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## Scrabble as a tool for engineering students' critical thinking skills development

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### Abstract

Without any doubt, critical thinking is essential for modern well-educated and creative engineers. Teaching students how to think more productively, generate and evaluate ideas is vital in contemporary engineering education. The paper is aimed at investigating development of engineering students' critical thinking skills with Scrabble Board Game. The paper proposes analysis of some theoretical sources, observation, teaching experiences of Board Game Scrabble application as a tool for development of engineering students' critical thinking skills. Findings and results demonstrate strategies of enhancing thinking skills in the process of EFL teaching with Board Game Scrabble. According to the author's practice and research within the system of higher technical education in Tomsk Polytechnic University, Board Game Scrabble is a very powerful teaching tool which focuses on engineering students' creative critical thinking, logic and analytical skills.

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### 1. Introduction

#### 1.1. Actuality of the topic

Nowadays the amount of information available through modern technology is huge. Besides, information explosion is likely to increase in the future. Engineering students, as new generation of professionals, need to choose the information they really would use and not just passively accept it. Students can be taught thinking skills strategies that allow them to process information efficiently, to think more productively, generate and evaluate ideas.

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Engineering students need to develop and apply critical thinking skills in doing their academic studies, solving various complicated problems that they face, and to evaluate the critical choices they will be forced to make as a result of the information explosion and other rapid technological changes. They can also learn to demonstrate habits of thinking behaviors in their daily and professional activities.

The need to teach and develop thinking skills is not a recent one. Throughout the years, a lot of critical thinking skills programs have been generated from educators, seeking to find the essential elements of thinking and to develop a methodical approach to teaching thinking skills as an important part of college or university syllabus. In every course, as well as in the course of English Foreign Language (EFL), students should be taught to think logically, analyze and compare questions to master English as a university subject.

This means hard work for teachers. It is much easier to teach students to memorize vocabulary and grammar and then assess them with multiple-choice tests. In a course that emphasizes thinking, objectives must include application and analysis, divergent thinking, and opportunities to organize ideas and support value judgments. University syllabi strive for graduates to be experienced and skilled at critical thinking. In spite of crucial importance, the efficient methods in effective thinking skills training required for future graduates has not been thoroughly researched. The EFL syllabus of Foreign Languages Department (Institute of Power Engineering, Tomsk Polytechnic University, Russia) focuses on effective tools aimed at developing students' critical thinking as well as their language competences. Board Game Scrabble is actual one.

### *1.2. Critical thinking definition.*

Thinking combines the related structures and processes of perception, memory, forming ideas, language and use of symbols – the basic cognitive skills which underlie the ability to reason, learn and solve problems. Thinking is inclusive of imagining, recalling, solving problems, free association, daydreaming, concept formation, and a variety of other procedures (Psychology Dictionary, 2014). Critical thinking skills figure prominently among the goals for education, whether one asks developers of curricula, educational researchers, parents, or employers. Although there are some quite diverse definitions of critical thinking nearly all emphasize the ability and tendency to gather, evaluate, and use information effectively (Beyer, 1985).

Whereas there are different definitions of widely-used critical thinking terms, each model describes similar elements of thinking, critical thinking, creative or all of them. Some researchers have quite completely studied critical thinking and developed useable definitions.

### *1.3. Background*

Researchers of critical thinking agree on the particular abilities circumscribed by the definition, which include analyzing arguments, claims, evidence, creative thought (Paul, 1992; Facione, 2000; Paul, R. W., & Elder, L. 2006); judging or evaluating (Lipman, 1988; Case, 2005; O'Hare, L.O., & McGuinness, 2009) making decisions or solving problems (Halpern, 2001; Willingham, 2007).

Critical thinking helps students to develop the intellectual integrity needed to evaluate the reasoning of others (Elder, 2004), encourage students learn to analyze and assess information in written materials: analyze the logic of articles, essays, or chapters (Paul and Elder, 2003).

Most researchers and educators consider that critical thinking is becoming increasingly important and suggest ways to teach critical thinking such as: various techniques to keep the class interesting (Robinson and Kakela 2006), open-book tests and student-authored exam questions (Vanderburgh, 2005), critical thinking debate (Davies, 2006), a set of cognitive skills that can be applied to teaching, utilizing, and assessing critical thinking skills (Facione, 2010), particular instructional strategies in fostering acquisition and transfer of critical thinking skills in higher education (Tiruneh, Verburgh & Elen, 2014) et al. The importance of developing engineering students' critical thinking in their professional careers is conceded by Andreu-Andres, Garcia-Casas, Rising (2009), Melles (2008).

### *1.4. Aim of the study.*

The author investigated how playing Board Game Scrabble actually benefits students in developing their critical thinking for sciences and engineering, provide them with a successful communication and good EFL knowledge.

The purpose of the study was to determine the effects of Scrabble in class and out-of-class programme on students' thinking skills development. Besides, the author aimed to examine the result of Board Game Scrabble competition engineering students vs. EFL professionals.

## **2. Materials and methods**

### *2.1. Board Game Scrabble*

During thousands of years games have entertained and educated people in countless ways as a part of human life. Nowadays, games are the powerful and effective device for teaching and learning because the human mind is more receptive in enjoyable atmosphere of gaming.

Board Game Scrabble is one of the most popular board games widely used by English Foreign Language (EFL) teachers. Scrabble is a useful supplement to teaching that is alive with authentic, interesting and stimulating learning opportunities. Scrabble is a board-and-tile game in which from two to four players compete in forming words with lettered tiles on a 225-square board; words spelled out by letters on the tiles interlock like words in a crossword puzzle.

Players draw seven tiles from a pool at the start and replenish their supply after each turn. There are 100 letter tiles, each imprinted with a point value for different letters. Words are scored by adding up the point values of their letters, multiplied by any of 61 premium squares that may be covered, such as double letter, triple letter, double word and triple word. Scoring, as the game advances, is possible both horizontally and vertically, with higher scores registered by forming two or more interlocking words at the same time. At the end of the game, when one player has no tiles or the board is deadlocked, the player who has scored the greatest number of points is the winner. Values of unused letters left to players are totaled and deducted from their scores (Encyclopedia Britannica, 2014).

Scrabble celebrated its 60-th birthday in 2008. The Telegraph has compiled a list of 60 pieces of trivia to mark the event. The facts speak for themselves: Scrabble is currently produced in 29 different languages; 53 % of all homes in Great Britain have a Scrabble set; there are around 4,000 Scrabble clubs around the world; Scrabble is used all over the world as a method of teaching English (The Telegraph, 2008).

Beyond all doubt, learning English grammar, as a key feature of any language, is often difficult. By integrating Scrabble, learners can focus both on meaning and word forms. In addition, they won't notice how much they're learning because playing Scrabble is so much fun. Beside grammar, Board Game Scrabble boosts students' spatial, creative thinking, social and personal skills related to critical thinking.

Spatial relationship skills improve as students plan words to fit available spaces on the board for getting the highest score. The act of manipulating tiles creates a hands-on connection between concepts and objects, reinforcing students' abilities to concentrate on spatial relationships developing their thinking skills and creativity.

Thinking skills also expand in the exciting team atmosphere of word play, fostering unique opportunities for creative and critical thinking without fear of judgment or poor grades. Imagining, planning, evaluating options and decision-making are some of the skills essential to team success. Playing Scrabble, students involve in brainstorming exercises, think of ways to come up with viable solutions and rich a specific goal.

Social and personal skills develop naturally as students experience principles of team play, friendly competition. Self-esteem grows in the Scrabble game atmosphere, where the definition of successful participation can range from pulling tiles from the bag to challenging another player's word. Even when a team loses, members have the satisfaction of working together to shape their part of the game.

Thus, Board Game Scrabble can be an efficient tool in the development of logical thinking and abstract concepts among engineering students.

### *2.2. Research Methodology*

Both experimental and interview survey research methods were used to investigate relationships in the study model. The hypothesis was that engineering students may enhance their thinking skills in the process of mastering EFL with Board Game Scrabble.

The research sample comprised 2nd year engineering students (N=42) and EFL teachers (N=6) of Institute of Power Engineering provided the subjects of this study. Within the experiment there were 4 groups: 2 students' groups as experimental and teachers group as a control group. Students played Scrabble for an academic year as class and out-of-class activity while teachers were new comers, without Scrabble experience. Then the most successful students, Scrabble players (N=6) were organized in two teams to compete vs. two EFL teachers' teams (N=6).

The tournament was conducted out of classroom situation where participants were not under any kind of pressure to obtain the highest score. While playing, the contrast in Scrabble practices and professional EFL knowledge could be clearly observed. On the one hand, there were EFL teachers with advanced level of English but without Scrabble practice, on the other hand there were engineering students with a lower English level who could rely on logical, spatial relationship, critical thinking skills and creativity trained through Scrabble programme.

### 2.3. Results and Interpretation

There was a significant tournament which indicated that engineering students performed better than EFL teachers. The game scores were fixed by tournament Score Keeper in a special Contestant Score Sheet presented in table 1. Students' teams won the tournament (238 to 222).

It is taken for granted that engineering students possess creative critical thinking skills but it should be noted that preliminary Scrabble training turned out to be relevant. As expected the Scrabble competition revealed that thinking abilities for Scrabble winning (as a measure of thinking and creativity) were quite important.

Table 1. The Contestant Score Sheet.

<b>SCRABBLE CLUB</b>				<b>Tomsk Polytechnic University</b>	
<b>Contestant Score Sheet</b>				<b>Date</b>	07.03.2014
Group	EFL teachers (2 groups), Engineering students (2 groups)				
Year	2-d year students				
EFL level	Teachers (CAE, Advanced),		Students (Intermediate)		
Team name	“Snowstorm”- <b>students</b>	“Siberian frost”- <b>students</b>	“Birch trees”- <b>teachers</b>	“Lilac”- <b>teachers</b>	
Turn	Play/ Score	Play/Score	Play/Score	Play/Score	
1	+6	+14	+10	+9	
2	+12/18	+12/26	+23/33	+8/17	
3	+5/23	+28/54	+3/36	+10/27	
4	+15/38	+15/69	+7/43	+6/33	
5	+10/48	+11/80	+7/50	+10/43	
6	+7/55	+14/94	+7/57	+12/55	
7	+9/64	+8/102	+13/70	+27/82	
8	+6/70	+10/112	+5/75	+9/91	
9	+9/79	+10/122	+3/78	+30/121	
10	+7/86	+7/129	+9/87	+2/123	
11	+16/102	+8/137	+14/101	+2/125	
Unplayed Tiles	-1	-0	-1	-4	
Total Points:	+101	+137	+100	+121	
Teams Points:		238		221	

In short, experiment and practice mentioned above, may be evident that Scrabble is an effective teaching tool in development critical thinking skills within engineering education environment.

The author summarized a research project to find out what students of Institute of Power Engineering think of Scrabble as part of their learning program. The respondents, students of experimental groups, were offered to complete the evaluation form by giving a feedback on their assessment the skills developed by playing Board Game Scrabble. In the present study the results indicated that the team building, spelling, vocabulary, and spatial skills were rated high by respondents.

Nevertheless, most of the respondents (93%) recognized their Scrabble experience excellent as an effective way of developing thinking skills (table 2).

Table 2. The evaluation form.

I can assess skills developed by Board Game Scrabble in the following way: <b>A</b> – excellent, <b>B</b> – good, <b>C</b> – fair		A	B	C
Items of assessment				
1.	Team building	72%	24%	4%
2.	Spelling skills	88%	12%	0%
3.	Vocabulary skills	86%	14%	0%
4.	Spatial skills	86%	10%	4%
5.	Thinking skills	93%	5%	2%

Thus it can be concluded, students' assessment speakingly confirms a special role of promising Scrabble in the development of such significant quality during the process of EFL learning as thinking skills.

### 3. Conclusion and Recommendation

The author's teaching experience and study Board Game Scrabble within engineering students of Institute of Power Engineering, Tomsk Polytechnic University made it possible to conclude that Board Game Scrabble should be introduced as a teaching tool and method selection for an advanced stage of students' critical thinking development.

It is indisputable that critical thinking skills improvement may be complemented and embedded in the EFL syllabus as a key component. Unquestionably, in contemporary field of modern engineering there exists a crucial need to teach critical thinking skills at university. With Board Game Scrabble teachers may create an atmosphere where students are encouraged to learn deeply, ask and answer questions, engage in divergent critical thinking, look for relationships among ideas and cope with real life issues.

To sum up, it is absolutely obvious that pedagogic ideas concerning teaching young generation critical thinking skills must be among priorities in present-day educational environment.

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