Pedagogical Blogging: Promoting Tertiary Level Students’ Critical Thinking by Using Socratic Questions

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Abstract
This study seeks to investigate the effects of pedagogical blogging on tertiary students’ critical thinking. The authors initially discuss the role of Socratic questions in promoting students’ critical thinking through Web 2.0 tools. They further explain how blogging was incorporated into the curriculum of a course for tertiary level students enrolled in a Malaysian university. Finally, they show how qualitative and quantitative methods were used to evaluate the efficiency of Socratic questions in students’ blogging and its effects on students’ critical thinking. Findings suggest that implementing Socratic questions in students’ blogging would help promote students’ critical thinking.

Introduction
Critical thinking (CT) has been regarded as an essential outcome of education (Reed, 1998; Yang, Newby, & Robert, 2005). It is defined as a purposeful thought process that includes interpretation, analysis, evaluation, and inference based on the examination of conceptual, methodological, and contextual consideration (American Philosophical Association, 1990). Staib (2003, p. 643) defines CT as “the art of thinking about your thinking while you are thinking in order to make your thinking better.” She argues that CT is an accurate way of thinking in daily life, of pursuing reliable and relevant world knowledge, and of deciding what to do or believe.

Paul and Elder (2007) refer to Socrates’ method of questioning, known as Socratic questioning, as one of the most effective methods that can be used to promote students’ CT. They argue that both Socratic questioning and CT share common end which leads to thinking
at a deep level. According to Seiferth (1997), the main feature that differentiates Socratic questioning from other CT skills is that Socratic questioning is more than eliciting a one-word answer such as an agreement or disagreement from students; rather, it focuses on the elements of reasoning in a well-organized and self-directed manner. In fact, Socratic questioning encourages dynamic and active interactions between students and teachers, and among students, in generating thoughtful questions; it also stimulates students to provide thoughtful answers for their questions by sharing their view points, and also building and expanding their CT skills (Cheong & Cheung, 2008; Paul & Elder, 2007; Seiferth, 1997; Teo, 2009). Paul (1993) mentions that Socratic questions challenge students’ accuracy and completeness of their thinking and move them toward the truth as their ultimate goal.

Although using Socratic questions would seem to promote students’ CT, many students are not generally able to pose thoughtful questions and therefore are unable to promote their CT. The basic problem does not lie in students’ lack of interest to ask or answer thoughtful questions but probably occurs due to a lack of time that limits the success of giving precise guidance to students to practice thoughtful questions in face-to-face learning environments (Precel, Eshet-Alkalai, & Alberton, 2009). These barriers have led to an effort to use Web 2.0 tools beyond classroom walls (MacKnight, 2000; Thomson, 2002; Allen, O’Shea, Daniel, Curry-Corcoran, & Baker, 2007; Yang, Wang, Woo, & Quek, 2011).

Richardson (2009) explains that emerging Web 2.0 technologies such as blogs, wikis, podcasts, and social networks have rendered learning independent of time and space. Among different Web 2.0 tools, blogs offer unique pedagogical affordances. They give students sufficient opportunity to critically reflect on their peers’ opinions, and create, post, and share their thoughts more analytically (Gooding & Morris, 2008; Oravec, 2002). Wang and Woo (2010) argue that blogs have been shown to facilitate teaching and learning CT skills in classrooms. They allow students to provide information to a large audience and encourage students to think deeply. They not only help students solicit their opinions and interact with one another (Avci & Askar, 2012), but also give them full control over the content once the course is over (Blackstone, Spiri, & Naganuma, 2007).

This paper reports the results from a study of using Socratic questions in students’ blogging and their effects on students’ CT. It first defines Socratic questions and how they would
promote students’ CT in an online learning environment. Then, it presents how students’ CT and the use of Socratic questions in their blog comments evaluated. The paper ends with a discussion of future studies and a conclusion.

**Socratic questions**

Socratic questions focus on asking questions and drawing out answers from students. To promote students’ ability to construct Socratic questions and engage students in these questions, the teacher should pose a series of pre-set questions systematically. These questions will never allow students to get a straight answer to any question. They are asked to “channel the learners’ thought processes along predetermined paths” (Paraskevas & Wickens, 2003, p.6).

Chin (2007) mentions that teaching Socratic questions takes some practice on both the teacher and students’ sides in classrooms. She found that Socratic questions would cause conceptual changes in students’ ways of thinking. Her finding is consistent with Yang et al. (2005, p. 164) who believe that asking thoughtful questions such as Socratic questions plays a significant role in students developing higher-level cognitive processes such as “self-reflection, revision, social negotiation,” which may lead to fostering CT.

To understand the nature and structure of Socratic questions, researchers have classified them into several different categories, though most have a great deal of common ground. Fisher (1998) has classified Socratic questions into five types including:

- Clarification (i.e., focusing on clarifying ideas)
- Reasons and evidence (i.e., focusing on supporting ideas)
- Alternative views (i.e., focusing on the other person’s point of view or perspective)
- Implications and consequences (i.e., focusing on questions in thinking of consequences or *implications* of current or past events)
- Questions about the question/discussion (i.e., focusing on analyzing, connecting, summarizing, and coming to conclusions in any discussion)
As shown in Appendix A, each type of question is divided into several subcategories. However, explaining these categories further and their application in detail would fall out of the scope of this article.

Rhodes’ (1995) typology of questions is a comprehensive guide to Socratic questions which consists of eight categories (see Appendix A):

- Informational (i.e., questions about a particular fact, situation, or conclusion)
- Interpretive (i.e., questions related to understanding the meaning of a particular observation or conclusion)
- Explanatory (i.e., questions to seek clarification of the meaning by giving reasons)
- Procedural (i.e., questions to seek clarification of a particular method or process)
- Relational (i.e., questions to seek clarification of the relationship between different elements)
- Verificational (i.e., questions to confirm the validity of observations or procedures)
- Heuristic (i.e., questions to stimulate a questioner’s interest to investigate more)
- Evolutional (i.e., questions to determine the value of any observation or conclusion)

For further explanations, readers are referred to Wenning, Holbrook, and Stankevitz (2006). Other categories of Socratic questions (see Appendix A) are proposed by Chin (2007, p. 822), which comprise:

- “Pumping” (i.e., questions that encourage students to further express their thoughts and ideas or give more information)
- “Reflective toss” (i.e., questions that are posed by a teacher to throw the thinking responsibility back to students to reply to a previous utterance made by them)
- “Constructive challenge” (i.e., a strategy to elicit a direct corrective feedback from students by posing problem-solving questions and asking students to brainstorm ideas to convince others)

Moreover, Paul and Elder (2007) emphasize that success in thinking does not occur unless students ask thoughtful questions to identify the components of thinking. To do so, they
suggest two significant Socratic questioning models including the “Elements of Thought” and “Universal Intellectual Standards.”

Elements of Thought model consists of eight categories:
- Questioning goals and purposes
- Questioning questions
- Questioning information, data, and experience
- Questioning inferences and conclusions
- Questioning concepts and ideas
- Questioning assumption
- Questioning implications and consequences
- Questioning viewpoints and perspectives

Questions of each category focus on the purpose in thinking, questions in thinking, information in thinking, inferences in thinking, concepts in thinking, assumption in thinking, implication in thinking, and point of view in thinking respectively (see Appendix A for the example of each category).

The Universal Intellectual Standards model revolves around the quality of reasoning where Socratic questions are classified into nine categories (see Appendix A):
- Clarity (refers to understanding clearly what a person is saying)
- Accuracy (applies when a statement is clear but not exact)
- Precision (applies when a statement is not stated explicitly or in detail)
- Relevance (applies when a statement is not relevant to the issue)
- Depth (applies when a statement is superficial)
- Breadth (applies when a statement shows only one point of view)
- Logic (applies when a statement does not make sense)
- Significance (applies when the most important problem is not considered in a statement)
- Fairness (applies when a statement reflects a partiality, preference, or prejudice)

For further information about two models, see Paul and Elder (2007, p. 5-9).
All aforementioned studies have provided valuable information indicating that using Socratic questions helps instructors encourage productive thinking in students. This study tries to investigate if applying different kinds of Socratic questions can promote students’ CT.

**Critical Thinking (CT) and Web 2.0 tools**

As earlier noted, using Socratic questioning can promote students’ CT in online learning environments. For example, sixteen undergraduate veterinary students participated in an asynchronous discussion forum (ADF). They were taught to practice SQ through ADFs during one semester. The results show that Socratic questioning helps students promote CT skills and enables them to maintain higher levels of CT skills without further facilitation by the instructor (Yang et al., 2005). Further research by Rose, Moore, Vanlehn, and Allbritton (2001) indicate that using Socratic questioning has long-term benefits on students’ learning and fosters their CT skills.

Other empirical studies reveal that certain blogging strategies such as providing comments on others’ blog posts can develop students’ CT (Richardson, 2009; Shahsavar & Tan, 2010; Wang & Woo, 2010). This view is supported by Kennedy’s study (2003) that blog comments are a means of encouraging students to discuss and analyze not only their own blog posts but also others’ posts critically. Rezaee and Oladi (2008) analyzed students’ blog comments by using the Features and Levels of Understanding (FLU) model developed by the researchers. It consists of knowledge, method, purpose, and forms. Similarly, they found that blog comments help students improve their thinking and creativity through blogging.

Although blogs have great potential to promote students’ CT (Wang & Woo, 2010), there is a lack of research on the implementation of Socratic questions in students’ blogging. This study aims to fill that gap and examine whether using Socratic questions in students’ blog comments can promote their CT.

**Methodology**

**Participants**

The participants were 40 tertiary level ESL students, aged between 20 and 25 (\(M = 22; SD = .85\)). They enrolled in a compulsory course of an undergraduate programme in a Malaysian university. All students had home or dormitory Internet access. Thirty-four
students were familiar with blogs and had used them for posting assignments, keeping diaries, updating their postings, sharing thoughts and information, giving comments, and reading others’ blog posts.

Procedure
The course blog ran for 14 weeks in the second semester of 2010. The blog was set up at www.blogger.com. It was a single website created by the instructor and utilized by all students. Students’ display names on the blog were changed to protect their identities and to allow them to communicate freely in blog activities. Students were told that their blog comments had to be written in English and they were briefed on the responsibility and etiquette issues pertaining to blogging such as the content of their posts, the deadline for each blog activity, and the length of each blog post. One of the researchers played the role of the instructor to train students on the nature of Socratic questioning during face-to-face and online sessions as explained below.

Face-to-Face Sessions
Three 60-minute face-to-face sessions between the instructor and students were held in a computer lab. In the first session, each student registered on the blog and posted a short paragraph about the course blog. They were further required to provide comments on two of their classmates’ blog posts. To ensure that all students would receive comments on their posts, they were asked to give the priority the posts without any comments.

In the second session, to practice Socratic questioning, the instructor provided a list of Socratic questions to the students (see Appendix A). Subsequently, the instructor chose an argumentative essay which was posted by one of the students during the first online session, and asked students to read and provide comments on it. In this part, students formed groups of three to five members of their own choice to discuss Socratic questions that occurred to them as they read the argumentative essay. Each student was assigned to comment on the assigned blog post individually after discussing the type of Socratic questions in their own group. At the end of this session, the instructor asked the groups to read their classmates’ comments on the assigned blog post and vote for the group with collectively the best comments on the post (see Appendix B). The same procedure was applied for the third face-to-face session.
Online Sessions

Two online sessions in which students participated outside the computer lab individually and independently were held. The former session was conducted prior to the second face-to-face session before teaching Socratic questions, while the latter was held subsequent to the third face-to-face session after teaching Socratic questions. In each online session, every student was asked to post an argumentative essay and comment on others’ blog posts. The length of each blog post was limited to 250-300 words. Appendix C provides a blog post example.

Instruments

To examine whether using Socratic questions in blog comments promotes students’ CT, the Elements of Thought model developed by Paul and Elder (2007) was applied to code students’ questions in their blog comments. This model focuses on the components of reasoning which matched the purpose of this study.

Moreover, the Cornell Critical Thinking Test Level X (CCTT-X) developed by Eniss and Millman (2005) was used to measure students’ CT ability. It contains 76 questions, five of which are sample questions and the rest (n = 71) are test questions. The students need to answer the questions in 50 minutes. It is a multidimensional CT test which shows a clear picture of each student’s CT ability in four subscales: induction, deduction, observation and credibility, and assumption. The internal consistency of subscales are .71, .69, .82, and .55, respectively, which shows a moderate to high level of internal consistency among items. Students’ CT scores are calculated by either using the total right scores where only the correct answers are counted, or using the formula that is total right scores minus one-half of the wrong scores (Ennis, Millman, & Tomko, 2004). In the current study, the second method was applied to guard against students’ guesses. For further information on the test items, readers are referred to the website: http://www.criticalthinking.com/series/055/index_c.jsp

In the current study, the researchers chose stimulating and challenging argumentative topics so as to match students’ interest. Topics did not have straightforward answers and required students to think deeply before posting (see Appendix D). Moreover, a panel of experts with 5-15 years’ experience of teaching academic writing to tertiary level students evaluated the
topics in terms of clarity, precision, and linguistic features (e.g., ambiguity in syntax and vocabulary) (Conlon, 1980).

**Data collection and data analysis**

At the end of the semester, students’ blog comments in the two online sessions were collected, printed out, and coded by the researchers according to the Elements of Thought model (Paul & Elder, 2007). The unit of analysis was defined to be Socratic questions to examine if the students raised Socratic questions in their comments. To overcome biasness in the application and interpretation of codes, two raters, including one of the researchers, evaluated the students’ blog comments. Both raters had experience in coding transcripts and knowledge of CT. To reach a consensus on each code used, two raters coded some questions selected randomly from students’ questions until they reached 90% agreement of coding (Creswell, 2003). Subsequently, codes were checked for inter-rater reliability. This means that after coding questions individually, the raters compared the codes. If the raters applied different codes for a particular question, they tried to reach agreement and keep one code by reviewing the definitions of the codes; in case of disagreement on the codes, they kept both codes (Shahsavar & Tan, 2010; Wang, Woo, & Zhao, 2009). Table 1 shows a sample of coding.

<table>
<thead>
<tr>
<th>Table 1</th>
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</table>

*A Student’s Blog Comment Coded based on the Elements of Thought Model*

<table>
<thead>
<tr>
<th>Question</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right...nice thoughts! Do you think if you have same level of education, you may understand each other better? (Q5)</td>
<td>Display of Understanding</td>
</tr>
<tr>
<td>In my opinion, some will have their own ego if they have equal level with that guy or girl, what do you think? (Q8)</td>
<td>Interpretation or Understanding</td>
</tr>
<tr>
<td>And, do you think the age 21 to 24 is really a suitable age to be in love? (Q5)</td>
<td>Analysis or Understanding</td>
</tr>
</tbody>
</table>

Note: Q5 = questioning concepts and ideas; Q8 = questioning viewpoints and perspectives

To examine the relationship between the overall use of Socratic questions before and after teaching Socratic questions, the researchers used a chi-square test. Moreover, a paired-samples $t$-test was conducted to investigate students’ CT ability before and after they were taught Socratic questions.

**Results**

In the pre-experimental stage, the total number of Socratic questions in students’ blog comments was 54. On average, each student made 1.38 (54 units/39 students) Socratic
questions. In the post-experimental stage, students asked 185 Socratic questions in their blog comments. On average, each student posted 4.74 (185 units/39 students) Socratic questions (see Table 2). The results show that the number of Socratic questions was approximately three times greater after students were taught Socratic questions.

Table 2

<table>
<thead>
<tr>
<th>#</th>
<th>Questioncategory</th>
<th># of units of analysis (%)</th>
<th># of units of analysis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Questioning goals and purposes</td>
<td>8 (13)</td>
<td>13 (7)</td>
</tr>
<tr>
<td>2</td>
<td>Questioning questions</td>
<td>7 (13)</td>
<td>17 (9)</td>
</tr>
<tr>
<td>3</td>
<td>Questioning information, data, experience</td>
<td>5 (9)</td>
<td>32 (17)</td>
</tr>
<tr>
<td>4</td>
<td>Questioning inferences and conclusions</td>
<td>5 (9)</td>
<td>39 (21)</td>
</tr>
<tr>
<td>5</td>
<td>Questioning concepts and ideas</td>
<td>5 (9)</td>
<td>43 (23)</td>
</tr>
<tr>
<td>6</td>
<td>Questioning assumptions</td>
<td>8 (13)</td>
<td>15 (8)</td>
</tr>
<tr>
<td>7</td>
<td>Questioning implication and consequences</td>
<td>12 (22)</td>
<td>20 (11)</td>
</tr>
<tr>
<td>8</td>
<td>Questioning viewpoints and perspectives</td>
<td>4 (7)</td>
<td>5 (3)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>54 (100)</td>
<td>185 (100)</td>
</tr>
</tbody>
</table>

As shown in Table 2, before teaching Socratic questions, the most frequently used Socratic questions were questioning questions (Q2), questioning goals and purposes (Q1), questioning assumptions (Q6), and questioning implication and consequences (Q7). The following are examples of the students’ comments including the interpreted coding:

Well I certainly agree with your statements especially the part that you mentioned about friends advice. Friends are the right ones to advise us because they tend to understand our feelings and problems that we are facing. Do you think we always have to listen to their advice? Could you explain it more? (Q2)

I agree… true friends are like diamonds… but did not figure out why you cannot appreciate your friends. Why are you saying this? (Q1)

It occurs to me that you can only trust your old friends? Is it always true? What are you assuming? (Q6)
A good friend can hardly be found, if so what is a result? (Q7)

Some students lacked skills in making critical comments before they were taught Socratic questions. They merely gave straightforward comments without engaging in thinking analytically, as exemplified in these comments:

Wow, this is indeed a very clear explanation....keep up good work.
Could not agree more!
Yeah, me too... I agree with you.
I really like your ideas. Good job mates.

After teaching Socratic questions, the most frequently Socratic questions asked by students were questioning information, data, and experience (Q3), inferences and conclusions (Q4), and concepts and ideas (Q5) (see Table 2). Examples of the students’ comments are as follows:

You said, "In my opinion, love does not and will not affect a student’s life unless the person involved allows it to." Is this conclusion based on your own experience? If yes, please let us know. (Q3)

Do you think falling in love with someone in the university is affecting your study? If yes, what are your reasons? (Q4)

Would you say only mature couples are able to manage well between academic matters and their relationship? What about immature university students who are in a relationship? Would all of them not be able to have a good balance between the two matters? (Q5)

As Table 3 presents, on the whole students used more Socratic questions in giving comments after they were taught in Socratic questions. The chi-square results, \[\chi^2(7, N= 239) = 20.22, p = .005\], statistically support this claim.
Comparing Socratic questions used by students in the pre-experimental and the post-experimental stage, we found a significant increase in questioning inferences and conclusions (Q4), questioning implications and consequences (Q7), and questioning concepts and ideas (Q5), after teaching Socratic questioning (see Table 3). The following are examples of the students’ comments after training.

Why do you think falling in love at the university affects students’ studies? Can you justify your reasons? (Q4)

You mean that university students are not mature enough to be in a stable relationship? (Q7)

Don’t you think that strong relationships may establish at the university? (Q5)

Finally, we evaluated students’ scores in the CCTT-X before and after they were taught in Socratic questions. The results of a paired sample t-test indicates a significant mean difference in students’ CT before and after teaching \[ t(39) = -2.83, p < 0.05 \].

**Discussion**

In this study, practicing Socratic questioning through blogging has promoted students’ CT. The significant increase in students’ CT indicates that students practiced more thinking in asking questions after teaching Socratic questions. The results also show the significant increase in using different categories of Socratic questions such as questioning inferences,
conclusions, implications, consequences, and concepts and ideas after they were taught Socratic questions. This finding can be explained by Paul’s (1993) statement that practicing Socratic questioning could promote students’ CT. Such questioning of classmates in a blogging activity can help students raise basic issues in their own thoughts, arrive at judgments based on their own reasoning, understand the background information, data, or experience to support their thought, and use inferences and conclusions to shape such thoughts. The findings of this study also support earlier studies that suggest Socratic questions promoted learners’ CT skills (Chua, 2004; Chin, 2006; Teo, 2009).

This study shows that a systematic step-by-step process may promote students’ CT. Instructors can foster students’ CT by placing thoughtful questions such as Socratic questions at the heart of students’ learning. This finding supports the notion that to ask right critical questions, a pre-planned systematic process is required to guide students’ thinking (Chin, 2006, Paul & Elder, 2007, Shahsavar, in press).

It is evident that blogging can facilitate teaching Socratic questions for a variety of reasons. First, teaching the use of Socratic questions through blogging assignments is not very demanding in terms of time and effort for teachers since blogs help students ask thought-provocative questions of each other without depending on their teachers (Richardson, 2009). As a result, using blogging helps foster learner autonomy and grows a sense of cooperation and responsibility among students (Harwood, 2010). Second, blogging can help students’ learning independent of place and time, since blogs can be accessed anytime from any device that has Internet connection. It also allows students to think deeply before any stage of the blogging activity, such as when leaving comments (Wang & Woo, 2010). In addition, it facilitates information transfer and collaboration, and engages students in meaningful interactions; a practice which has been shown to promote students’ CT (Johnson, 2004; Wang et al., 2009). Finally, blogs would furnish an equal opportunity to all students to ask critical questions, particularly when it seems to be difficult for instructors to invite all students specially those students who would prefer to play a passive role in face-to-face classes to ask thoughtful questions (Shahsavar & Tan, 2011).
Future studies
It should be restated that in the present study, blog comments were analyzed based on the Elements of Thoughts (Paul & Elder, 2007). This model was applied to deconstruct critical questions into its constituent parts: purpose, question at issue, information, interpretation and inferences, concepts, assumption, implications and consequences, and point of view (Thompson, Ralston, & Hieb, 2012). Different findings might have been made if a different model such as Fisher’s (1998) had been applied. Secondly, although students applied more Socratic questions in all categories of Elements of Thoughts after being taught Socratic questions, the most significant increase was found specially in questioning inferences, conclusions, implications, consequences, and concepts and ideas. A better result could be achieved if the researchers gave more focus on teaching other categories of Socratic questions. Thirdly, in the present study, students were trained in Socratic questions over the course of one semester; it is not clear if students would have demonstrated the same pattern of CT if they had been observed over a longer period of time. To examine if promoting students’ CT is sustainable, longitudinal studies to investigate the effect of training Socratic questions on students’ CT over an academic year or longer should be implemented. Finally, the application of Socratic questions is not limited to blogging; researchers have suggested other options for using other Web 2.0 tools such as wikis, discussion forums, and virtual classroom environments.

Conclusion
Fostering students’ CT skills is an important undertaking in education. This study explored the effectiveness of blogging in promoting students’ CT. It showed that using Socratic questions in students’ blog comments can foster students’ CT. In fact, teaching Socratic questions through pedagogical blogging may be beneficial for students to promote their CT not only in learning academic subjects but also in different aspects of their life.

References


## Appendix A: Taxonomy of Socratic Questions

<table>
<thead>
<tr>
<th>#</th>
<th>Question Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Questions that seek clarification</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Explaining</em></td>
<td>Can you explain that…?</td>
</tr>
<tr>
<td></td>
<td><em>Defining</em></td>
<td>What do you mean by…?</td>
</tr>
<tr>
<td></td>
<td><em>Giving Examples</em></td>
<td>Can you give me an example of…?</td>
</tr>
<tr>
<td></td>
<td><em>Supporting</em></td>
<td>How does that help…?</td>
</tr>
<tr>
<td></td>
<td><em>Enquiring</em></td>
<td>Does anyone have a question…?</td>
</tr>
<tr>
<td>2</td>
<td>Questions that probe reasons and evidence</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Forming argument</em></td>
<td>Why do you think that…?</td>
</tr>
<tr>
<td></td>
<td><em>Assumptions</em></td>
<td>How do we know that…?</td>
</tr>
<tr>
<td></td>
<td><em>Reason</em></td>
<td>What are your reasons…?</td>
</tr>
<tr>
<td></td>
<td><em>Evidence</em></td>
<td>Do you have evidence…?</td>
</tr>
<tr>
<td></td>
<td><em>Counter example</em></td>
<td>Can you give me an example/counter-example…?</td>
</tr>
<tr>
<td>3</td>
<td>Questions that explore alternative views</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Re-stating a view</em></td>
<td>Can you put it another way…?</td>
</tr>
<tr>
<td></td>
<td><em>Speculation</em></td>
<td>Is there another point of view…?</td>
</tr>
<tr>
<td></td>
<td><em>Alternative views</em></td>
<td>What if someone were to suggest that…?</td>
</tr>
<tr>
<td></td>
<td><em>Counter argument</em></td>
<td>What would someone who disagreed with you say…?</td>
</tr>
<tr>
<td></td>
<td><em>Distinctions</em></td>
<td>What if the difference between those views/ideas…?</td>
</tr>
<tr>
<td>4</td>
<td>Questions that test implications and consequences</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Implications</em></td>
<td>What follows from what you say…?</td>
</tr>
<tr>
<td></td>
<td><em>Consistency</em></td>
<td>Does that fit with what we said earlier…?</td>
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<tr>
<td></td>
<td><em>Consequences</em></td>
<td>What would be the consequences of that…?</td>
</tr>
<tr>
<td></td>
<td><em>Generalising rules</em></td>
<td>Is there a general rule for that…?</td>
</tr>
<tr>
<td></td>
<td><em>Testing the truth</em></td>
<td>How could you test to see if it were true…?</td>
</tr>
<tr>
<td>5</td>
<td>Questions about the question/discussion</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Questioning</em></td>
<td>Do you have a question about that…?</td>
</tr>
<tr>
<td></td>
<td><em>Analysing</em></td>
<td>What kind of question is it…?</td>
</tr>
<tr>
<td></td>
<td><em>Connecting</em></td>
<td>How what does was said help us…?</td>
</tr>
<tr>
<td></td>
<td><em>Summarising</em></td>
<td>Who can summarize so far…?</td>
</tr>
<tr>
<td></td>
<td><em>Coming to conclusions</em></td>
<td>Are we any closer to answering the question…?</td>
</tr>
</tbody>
</table>

### Rhodes’ questions

1. **Informational questions**
   - How does it work?
2. **Interpretive questions**
   - What do you mean by that?
3. **Explanatory questions**
   - What is the reason for that?
4. **Procedural questions**
   - How is that done?
5. **Relational questions**
   - How do these compare or contrast?
6. **Verificational questions**
   - What are the facts to support it?
7. **Heuristic questions**
   - What could we find out?
8. **Evaluational questions**
   - What difference does it make?

### Chin’s Taxonomy

1. **Pumping**
   - “Right”, “Uh-huh”, and “Ok”
2. **Reflective toss**
   - S1. “I think…”
   - T. “Any suggestions to her answer?”
   - S2. “Yes,…”
3. **Constructive challenge**
   - How to find the density of one’s body?
### Pedagogical Blogging: Promoting Tertiary Level Students' Critical Thinking

#### Appendix B: Example of Voting for the Best Comments on the Blog

<table>
<thead>
<tr>
<th>Elements of Thoughts</th>
<th>Universal Intellectual Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Questioning goals and purposes</td>
<td>1. Clarity</td>
</tr>
<tr>
<td>2. Questioning questions</td>
<td>2. Accuracy</td>
</tr>
<tr>
<td>3. Questioning inferences, data, and experience</td>
<td>3. Precision</td>
</tr>
<tr>
<td>4. Questioning inferences and conclusions</td>
<td>4. Relevance</td>
</tr>
<tr>
<td>5. Questioning concepts and ideas</td>
<td>5. Depth</td>
</tr>
<tr>
<td>7. Questioning implications and consequences</td>
<td>7. Logic</td>
</tr>
<tr>
<td>8. Questioning viewpoints and perspectives</td>
<td>8. Significant</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>What was your purpose when you made that comment?</th>
<th>What question you are raising. Could you explain it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clarity</td>
<td>Could you elaborate further on that point?</td>
<td>How could we find out if that is true?</td>
</tr>
<tr>
<td>2. Accuracy</td>
<td>Could you be more specific?</td>
<td>How is that connected to the question?</td>
</tr>
<tr>
<td>3. Precision</td>
<td>What are some of the complexities of this question?</td>
<td>Do we need to consider another point of view?</td>
</tr>
<tr>
<td>4. Relevance</td>
<td>Does all this make sense together?</td>
<td>Is this the central idea to focus on?</td>
</tr>
<tr>
<td>5. Depth</td>
<td>Do I have any vested interest in this issue?</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Fisher (1998, p. 7-10); Wenning et al. (2006, p.11); Chin (2007, p. 824-825); Paul and Elder (2007, p. 5 & 9)
Appendix C: A Student’s Blog Post Example

Friends are the persons that we know very well. They also are the persons that we like, support, trust and sympathize with. Friends also can become exactly like our family. This is because: we can take a good care of them, love them and respect them just like we respect our family member. Mostly, people search for a friend because they just want a shoulder to cry, someone that can share their good time with and also can tell all our secrets to. This shows that friends are very important in a human life.

Having a friend sometimes can cause problems and sometimes not. This is because; friends are made for solving our problems or being good listeners. Most of the problems have been created by our self and if they are the one who causing the problems, we have to talk about it and tried to understand them better. Actually, it is hard to be a good friend. This is because, everybody has their own attitude and

Appendix D: Blog Topics

**Topic 1**
What are friends? Why do people have friends? Does having a friend ever cause problems? Is it hard to be a good friend? What is the difference between friends and best friends? (250-300 words)

**Topic 2**
Upon entering university, students meet many people leading to new friendships. There is a possibility that such a new friendship may lead to falling in love. Do you think that falling in love can affect students’ academic progress? Do you think that being in love helps or hinders students’ academic activities? (250-300 words)

**About the authors**
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