

An Investigation into Engineering ESP Textbooks from Instructors' Perspective: Critical Thinking in Focus

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Abstract

This study is an attempt to evaluate, through a qualitative design, engineering ESP (English for Specific Purposes) textbooks taught to students of Engineering with a focus on critical thinking skill. A typical ESP textbook taught in Iran consists of 15 units, starting with a text, comprehension, vocabulary, and several production exercises. The purpose of this study is to evaluate ESP textbooks and present four ESP instructors' opinions with respect to critical thinking as a fundamental need for students of engineering. To this end, a semi-structured interview was exploited to probe the books and through content analysis, instructors' opinions were categorized and their commonalities were extracted grounded on five main themes of the WGCTA (Watson-Glaser Critical Thinking Appraisal). The results of the content analysis indicated that there was a general consensus among the instructors that these textbooks do not rightly address the needs of learners in terms of enhancing their critical thinking skill; therefore, certain suggestions were provided by the instructors to improve the books. The findings promise implications for reflection in ESP instruction and materials development.

Keywords: engineering ESP textbooks, ESP instructors, students' critical thinking, WGCTA

INTRODUCTION

In the rapidly changing world of language learning and current developments in this field, the significance of developing students' competency to overcome complicated problems in real life contexts cannot be ignored (Bransford et al., 2000). Dealing with complex problems requires students to take part in active critical thinking processes (National Educations Goals Panel, 1991). Given the fact that critical thinking skills are necessary for decision making and comprehending the problematic issues, they are deemed to be specifically significant for engineering professionals who are expected to make prominent decisions (Giere, 1997). Moreover, critical thinking is inseparable from influential scientific and technical communication. In other words, it is necessary for engineering students to develop the skills to criticize the assumptions and inferences

and also the way they communicate and argue for their own claims. Therefore, students as consumers of technical information can benefit from the skills to assess claims and inferences critically and also as producers can be trained to question assumptions as well as checking on their own reasoning.

Educationally speaking, there is a general consensus among researchers on the significance of promoting students' critical thinking in schools. In this line, in order to fill in the gap, a string of scholarly research investigated the effects of critical thinking on academic achievement (e.g., Frisby, 1992; Giancarlo & Facione, 2001) to highlight its role as a fundamental need of university students in order to solve problems (National Educations Goals Panel, 1991). Therefore, pressing need is felt to gain insights into the actual instructional classroom practices of teachers in ESP courses (Atai & Ftahi-majd, 2014), syllabi and textbooks where highly cognitive skills including critical thinking can be developed.

ESP TEXTBOOKS

At the present situation of Iran, ESP education is an inseparable part of the university curriculum for all academic programs and almost all undergraduates in higher education institutions have to go through it. Students majoring in the different fields at universities around the country are required to pass a two-credit Basic English course following a three-credit General English course. Then, they have to pass a two or three-credit ESP course, based on their majors mainly focused on passages and their related vocabularies and exercises superficially. Thus, there is dissatisfaction with dominant paradigm and new values emphasizing centrality of the learners and improving their cognitive skills are put forward. Therefore, the challenge is based on the proposition of a methodology to put these facts into practice (Rajabi, Kiany & Maftoon, 2012). Accordingly, in order to revolutionize the existing paradigm, an outstanding change in a number of elements including syllabi and textbooks in ESP courses is required (Errey, 2001; Scott, 2001).

In spite of the fact that some textbooks have been developed through the cooperation of well-rounded ESP instructors, the designed exercises are not sufficient and more well-prepared exercises geared toward developing students' cognitive skills i.e. critical thinking are required. Efficient questioning suggested by Socrates is one of the practical practices that instructors can put into effect in order to increase students' critical thinking. Good questions can refer to those that stimulate thinking and encourage students to interpret, analyze, synthesize, critique and reflect. Thus, questioning has been valued among instructors as an open-ended process of research and as function of critical thinking (Ikuenobe, 2001). Therefore, this study is an attempt to investigate the engineering ESP textbooks as an area where critically-oriented questions can be raised. Thus, the following research question is central in this study:

Does engineering ESP textbooks promote students' critical thinking?

METHOD

Research design

With reference to the nature of the study and in order to answer the research question, a qualitative design was conducted to provide a comprehensive picture of the present study.

Context and participants

The participants of the present study comprised four ESP instructors all of whom were Iranian and native speakers of Persian. The instructors including both male and female participants held PhD degrees and also ESP courses at Isfahan University of Technology (IUT) and other universities. This study was purposively conducted at IUT where ESP courses were mainly offered for the students of engineering.

With regard to the aforementioned points, the demographic information of instructors is presented in Table 1. Hereafter, numbers are used to refer to these instructors so that "I1", for instance, stands for ESP instructor 1.

Table 1: Instructors' demographic information

Participants	Gender	Age	Field of study	Degree	ESP or EGP training opportunities	Teaching experience		The ESP course taught: English for the Students of...
						General	ESP	
I1	Male	35	Applied Linguistics	PhD	University courses in EGP & ESP	12	8	Agriculture Eng. Electrical Eng. Material Eng. Sciences
I2	Female	34	Applied Linguistics	PhD	University courses in EGP & ESP	8	5	Material Eng. Electrical Eng. Sciences Humanities
I3	Male	32	Applied Linguistics	PhD	University courses in EGP & ESP	10	3	Engineering Biology
I4	Male	31	Applied Linguistics	PhD	University courses in EGP & ESP	9	4	Sciences Engineering Economics

Instrumentation and data collection

The instruments selected for the purpose of this study comprised the engineering ESP text book, The Watson-Glaser Critical Thinking Appraisal and, semi-structured interview each of which are illuminated in the following sections.

Engineering ESP Textbook

The evaluated material in this study were ESP books for Students of Engineering taught at universities of Iran. A typical ESP textbook taught in Iran, e.g. English for the students of Materials Sciences by SAMT Publications, as an EFL country consists of around 15 units each of which is started by reading passage, vocabulary and comprehension exercises followed by cloze passages as well as translation exercises.

The WGCTA

Another instrument utilized in this study was the Persian version of Watson-Glaser Critical Thinking Appraisal (WGCTA) properly designed to measure distinguished interdependent aspects of critical thinking through its subscales including inferences, recognition of assumptions, deduction, interpretation and evaluation of arguments. It is best manifested as an instrument to test students' critical thinking ability and its five subscales should not be interpreted individually (Bernard et al., 2008). Psychometric properties are sound with acceptable internal inconsistency (Cronbach's α coefficient r ranging from .78 to .85; Watson & Glaser, 2006) and test-retest reliability ($r = .81$; Watson & Glaser, 1964). Moreover, sufficient evidence of criterion-related validity, with the WGCTA scores consistently manifesting significant correlations with on-the-job performance (Watson & Glaser, 2006) and also decision-making effectiveness (Shin, 1998) were found.

Semi-structured interview

To serve the objectives of the present study in terms of the engineering ESP book evaluation, semi structured interview as a less rigid style of interview was conducted to give the researcher the opportunity to have more freedom to digress and probe for more information based on his or her written list of questions (Mackey & Gass, 2005). Thus, a list of questions based on the five main sub-scales of the WGCTA was prepared to evaluate the engineering ESP book and probe instructors' opinions and their further suggestions to improve the engineering ESP book in terms of critical thinking.

Data analysis

The data collected through the semi-structured interviews were analyzed qualitatively to answer the second research question raised in this study. Instructors' evaluation of the course book based on the five subscales of the WGCTA as the main themes employed in the interview were summarized respectively.

Table 2: ESP instructors' opinions grounded on the WGCTA five sub-scales

Themes	Commonalities	More specific explanations
1. Drawing inferences	All four instructors put forward the fact that ESP books teach students how to draw inferences superficially and implicitly	I3 recommended that it had better these sub-scales be taught explicitly and certain passages and more specific exercises be devoted for every sub-scale.
2. Recognizing assumptions	All instructors homogenously believed that this sub-scale is completely neglected in ESP books.	More particularly, I3 believed that book exercises are not geared toward developing critical thinking scales.
3. Deductive reasoning	All instructors argued that certain exercises are covered in books in order to improve deductive reasoning. In other words, this sub-scale has been among the concerns of authors but it is not focused on sufficiently.	I1 believed that in spite of the fact that some exercises are related to deduction, certain conditions like students' level of proficiency and their disciplinary expertise had to be considered in designing exercises either implicitly or explicitly.
4. Logic interpretation	-(I1, I2 & I4) believed that this sub-scale is taken into account in ESP books but it is too implicit and superficial. However, I3 held that this sub-scale is not considered at all in ESP books.	-I3 believed that as passages are not well- chosen to foster this sub-scale, apparently their exercises don't follow this aim either.
5. Argument evaluation	-All believed that this sub-scale is considered superficially and it is not well focused on in exercises.	-I1 put forward the fact that as the texts are scientific, students do not have tendency toward evaluating the arguments and just true-false exercises are used simplistically. I2 believed that this scale is only employed in examination questions and it is not pointed to in ESP exercises at all. And finally, I3 believed that only 10% of book exercises are in this line.

CONCLUSION

As the results of the research question based on five themes i.e. the WGCTA sub-scales under investigation revealed, ESP instructors' opinions in evaluating ESP books in terms of critical thinking were almost homogenous and their commonalities overshadowed their minor differences.

With regard to the evaluation of engineering ESP textbooks taught to students of engineering, certain exercises associated to the WGCTA sub-scales, i.e. themes, except recognizing assumptions were observed. However, according to ESP instructors involved in this study, these exercises were implicit and superficial attention had been paid to foster these assumptions. Therefore, certain suggestions were made by instructors in order to improve these books in terms of critical thinking as a fundamental need of ESP students.

As the first concern, it was recommended that a WGCTA sub-scales be taught explicitly in every unit and well-prepared passages followed with a full range of exercises be designed to improve every sub-scale. Secondly, it was suggested that while ameliorating exercises, students' proficiency level and their disciplinary expertise had better be among the concerns of the author. Moreover, a critically-oriented character developed by instructors is also called for to make students curious about the language world around and more realistically about the real world they deal with.

In terms of implications, this study highlights the role of ESP textbooks as another catalyst to promote students' critical thinking and make instructors feel responsible to compensate the deficiencies of ESP textbooks in hand even by designing extra exercises or taking more critically-oriented approaches to foster students' critical thinking.

This study grounded on the influence of ESP textbooks on students' critical thinking suffers from some limitations. Investigating students' critical thinking is a complicated issue. Students' critical thinking can be ameliorated or deteriorated by a wide variety of practices. Therefore, the results of this study just go for the influence of ESP books in order to improve critical thinking as a cognitive ability.

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REFERENCES

- Atai, M. R. & Fatahi-Majd, M. (2014). Exploring the practices and cognitions of Iranian ELT instructors and subject teachers in teaching. *EAP reading comprehension. English for Specific Purposes* 33, 27–38.
- Bernard, R. M., Zhang, D., Abrami, P. C., Sicol, F., Borokhovski, E., & Surkes, M. A. (2008). Exploring the structure of the Watson- Glaser critical thinking appraisal: One scale or many subscales? *Thinking Skills and Creativity*, 3, 15–22.
- Bransford, J., Brown, A., & Cocking, R. (Eds.). (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press.
- Errey, L. (2001). EAP teacher training: How specialized is it? *EL Gazette*, October.

- Frisby, C. L. (1992). Construct validity and psychometric properties of the Cornell Critical Thinking Test (Level Z): A contrasted group analysis. *Psychological Reports, 71*, 291-303.
- Giancarlo, C. A., & Facione, P. A. (2001). A Look across four years at the disposition toward critical thinking among undergraduate students. *The Journal of General Education, 50* (1), 29-55.
- Giere, R.N. (1997). *Understanding Scientific Reasoning*, Harcourt Brace, 4th edition.
- Ikuenobe, P. (2001). Questioning as an epistemic process of critical thinking. *Educational Philosophy and Theory, 33*(3), 325-341.
- Mackey, A. & Gass, S. (2005). *Second Language Research: Methodology and Design*. Mahwah, New Jersey: Lawrence Erlbaum Associates.
- National Education Goals Panel (1991). *The National Education Goals Report: Building a Nation of Learners*. Washington, D.C.: U.S. Government Publishing Office.
- Rajabi, P. Kiany, Gh. & Maftoon, P. (2012). Iranian English Major vs. Subject-matter ESP Teachers' Beliefs and Instructional Practices in ESP Classes: A Comparative Study. ESP. In-service teacher training programs. *Ibérica 24*, 261-282.
- Scott, M. (2001). Is an ELT training good enough for EAP? *EL Gazette*, September.
- Shin, K. R. (1998). Critical thinking ability and clinical decision making skills among senior nursing students in associate and baccalaureate programmes in Korea. *Journal of Advanced Nursing, 27*, 414-418.
- Watson, G. and Glaser, E.M., (1964). *Watson-Glaser Critical Thinking Appraisal Manual*. Psychological Corporation.
- Watson, G., & Glaser, E. M. (2006). *Watson-Glaser critical thinking appraisal short form manual*. San Antonio, TX: Harcourt.