การพัฒนาทักษะการคิดวิเคราะห์ด้วยการตั้งคำถาม: ตั้งคำถามอย่างไรให้เหมาะสม

Improving critical thinking through questions: How to set the right questions?

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บทคัดย่อ

ทักษะการคิดวิเคราะห์ เป็นหนึ่งในทักษะสำคัญ 4 Cs เพื่อพัฒนาทักษะด้านการเรียนรู้และนวัตกรรม ซึ่งเป็นทักษะสำคัญในศตวรรษที่ 21 ที่นักการศึกษาได้ให้ความสำคัญในทักษะด้านนี้มาเป็นระยะเวลาที่นานมากแล้ว มาร์ติน ลูเทอร์ คิง ได้กล่าวไว้ในปี 1947 ถึงความสำคัญของทักษะการคิดวิเคราะห์ว่า “หน้าที่ของการศึกษาคือเพื่อสอนให้คนคิดอย่างไตร่ตรอง คิดอย่างวิเคราะห์” (ฮอบบ์, 2010) งานวิจัยมากมายแสดงให้เห็นว่า การคิดวิเคราะห์ที่ดี จะนำไปสู่การตัดสินใจในสถานการณ์ที่ซับซ้อนได้ดียิ่งขึ้น เมื่อไม่นานมานี้ กระทรวงศึกษาธิการได้ยอมรับว่า เด็กไทยมีปัญหาด้านความสามารถด้านภาษาอังกฤษและความสามารถด้านการคิดวิเคราะห์ ผลการสอบ PISA พบว่าประเทศไทยอยู่ในอันดับที่ 55 จากทั้งสิ้น 72 ประเทศ ทักษะการคิดวิเคราะห์นั้นสามารถเรียนรู้ได้ เนื่องจากว่าทักษะนี้ไม่เกี่ยวข้องกับสติปัญญา และไม่จำเป็นต้องเกิดขึ้นเฉพาะเมื่อเข้าสู่ในวัยผู้ใหญ่เท่านั้น บทความนี้จึงมีจุดมุ่งหมายเพื่อเสนอแนวคิดการใช้คำถามแบบ Socratic Questioning และการเรียนรู้ของ Bloom Taxonomy เพื่อเป็นแนวทางในการสร้างคำถามที่เหมาะสมเพื่อทักษะการคิดวิเคราะห์ในห้องเรียน

คำสำคัญ: การคิดวิเคราะห์ การตั้งคำถาม

Abstract

Critical Thinking (CT) is one of important 4Cs skills in developing student's learning and innovation skill, which are seven required skill of 21st century. Educators, however, has long been considered CT as one of important learning skills. As Martin Luther King said in 1947 "The function of education is to teach one to think intensively to think critically" (Hobbs, 2010). Several study showed that good critical thinking make better decision and judgement in complex situation. (eg., Knezic, Wubbels, Elbers & Hajer, 2010; Judith, 2010; Scott, 2015) Recently, Ministry of Education admitted that English proficiency and critical thinking are particularly concerning problems among Thai students. The PISA range of Thai students is at 55th from 72 countries around the world. (Thailand Research Fund, 2016). According to Walsh and Paul (1988), CT can improve by teaching because it is not an intelligence and does not necessarily develop with maturity. Therefore, this paper will propose on using Socratic questioning and Bloom Taxonomy in order to give an alternative aspect of setting right questions to promote Critical Thinking in classroom.

Keyword: Critical thinking, Questioning, Bloom Taxonomy, Socratic questioning

Critical Thinking

Critical Thinking has long been concerned in varied aspect. The literature on critical thinking, however, has been essence in three approaches (Lai, 2011): philosophical approach, psychological approach and academic approach.

Philosophical approach

Greek philosophy, Socrates, Plato, Aristotle were pioneer academia in CT. Recently, Matthew Lipman and Richard Paul are widely known as leading CT researchers. Accordingly, Paul (1990, p. 91) stressed that "CT is thinking about your thinking while you are thinking in order to make your thinking better". It's also stated by Ennis (1985) that CT is "reasonably and reflectively deciding what to believe or do". It's showed that philosophical approach focuses on hypothetical critical thinker; giving more concern on the qualities and characteristics of person rather than the result behavior that thinker can perform (Thayer–Bacon, 2000).

Cognitive psychological approach

This approach is contrasted from the philosophical approach in two aspects (Lai, 2011). First, Sternberg (1986, p. 6) states that "cognitive psychologist tends to focus on fundamental question: how people think by studying how people have thought about thinking." Therefore, cognitive psychological approach particularly focus on comparing thinker's behavior between how thinker thinks and how they could or should think under ideal condition. (Sternberg, 1986). Secondly, this approach tends to focus on types of thought included a list of skills or procedures which can be performed by thinkers. (Halpern, 1998; Willingham, 2007).

The educational approach

The field of education has also widely concerned and discussed about CT (Dwyer, Hogan & Stewart, 2014; Art–in, 2014). This approach is focus on methods and strategies in order to improve analytical thinking skill. Benjamin Bloom and his associates are well–known leading researcher in this aspect. The Bloom taxonomy (1956) for information processing skills is one of

outstanding cited sources for educators and researchers particularly focus on higher–order thinking skills (Lai, 2011).

Critical Thinking Characteristics

Nosich (2009) stated that there are four noticeable CT features needs to be concerned.

1. *CT is reflective*. It is metacognitive. It involves a reflection on thinking
2. *CT involves standards*. It has to meet criteria of reasonableness. Accuracy, relevance and depth are some example of standard or criteria.
3. *CT is authentic*. It is far more about what the thinker believe or do. However, it is about good judgment.
4. *CT involves being reasonable*. There is no rule or guideline to guarantee successful reason. However, all reasons need to be followed thoughtfully not by rote.

Elder and Paul (2006B, p.4) argued that a well cultivated critical thinker will:

1. Raise vital question and problems, formulating them clearly and precisely
2. Gather and accesses relevant information, using abstract idea to interpret it effectively
3. Come to well reason, conclusion and solutions, testing them against criteria and standards
4. Think open– mindedly within alternative system of thought, recognizing and assessing, as need be, their assumption, implications, and practical consequences
5. Communicate effectively with other in figuring out solutions to complex problem.

Therefore, good CT has to be accurately reflective, authentic and reasonable which come from thoughtful process of the thinker. In addition, to

cultivate CT, well prepared questions and problems should be delivered with open–minded discussion and communication in classroom.

The process of Critical Thinking

Nosich (2009) suggested that to fully fledge critical thinking, three important parts will be involved.

1. *Asking questions*: When teacher assign problem task to students, generally, students don't ask the questions but jump in and try to solve the problem in various way that come into their mind. However, to think critically, the questions need to be addressed should be question that go to the heart of matter.

2. *Trying to answer those questions by reasoning them out*: Reasoning out answers to questions need us to be thoughtfully find out the answer from not only use what we remember or come into our mind but also use all power to defend those answers. It requires different way to approach the question with a different spirit. However, the spirit should genuinely want to figure out a clear, accurate answer to a question that is important to that person. Reasoning it out might begin with rethinking the question and then reformulating it in a more neutral and productive way.

3. *Believing the result of those reasoning*: When thinking critically, we do not give merely verbal agreement, but rather believe the result because we have done our best to reason the issue out which is the best way to give reliable answer.

In regard to the process of critical thinking by Nosich (2009), asking questions is considered as important role to promote CT. In addition, many studies also approved that there is a significant relationship between questioning technique and student's outcome (Knezic et al, 2010; Dwyer et al, 2014). Effective questioning induces students' deeper thought and idea (Elder & Paul, 2003). The success classroom discussion depends on well prepare

questions of teachers (Gunter, Estes, & Mintz, 2010). Dwyer (2017) states that taxonomies of thinking process is considered to be necessary tool for the successful application of CT. Therefore, teacher always plays a key important role in using well effective set of questioning framework to promote CT in classroom.

Socratic Questioning

Socrates was famous Greek philosopher who has been recognized as one of the founder of Western philosophy. He also set the agenda of CT and innovated a method of instruction based on questioning. Socratic inquiry is emphatically not "teaching" but using questions to provoke student's thought and awareness, then, collect those new idea and thought to build new understanding from previous knowledge and information.

Socratic questioning is an approach used in psychotherapy as well as in teaching. In psychotherapy, the use of Socratic questioning is as it is to clarify the problem as it does not seem to be defined anywhere (Carey & Mullan, 2004). In education, Socratic questioning widely uses to demonstrate and prove certain habits of mind in order to train lawyers.

Paul and Elder (2006A), founder of Center for Critical Thinking categorizes Socratic questioning into nine types as followed.

1. Questions of clarification	What do you mean by.....? / Would you say more about that? / Why do you say that?
2. Questions that probe purpose	Was this purpose justifiable?/ What is the purpose of .....? / How do the purposes of these two groups vary?
3. Questions that probe assumptions	What are you assuming?/ What could we assume instead? / Is it always the case?/

	Why do you think the assumption holds here?
4. Questions that probe information, reasons, evidence and causes	What would be an example? / How did you think is the cause? How could we go about finding out whether that is true?
5. Questions about viewpoints and perspectives	What would someone who disagrees say? / How could you answer the objection that.....would make? / What is an alternative?
6. Questions that prove implication and consequences	What are you implying by that?/ What effect would that have?/ If this and this are the case, then what else must be true?
7. Questions about the questions	Why is this question important?/ Do we need fact to answer this?/ Is this the same issue as .....?
8. Questions that probe concepts	What is the main idea we are dealing with?/ Are you using this term "....." in keeping/ Why/how is this idea important? With educated usage?
9. Questions that probe inferences and interpretations	What do you think of .....?/ How shall we interpret these data?/ Given all the facts, what is the best possible conclusion?

Socratic questioning is best introduced to classroom when addressing an argumentative issue. Teachers have to be prepared to ask questions spontaneously to follow the paths created by various student answers. The goal of Socratic questioning is to move students from the unclear to the clear, the inconsistent to the consistent. It is possible; however, that some obstacles would immediately happen

for newbie teachers to think and continually ask students follow–up questions as they examine an issue in depth. When the process of questioning is not done well, students can easily jump to free–wheeling discussion. In addition, the Socratic questioning requires higher order thinking skills. In lower level students, this type of question would lead them to meet the struggle. Therefore, in order to promote CT through Socratic questioning, good framework needs to be integrated.

Bloom Taxonomy

Bloom Taxonomy (1956) of educational objective is a set of hierarchical classification framework developed for purposed of enhancing education and manner in which thinking is examined in the classroom via classifying ‘mental act or thinking [resulting from] educational experiences’ (Bloom, 1956 cited in Dwyer, 2017). Krathwohl (2002) updated six categories to develop CT into verb form (see Figure 1) Dwyer (2017) argued that Bloom taxonomy consist of modern conceptualizations of CT.

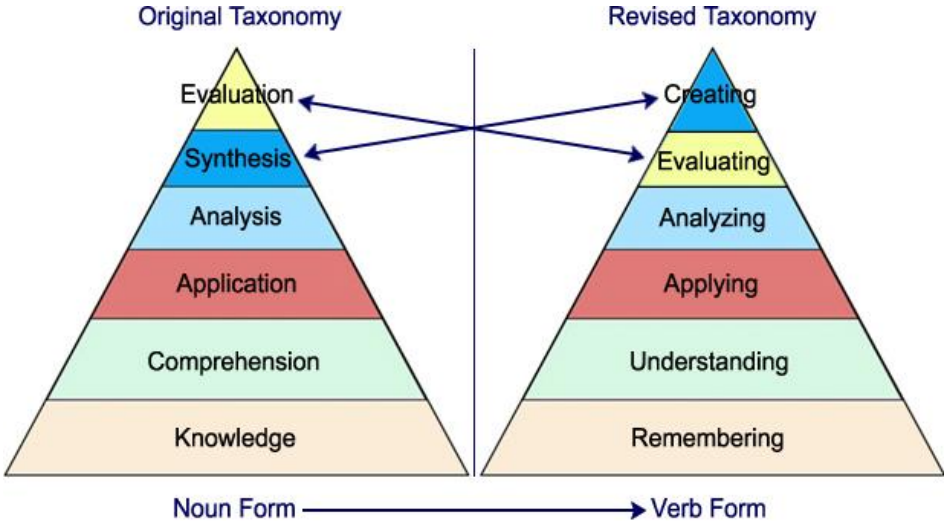

Figure 1 Six categories to develop CT into verb form

Griffith University (2014) has developed Critical Evaluation Skill Toolkit which contain of set of questions to enhance student CT as table followed.

Level 1 Knowledge	**Exhibits previous learning material by recalling facts, terms, basic concepts and answer.**
Keywords	Who, what, why, when, omit, where, which, choose, find, how, define, label, show, spell, list, match, name, relate, tell, recall, select.
Questions	What is ...?/ How is ...? /Where is ...?/ When did .....happen?/ How did ..... happen? / When did ...?/ Can you recall ...?/ How would you show ...? Can you select ...?/ Who were the main ...?
Level 2: Comprehension	**Demonstrating understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions and stating main ideas.**
Key words	Compare, contrast, demonstrate, interpret, explain, extend, illustrate, infer, outline, relate, rephrase, translate, summarize, show, classify.
	How would you classify the type of ...?/ How would you compare ...? contrast ...?/ Will you state or interpret in your own words ...? Which statements support...?/ Can you explain what is happening ... what is meant...?/ What can you say about...?/ Which is the best answer ...?
Level 3: Application	**Solving problems by applying acquired knowledge, facts, techniques and rules in a different way.**
Keywords	Apply, build, choose, construct, develop, interview, make use of, organize, experiment with, plan, select, solve, utilize, model, identify.

Questions	How would you use ...?/ What examples can you find to ...? How would you solve ..... using what you have learned ...? How would you organize ..... to show ...?/ How would you apply what you learned to develop ...?/ What other way would you plan to ...? What would result if ...?/ Can you made use of the facts to ...?
Level 4: **Analysis**	**Examining and breaking information into parts by identifying motives or causes; making inferences and finding evidence to support generalizations.**
Keywords	Analyze, categorize, classify, compare, contrast, discover, dissect, divide, examine, inspect, simplify, survey, take part in, test for, distinguish, list, distinction, theme, relationships, function, motive, inference, assumption, conclusion.
Questions	What are the parts or features of ...?/ How is ..... related to ...? Why do you think ...?/ What is the theme ...?/ What motive is there ...? How would you classify ...?/ How would you categorize ...? Can you identify the difference parts ...?/ What evidence can you find ...?
Level 5: **Synthesis**	**Compiling information together in a different way by combining elements in a new pattern or proposing alternative solutions.**
Keywords	Build, choose, combine, compile, compose, construct, create, design, develop, estimate, formulate, imagine, invent, make up, originate, plan, predict, propose, solve, solution, suppose, discuss, modify, change, original, improve, adapt, minimize,

	maximize, delete, theorize, elaborate, test, improve, happen, change.
Questions	What changes would you make to solve ...?/ How would you improve ...? What would happen if ...?/ Can you elaborate on the reason ...? Can you propose an alternative ...?/ What could be combined to improve(change) ...?/ Suppose you could ..... what would you do ...?
Level 6: Evaluation	**Presenting and defending opinions by making judgments about information, validity of ideas or quality of work based on a set of criteria.**
Keywords	award, choose, conclude, criticize, decide, defend, determine, dispute, evaluate, judge, justify, measure, compare, mark, rate, recommend, rule on, select, agree, interpret, explain, appraise, prioritize, opinion, support, importance, criteria, prove, disprove, assess, influence, perceive, value, estimate, influence, deduct.
Questions	Do you agree with the actions ...? with the outcomes ...? What is your opinion of ...?/ How would you prove ...? disprove ...? Would it be better if ...?/ What choice would you have made .? What would you select ...?/ How would you prioritize ...?

Though the taxonomy presented above can identify only descriptive thinking process and link among them. It does not elaborate on the manner in which on applied higher–order thinking process (Krathwohl, 2002; Moseley et al., 2005). In other word, this framework cannot promote cognitive psychological aspect concerning on how people have thought about thinking.

Critical thinking are dependent upon memory, given that it is not possible for one to use CT processes if one does not know or remember the necessary or

relevant information (Krathwohl, 2002). To promote CT in both descriptive thinking and cognitive psychological aspect, the application of Socratic questioning and Bloom taxonomy would be a possible alternative solution. Questions of Remembering and Understanding level and also question of clarification can be applied to check students' background knowledge and prepare them to the higher order thinking stage. Then, the other stages in Bloom taxonomy would be approached to students orderly with an integration of the Paul and Elder's Socratic questioning taxonomy. Teachers have to prepare the questions of each lesson grounding on the Bloom taxonomy with the purpose of arousing students' awareness toward their ignorance, misconceptions, wrong assumptions, and false conclusions. Though, the right answer will not put into the main concerning. The ultimate goal of using these techniques in classroom is not only to promote students' Critical Thinking but also to provoke their life examination.

References

Art-in, S. (2014). The development of teacher training curriculum on learning management to develop students' analytical thinking in Thailand. *Social and Behavioral Sciences (116)*, 93*-945.

Bloom, B.S. (1956). Taxonomy of educational objective: The classification of educational goals. *In Handbook1: Cognitive domain*. New York: McKay.

Carey, T.A., & Mullan, R.J. (2004). What is Socratic questioning? *Psychotherapy: Theory, Research, Practice, Training, 41*(3), 217-226.

Dwyer, C.P., Hogan, M.J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking Skill and Creativity (12), 43-52*. Retrieved Oct 25, 2016 from http://www.sciencedirect.com/science/article/pii/S1871187114000030

Dwyer, C.P. (2017). *Critical Thinking: Conceptual, Perspective and Practical Guideline*. London: Cambridge University Press.

Elder, L. & R. Paul (2006A). *Art of Socratic questioning*. Dillion Beach, CA: Foundation for Critical Thinking.

Elder, L. & R. Paul (2006B). *Critical Thinking: Concept and Tools*. Dillion Beach, CA: Foundation for Critical Thinking.

Ennis, R.H. (1985). A logical basis for measuring critical thinking skills. *Educational Leardership, 43*(2)

Lai, E. R. (2011). *Critical Thinking: A Literature Review*. Retrieved from http://images.pearsonassessments.com/images/tmrs/CriticalThinkingReviewFINAL.pdf.

Griffith University (2014). *Critical Evaluation Toolkit*. (2nd ed.). Retrieved from http://www.griffith.edu.au/__data/assets/pdf_file/0004/290659/Criticalevaluation-skills.pdf

Gunter, M.A., Estes, T.H., and Mintz, S.L. (2010). Instruction: A model approach, (5th ed.). Boston: Pearson Education.

Halpern, D. F. (1998). Teaching critical thinking for transfer across domains: Dispositions, skills, structure training, and metacognitive monitoring. *American Psychologist, 53(*4), 449-455

Hobbs, A. (2010). *Teen summit focuses on education, leardership*, Retrieved from http:// www. pnwlocalnews.com/south_king/fwm/lifestyle/81599297.html

Judith, B.T. (2010). Socratic teaching in not teaching, but direct transmission is: Notes from 13 to 15 year olds' conceptions of teaching. *Teaching and Teacher Education 26,* 656-664.

Knezic, D., Wubbles, T., Elbers, E., & Hajer, M. (2010). The Socratic Dialogue and teacher education. *Teaching and Teacher Education 26,* 1104-1111.

Krathwohl, D.R. (2002). A revision of Bloom's taxonomy: An overview, *Theory into Practice, 41(4),* 212-218.

Moseley, D., Baumfield, V., Elliot, M.J., Gregson, M., Higgins, S., Miller, J., et al. (2005). *Framworks for thinking: A handbook for teaching and learning*. Cambridge: Cambridge University Press.

Nosich, G.M. (2009). *Learning to Think Things Through: A Guide to Critical Thinking Across the Curriculum*.(3rd ed). New York: Pearson Prentice Hall.

Thailand Research Fund (2016). *The study of Critical thinking and Public Mind for developing Thai Student Proficiency*. Retrieved from http://knowledgefarm.in.th/critical-thinking-and-civic-mindedness-on-thai-student/

Thayer-Bacon, B.J. (2000). *Transforming critical thinking; Thinking constructively*. New York, NY: Teacher College Press.

Willingham, D.T. (2007). Critical thinking: Why is it so hard to teach? *American Educator, 8-19*

Scott, A.D. (2015). Critical thinking, questioning and student engagement in Korean university English courses. *Linguistics and Education 32,* 131-147.

Sternberg, R.J. (1986). Motivation and instruction. In D.C. Berliner & R.C. Calfee, (Eds.), *Handbook of Educational Psychology* (pp.85-113). New York, NY: Macmillan.