Content Analysis for Critical Thinking Skills in the Lower Primary School Science Textbooks in Malaysia

Mohammed Y. M. Mai

Faculty of Education, Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak Darul Ridzuan

Muhammed Yusuf

Faculty of Education, Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak Darul Ridzuan

Maria Saleh

Faculty of Education, Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak Darul Ridzuan

Abstract

The purpose of this study is to analyse lower primary science textbooks (grade 1-3), which were implemented by the Ministry of Education in Malaysia, in terms of thinking skills. To achieve this, a tool for content analysis including thinking skill items will be constructed. Two science teachers have be trained to conduct the content analysis for grade 1-3 science textbooks, the reliability and validity of analysis have be verified using Cohen's kappa statistic. From the results, it can be seen clearly that Prioritizing", "Evaluation" and "Detecting Bias" thinking skills are not included at all in the science textbook from year one until year three. While, the most frequent critical thinking skills are "attributing", "analysing", "Grouping and Classifying" and "Sequencing" gradually. Most of the skills have been in the pictures for year one, and in the "text" and then within the "picture" and finally within the "activities" for both of year two and three. Such research help teachers and curriculum developers in the development and implementation of science curriculum to raise the level of achievement of thinking skills for students.

Keyword: Thinking Skills, Critical Thinking Skills, Content Analysis and Science Textbooks

Introduction

Science is the one of the most important subjects that is taught in our schools. In Malaysia, the science curriculum aims at producing active learners. To this end, pupils are given many opportunities to engage in scientific investigations through hands-on activities and experimentations. The inquiry approach, incorporating thinking skills, thinking strategies and thoughtful learning, should be emphasized throughout the teaching-learning process (Curriculum Development Centre, 2002).

The Ministry of Education in Malaysia introduced the National Philosophy of Education (NPE) in 1988. According to NPE "Education in Malaysia is an on-going effort towards further developing the potential of individuals in a holistic and integrated manner, to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards and who are responsible and capable of achieving a high level of personal well-being as well as being able to contribute to the betterment of the family, society and the nation at large (Al-hudawi, Musah, Lai, & Fong, 2014). In consonance with the National Education Philosophy, science education in Malaysia nurtures a science and technology culture by focusing on the development of individuals who are competitive, dynamic, robust and resilient and able to master scientific knowledge and technological competency (Curriculum Development Centre, 2002). Therefore, science curriculum ought to enhance the personal development of students and contribute to their lives as citizens.

Science education reformers currently characterize professional science as both a specialized form of inquiry and as a body of knowledge (Howes, 2002), therefore, science education must be oriented towards acquisition of skills, self and social empowerment for all students specially students with impairment. A goal of improving students' abilities to acquire

the skills is necessary to be able to use critical thinking and problem-solving skills independently. Students who have learned to use critical thinking and problem-solving skills will be better equipped to meet new challenges (Lins, 1993).

One of the primary goals of the early childhood science curriculum is the development of scientific thinking in young children. Scientific thinking has been an important area of cognitive development since the work of Inhelder and Piaget. Scientific thinking, defined as intentional knowledge seeking, encompasses the abilities to generate, test, and evaluate hypotheses, theories, and data, and to reflect on this process. More recently, the Partnership for 21st Century Skills has identified critical thinking as one of several learning and innovation skills necessary to prepare students for post-secondary education and the workforce (Lai, 2011).

Williams (1993) presented for three definitions of critical thinking by leading researchers. First, Robert Ennis's classic definition: "Critical thinking is reasonable, reflective thinking that is focused on deciding what to believe or do". Next, Matthew Lipman's definition: "Critical thinking is skillful, responsible thinking that is conducive to good judgment because it is sensitive to context, relies on criteria, and is self-correcting. Finally, in informal presentations, Richard Paul uses this definition: "Critical thinking is thinking about your thinking, while you're thinking, in order to make your thinking better".

Critical thinking is different from just thinking. It is metacognitive— it involves thinking about your thinking (Williams, 1993). On the other hand, some motivation research suggests that difficult or challenging tasks, particularly those emphasizing higher-order thinking skills, may be more motivating to students than easy tasks that can be solved through the rote application of an information (Lai, 2011). Critical thinking is evaluating conclusions by logically and systematically examining the problem, the evidence, and the solution (Aslan & Polat, 2008). Critical thinking skills are useful in almost every life situation. According to many researchers, the ideal critical thinker are: (Thompson, 2011).

habitually inquisitive and intellectually curious,

well-informed, willing to reconsider, clear about issues,

diligent in seeking relevant information,

open-minded, flexible, fair-minded in evaluation,

honest in facing personal biases,

prudent in making judgments,

orderly in complex matters,

reasonable in the selection of criteria,

focused in inquiry to identify solutions to problems

persistent in seeking results which are as precise as the subject and the circumstances in the inquiry permit,

cognizant of potential barriers and difficulties,

In essence, as students develop the skills to conduct scientific investigations, their knowledge of science concepts and processes will be enhanced (Lewis, 2012).

Critical thinking includes the component skills of analyzing arguments, making inferences using inductive or deductive reasoning, judging or evaluating, and making decisions or solving problems (Lai, 2011).

Consequently, science education must help young students begin to develop critical thinking skills needed throughout their lives. To master a skill, science curriculum must give the opportunity for a student to learn and practice the skill throughout the content of science textbooks.

Research Statement

Malaysia is looking forward towards becoming a fully developed country by the year 2020 as in the nation's ' Vision 2020' . The decline in the number of students taking up science in upper secondary schools over the last decade has caused great concern among many politicians and science educators over the availability of skilled manpower necessary to achieve the

nation' s vision (Ling, 1999). Science has three distinct and interrelated parts: attitudes, processes, and products (Schweingruber, H. A., Duschl, R. A., & Shouse, 2007). In Malaysia, the science curriculum aims at producing active learners. To this end, pupils are given many opportunities to engage in scientific investigations through hands-on activities and experimentations. In order to incorporate thinking skills in science education, thinking strategies and thoughtful learning, should be emphasized throughout the teaching-learning process (Curriculum Development Centre, 2002). Therefore, the content of curriculum should be applied accuracy in the preparing the students to meet the demands resulting from the rapid changes in science and technology, economic and social.

Textbooks due to great importance in determining educational content are center of special attention for all those involved in education and it is most important expression of curriculum (Soleymanpour & Kiadaliri, 2014), textbooks provide the main resource for students as the major vehicle for conveying information to students, and enable teachers to animate the curricula and giving life to the subjects taught in the classroom (Aslan & Polat, 2008).

Thus, this study will provide useful information by exploring the inclusion of the critical thinking skills of students' and teacher‘s editions of 1-3 grade science textbooks published by Ministry of education in Malaysia. Thus, the research aimed to answer following questions:

To what extent the content of science textbook of lower primary school has used critical thinking skills?

To what extent there is a balance of critical thinking skills in the content of science textbooks of lower primary school?

Research Methods

To address the research questions, content analysis method is preferred to identify the infusion of critical thinking skills in lower primary science textbooks. Content analysis has been defined as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Krippendorff, 2004). It is a qualitative research method frequently used in this type of studies for analyzing textual information in a standardized way that allows evaluators to make inferences about that information (Lewis, 2012).

Population and Sampling

In this research, lower primary science textbooks will be analyzed through “content analysis”. Lower primary science textbooks in year 1, year 2 and year 3 approved by Ministry of Education to be used in lower primary schools constitute the population of this research.

Thus, statistical population include all lessons and chapters contents of the lower primary science textbooks in year one, year two and year three of lower primary school and the sample consists of 11 topics that randomly selected form Year one, Year Two and Year Three.

Reliability

The type of reliability used for this research is inter-rater reliability which is described as reproducibility by Krippendorff (2004). Inter-rater reliability using Cohen's kappa (κ) is the level of agreement between raters or judges. If everyone agrees, IRR is 1 (or 100%) and if everyone disagrees, IRR is 0 (0%). The reliability coefficient was calculated using Cohen's kappa. The Cohen’s kappa results for this research is 0.9 which means there is 90% of similarities between the first and second analysis for the same topic. To make valid inferences from the text, it is important that the classification procedure be reliable in the sense of being consistent, this mean different people should code the same text in the same way. Therefore, one of the most critical steps in content analysis involves developing a set of explicit recording instructions. These instructions then allow outside coders to be trained until reliability requirements are met.

Research Instruments

The instrument that developed during the analysis processes is a critical thinking skills code book that defines what is perceived as a codable thinking skills in a science textbook. The critical thinking skills will be aligning with Science Curriculum Framework that guided the analysis of the textbooks. All keywords for each critical thinking skills were extracted from the Standards-Based Curriculum for Primary Schools.

Data Collection Process

Step I: Establishing coding categories

The first step of data analysis for this research focused on establishing rules for coding the data to ensure objectivity. According to Weber (1990), the pre-determined categories are based upon some theory when dealing with priori coding. For this research, the critical thinking skills were taken from the Conceptual Framework of Science Curriculum (Table 1)

Table 1: *Categories, Definition and Codes*

Categories	*Definition*	*Codes*
Attributing	Identifying characteristics, features, qualities and elements	1
Comparing and Contrasting	Finding similarities and differences	2
Grouping and Classifying	Separating and grouping objects or phenomena	3
Sequencing	Arranging objects and information in order	4
Prioritizing	Arranging objects or information in order based on their importance and urgency	5
Analyzing	Processing information in detail by breaking it down into smaller parts	6
Detecting bias	Detecting views or opinions	7
Evaluating	Making consideration on the good and bad qualities.	8
Making conclusions	Making statements	9

Step 2 : Determining Recording Units

According to Krippendorf (2004), recording units are units that are distinguished for separate description, transcription, recording, or coding. Holsti (1969) stated that a recording unit is the specific segment of content that is characterized by placing it in a given category. Researchers will identify each of the critical thinking skills according to recording units.

Step 3 : Selecting Random Samples

Simple random sampling is a form of sampling in which a number of distinct subjects are selected randomly from the population in a way that each unit has equal chance to be selected.

Step 4 : Creating Coding Procedures

A textbook analysis coding form was created for this study using nine critical thinking skills from the Conceptual Framework of Science Curriculum. Table 2 show the nine critical thinking skills which are based on the Conceptual Framework of Science Curriculum.

Table 2: *Summary of the critical thinking skills*

SKILLS	**DESCRIPTIONS**
Attributing	Identifying characteristics, features, qualities and elements of a concept or an object.
Comparing and Contrasting	Finding similarities and differences based on criteria such as characteristics, features, qualities and elements of an object or event.
Grouping and Classifying	Separating and grouping objects or phenomena into groups based on certain criteria such as common characteristics or features.
Sequencing	Arranging objects and information in an orderly based on the quality or quantity of common characteristics or features such as size, time, shape or number.
Prioritizing	Arranging objects or information in an orderly manner based on their importance or urgency.
Analyzing	Processing information in detail by breaking it down into smaller parts to understand concepts or events as well as to find the implicit meanings.
Detecting Bias	Detecting views or opinions that have the tendency to support or oppose something.

Evaluating	Making considerations and decisions using their knowledge, experiences, skills and values, and giving justifications.
Making Conclusions	Making a statement about the outcome of an investigation based on a hypothesis or strengthening something based on an investigation.

All the selected nine critical thinking skills from the Conceptual Framework of Science Curriculum were analyzed under three categories which are text, pictures and activities. Table 3 shows the summary of the categories.

Table 3: *The summary of the categories.*

CATEGORIES	DESCRIPTIONS
Text	A book or other written or printed work, regarded in terms of its content rather than its physical form.
Picture	A painting or drawing
Activity	The condition in which things are happening or being done.

Step 5: Reading and Coding Data

After attending to the objectivity and systems of the study as described in above steps, the researchers then read, interpreted, and coded instances of critical thinking skills in Year One, Year Two and Year Three Revised KSSR Science Textbooks.

Step 6: Determining Frequencies

After coding the critical thinking skills identified in each textbook, the number of occurrences tabulated for each category and calculated the percentages of critical thinking skills infused in Revised KSSR Science Textbook for Year One, Year Two and Year Three using Contingency tables (Crosstabs table) with Chi-square test.

Results and Discussion

To what extent the content of science textbook of lower primary school has used critical thinking skills?

To determine *to what extent critical thinking skills infused in revised KSSR lower primary science textbooks,* Contingency tables (crosstabs tables) were used between the skills and the category (text, pictures, and activities) to answer the above question. Table 4 shows the results of contingency tables between skills and the category for Year One.

Table 4: *The results of contingency tables between the skills and the category for Year One*

YEAR ONE		CATEGORY			Total
SKILLS		TEXT	PICTURES	ACTIVITIES	
Attributing	Count	7	20	6	33
	% within SKILLS	21.2%	60.6%	18.2%	100.0%
	% of Total	17.9%	51.3%	15.4%	84.6%
Comparing and Contrast	Count	1	0	2	3
	% within SKILLS	33.3%	0.0%	66.7%	100.0%
	% of Total	2.6%	0.0%	5.1%	7.7%
Grouping and Classifying	Count	0	0	1	1
	% within SKILLS	0.0%	0.0%	100.0%	100.0%
	% of Total	0.0%	0.0%	2.6%	2.6%
Making Conclusions	Count	2	0	0	2
	% within SKILLS	100.0%	0.0%	0.0%	100.0%
	% of Total	5.1%	0.0%	0.0%	5.1%
Total	Count	10	20	9	39
	% within SKILLS	25.6%	51.3%	23.1%	100.0%
	% of Total	25.6%	51.3%	23.1%	100.0%

Chi-Square = 14.4, df 6, P=.026

The results in the table 4 show that Chi-Square is significant (Chi-Square = 14.4, df 6, P=.026), this means that there is an association between skills and three categories of the content analysis. From the results, “Attributing” got the most frequent

with 84.6% of all skills, while "Comparing and Contrast" has 7.7%, "Making Conclusion" got 5.1% and "Grouping and Classifying" got 2.6%. Based on the results it is clear that the most frequent critical thinking skills is "Attributing", the most of this skill has been in the "pictures" with 60.6% and then within the "text" with 21.2% and finally within the "activities" with 18.2%.

Table 5 show the results of contingency tables between skills and the category for Year Two.

Table 5: *The results of contingency tables between the skills and the category for Year Two*

YEAR 2		CATEGORY			
SKILLS		TEXT	PICTURES	ACTIVITIES	Total
Attributing	Count	20	21	5	46
	% within SKILLS	43.5%	45.7%	10.9%	100.0%
	% of Total	27.8%	29.2%	6.9%	63.9%
Comparing and Contrast	Count	2	0	1	3
	% within SKILLS	66.7%	0.0%	33.3%	100.0%
	% of Total	2.8%	0.0%	1.4%	4.2%
Grouping and Classifying	Count	3	3	3	9
	% within SKILLS	33.3%	33.3%	33.3%	100.0%
	% of Total	4.2%	4.2%	4.2%	12.5%
Sequencing	Count	4	6	0	10
	% within SKILLS	40.0%	60.0%	0.0%	100.0%
	% of Total	5.6%	8.3%	0.0%	13.9%
Making Conclusions	Count	4	0	0	4
	% within SKILLS	100.0%	0.0%	0.0%	100.0%
	% of Total	5.6%	0.0%	0.0%	5.6%
Total	Count	33	30	9	72
	% within SKILLS	45.8%	41.7%	12.5%	100.0%
	% of Total	45.8%	41.7%	12.5%	100.0%

Chi-Square = 13.3, df 8, P=.101

The results in the table 5 show that Chi-Square is not significant (Chi-Square = 13.3, df 8, P=.101), this means that there is no association between skills and three categories of the content analysis. From the results, "Attributing" got the most frequent with 63.9% of all skills, while "Sequencing" has 13.9%, "Grouping and Classifying" got 12.5%, "Making Conclusions" got 5.6% and "Comparing and Contrasting" got 4.2%. Based on the results the most frequent critical thinking skills is "Attributing", the most of this skill has been in the "pictures" with 29.2% and then within the "text" with 27.8% and finally within the "activities" with 6.9%.

Table 6 show the results of contingency tables between skills and the category for Year Three.

Table 6: *The results of contingency tables between the skills and the category for Year Three*

YEAR 3		CATEGORY			
SKILLS		TEXT	PICTURES	ACTIVITIES	Total
Attributing	Count	4	5	2	11
	% within SKILLS	36.4%	45.5%	18.2%	100.0%
	% of Total	4.8%	6.0%	2.4%	13.1%
Comparing AND CONTRAST	Count	2	2	1	5
	% within SKILLS	40.0%	40.0%	20.0%	100.0%
	% of Total	2.4%	2.4%	1.2%	6.0%

Grouping and Classifying	Count	3	4	3	10
	% within SKILLS	30.0%	40.0%	30.0%	100.0%
	% of Total	3.6%	4.8%	3.6%	11.9%
Sequencing	Count	4	5	1	10
	% within SKILLS	40.0%	50.0%	10.0%	100.0%
	% of Total	4.8%	6.0%	1.2%	11.9%
Analysing	Count	19	17	1	37
	% within SKILLS	51.4%	45.9%	2.7%	100.0%
	% of Total	22.6%	20.2%	1.2%	44.0%
Making Conclusions	Count	5	1	5	11
	% within SKILLS	45.5%	9.1%	45.5%	100.0%
	% of Total	6.0%	1.2%	6.0%	13.1%
Total	Count	37	34	13	84
	% within SKILLS	44.0%	40.5%	15.5%	100.0%
	% of Total	44.0%	40.5%	15.5%	100.0%

Chi-Square = 16.3, df 10, P=.091

The results in the table 4.3 shows that Chi-Square is not significant (Chi-Square = 16.3, df 10, P=.091), this means that there is no association between skills and three categories of the content analysis. From the results, "analyzing" got the most frequent with 44.0% of all skills, while "attributing" and "making conclusion" got 13.1% each, "sequencing" and "grouping and classifying" got 11.9% each and "comparing and contrasting" got 6.0%. Based on the results it is clear that the most frequent critical thinking skills is "analyzing", the most of this skills have been in the "text" with 51.4% and then within the "picture" with 45.9% and finally within the "activities" with 2.7%.

To what extent there is a balance of critical thinking skills in the content of science textbooks of lower primary school?

Contingency tables (crosstabs tables) were used between the skills and the category (text, pictures, and activities) to answer the above question. Table 7 shows the results of contingency tables between skills and the category for the textbooks from year One until year three.

Table 7: *The results of contingency tables between skills and the category of years one, year two and year three.*

Year	Category	Skills (*) (*)									Total		
		1	2	3	4	5	6	7	8	9	By	category	By year
1	Text	7	1	0	0	0	0	0	0	2	10	25.60%	
	Pictures	20	0	0	0	0	0	0	0	0	20	51.30%	39
	Activities	6	2	1	0	0	0	0	0	0	9	23.10%	20%
2	Text	20	2	3	4	0	0	0	0	0	33	45.80%	
	Pictures	21	0	3	6	0	0	0	0	0	30	41.70%	72
	Activities	5	1	3	0	0	0	0	0	0	9	12.50%	37%
3	Text	4	2	3	4	0	0	19	0	5	37	44.00%	
	Pictures	5	2	4	5	0	0	17	0	1	34	40.50%	84
	Activities	2	1	3	1	0	0	1	0	5	13	15.50%	43%
Total	By skills	90	11	20	20	0	0	37	0	13	195		
		46%	6%	10%	10%	0%	0%	19%	0%	7%			

(*) Attributing (1), Comparing and Contrast (2), Grouping and Classifying (3), Sequencing (4), Prioritizing (5), Analyzing (6), Detecting Bias (7), Evaluation (8), Making Conclusions (9)

From the results in table 7, "attributing" got the most frequent with 46.0% of all skills, while "analysing" got 19%, "grouping and classifying" and "sequencing" got 10% each, "making conclusion" got 7 % and "compare and contrast" got 6%. Plus, "prioritizing" and "detecting bias" got 0%. Moreover, year three science textbook got the most frequent with 43% of all years, while year two science textbook got 37% and year one science textbook got 20%. Based on the results, it is clear that the highest percentage of critical thinking skills infused in revised KSSR science textbook is in year three, with the most of this skills have been in the "text" with 44.0% and then within the "picture" with 40.50% and finally within the "activities" with 15.50%. The second highest percentage of critical thinking skills infused in revised KSSR science textbook is in year two, with the most of these skills have been in the "text" with 45.80% and then within the "picture" with 41.70% and finally within the "activities" with 12.50%. The lowest percentage of critical thinking skills infused in revised KSSR science textbook is in year one, with the most of these skills have been in the "pictures" with 51.30% and then within the "text" with 25.60% and finally within the "activities" with 23.10%.

Conclusions

For the revised KSSR of year one science textbook, the most frequent critical thinking skills is "attributing", most of the skills have been in the pictures then within text and finally with the activities. Similarly, for revised KSSR of year two science textbook, the most frequent critical thinking skills is "attributing", the most of this skill has been in "pictures" and next within "text" and finally within the "activities".

On the other hand, the most frequent critical thinking skills in the third revised KSSR of year three science textbook is "analyzing". The most of these skills have been in the "text" and then within the "picture" and finally within the "activities". In year three science textbook, the quantity of "text" used to learn the critical thinking skill "analyzing" increases significantly compared to year one and year two science textbooks.

From all the three science textbooks, the highest percentage of critical thinking skills infused in revised KSSR science textbook is in year three, with the most of these skills have been in the "text" and then within the "picture" and finally within the "activities". The second highest percentage of critical thinking skills infused in revised KSSR science textbook is in year two, with the most of these skills have been in the "text" with and then within the "picture" and finally within the "activities". The lowest percentage of critical thinking skills infused in revised KSSR science textbook is in year one, with the most of these skills have been in the "pictures" and then within the "text" and finally within the "activities".

From the results, it can be seen clearly that Prioritizing", "evaluation" and "Detecting Bias" thinking skills are not included at all in the science textbook from year one until year three. While, the most frequent critical thinking skills in the revised KSSR of year one to year three science textbook are "attributing", "analyzing", "Grouping and Classifying" and "Sequencing" gradually.

The results show that the higher percentage of "pictures" for the "attributing" critical thinking skills infused in the Revised KSSR of year one and two science textbooks indeed gives incredible benefits for the children in the first two years.

References

[1] Al-Hudawi, Shafeeq and Fong, Rosy Lai Su and Musah, Mohammed and Tahir, Lokman Mohd, The Actualization of the Malaysian National Education Philosophy in Secondary Schools: Student and Teacher Perspectives (April 1, 2014). International Education Studies, 7(4); 2014, 57-68. Available at SSRN: https://ssrn.com/abstract=2419489 or http://dx.doi.org/10.2139/ssrn.2419489
[2] Aslan, C., & Polat, D. (2008). Content Analysis on Primary Education Turkish Course Books from the Point of Acquiring Critical Thinking Skills. In G. T. Papanikos (Ed.), Issues on Education and Research (Vol. 1). Athens, Greece: Athens Institute for Education and Research.
[3] Curriculum Development Centre. (2002). Integrated Curriculum for Secondary Schools. Ministry of Education Malaysia.
[4] Howes, E. V. (2002). Learning to teach science for all in the elementary grades: What do preservice teachers bring? Journal of Research in Science Teaching, 39(9), 845–869. https://doi.org/10.1002/tea.10049
[5] Krippendorff, K. (2004). Content analysis: An introduction to its methodology (2nd ed.).
[6] Lai, E. R. (2011). Critical thinking: A literature review. Critical Thinking, (June), 1–49. Retrieved from http://images.pearsonassessments.com/images/tmrs/CriticalThinkingReviewFINAL.pdf
[7] Lewis, R. A. (2012). A Content Analysis of Inquiry in Third Grade Science Textbooks. Young University - Provo.

[8] Ling, A. Y. J. (1999). Primary Science Curriculum Implementation in Malaysia: Inquiry as Hope and Practice. Massey University, Palmerston North, New Zealand.
[9] Schweingruber, H. A., Duschl, R. A., & Shouse, A. W. (Eds.). (2007). Taking Science to School: Learning and Teaching Science in Grades K-8. Teaching Science. Washington, D.C.: National Academies Press. https://doi.org/10.17226/11625
[10] Soleymanpour, J., & Kiadaliri, S. (2014). ANALYSIS OF SOCIAL SCIENCES TEXTBOOK IN FOURTH AND FIFTH GRADE OF ELEMENTARY SCHOOLS BASED ON INTEGRATED, 4(5), 13–22.
[11] Thompson, C. (2011). Critical Thinking across the Curriculum: Process over Output. International Journal of Humanities and Social Science, 1(9), p4.
[12] Thousand Oaks, CA: Sage.
[13] Williams, T. M. (1993). What is critical?, 1–46. https://doi.org/10.1016/0263-7863(93)90035-L