach's alpha indicates the internal consistency reliability of the survey items, was .89. As for the content validity, the inter-rater agreement, which correlates two judges' ratings, was .93. It is statistically a high level of agreement. The questionnaire can be found in Appendix II.

Observation

Students' behaviors in classroom activities such as discussions and assessment were observed and recorded. The observation evaluation table was used to collect the information, and Table 1 was the sample of evaluation table.

Table 1: Observation Evaluation Table

Items	Agree	Somewhat agree	Disagree	Comments
The student responds actively to teacher's questions				
Student in the group activities acts actively and is willing to cooperate with classmates				
Student has clear plans and goals for their vocabulary learning				
When encountering difficulties in vocabulary learning student actively asks the teacher for help				
Student autonomously uses newly-learned vocabulary in classroom activities				

The researcher returned records to each student as feedback in order to promote students' understanding of their learning. Observations helped to know students' learning autonomy, attitudes towards teaching activities and methods. Students' challenges and difficulties as well as what they had mastered in vocabulary learning could be presented in the tables. The researcher paid special attentions to the students who had difficulties in adapting to classroom activities since the information can provide further knowledge about students' attitudes toward formative assessment in vocabulary learning.

Portfolios

Portfolio documents were made for each student of the experimental group. Portfolios were collections of students' learning materials. The portfolios included test papers, writing assignments, teacher's feedback and comments, peer-assessment tables, and

self-assessment tables. Students in the experimental group were required to fill out the self and peer-assessment tables after each class session. Every two weeks the teacher and students discussed about their portfolios in terms of their performance, progress, and difficulties in the learning. The teacher provided timely guidance to make sure that the assessment made by students was proper and valuable. Table 2 was the sample of assessment table for students to make self-assessment and peer-assessment. Among listening, speaking, reading and writing in English language, vocabulary learning achievement and progress were especially obvious in speaking and writing.

Table 2: Student's Self and Peer-Assessment Table

In the speaking	Agree	Somewhat agree	Disagree	Comments
Pronouncing words correctly				
Good use of linking words while speaking				
Expressing ideas clearly				
In the discussion behaving actively and giving useful suggestions				
In the writing				
The opening part is interesting and words use is attractive.				
The main ideas are stated clearly.				
Variety of expressions				
Good command of words and phrases				
Proper use of conjunctions				
Proper use of idiom				
Good spelling and handwriting				

Interview

Informal interviews were conducted in the experimental group in order to learn feelings and attitudes of these students toward formative assessment and challenges they met to perform class tasks. Examples of some interview questions were as follows: what's your feeling and opinion about the current vocabulary teaching compared with the former vocabulary teaching? What do you think of the

classroom assessment activities such as self-assessment and peer-assessment? Do you think peer-dictation is effective to improve your vocabulary learning?

Data Collection

Data collection instruments were as follows: in the pre-assessment phase they were vocabulary pre-test and pre-questionnaire; in the assessment phase the instruments were observation, interview and portfolios; in the phase of post-assessment the instruments used were interview, vocabulary post-test and post-questionnaire.

Data Analysis

The independent sample t-tests were used to explore whether there was significant difference in the vocabulary pre-test between control group and experimental group. If there was not significant difference, it indicated that the two groups had equivalent vocabulary level. The following independent sample t-tests were used to examine whether there was significant difference between experimental group and control group in the vocabulary post-test. Paired sample t-test was adopted to explore the differences of vocabulary pre-test and post-test for experimental group as well as control group.

The records of observation, interview and portfolios were also analyzed using the qualitative analysis software package, Atlasti, with a specific focus on research questions of present study. Quantitative methods combined with qualitative methods were used to collect and analyze data.

Results and Discussion

Results of Vocabulary Tests

All the students who participated in the vocabulary pre-test also attended the post-test. Thus, 46 students from control group and 47 students from experimental group were valid subjects. The independent sample t-test showed that there was no statistically significant difference of vocabulary level between control group and experimental group before the research ($p=.84>.05$). The mean score of the control group was 103.52 and that of experimental group was 103.26. The two scores were quite close to each other with a difference of 0.26. It showed that the two groups were

approximately equivalent in English vocabulary level before they attended the study. After the implementation of formative assessment methods in the experimental group, a vocabulary posttest was given to students of both control and experimental group to explore the effectiveness of formative assessment in English vocabulary learning. The results of independent sample t-test showed that there was a significant difference between the two groups in the vocabulary post-test ($p=.047<.05$). The mean of experimental group ($M=106.15$) was much higher than that of the control group ($M=103.85$). This answers the first research question: Is formative assessment effective to enhance English vocabulary achievement of senior high school students? Students in the experimental group performed better in the vocabulary posttest than students from the control group. The formative assessment was effective to improve English vocabulary achievement of senior high school students in China.

In order to further examine the effectiveness of formative assessment, paired sample t-tests were used to investigate whether there were significant differences of vocabulary level in pre-test and post-test for the two groups. Regarding the control group, the mean of pre-test was 103.52 while the mean of post-test was 103.85. The difference was not significant ($p=.50>.05$).

Concerning the experimental group, there was a significant difference of vocabulary level between pretest and posttest ($p=.00<.05$) after the implementation of formative assessment. The mean of the post-test ($M=106.15$) was significantly higher than that of the pre-test ($M=103.26$). It indicated that there was a significant progress made by students in the experimental group after implementation of formative assessment. Formative assessment was effective to enhance vocabulary achievement of students. The results were consistent with the conclusion of previous research (i.e., Black & William, 1998). Black and William (1998) testified to the effectiveness of formative assessment, and concluded that formative assessment if used correctly had a positive impact on student learning.

This finding also helped confirm the theory of vocabulary learning process (Nation, 2001). According to Nation (2001), if words were processed deeply they were most likely to be stored in long-term memory and the frequent occurrence of a word facilitated words remembering. Formative assessment provided students with a learning environment where students could express themselves freely, receive timely feedback from teachers and peers, and be fully exposed to words. Thus, students from the experimental group performed better than before in their vocabulary learning.

Results of Questionnaire

In the pre-questionnaire, the percentage of students who considered vocabulary important was 68. In post-questionnaire the percentage was 79. It indicated that students held a positive attitude toward the importance of vocabulary learning and formative assessment promoted that attitude. Although the majority of students knew that vocabulary learning was important, only 38 percent of them in the pre-questionnaire showed interest in vocabulary learning. It indicated that students' learning interest or autonomy was prevented by some factors, and traditional assessment could be one of these factors. In the post-questionnaire the percentage increased to 52. It indicated that formative assessment probably stimulated students' interest in English vocabulary learning. Fifty-three percent of students agreed that they would actively finish assignments and seek for other learning resources in the post-questionnaire while in the pre-questionnaire the percentage was only 36. It showed that students developed interest, motivation or autonomy in the English vocabulary learning after the implementation of formative assessment. Formative assessment focuses on students' affective needs and personal development. The progress in vocabulary learning made by students from the experimental group could be partly due to the enhanced learning interest and motivation. Learners with great interest and motivation as well as low anxiety could perform successfully in language learning. If assessment methods were suitable for students, their interest and motivation in vocabulary learning could be aroused.

Only 30 percent of students reported in the pre-questionnaire that they reacted actively in the classroom to the teacher's questions, and 38 percent of students would like to get involved in class discussions and communicate with peers while 34 percent of students would like to make study plans and set learning goals. It implied that students had a low level of learning autonomy and acted passively in the vocabulary learning inside and outside of classrooms. However, in the post-questionnaire about half of the students reported that they realized they should study actively and autonomously and cooperate with the teacher and classmates. Fifty-three percent of students began to study with clear plans and goals. Making plans, reflecting one's own learning and setting goals are all predictors of autonomous learning, and more and more students from the experimental group began to have reflection and autonomy in their English vocabulary learning.

According to humanistic theory, learning was student-centered and teaching should encourage students to act independently. The humanistic theory considered the development of learners' autonomy as the goal or purpose of teaching. The data of questionnaires affirmed that formative assessment could help to cultivate students' ability of autonomous vocabulary learning. Students began to realize that vocabulary learning was important and interesting. They developed awareness and consciousness in learning autonomy and made study plans and set goals autonomously which also strengthened their learning motivation.

Sixty-six percent of students reported in the pre-questionnaire that they never made summary of effective learning methods whereas 51 percent of students in the post-questionnaire reported that they had that awareness of summary making. More than half of students thought that they did not have or be taught effective methods of learning vocabulary. In the traditional classroom students usually learned vocabulary by rote instead of other effective methods which resulted in a lack of competence in actual communication. The percentage of the students who actively accepted methods introduced by the teacher increased from 53 percent in pre-questionnaire to 72 percent in post-questionnaire. It indicated that much more students accepted the vocabulary teaching methods and activities in formative assessment. Students mainly held a positive opinion about formative assessment in vocabulary teaching. Most students believed that formative assessment enhanced their vocabulary learning and they had confidence in their future vocabulary learning. In the post-questionnaire 32 out of 47 (68%) students agreed that formative assessment was effective to improve their vocabulary learning, and they preferred the new vocabulary teaching and assessment methods and had confidence in their future vocabulary learning. Sixty-two percent of students felt that they made progress in English vocabulary learning which also was proved in the vocabulary tests.

The results of questionnaire helped answered the second research question, "Is formative assessment helpful to improve students' autonomy and interest in vocabulary learning?" and the third research question, "What are students' opinions about formative assessment in English vocabulary teaching?" It was found that formative assessment methods promoted students' autonomy and interest in English vocabulary learning and most students held positive opinions about formative assessment and had confidence in their vocabulary learning. The findings of the two research questions were further testified in observations, interviews and portfolios.

Results of Observation, Interview and Portfolio

The researcher began to observe the experimental group at the beginning of the research and the gradual change of students was observed in the experimental group. After the analysis of observation evaluation tables, it was found that almost half of the students became more and more active in the classroom. They became more and more active to participate in vocabulary learning discussion, group work, and self-assessment and peer-assessment activities. They answered the teacher's questions much more actively than before. They expressed a liking to communicate more about their learning feelings and experience. And students became more keen to set goals and make plans for themselves, which showed that they developed learning autonomy.

The following interviews were used to explore further information about students' opinions about the application of formative assessment in the vocabulary teaching and testify findings of questionnaire and observation. Thirty-four students from the experimental group participated in the informal interviews. Most students stated that applying formative assessment into vocabulary teaching was helpful and interesting, and formative assessment could facilitate their English vocabulary learning which also was testified in the vocabulary tests. For instance, Ping noted, "I think English vocabulary is not so boring and I began to feel it is sometimes interesting and I learned something useful". Lin also stated, "I would like to speak and answer teacher's question and in group work I have to cooperate with others, do something and speak out." Students became more keen to express themselves than before. Most students from the experimental group thought the current teaching methods were different but more effective than before. They gradually found that learning vocabulary was not so boring and demanding as they would have thought. The change of their attitudes could promote their vocabulary achievement. Wang said, "Because of the teacher's guidance and new methods used, I began to like English learning and I think the methods teacher used are helpful to improve my vocabulary learning, and I think vocabulary learning become more interesting than before." There were also a few students who held opposite opinions. For example, Jiang noted, "I think these vocabulary learning activities are useless. I have my own methods and when I meet a new word I will look up word-list or dictionary and try to remember it.

I do a good job in the vocabulary learning so I think other method or activity is a waste of time.”

Some students in the experimental group stated that self-assessment and peer-assessment were somewhat useless at the very beginning of the implementation of formative assessment. They thought it was a waste of time to fill out tables. Some students considered filling out self-assessment tables or peer-assessment tables as a routine but not necessary. In order to solve these issues much more attention was paid to these students and their performance in the class. Timely guidance and feedback were provided to students to make sure they were willing as well as qualified to assess themselves and their peers. Gradually, after they got some valuable feedback, students realized that self-assessment and peer-assessment were useful and could help them to know their strengths, weaknesses and what to do to improve themselves in the future.

Student’s progress, efforts and self-reflection could be shown clearly in portfolios. In portfolios there were students’ peer-assessment and self-assessment tables, writings, assignment, paper tests, teachers’ feedback and comments or other reading materials used inside and outside of classrooms. After examining students’ self-assessment and peer-assessment tables, it was found that students’ comments or feedback became more and more specific and clearer than before. For instance, “I like this sentence in your writing”, “it was not right to use this word here”, “I think you should use past tense here”, “The preposition ‘on’ should be changed to ‘in’”. Students’ plan of study and objectives also became clearer than before, for instance, “after this week I will finish two writing and master the use of 10 new words and 5 new phrases”, “I hope I can speak more and answer more questions from teachers in the class”. In the portfolios, there were valuable and interesting English reading materials like newspapers and magazines with fresh and important words or expressions marked by students. After analyzing students’ writing samples, the researcher and the teacher consistently found that students’ command of vocabulary was much better than before with many idiomatic, various and proper words and expressions used in their writing. All these data indicated that students became more and more autonomous and motivated in their English vocabulary learning and they did make progress.

Conclusions

Formative assessment was effective to enhance students' English vocabulary learning since from the results of vocabulary tests it was concluded that students from the experimental group made significant progress in the vocabulary post-test after the implementation of formative assessment and students from the experimental group performed better in vocabulary test than those from the control group.

Formative assessment was helpful to improve students' autonomy and interest in vocabulary learning. Students became active to participate in classroom discussion and cooperation, and began to make study plans and set goals autonomously. They gained awareness and consciousness of vocabulary learning autonomy. Most of students believed that vocabulary learning was significant and interesting and their motivation and confidence in English vocabulary learning was strengthened after the implementation of formative assessment in the classroom.

Students held positive opinions about formative assessment in vocabulary teaching. Formative assessment stimulated students' interest, autonomy and confidence in English vocabulary learning. Most of them agreed with the effectiveness of formative assessment methods and related teaching activities. They were confident that they could make further progress under the guidance of assessment and teaching methods.

Implications

Firstly, affective factors are important for English vocabulary learning and teaching. It is suggested that teachers pay attention to students' affective needs and personal development. Student is the center of teaching and educational assessment. Autonomy, interest as well as motivation should be strengthened by teacher's instructions. Teachers can design meaningful classroom activities and provide authentic class materials to arouse students learning motivation and interest. Teachers are suggested to design classroom activities and adopt appropriate teaching methods according to students' needs and potentials.

Secondly, students feel better encouraged to cooperate with others in vocabulary learning. Group work, peer-assessment and peer-dictation are all effective methods for vocabulary learning. Communications and cooperation among learners help arouse and recall their memory of newly learned vocabulary. Interactions between teachers and students facilitate language learning. Teachers are suggested to provide valuable and timely feedback for students to help them gain a better

understanding of their own learning process. Knowing students' progress, weakness and problems in vocabulary learning could help teachers to modify curriculum design, teaching materials and methods.

Thirdly, in the educational assessment students could be encouraged to act as assessors. The assessment can be more humanistic and multi-dimensional. Self-assessment and peer-assessment, as part of learning process, can be used to improve vocabulary learning. Teachers are suggested to provide timely guidance and comments in order to make best of the advantages of self-assessment and peer-assessment. Students are better to be informed of purposes and criteria of assessment and what is expected in the assessment. Teacher's comments and feedback should be comprehensible, concrete and timely, from which students could learn their strengths and weaknesses and how to make adjustment and improvement.

Students could learn actively and make great progress if they understand themselves better and know their own strengths and weaknesses. Students can be trained to take responsibility for their own learning, and they could learn more from peers by sharing learning experience and develop skills for lifelong learning through self-assessment and peer-assessment. Instructions of how to set goals and use learning strategies are vital and students' learning motivation could be strengthened if they have a goal.

Limitations

The time of implementation of formative assessment is not long enough, and the complete effectiveness of formative assessment cannot be measured during one semester. A delayed test to see how long the effect lasts can be conducted in the future. Besides, there is no separate class for vocabulary learning. Vocabulary teaching was carried out in English class where writing, listening, grammar and other tasks also need to be performed. The time for vocabulary teaching is very limited. The next limitation is that the research is only conducted in two classes with only 47 students in experimental group. If the sample size is larger, the results may be perhaps more obvious/definitive and thought-provoking. Finally, the vocabulary test cannot completely reflect students' real competence in English vocabulary. The same vocabulary test was used in pre-test and post-test, which may affect the validity of vocabulary test. The assessment activities and methods used for vocabulary teaching are not various and abundant enough. In the questionnaire the number of questions is

not large enough and its representativeness may affect the validity of the questionnaire.

Suggestions for Future Research

The present research explored the effectiveness of formative assessment in English vocabulary learning, and whether the same effects could be found in other aspects of English learning still needs to be examined. Control group can be tested in questionnaires for comparisons with experimental group. More effective assessment activities and methods can be designed and created according to the needs of students to implement formative assessment in classrooms. More participants and a larger community could be investigated to identify the effectiveness of formative assessment in English language learning. How to combine summative assessment and formative assessment to establish a dynamic and multi-dimensional assessment system to enhance learners' motivation and autonomy in language learning can be examined in future studies.

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