

EFL Students' Burnout in English Learning: A Case Study of Chinese Middle School Students

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Abstract

This paper aims to explore the English learning burnout of Chinese middle school students to provide solutions to reduce it. Foreign Language Classroom Burnout Scale (FLCBS) is used to make an investigation into 212 middle school students of different grades in No. 10 Middle School in Xi'an city in China. After both qualitative and quantitative analyses of data collected from the questionnaires, it finds out that: 1) a medium level of English learning burnout exists in the students of No.10 Middle School ($M=53.80$). 2) In terms of grade, three grades have no statistically significant differences in burnout ($p=0.377>0.05$). 3) As for gender, there is statistically significant difference ($p=0.001<0.05$). The male's total burnout is higher than the female's, especially in Low Efficiency ($p=0.006<0.05$). 4) There is statistically significant difference in English learning burnout between different majors ($p=0.001<0.05$). The learning burnout of science students is higher than that of art students, especially in Depletion and Low Efficiency. Based on the research findings, it puts out such suggestions for teachers to lower down students' English learning burnout as building up students' confidence, adopting new teaching methods, and improving the relationship between teacher and students.

Keywords: middle school students, English learning, burnout

1. Introduction

Burnout is a psychological problem mainly caused by the complexity of people's relationship to work. Burnout was first regarded as unscholarly "pop science", however, in the 1970s the conceptualization of "job burnout" emerged from academic research work (cf. Freudenberg, 1975; Maslach, 1982), and its scientific and academic value has drawn more and more scholars' attention. Researchers have made much deeper and greater research from different perspectives—from initial exploratory work to systematic empirical work, obtaining significant findings.

As research continues, more and more scholars found that English learning burnout existed in a considerable number of students. Students with English learning burnout often feel unmotivated when learning English. Meanwhile, some students with serious burnout always like to sit at the very back of the classroom, not willing to communicate with their classmates. It is so obvious that burnout is a bad behavior influencing not only students' English learning, but also their mentality. Therefore, English learning burnout deserves great concern and attention from educators and scholars.

There have been many studies about burnout home and aboard in recent decades; however, research about middle school students' English learning burnout is not sufficient enough in China and more effective and appropriate ways to reduce English learning burnout still need to be found out. As a result, it is of great significance to research into students' language learning burnout to help teachers to find good solutions to improve students' English learning.

2. Literature Review

2.1 The Definition of Burnout

The term "burnout" was first put forward in 1975 by American scholar Freudenberg in his article entitled "Staff Burnout" in the *Journal of Social Issues*. The burnout in his research originally related to job burnout or

occupational burnout which is featured by a set of symptoms including exhaustion resulting from worker's excessive demands, physical symptoms such as headaches and sleeplessness, "quickness to anger," and closed thinking as well as mental symptoms including cynicism, negativism, inflexibility, rigidity of thinking, unhappiness and boredom. Freudenberg described burnout as "failure or exhaustion because of excessive demands on energy, strength, or resources (1975, p. 73). Pines & Maslach defined burnout as a syndrome of physical and emotional exhaustion involving the development of negative self-concept, negative job attitudes and loss of concern and feeling for clients (1978, pp. 233-237). According to Maslach et al., burnout is "a prolonged response to chronic emotional and interpersonal stressors on the job, and is defined by the three dimensions of exhaustion, cynicism, and inefficacy (2001, p. 397).

With the study of job burnout being furthered, many scholars have extended their research scope of burnout from "job burnout" to students' learning burnout. Pines and Kafry (1980) after comparing the burnout among students, nurses, counselors and educators, discovered college students experienced more tedium than professionals and regarded their school work as more stressful and lacking in rewards relative to the way professionals look on their work experience. This can be attributive to students' long-term academic and achievement pressure in the process of their learning. Burnout causes energy loss, indifference and behavioral alienation and loss of enthusiasm in learning. Learners with a burnout have higher absenteeism, lower motivation, higher percentage of dropout and so on (Meier & Schmeck, 1985, pp. 63-69).

Learning burnout has also attracted attention from Chinese scholars who made research into burnout in students of different types. Lian et al. made a research on college students' burnout and described learning burnout as a psychological and physical exhaustion in the students who are not interest in learning and have a negative attitude to learning (2006, p. 47). Many studies and experiments on students' learning have shown that burnout is a negative affective and behavioral factor leading to students' low interest and motivation in learning. When students have learning burnout, they will have no interest and enthusiasm in learning and feel tired and sick of learning.

2.2 The Study of English Learning Burnout

In the field of foreign language teaching and research, researchers have also mentioned the phenomenon of foreign language learners' burnout in their study. It is pointed out most language learners would have obvious burnout when they are learning a third language (Ehrman, 1996, pp. 81-104). It is concluded that the long-term inconsistency of teachers' teaching styles with students' learning styles can lead to students' learning burnout (Felder & Henriques, 1995, p. 21). By comparing English learning burnout between English majors and non-English majors, it has found that there is no difference in the burnout degrees between the two groups, but the burnout distribution of non-English majors is quite distinct from that of English majors (Gao, 2012, pp. 113-117). Ma found out that English learning burnout was widespread in students' English learning at Western local university in China. It is shown that statistically significant differences in English learning burnout are found in students from different grades and with different English learning proficiency (2009, pp. 1266-1269).

2.3 Classification of Learning Burnout

Maslach & Jackson pointed out three-component conceptualization of burnout---Emotional exhaustion, Depersonalization and Diminished personal accomplishment (1981, pp. 99-113). Emotional exhaustion is a chronic state of physical and emotional depletion that results from excessive job and/or personal demands and continuous stress (Wright, 1998, pp. 486-493). Depersonalization, a symptom of anxiety and disorders, describes the individual who treats the recipients of service in a negative, apathetic and excessively alienated way. Diminished personal accomplishment means the negative evaluations of the self (Maslach, 1982).

Lian et al. (2005, pp. 632-636) classified Chinese college students' learning burnout into Depression, Misconduct and Reduced personal accomplishment. Hu & Dai (2007, pp. 162-164) put forward the components of Chinese middle school students' learning burnout including emotional exhaustion, reduced learning accomplishment, distance between teachers and students and physical exhaustion.

Yang (2010, pp. 157-158) divided learning burnout into Emotional Exhaustion which refers to students' weariness facing some excessive demands and work; Depersonalization, a personal response to the cynical and dispassionate manner and attitude to the interpersonal relationship and in English learning, is the coldness and negative state in English learning activities; Low Efficiency refers to the individual's feeling of impotence or incapacity and his lack of sense of accomplishment. In English learning it means the decrease of their English learning ability and achievement evaluation.

In this paper, the types of English learning burnout are mainly based on Yang's division because of its reliability

and viability as well as its design specially for Chinese students, and they are Indifference, Depletion and Low Efficiency.

3. Research Methodology

3.1 Research Questions

This paper tries to find answers to the following four questions:

1. What is the overall situation of Chinese middle school students' English learning burnout?
2. What are the differences between male and female Chinese students in terms of Depletion, Indifference and Low Efficiency?
3. What are the differences in English learning burnout among Chinese students in the three grades?
4. What are the differences in English learning burnout in terms of different majors?

3.2 Participants

In this investigation, participants are students ranging from grade 10 to 12 of Xi'an No.10 Middle School, a provincial key middle school in Xi'an city, China. The total number of participants is 212; 40 students are from grade 10, 73 students from grade 11, and 99 students from grade 12. Students from grade 11 and 12 are majoring in either Liberal Arts or Sciences. A number of 112 students are male, accounting for 52.8%; 100 students are female, accounting for 47.2% of the total. A total of 80 students are in Liberal Arts and 92 students in Sciences. The detailed information is listed in Table 1, Table 2, and Table 3.

Table 1. Description of Subjects in Grade

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Grade 1	40	18.9	18.9	18.9
	Grade 2	73	34.4	34.4	43.3
	Grade 3	99	46.7	46.7	100.0
	Total	212	100.0	100.0	

Table 2. Description of Subjects in Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	112	52.8	52.8	52.8
	Female	100	47.2	47.2	100.0
	Total	212	100.0	100.0	

Table 3. Description of Subjects in Major

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arts	80	37.7	37.7	37.7
	Sciences	92	43.4	43.4	81.1
	Undetermined	40	18.9	28.3	100.0
	Total	212	100.0	100.0	

3.3 Instrument

In this research, the instrument is a questionnaire. The learning burnout scale is designed by Yang (2010, p. 157). This scale has been proved to have high reliability and validity during the inspection of learning's language learning burnout. The questionnaire includes 18 items, which aims at investigating the students' current burnout state of English learning. The 18 items are divided into three dimensions: Emotional Depletion, Indifference and Low Efficiency. Five items are on Emotional Depletion; seven items on Indifference and six items on Low Efficiency (or low self-efficacy). The participants were required to evaluate the degree of their perception of each item on a 5-point Likert scale ranging from 5 (very agree) to 1 (not very agree). Some of these items involve reverse scoring. The higher scores they got, the more severe burnout they would have in English learning.

The internal consistency coefficient (Cronbach's Alpha) of the data about the 18 items is 0.810, which shows a high credibility, as is shown in Table 4.

Table 4. Reliability Statistics of All Items in Burnout

Cronbach's Alpha	N of Items
.810	18

The internal consistency co-efficiency (Cronbach's Alpha) of each of the three burnouts is between 0.057 and 0.897. (See Table 5, 6 and 7)

Table 5. Reliability Statistics of 5 Items in Depletion

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.897	.897	5

Table 6. Reliability Statistics of 7 Items in Indifference

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.057	.051	7

Table 7. Reliability Statistics of 6 Items in Low Efficiency

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.838	.838	6

3.4 Data Analysis Techniques

The 230 questionnaires were distributed. In the uniform instruction, the subjects were required to independently finish the questionnaires which were taken back on the spot. A number of 212 questionnaires were retrieved and the recovery rate is 92.2%. All the 212 questionnaires are valid. The data collected were put into computer and analyzed by the software Statistical Package of Social Studies (SPSS).

4. Results and Discussion

4.1 The Overall Situation of Middle School Students' English Learning Burnout

Table 8 below shows that the mean of students' English learning burnout is 53.80, which indicates that students' English learning burnout in No. 10 Middle School is at middle level.

Table 8. Descriptive Statistics of the Overall Burnout

	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
sum	212	26	78	11405	53.80	9.164	83.973
Valid N (listwise)	212						

In terms of the three English learning burnout: Depletion, Indifference, Low Efficiency, statistics show that the mean for Depletion is 15.59, Indifference is 21.11, and Low Efficiency is 17.09. (See Table 9)

Table 9. Means of the Three Learning Burnout

Data of Items	Depletion	Indifference	Low Efficiency
Objects	212	212	212
Mean	15.59	21.11	17.09

The results show that the higher the average score, the more serious students' English learning burnout is. Among the three kinds of learning burnout, students have the highest score in Indifference, followed by Low Efficiency and Depletion.

According to the results of the questionnaire, the highest burnout is Indifference, which has a mean score of

21.11. It shows that students are indifferent to English, which implies that interest has a great influence on students' English learning burnout. There are some reasons leading to this. First of all, students are not aware of the importance of English. For example, quite a number of Chinese students question the necessity of English learning. The second reason for students' lack of interests in English is because learning English is not an easy job, but requires students to master such four skills as listening, speaking, reading and writing; especially to remember English words is a very tedious process which would reduce students' interest in learning English.

Next to Indifference is Low Efficiency. The reason for students' Low Efficiency in English learning can be explained from the following two aspects. One is teachers' teaching capability; the other is students' learning capability. Firstly, teachers play an important role in students' learning process. The current English teaching mode mainly follows the traditional one, with teacher as the leader and students as the listeners of class. In this teacher-dominating mode, teachers mostly attach importance to how much information students have been taught while paying less attention to how much knowledge students have absorbed. Students often have little time to digest and reflect what they have learnt and fail to catch up with their teachers at last. Undoubtedly, this commonly-used "Duck-stuffing" way of teaching unavoidably leads to students' Low Efficiency in English learning. Secondly, the low learning efficiency is also caused by students' lack of appropriate learning strategies. As we all know, good learning strategies can improve and facilitate English learning. Thirdly, education in China mainly focuses on students' scores while neglecting the teaching of learning strategies. Therefore, students more often than not have little improvement in their English. Meanwhile, Chinese students value "face" more than Western students do; they are very concerned about the negative evaluation from their teachers or any other students. Therefore, some students who are afraid of being regarded as being ignorant and retarded by others are quite unwilling to ask questions even though they do not understand the knowledge.

The reasons why so many students have burnout in Depletion may be caused by learning pressure. And the inappropriate learning methods also cause students to feel difficult in learning English. At the same time, Chinese middle school students are under great pressure from the college entrance exams. The more pressure they feel from the exams, the more Depletion they would get from English learning.

4.2 Differences in English Learning Burnout Between Male and Female Students

The differences in English learning burnout between male and female students are presented in the following Table 10. Statistics show that male and female students show significant difference in Low Efficiency ($p=0.006<0.05$) and total burnout ($p=0.001<0.05$), with the mean score of 17.57 for males and 16.55 for females in Low Efficiency; and with 55.43 for males and 51.97 for females in total burnout. This finding means that male students generally have higher burnout than female students, specifically in Efficiency. As a result, gender is a significant variable leading to the middle school students' English learning burnout. (See Table 10)

Table 10. Students' Burnout in Different Gender

	sex	N	Mean	p
Depletion	F	112	16.51	0.104
	M	100	14.57	
Indifference	F	112	21.35	0.559
	M	100	20.85	
Low Efficiency	F	112	17.57	0.006
	M	100	16.55	
sum	F	112	55.43	0.001
	M	100	51.97	

The cause of this phenomenon lies in the sex difference in language learning. Spanish scholars Bacon & Finnemann's study found out that women have higher learning motivation than men, and women are better at using learning strategies and memorizing words and expressions (Bacon & Finnemann, 1992, pp. 471-495). Green & Oxford's (1995, pp. 261-297) research reveals that women are more successful in using learning strategies than men. Women are more adept at communication, and they ask and respond to what they do not know in time, which helps them to release pressure, and reduce burnout rate. Men are more concerned about their face and dignity in communication than women do (ibid.). They are often embarrassed to answer or give

feedback, and reluctant to show their shortcomings in language learning, and this cause them feel stressed, leading to burnout.

4.3 Differences in English Learning Burnout Among Students in Different Grades

The results show that the total burnout among students in the three grades has no statistically significant difference ($p=0.377 > 0.05$). Specifically speaking, students in the three grades have no statistically significant difference in Depletion ($p=0.053 > 0.05$), Indifference ($p=0.290 > 0.05$) and Low Efficiency ($p=0.253 > 0.05$). (See Table 11)

Table 11. ANOVA of Students' Burnout in Different Grades

		Sum of Squares	df	Mean Square	F	Sig.
Depletion	Between Groups	115.871	2	57.936	2.971	.053
	Within Groups	4075.242	209	19.499		
	Total	4191.113	211			
Indifference	Between Groups	19.083	2	9.542	1.245	.290
	Within Groups	1602.200	209	7.666		
	Total	1621.283	211			
Low Efficiency	Between Groups	62.339	2	31.170	1.385	.253
	Within Groups	4704.958	209	22.512		
	Total	4767.297	211			
Sum	Between Groups	164.734	2	82.367	.981	.377
	Within Groups	17553.544	209	83.988		
	Total	17718.278	211			

This set of data has no statistically significant difference. It is probably because the subjects of the investigation are from a key middle school where students have stronger and greater will and determination to pass the college entrance exams than students of ordinary school. In this key middle school, students' learning purpose is clear, and their self-discipline and management ability are quite strong. Their study foundation is solid, and their learning attitude is positive. A good learning environment also makes the students' learning competitive and their aims firm.

4.4 Differences in English Learning Burnout Between Science and Liberal Art Students

Table 12 and 13 show that there is statistically significant difference between students in Sciences and those in Liberal Arts; separately speaking, students in the two majors have statistically significant difference in Depletion ($p=0.028 < 0.05$), Low Efficiency ($p=0.024 < 0.05$) and total sum of burnout($p=0.001 < 0.05$).

Table 12. Students' Burnout in Different Major Groups

	Major	N	Mean
Depletion	Arts	80	13.79
	Sciences	92	16.61
Indifference	Arts	80	20.58
	Sciences	92	21.79
Low Efficiency	Arts	80	16.15
	Sciences	92	17.46
Sum	Arts	80	50.51
	Sciences	92	55.86

Table 13. Sig of Three Learning Burnout

	sig
Depletion	0.028
Indifference	0.464
Low Efficiency	0.024
Sum	0.001

The result shows that major is a variable leading to the difference in English learning burnout between students in Sciences and those in Liberal Arts, and the learning burnout of students in Sciences is higher than that of students in Liberal Arts, especially in Depletion and Low Efficiency. The obvious difference in Depletion and Low Efficiency lies in that students in Sciences are good at logical and analytical thinking, like math but not good at remembering visual and auditory images.

5. Teaching Suggestions

According to the research, English teachers should try their best to relieve the learning burnout of Chinese middle school students. Teachers should pay attention to learning burnout and understand the influence of learning burnout. Early detection and prevention can help students with learning burnout get rid of burnout earlier. Some suggestions are provided as follows:

Firstly, it is necessary to build students' confidence. The most useful way of improving students' learning is to make students feel confident. To cultivate the students' English learning confidence means to help them to obtain successful experience. Because students' successful experience in the past is the foundation of English learning self-efficacy, which will largely enhance students' confidence to succeed in the future study. The successful completion of a task can help students to enhance their competence and confidence to complete more tasks. Considering the lack of confidence in English learning, teacher should try to invent and create different and appropriate teaching steps and teaching environment to attract students' attention and interest, simulating their learning motivation and building up their confidence.

Secondly, teachers should change the teaching methods appropriately. They can add some interesting video, audio materials appropriately to attract students' attention during the class time. The traditional teacher-centered teaching mode only emphasizes the input while neglecting students' output. Therefore, in traditional English class, English teachers cram so much knowledge into students' brain that students are not able to absorb and digest at one time. Several students said "English learning is very boring. In every lesson there are too many notes, so we just write down the notes and have no time to understand them. The teacher always repeats the same word or sentence several times, which makes me bored. etc." As a result, teachers should update their teaching styles and methods and learn the advanced teaching methodology and let students become the masters of the class. Teachers should pay more attention to apply theory into teaching practice to enhance the charm of teaching. They need to teach students the ways to study, let students enjoy English learning and know the value of learning.

Thirdly, teachers should build a harmonious relationship with students. A healthy relationship between teachers and students is the basis for efficient English teaching and learning. Teachers should not always treat students with a straight face. The relationship between teachers and students is not to make students afraid of teachers, but to make both sides respect each other and learn from each other. Fear will only lead to the deterioration of the teacher-student relationship. Teachers' love plays a very important role in creating a good relationship between students and teachers. It is very helpful in lessening students' burnout in English Learning. Teachers' love for students reflects his respect for students as well as his teaching art and wisdom. Only when a harmonious relationship is created and built up can the teacher better know students and students learn English with relaxation.

6. Conclusion

This study has found out that middle school English learning burnout exists in Xi'an No.10 middle school in China. The male students' burnout is higher than that of females, especially in Low Efficiency. Grade is not a noticeable variable in students' English learning. Students in Sciences have higher English learning burnout than students in Liberal Arts. In order to reduce students' learning burnout, provided in the paper are some teaching suggestions such as the building of students' confidence, the improvement of teacher-student relationship and the adjustment of teaching methods.

It is of pedagogical significance to both English teachers and learners to face language learning burnout. With a

good understanding of the contributing factors to learning burnout, teachers could help students to avoid burnout to enhance their learning proficiency. However, this study unavoidably has its own limitations. Firstly, the number of subjects is limited. Secondly, this study only focuses on the burnout differences in terms of gender, grade and major in one middle school. Therefore, the results of the study should be taken with caution. Further studies can investigate students' burnout in different schools with a larger number of subjects. Moreover, students' English learning burnout should be further analyzed from different perspectives so that more useful pedagogical implications can be found.

References

- Bacon, S. M. C., & Finnemann, M. D. (1992). Sex differences in self-reported beliefs about foreign-language learning and authentic oral and written input. *Language Learning*, 42(4), 471-95. <https://doi.org/10.1111/j.1467-1770.1992.tb01041.x>
- Ehrman, M. E. (1996). An exploration of adult language learner motivation, self-efficacy, and anxiety. In R. L. Oxford (Ed.), *Language learning motivation: Pathways to the new century* (pp. 81-104). Honolulu: University of Hawaii Press.
- Felder, R. M., & Henriques, E. R. (1995). Learning and teaching styles in foreign and second language education. *Foreign Language Annals*, 28(1), 21-31. <https://doi.org/10.1111/j.1944-9720.1995.tb00767.x>
- Freudenberger, H. J. (1975). The staff burn-out syndrome in alternative institutions. *Psychotherapy: Theory, Research & Practice*, 12(1), 73-82. <http://doi.org/10.1037/h0086411>
- Gao, G. (2012). An analysis on the characteristics of non-majors' foreign language learning burnout. *Foreign Language Research*, (6), 113-117. <https://doi.org/10.16263/j.cnki.23-1071/h.2012.06.026>
- Green, J. M., & Oxford, R. (1995). A closer look at learning strategies, L2 proficiency, and gender. *TESOL Quarterly*, 29(2), 261-297. <https://doi.org/10.2307/3587625>
- Hu, Q., & Dai, C. L. (2007). A research on middle school students' learning burnout structure. *Psychological Science*, 30(1), 162-164. <https://doi.org/10.16719/j.cnki.1671X981.2007.01.041>
- Lian, R. et al. (2005). Relationship between professional communication and learning burnout of undergraduates and scales developing. *Acta Psychologica Sinica*, 37(5), 632-636.
- Lian, R., Yang, L. X., & Wu, L. H. (2006). A study on the professional commitment and learning burnout of undergraduates and their relationship. *Psychological Science*, 29(1), 47-51. <https://doi.org/10.1671/Jcnki.1671-6891.2006.01.013>
- Ma, Y. (2014). English learning burnout and its correlative factors among students at western local university. *China Journal of Health Psychology*, (8), 1266-1269. <https://doi.org/10.13342/j.cnki.cjhp.2014.08.056>
- Maslach, C. (1982). *The burnout: The cost of caring*. Englewood Cliffs, N.J.: Prentice Hall.
- Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Occupational Behaviour*, (2), 99-113. <https://doi.org/10.1002/job.4030020205>
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52(1), 397-422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Meier, S. T., & Schmeck, R. R. (1985). The burned-out college student: A descriptive profile. *Journal of College Student Personnel*, 26(1), 63-69.
- Pines, A., & Kafry, D. (1980). *Tedium in College*. Paper Presented at the Western Psychological Association Meeting, Honolulu, Hawaii (ERIC Document Reproduction Service No. ED 192210).
- Pines, A., & Maslach, C. (1978). Characteristics of staff burnout in mental health settings. *Psychiatric Services*, 9(4), 233-237. <https://doi.org/10.1176/ps.29.4.233>
- Wright, T. A., & Cropanzano, R. (1998). Emotional exhaustion as a predictor of job performance and voluntary turnover. *Journal of Applied Psychology*, 83(3), 486-493. <https://doi.org/10.1037/0021-9010.83.3.486>
- Yang, T. (2010). *The relationship between foreign language learning burnout and motivation* (Unpublished doctoral dissertation). Southwest Jiaotong University, Chengdu, China.

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