Student’s scientific reasoning on advertising as literature

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Abstract. The objective of this study was to investigate students in Grade 9 on scientific reasoning skills by combining basic learning about advertising. The samples were 30 students in Grade 9 at Khon Kaen Demonstration Secondary School, Khon Kaen Province. In this study, interpretative paradigm was used to analyze teaching and learning activities aiming at enhancing students’ scientific reasoning skills through advertising as literature. Data were collected from class observation and assignment that reflect students’ scientific reasoning process based on the Four-Phased Approach of Reasoning proposed by Wu [1] that consists of 4 phases: (1) Issues identification as to identify key issues, (2) Clarification as to clarify personal views or attitudes toward issues, (3) Discussion and Defense as to logically present viewpoints and discuss them, and (4) Synthesis and Conclusion. Students were challenged to express their arguments regarding advertising they have exposed to and seek appropriate solutions to the problems. Students’ scientific reasoning process to analyse advertising as knowledge literacy also reflects their problem-solving skills. The results showed that students could express their opinions in logical thinking process by starting from 1) identifying issues, 2) clarifying viewpoints on advertising, 3) discussing and defending, and 4) synthesizing and concluding. Therefore, using advertising as literature to induce students can significantly develop their scientific reasoning skills. This study also presents practical implications to enhance students’ scientific reasoning through learning activities of literary advertising.

Keywords: Scientific Reasoning, Advertising as Literature

1. Introduction
Scientific reasoning is one of the most essential skills for students required in the 21st century. Since today is filled with a diversity of information resources, students must have analytical thinking based on scientific approach to help them use rational explanation to justify the information. Thus, reasoning skills lead students to acquire other competencies to accomplish higher learning outcomes and their career success [2][3][6][8].

However, the current teaching strategies are likely to be barrier of transforming conventional class into a more active class with student-centered learning environment. Using open-ended scientific inquiry was also used to challenge students to construct their learning process. Therefore, the invention of science process by using interesting teaching media along with questions is suggested to induce students to develop step-by-step reasoning process. By using literary advertising for improving students’ scientific reasoning skills, students are required to clarify the concrete and substantive reasoning sub-skills by extracting from abstractive and cognitive information from the literary advertising. Hence, the analytical
learning activities of advertising as literature allow students to address the deeper meaningful interpretation of information or problems in order to initiate arguments for seeking solutions to solve the problems, then assess their viewpoints before finalizing their conclusion [2][3][7][9].

Furthermore, the assessment strategy for reasoning skills is important component for students’ reasoning skills improvement. Several traditional assessments suggested the multi-dimensional assessing tools in both quantitative and qualitative methods obtained from teacher’s ratings assessment and students’ self-ratings assessment. Consequently, these assessment tools were likely to be standardized emphasizing on reasoning results. The proposed that reasoning skill assessment should not be globally standardized since the skill is long accumulated through individual’s dynamic cognitive process tied with personal characteristics, cultural background and issue contexts. Thus, in this study, the conceptual framework for assessing students’ reasoning competencies was based on Wu’s Four-Phased Approach of Reason, consisting of the following 4 phases [1] [4] [5][10][11].

2. Research Methodology

Four-phased Approach of Reasoning was employed to provide better understanding to further improve Grade 9 students’ reasoning skills by using advertising as literature. The qualitative data were obtained from the students’ descriptive feedbacks to draw content analysis of students’ reason process for the conclusion of the research. The data were further interpreted for implications and suggestion to eliminate the limitations in the future study.

2.1 Population and sample

The population used in this study was students in Grade 9 at Demonstration School, Khon Kaen University, Department of Secondary Education. The whole 1 classroom, consisting of 30 students was randomly selected using purposive sampling.

2.2 Research tools

The research tools used in the research are divided into 2 types; for data collection and tools for data analysis. Research instruments used for data collection were as follows:

2.2.1 Lesson plans using open approach, consisting of 2 lessons; learning advertising as literature and problem-based learning activities to allow students’ reasoning skills development. The learning activities given for students lead to various ways of seeking solutions. The author designed several situations of problem from the experts’ guidance. The lessons were planned based on the lesson plan of Unit 1 (Classification) and Unit 2 (Summarizing).

2.2.2 The Four-phased Approach of Reasoning was used as a framework of scoring rubrics.

2.2.3 Two video cameras were used. The first zooming camera was used to record the target group of students, particularly their motions and conversations during their seeking solutions with detailed information. Another camera was used to capture the overall classroom environment during their open approach learning.
2.3 Data collection
This research was conducted in the second semester of the academic year 2015. Data was collected from
the recorded videos and protocols for students’ reasoning or logical thinking ability. The experiment was
conducted for two weeks; 2 days per week for 50 minutes each session, making a total of 4 sessions with
the following steps.
1. The author and an assistant conducted the experiment by using open approach learning. According
to data collection period, four sessions were conducted with the corresponding 4 lesson plans.
2. When the 2-week experiment has been completed, the protocol for assessing from students’
descriptive feedback was grouped into groups at different levels of logical thinking ability.

2.4 Data analysis
1. Qualitative data were analyzed by using descriptive analysis to draw the conclusion of the research.
2. The data further analyzed in order to assess the actual abilities of students in reasoning skills
development to propose guidelines for future development of teaching and learning management.

3. Results
The learning activities were based on the selected 5 advertisements as literature. Students were asked to
divide into 5 groups; with 7-8 students in each group. The three opening advertisements with only visual
and music were played, meaning that non-narrative description was presented.

Advertisement 1: The first video clip showed the scene that a father was in the living room with his
wife and a child. The father pretended as was driving while his wife and his child were sitting in the
passenger seats. The father turned around to look at his wife and the child and continued driving.
Suddenly, the father put a break and crashed harshly. His wife and the child ran as fast as possible to hold
his body. His wife wrapped his chest from the back while the child locked his waist. The windshield
broke into piece; however, he was safe. Then, the quote appeared; “Embrace Life, Always Wear Your
Seat Belt” as shown in Figure 2.

![Figure 2](https://www.youtube.com/watch?v=XEDU5XxgyD8)

Figure 2. Advertisement showing “Embrace Life, Always Wear Your Seat Belt”

Advertisement 2: The second video clip showed the scene that a man was walking to a bus with a
door open. Suddenly, he saw himself as a child in the windshield of the bus. He turned around and found
the mirror of a store. Still, he saw himself as a child dancing happily. The passengers on the bus also
wondered what happened and started to look at him curiously. Then, everyone turned so young and
danced joyously. The last scene showed that everyone seems a lot younger, even an old man walking by
with his dog also look young as a toddler. Then, the message appears; “Drink Evian Pure and Natural -
Evian live young,” as shown in Figure 2.
Figure 3. Advertisement showing “Drink Evian Pure and Natural - Evian live young”

Advertisement 3: The third video clip showed the scene with a message, “Air Superiority” and a graphic of hundreds of red dots like a mesh were rolling in slowly. Then, an image of the soles of the shoes gets in gently. The image of red dots and rolling mesh keep swapping continuously with an upbeat music. Then, the scene of shoes turns into a pair of shoes with blue and pink colors, with ending message saying, “Air Max Lunar 90” as shown in Figure 3.

(Source: https://www.youtube.com/watch?v=mkHxG9a8kCQ)

Figure 4. Advertisement showing “Air Max Lunar 90”

After the first three non-descriptive video clips of advertisements were presented, with only video and music, students were asked to work in groups with the given time of 15 minutes. Later, the teacher asked questions concerning the three commercials aiming to stimulate student’s critical thinking to acquire reasoning skills. The teacher’s questions and students’ answers were listed as below.

1. What are differences among the three media? Are there any interesting issues?

Student 1: “The message telling us to fasten the seat belts and be aware of the safety while using cars.”

Student 2: “The second ad was about drinking water can refresh us, feel alive, and bring back the youthful feelings again.”

Student 3: “The third commercial was about the shoes. The features of flexibility, design, and availability in two colors were present to attract different target groups.”

From the non-narrative advertisement learning activities, students have responded it regarding the main topics correctly by mentioning 1-2 issues. However, students seemed not to have arguments beyond the content. That is, they provided only the information from what they saw in the commercials. After that, the teacher played the fourth advertisement based on true story.

Advertisement 4: The fourth video clip showed the scene that Jane, a 4th-year college student, is in hurry to get dress to go to her daughter’s school on Mother’s Day. Every mother on that day looks at Jane when she is on stage with the questions in their head, “How can she be a mother? She is still in the college. She must have a baby since she was 18 years old.”

Then, another scene cut in showing that Jane is in fact an introvert person. After class, Jane always rushes back to pick up her daughter June at school. Many people gossip about her having a child with a rich man. One day, she saw an art teaching announcement. Chat, an art teacher, takes June to study art.
Chat described, “Jane is an ordinary woman, but her smile is so beautiful.” He asked Jane, “Why don’t you tell everyone about June? Tell them what the truth is!”

The scene cut back to Jane is on stage where June sat on her knees taking a bow at her mother’s feet to respect her. Jane burst the tear and hug her tightly. Another scene cut in showing the memories of Jane when she was throwing a garbage and saw a baby left at the dump. She picked that baby up from the trash.

Then, the scene cut back to when Chat asked her to tell the truth. Jane explained, “It is ok that everyone looks down on me, rather everyone looks down on June. The last scene showed the moment that June said “I love you” to her mom. The ending massage is “Wacoal believes that every woman is created to be beautiful, not from the outside, but woman is the most beautiful from the inside.”

(Source: https://www.youtube.com/watch?v=wPtOm9UXnfU)

**Figure 5.** Video clip showing “Beauty from the Inside”

After watching, students were asked to work in groups for 15 minutes. Then, teacher used questions to challenge students to develop their reasoning skills as listed below.

1. What is the story about? What are the main problems and minor problems found in the story? Can you suggest the best solution for the problems?

Student 1: “The advertisement contains the main idea that a female college student raised a girl without telling the truth to others although she was misunderstood that the girl was an unexpected child. The main problem was that a college woman found a baby left in a dump, so she raised her as her own child. The second problem was that others judged her as a bad woman with unplanned pregnancy.”

From the Student 1’s answers, it is found that the student had such logical thinking process by expressing 1-2 issues problems concerning an abandoned child and being judged or misunderstood by others.

Student 2: “The solution for the first problem, I think raising an abandoned child should be advised by the specific foundation. It was not quite right to raise a child by herself. The second problem was that other people look down on the young mother. The solution is to ignore those words. In fact, we should not judge other people. Perhaps, they think it is right to do so.”

From the Student 2’s answers, it is found that the student was able to discuss two arguments like Student 1. Overall, the student could draw conclusions; however, he/she was unable to explain why we should not care much about other people’s words.

Student 3: “I think the main problem was abandoning a child. If nobody left a baby at the trash, Jane would not have to raise that child. So, the problem would not start from the beginning. Anyway, if we were Jane, we would have asked an official to take the child to an orphanage. If this is a true story, Jane could adopt her after 1 year.”

From the Student 3’s answers, it is found that the student was able to identify the main idea of only 1 problem about abandoning a child. Overall, the student could draw conclusions; however, he/she was unable to explain clearly nor emphasize any arguments.

Advertisement 5: The fifth video clip showed the scene that an old man begging for money. In his plastic bag, there were a 10-baht and 5-baht coin. The old man was handicapped with an artificial leg. He pushed his cart along the way to collect recyclable trash for money. In the morning, when he walked past the monks, he offered the monks with a 10-baht coin. He walked past a woman. That woman threw a trash at him. Still, he continued walking. When he walked past, a restaurant owner was fighting about the
garbage with the owner of house next door. Then, he walked further past a man washing his Mercedes car, the man splashed water at him to chase him away. Still, he kept walking until he saw a girl watching her friends buying an ice-cream. The old man took out a 10-baht coin for the girl. The girl was very happy and returned a 5-baht change back for him.

The old man continued walking to the hospital to ask for an artificial leg because the old one was impaired. The uncle submitted documents to the hospital staff, but he put them in a huge pile of documents and gave the old man with some painkillers. The girl saw her uncle walking across the street. Suddenly, a robber who just snatched a woman’s bag ran into the old man harshly until he fell on the floor with the bag stolen by the thief. The robber told him to bring the bag back, but the uncle did not let the robber have the bag. So, the robber kicked the old man and got away by his friend who rode a motorcycle to pick up. Before he left, he stepped on the old man’s legs until they broke. The uncle was unconscious with the woman's bag. People walking past mistakenly and thought that the old man was a thief, so he was taken to a jail. The girl watched the news and saw the old man got arrested. Suddenly, the girl saw an advertisement of a governor, then she realized that there was a 5-baht coin in her pocket. So, she used that coin to call to inform the governor about the whole true story of the old man.

Finally, the old man was bailed out, and got a new artificial leg and a new bike for collecting trash. Everyone smiled at him with kindness. Then, the statement appeared on the screen; “Good people make other people good” It means good people teach goodness to other people in the society. If good people maintain themselves in goodness, it will be difficult for bad people to make good people bad. The important thing is the strength of the good people,” said His Majesty King Bhumibol Adulyadej. Then, an additional message, “Even at the dead end, there is still a solution,” said the governor.

After watching, students were asked to work in groups for 15 minutes. Then, teacher’s questions and students’ answers were listed as below.

1. What is the story about? What are the main problems and minor problems found in the story? Can you suggest the best solution for the problems?

Student 1: “The main story is that an old man is poor and insulted by the society as being poor. However, he has a good heart. He gave the girl some changes even though he actually needed that money to survive. Suddenly, a robber snatched the woman’s bag and ran to hit him. He fell on the floor, and people misunderstood that the man was a thief. So, he got into jail. The girl therefore explained that the man was innocent. He was trying to help by grabbing the bag from the robber.

The summary of problems is that people today value a person from his/her money. That is, when a drunk guy saw the man lying down with a stolen bag, he was judged as a robber, but he could not run away because of his broken artificial limbs. If I were to solve the problem, I would teach the next generation not to have prejudice against the poor because everyone has his own conscience.

The second problem is catching a wrong person. He was innocent. If I were a police officer, I would have clear evidence before accusing someone of stealing. The police officer should not listen to one side of the story. The story ended with the conclusion that good always overcomes evil. If a good person remains with his good deeds, it is difficult that a bad person will overcome a good person. The essence of
the advertisement is about being a good person. The girl knew the truth that the man did not do anything wrong, so she flight for the right thing.”

From Student 1’ answers, it was found that the student could identify 2-3 possible issues. First, people valued the appearance and money. Second, the police arrested a wrong person to punish. Then, the student discussed about the argument that the police officer should have adequate evidence before charging someone with stealing. Otherwise, the police should not listen to only one side of the story.

Student 2: “I have found a different issue in the scene that the man asked for help from a hospital staff. He was ignored by the staff. The request forms were totally abandoned in the pile. This shows the unfair treatment of hospitals in Thailand. We call it as double standards. The patients with higher financial status would receive better care than people with lower status. If I were the hospital staff, I would have helped deliver the request form to the doctor to proceed his request.

Another problem is the greed of people today. Let’s take an example from the scene that the restaurant threw the garbage to the front of the house next door. So, the house owner took a revenge. This happens in our society today. People tend to take a revenge, instead of fixing the problem.”

From Student 2’ answers, it is found that that the student could identify 2-3 possible issues, namely using artificial limbs and throwing food scraps in front of the house causing the problems. Then, the student could discuss one argument.

4. Discussion
After the students were stimulated by using challenging questions, they developed critical thinking from the story-telling advertisement as literature. From these learning activities, students were able to provide rational answers in all four areas, namely identifying issues, clarifying the cause of issues, discussing arguments and summarizing with conclusion.

From the activities of learning advertisement as literature, students were asked to watch the first three advertisements with only background music and animation, without any conversation. The teacher asked, “what happened in the advertisements?” Then, students’ answers of each group were correct and relatively similar. More specifically, from the fourth and fifth advertisements with music and narrative conversation, students were able to identify the main problems and minor problems by expressing 1-2 opinions on issues, discussing arguments, and summarizing with conclusions. By considering the assessment criteria of 4-step reasoning process, students could develop their critical thinking to address issues, discuss argument and summarize the problems and with solutions as conclusion.

5. Conclusion
Based on open approach aiming at developing students’ reasoning skills by using advertisement as literature, students become more active and pay greater attention during the activities. That is, when the teacher showed the advertisements, students concentrated on watching the advertisements: no one was talking. When questions were raised, students eagerly respond with various answers. Therefore, this activity provided students greater opportunities to pursue self-learning while developing personal experience and problem-solving skills to construct best solutions for the given problems before making decisions.

Moreover, when students perceive that they have acquired reasoning skills, they would have self-confidence to express opinions and share with other members. Consequently, they tend to discuss and exchange knowledge with each other while taking higher responsibilities to accomplish the goals of the group, which in turn, develops their teamwork and collaboration skills that are required in the 21st century learning.
6. References

[1] Wu, M., Tseng, K., & Greenan, J. P., (2003). How can reasoning skills be improved? An experimental study of the effects of reasoning skills curriculum on reasoning skills development for students in postsecondary technical education programs. European Conference of Educational Research. Hamburg. Germany. Available at http://www.leeds.ac.uk/educol/documents/00003391.htm (Retrieved on 02/12/2019).

[2] Zhou, S., Han, J., Koenig, K., Raplinger, A., Pi, Y., Li, D., & Bao, L. (2016). Assessment of scientific reasoning: The effects of task context, data, and design on student reasoning in control of variables. Thinking skills and creativity, 19, 175-187.

[3] Khoirina, M., & Cari, C. (2018). Identify Students’ Scientific Reasoning Ability at Senior High School. Journal of Physics: Conference Series, 1097 (1): 012024

[4] Good, C. V. Dictionary of Education. New York: Mc Grew – Hill Book, 1973.

[5] Piaget. J. (1952). The Original of intelligence in Children. Trans, by Marget Cook. New York: International Universitie Press.

[6] Sutaphan, S. Yuenyong, C. (2019). STEM Education Teaching approach: Inquiry from the Context Based. Journal of Physics: Conference Series, 1340 (1), 012003

[7] Yuenyong, C. and Narjaikaew, P. (2009). Scientific Literacy and Thailand Science Education. International Journal of Environmental and Science Education, 4(3): 335 – 349

[8] Meela, P., and Yuenyong, C., (2019). The study of grade 7 mental model about properties of gas in science learning through model based inquiry (MBI). AIP Conference Proceedings. 2081, 030028-1–030028-6. (View online: https://doi.org/10.1063/1.5094026)

[9] Pagsangkanae, P., Apitanagotinon, R., Wongsila, S. and Yuenyong, C. (2019). Developing the explicit: Nature of science genetically modified organisms (GMOs) unit through 5Es learning. AIP Conference Proceedings. 2081, 030029-1–030029-7. (View online: https://doi.org/10.1063/1.5094027)

[10] Nongkhunsarn A, Yuenyong C, Tupsai J, Sranamkam T. (2019). Grade 11 Student’s Mental Model of Fluid and Analytical Thinking in Science Teaching Through Science Technology and Society (STS) Approach. Journal of Physics: Conference Series, 1340 (1), 012043

[11] Yuenyong C 2017 Enhancing Thai Students’ Thinking Skills about Energy issues: Influence of Local Values. Chemistry: Bulgarian Journal of Science Education, 26 (3): 363 – 376