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## Pattern of reflection in learning Authoring System through blogging

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## ABSTRACT

This research study aims to identify student's perceptions regarding the use of blogging, the pattern of reflection involved in learning Authoring System through blogging and student's performance in tests based on the reflection's pattern. Sixteen students who registered for the Authoring System subject participated in this study. It was conducted using quantitative approaches, through survey and pre-experimental design of one group post-test type. The instruments used were questionnaire, performance test and blog contents, where tutors and students posted messages and comments on the blog during the course. The results showed that the students' overall perception regarding the educational benefits of writing a blog and reading other students' blogs and comments was positive. Students also moderately agreed that they had difficulties in engaging in the reflection through blogging. It was also found that blogging indirectly improved the students' performance in the test. Through blog content analysis, the dominant type of reflection was monologue. However, the results from the data mining analysis showed that the students used reflective conversation and monologue type of reflection to achieve Grade A in learning Authoring System. It shows that students require deep and critical reflection to perform better in the subject.

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## 1. Introduction

A learning journal is an essential medium for reflection to support the particular content of educational programs. All adults reflect and sometimes it occurs only when the environment is encouraging for reflection, such as an incentive or some emphasis on the guidance of reflection (Moon, 2006).

Since the late 1990s, the theory and practice of reflection has made a major impact in the educational environment especially in language learning but less attention has been placed on learning computer subjects. In addition, the result of reflection (which is likely to be reflective) is often assessed by tutors (Lamy & Goodfellow, 1999). This can actually motivate some students in writing reflective materials as it will be frequently viewed by their tutor (Moon, 2006). This factor may influence the nature of reflective learning (Boud & Walker, 1993).

Moon (2006) says that reflection is a form of thinking, as it often involves complex issues and may generate difficult consequences. This is in line with Dewey's (1933) thought on reflection that thinking must involve "a state of doubt, hesitation, perplexity and mental difficulty". Authoring System is a subject which can be considered complex since it integrates the use of scripting languages such as Action Script. Action Script tutorials are available over the Internet as this language is an open source however, creating a simple animation is not as simple as it seems. Often there is a need to check for errors when we do certain things that may generate undesired result (Reynolds, 2008). Handling the errors is not an easy task and for those who are new to scripting might find this very troublesome. The availability of reflective learning is helpful in facilitating students in learning the Authoring System subject effectively as they are encouraged to actively share ideas, experiences and perspectives on the emerging issues related to the Action Script topic especially in discussing the concepts and errors. The interaction, personal opinion or knowledge publishing provides the possible pathway for reflection which leads to deep learning (Boud, 2001).

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For the purpose of nurturing reflection, asynchronous discussion is more appropriate as compared to synchronous discussion due to the flexibility that the learners have to think carefully about the discussion and record exchanges (messages and replies) which can be accessed repeatedly (Lamy & Goodfellow, 1999). Synchronous communication technologies such as live chats are ineffective because they allow little time for thinking (Bartlett-Bragg, 2003).

Educators should be aware of how the new technologies can fit with flexible learning. Blogging is among the technologies that promise the flexible and accessible opportunities for student-centered practices (Glogoff, 2005). A blog is an online journal where users can update the posts, in their own words (Matheson, 2004). Blogging is a useful approach for learning Authoring subjects as it can stimulate reading and motivates learning, builds the community, makes hyperlinks to other resources and provides a learning space. A blog is an appropriate platform for giving such motivation provided that one can read and make comments that lead to discussion about shared interests and individual differences. Engaging actively with blogs gives students an opportunity to read issues and deepen the learning experiences through reflection (Yang, 2009). Studies have shown that the influence of Internet access has caused a number of students to read comprehensively (Liaw, Chen, & Huang, 2008; Rodzvilla, 2002; Stiler & Philleo, 2003).

Student's reflections through blogging can be categorized based on several patterns. The social interaction model as proposed by van Lier (1996) applied the social-interactionist view of learning for the discussion of the language learning by categorizing communications that occur between the lecturer and learners. It involves monologic, dialogic and fully conversational talk. According to Lamy and Goodfellow (1999), the model proposed by van Lier (1996) has never been tested to the analysis of online interaction exchanges. Thus, the social interaction model was adapted to study the role of online learning reflection to facilitate learning. Lamy and Goodfellow (1999) used the terms "monologue", "dialogue", "social conversation" and "reflective conversation" in their study.

To encourage the students to reflect on their learning, instructors need to scaffold the learning process. One of the types of instructor scaffoldings that can be used is metacognitive scaffolding. In education, the goal of metacognitive scaffolding is for the students to become independent, self-regulating and less teacher-dependent. In other words, the metacognitive scaffolding aims at helping students to control and monitor their own learning (Azevedo & Hadwin, 2005) as it can develop higher-level cognitive strategies (Hartman, 2001).

Therefore, the metacognitive scaffolding strategies through blogging were implemented in the study to trigger student's reflection and then student's patterns of reflection were analyzed based on the model proposed by van Lier (1996), which was further investigated by Lamy and Goodfellow (1999).

## 2. Theoretical background

### 2.1. Social constructivist learning environment and blogging

Social constructivist learning environment (SCLE) is the environment that represents the social constructivism theory. It designates a way of knowing where learners are able to build new comprehension and knowledge during the social interaction with peers (Wink & Putney, 2002). Vygotsky (1978) stated that a person can develop deep understanding through collaboration and from more knowledgeable peers rather than from his/her own ability. SCLE serves as an open platform where the students work and learn collaboratively and it does not manage, control and track users which is totally different from the concept of the learning management system (Hart, 2009).

In SCLE, learners are invited to activate their prior knowledge and construct new information based on what they already know (Driver & Easley, 1978). Apart from that, the social dimension of learning enables students to make meaning of the world via personal and society processes (Driver, Asoko, Leach, Mortimer, & Scott, 1994). They are given opportunities to test new knowledge claims with peers and link these new ideas with personal experience and existing knowledge (McRobbie & Tobin, 1997). Finally, students can identify, express and exchange ideas, reflect on other student's views, organize their own views and negotiate shared meanings (Prawat, 1993).

SCLE is suitable for the integration with an online setting such as a blog. Blogging that promotes the social constructivist environment acts as a place where students can reflect and use the tool and the available information to meet their learning target and perform problem-solving activities (Wilson, 1996). Some of the characteristics that fit blogging within SCLE are that it acts as a platform for stimulating reading and giving motivation and students can widen their learning experience through reflection and dialogue. Blogs also enable students to build a learning community as they share the same interests. The use of hyperlinks enables new readers to follow earlier discussion and can make the blog more interesting and lively with pictures or sounds (Efimova & Fiedler, 2003). Blogs also encourage a learner-centered environment and students can learn at their own pace (Efimova & Fiedler, 2003).

### 2.2. Metacognitive scaffolding

The most effective metacognitive instruction involves both theory and practice. Learner must be exposed to cognitive processes and strategies that is used as metacognitive knowledge. Metacognitive knowledge involves the reader's awareness, monitoring, and guidance of his/her cognitive processing when construction is meant from text (Garner, 1990; Nist & Holschuh, 2000). Instructors are therefore encouraged to engage students in effective learning processes and help them regulate their thinking by integrating the metacognitive strategies in learning that is necessary for academic success. Students who engaged in metacognitive activities were improved in learning while the weaker students were positively affected as compared to better students from such activities. Unfortunately, many students failed to directly engage in metacognitive thinking unless they were shown the ways to do so through prudently designed instructional activities. Thus, it is vital to apply metacognitive support in the design of the learning environment.

According to Rimor, Reingold, and Kalay (2008), an appropriate response from instructor can transform the course into a learning environment where students are likely to learn through reflective and metacognitive processes. An injection of metacognitive scaffolding in an online course will promote student's metacognitive reflections. The metacognitive scaffolds that are injected by the instructor include "presenting the rationale for the task, fostering the integration across various course readings and course objectives, supporting reflective writing, differentiating between conclusion, fact, opinion and hypothesis, supervising text comprehension, focusing on the process of learning and encouraging interaction among participants". All of these scaffolds categories were found to make students to reflect on their task and therefore contributed to their experience as a community of learners.

### 2.3. Reflection's pattern

In Lee's (2005) framework, reflection was investigated based on the depth of the involved thinking process. Three levels of depth were examined. The lowest level is known as 'recall' level, in which one describes, recalls and interprets issues with regards to personal experience without considering other explanation. The second level is the 'rationalization' level, where issues are interpreted through reasoning and generalizing experiences with basic principles. The third level is the 'reflectivity' level, where personal experiences are approached with a view of improvement in the future, analyzing issues from various perspectives and its impacts towards understanding the issue. In Lee's (2005) definition of reflective thinking, the lowest and the highest level of reflection is differentiated by a deeper thinking process which involves dynamic explanation of an issue and the ability to ask the 'why' and 'so what' question.

Hatton and Smith (1995) identified three stages of reflections in teacher's journal writing which are descriptive writing, dialogic reflection, and critical reflection. Descriptive writing being the lowest level is described as a pure description of an event, a situation or an issue whereas, dialogic reflection is characterized based on an exploration and consideration of differing reasons. The highest level which is critical reflection includes possible reasons and consideration of the broader historical, social and political contexts. The approach of Lee (2005) is similar to the approach of Hatton and Smith (1995), in which the degree of reflection is obtained. Although different terms are used, similar attempts were made to capture degrees of reflectivity on the basis of one's ability to place things into perspective.

From all the perspectives on how reflection can be categorized, only a few of them focused on reflections through online learning. Among the researchers who have carried out research related to online learning reflection are Lamy and Goodfellow (1999).

Lamy and Goodfellow (1999) adapted the social interaction model which was used in van Lier's (1996) research to study online learning reflection to facilitate learning. They identified four patterns of reflection which are monologue, dialogue, social conversation and reflective conversation. Monologue refers to messages which do not require nor invite a reply and generate no further exchanges on the course whilst dialogue is about messages that show control and reflective focus. It is often controlled by the tutor and the reply is socially consistent. Social conversation is a conversation with a social focus that does not contribute significantly to the learning objective. Reflective conversation refers to messages that have interaction with both an information and social focus. The interaction is described as a negotiation of understanding, a focus on possibilities and communicative symmetry.

Based on the related theories and the characteristics of blogging, the integration of all the theories in this research can be seen in Fig. 1. In Fig. 1, it can be seen that seven metacognitive scaffolds as suggested by Rimor et al. (2008) are the actions that trigger student's reflection on selected topics of Authoring Language where the blogging characteristics allow the occurrence of the reflection process. Indirectly, the characteristics of blogging will also support SCLE and student's reflections through blogs can be analyzed based on reflection patterns that is, monologue, dialogue, social conversation, and reflective conversation.

### 3. Research objectives

Following are the objectives of this research:

- (1) To ascertain student's perceptions regarding the use of blogging
- (2) To identify the difficulties confronted by students in doing reflection
- (3) To establish student's patterns of reflection involved in learning Authoring System through blogging
- (4) To evaluate student's performance in a test based on the reflection's patterns.

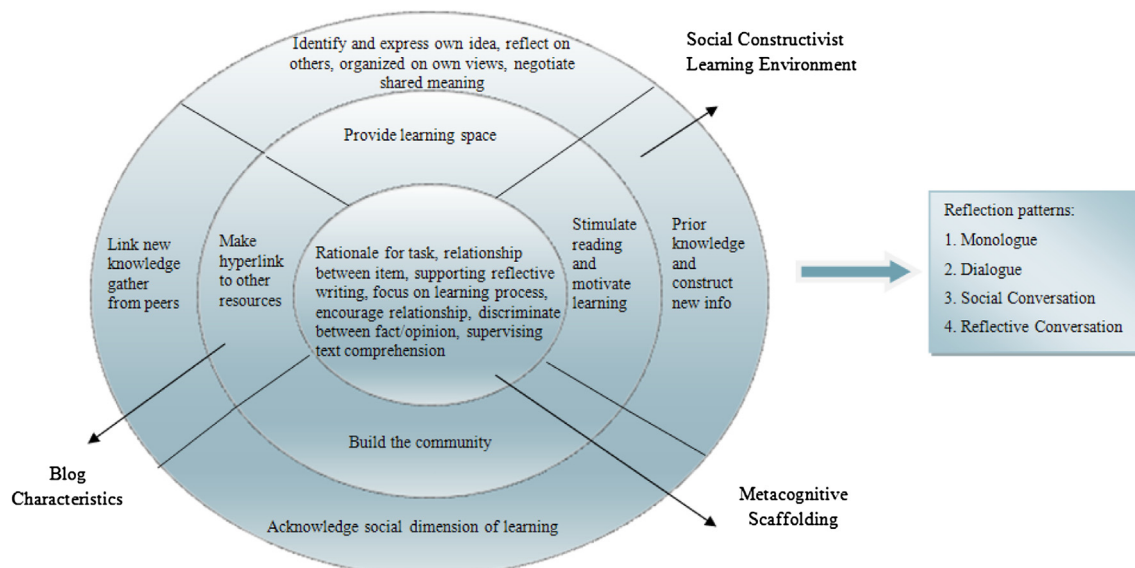


Fig. 1. Theoretical framework.

## 4. Method

### 4.1. Design

A survey and pre-experimental design of one group post-test type were employed in this study. The survey was carried out to gather the information based on standardized approaches using standardized instruments and a questionnaire was used for this purpose. One group post-test design is a type of pre-experimental design where only one group receives a treatment and it is then measured in a test (Campbell & Stanley, 1963). For this study, a post-performance test was used. There was no control group or baseline condition in this study to compare with and therefore, the research findings were carefully interpreted by the authors.

The validity of this research was augmented by using data triangulation in the quantitative data collection and analysis procedure. The purpose of data triangulation was to seek clarification, understanding (Hoepfl, 1997) and to give supportive information for the quantitative research (Harun & Tasir, 2003). Table 1 shows the working plan for the study in gathering data for the entire eight weeks.

### 4.2. Sample

The whole population was chosen as a sample for this study which involved sixteen postgraduate students who took the Educational Technology (MPP) program. They enrolled in the Authoring System subject which is the core subject of the program that is related to computer education. In addition, the researchers chose this sample due to experiences and knowledge of the subject (Gay, Mills, & Airasian, 2009). Two tutors were involved to trigger student's reflections in their blogs.

Due to the relatively small size, the whole population was chosen. Some information might be missed and the risk of missing potential insights might be increased if the researchers had ignored small number of units in this study (Lund & Lund, 2010). It is possible to gain profound insights into phenomena that researchers are concerned about when all members are included (Lund & Lund, 2010).

### 4.3. Instruments

Three research instruments were used in this study: questionnaire, performance test, and student's reflection in their blogs. These instruments were chosen to triangulate key understandings that have been expressed in this research.

#### 4.3.1. Questionnaire

The questionnaire was used to identify student's perceptions regarding the educational benefits of reflection through blogging and the difficulties faced by the students in doing reflection. The questionnaire was divided into several parts as illustrated in Table 2. Items in each part of the questionnaire were analyzed to produce an overall reliability value of Cronbach's Alpha = 0.764, which implies that the questionnaire can be used in the study (Bowling, 2005).

#### 4.3.2. Performance test

The performance test consisted of two questions and was graded five marks for each question. The performance score was used later in data mining analysis in order to predict student's performance based on the pattern of reflection among students in learning Authoring System. Table 3 provides a sample of the test given to the students.

#### 4.3.3. Observations and analysis of students' reflections in blogs

Throughout the eight weeks, student's blogs were monitored in order to observe their activities and to encourage them to do the reflection critically. In this study, five case studies were posted in the tutor's blog and students were required to make critical reflections on each case study. Some of the case studies were created based on the problems encountered by the students while completing the class activities. Table 4 shows all the case studies highlighted in the blog.

Reflective and metacognitive learning processes are important in the context of education (Rimor et al., 2008). In order to promote reflection from students, tutors response to the student's posts and comments in the blog based on the metacognitive scaffolding guidelines. It was performed in order to transform the course into meaningful learning and experiences (Rimor et al., 2008). Table 5 introduces the categories of metacognitive scaffolding, which were scaffolded by the tutors to the students in the blog.

**Table 1**  
Work planning.

Week	Discharge of duty
Week 1	<ul style="list-style-type: none"> <li>Instructed the students to create a blog</li> <li>Students created the blog and became familiarized with the environment</li> </ul>
Week 2–3	<ul style="list-style-type: none"> <li>Teaching and learning on Action Script continued</li> <li>Students started writing the entry/reflection regarding today's activities</li> <li>Students were given case study and they made reflections in their own blog</li> <li>Tutors responded to each student's blog</li> </ul>
Week 4–7	<ul style="list-style-type: none"> <li>Teaching and learning on Action Script continued</li> <li>Students were given case study and made reflections in their own blog</li> <li>Tutors responded to each student's blog</li> </ul>
Week 8	<ul style="list-style-type: none"> <li>The questionnaires were distributed to the students</li> <li>Students sat for a test in order to gather the performance data</li> </ul>

**Table 2**  
Parts of questionnaire.

No.	Part	No. of question
1	Part A: benefit of writing a blog	9
2	Part B: benefit of reading other students' blogs and comments	11
3	Part C: difficulties confronted in doing reflection	9

Seven scaffolding categories as illustrated in Table 5 were developed and each category consisted of several items as suggested by the researchers. To evaluate the agreement of the items in each scaffolding category, an inter-rater reliability measurement was carried out. A statistical measure of inter-rater reliability is Cohen's Kappa which ranges generally from 0 to 1.0 where large numbers mean better reliability. The result of the inter-rater reliability was 0.794 with 81 percent of agreement (46 from 57 items were agreed between two researchers).

The result of the inter-rater analysis that consisted of 57 items was  $Kappa = 0.794$  with  $p < 0.001$ . Values of Kappa from 0.40 to 0.59 are considered moderate, 0.60–0.79 substantial and 0.80 is outstanding (Landis & Koch, 1977). Kappa values should be at least 0.6 and often higher than 0.7 before a good level of agreement can be claimed. The percentage of agreement was 81 percent in this study. Therefore, the items developed for each scaffolding category were acceptable and outstanding.

## 5. Data analysis

The responses to this questionnaire were analyzed using SPSS to obtain the mean, percentage and frequency. The analysis aimed to answer the first and second research objectives which concerned the student's perceptions about the educational benefits of reflection through blogging and the difficulties confronted by students in doing reflection. The level of the mean score representation was used to look at the student's variables. The level is presented in Table 6.

The performance test data was analyzed to determine their scores in terms of percentages. Each question carried 5 marks and was scored on the basis of answer scheme. Meanwhile, the content of the blog was analyzed by using the model of reflection as proposed by Lamy and Goodfellow (1999). Each post and comment in the tutor's blogs and student's blogs were analyzed using the content analysis technique that is categorized into four namely; monologue, dialogue, social conversation, and reflective conversation. Thus, the pattern of reflection in learning Authoring System can be identified among the students. Table 7 shows examples of posts/messages of reflection that are based on the Lamy and Goodfellow (1999) model.

After the performance scores and frequencies were gathered for each type of reflection, a decision tree was produced by using data mining techniques via the Weka 3.6.6 toolkit. This decision tree was used to predict the student's performance and patterns of reflection in learning Authoring System.

## 6. Results


### 6.1. Analysis of perception regarding educational benefits of writing a blog

The results of the percentage, mean and standard deviation for students' perceptions regarding the educational benefits of writing a blog that consists of nine items, are displayed in Table 8. The highest mean was 4.50 for item number 2, while the lowest mean was 3.62 for item number 9. The overall mean for students' perception regarding the benefit of writing a blog was high at 4.04.

### 6.2. Analysis of perceptions regarding educational benefits of reading other students' blogs and comments

The results of the percentage, mean and standard deviation for students' perception regarding the educational benefits of reading other student's blogs and comments are displayed in Table 9. The items were used in order to measure the benefits. The highest mean was shared

**Table 3**  
Test questions.

No.	Test question
1	<p>Ahmad is required to make an animation like the following by using Adobe Flash.</p>  <p>He draws the ball and converted it into symbol and applied Motion Tween to produce the design as required. When he tested the movie, he found out that his design was totally not the same as pictured above. Ahmad was clueless as he was not sure what went wrong and now he is seeking your advice to produce the animation in the right way. What will be your advice to him? What is the right technique to produce the animation like the above picture? What are the differences between the Motion Tween and your Proposed Method? Explain the steps involve thoroughly. <i>Hint: Do answer based on reflection that you have done inside your blog.</i></p>
2	<p>"Flash is a tool for automated animation permitting you to create shapes and move them without having to draw each frame of the animation. However, you can also animate in the traditional manner by drawing each frame of animation." What makes traditional animation differ from cut-out Animation in terms of layer? Lets say you are required to design an animation using a series of images (for eg. Rabbit walking). How do you plan your character? What do you do in order for Flash to recognize that you have series of images? Explain what are the steps required to make the rabbit walks from one place to another? <i>Hint: Do answer based on reflection that you have done inside your blog.</i></p>

**Table 4**  
Case study activities.

No.	Case study
1	Among the problem that encountered was to paint the sky gradiently. I wanted the blue colour on top of the rectangle and white at the bottom, but it turned out with the blue colour on the right and gradually fades to white on the left side of the rectangle. I just rotated the rectangle to get as what was desired. What is the right technique of doing this? Any ideas please.
2	If you want to make the ants movement look realistic, more key frame are added and the position of the ants is changed. When you add the motion at the ant layer, you will see there's one option 'Orient to path' appears at the properties section. So I want you to discuss that is it enough if a person just checks at the 'Orient to path' to make the ants movements look real or is it still needed to add more key frame and adjust the position too?
3	All this while we only used Pencil tool to draw the line/path thus the object can move. Is it possible to make the line using a Brush tool? Do you really think that the ants can move along the path that has been drawn using Brush tool? If yes, why is it so? If not, why is it so?
4	One of your classmates had this puzzle in her mind that "how to make the Bunny makes a realistic turn". Now I would like to throw some hints in order for you to find the answer. You are required to think and consider about these two things: Is it the settings of the key frame or the rabbit's picture that kind of flat which actually contributes to the problem?
5	This is the problem encountered by your friend. "Right now I'm doing MCQ and text entry exercise. I have no clue why I always get the incorrect answer instead of correct one. The action script used was perfectly the same with the tutorial given. Why it happened that way?"

among 3 items which were items number 1, 2 and 3 with the mean of 4.31. The lowest mean was also shared among 2 items which were item number 8 and 9 with the mean of 3.81. The overall mean score for students' perception regarding the benefits of reading other students' blogs and comments was high at 4.10.

### 6.3. Analysis of perception regarding the difficulties in engaging reflection through blogging

The results of the percentage, mean and standard deviation for students' perception regarding the difficulties in engaging reflection through blogging are displayed in Table 10. The highest mean was item number 8 while the lowest mean was item number 2. The overall mean score for students' perception regarding the difficulties in engaging reflection through blogging was moderate at 2.99.

### 6.4. Analysis of patterns of reflection and performance score

Table 11 shows the patterns of reflection based on posts and comments posted by students through blogging. It can be seen that most of the students posted at least more than five posts in their blog. The most active blogger was Blogger 11 who wrote 24 posts within the eight weeks of classes. Almost 238 posts were posted by all students throughout the eight week period.

From the posts, the data has been categorized into four patterns of reflection which are monologue, dialogue, social conversation, and reflective conversation (Lamy & Goodfellow, 1999). The monologue pattern involves "messages that do not refer to other messages and do

**Table 5**  
Metacognitive scaffolding guidelines.

Metacognitive scaffolding by tutors	Examples of message posted by tutors in blog
Presenting rationale for task and activities (giving direct rationale or asking students the rationale)	<ol style="list-style-type: none"> <li>1. From the given article, please identify the conclusion, facts, opinions and hypothesis.</li> <li>2. Here are the reasons why you need to solve the given problem.</li> <li>3. These are some reasons why you need to be involved in the given learning activity/task. I hope those reasons satisfy you and your team.</li> </ol>
Presenting the relationship between reading items, course objectives and tasks (comparing two concepts, identifying the differences or similarities)	<ol style="list-style-type: none"> <li>1. Based on the given learning task/activities, can you relate it with the concept that we have learn in class today.</li> <li>2. Based on the given notes in class today, please relate the content of the notes with the solution of the case study. Do you need to refer to the notes in order to solve the given case study?</li> <li>3. If you think about A and B, how can you relate both?</li> </ol>
Supporting reflective writing (giving feedback – positive or negative to encourage reflection)	<ol style="list-style-type: none"> <li>1. Carry on your work. Don't give up and continue your reflection.</li> <li>2. Your reflection on the issue is true.</li> <li>3. Yes, you are totally correct and you got it. Please continue to reflect on the issue.</li> </ol>
Focusing on the process of learning (monitoring learning process/asking question to trigger learning at low level do not yet require the students to reflect)	<ol style="list-style-type: none"> <li>1. Any new ideas on this issue? What are your opinions on this issue?</li> <li>2. Anyone have idea?</li> <li>3. From today's lecture, please state the main issues that we have covered in the class. Please state also the main issues that we did not cover yet.</li> </ol>
Encouraging the relationship among participants (asking questions to encourage students to interact with peers; give compliments about the group's performance)	<ol style="list-style-type: none"> <li>1. Both of you made a good partner.</li> <li>2. Please comment on your friend's ideas.</li> <li>3. Please compare your ideas with your friends.</li> </ol>
Discriminating between conclusion/fact/opinion/hypothesis	<ol style="list-style-type: none"> <li>1. Can you give support or reference on your opinions (any link or quotation that you refer).</li> <li>2. Class, please comment on your friend's comments whether they are facts, opinions and hypothesis?</li> <li>3. Is your statement a fact or just your opinion?</li> </ol>
Supervising text comprehension (instructor refers to the previous statement posted by students and then makes comments or asks more about their posts)	<ol style="list-style-type: none"> <li>1. How have you been progressing in understanding concept based on your comments in the forum?</li> <li>2. In your statement, you keep on mentioning about A. Why?</li> <li>3. Thank you for reflecting on the issue/concept/formula, if you are given a second chance to revise your reflection, what are the factors that you plan to improvise? Why?</li> </ol>

**Table 6**  
Interpretation of mean scores of variables.

Range	Interpretation
1.0–1.80	Very low
1.81–2.60	Low
2.61–3.40	Moderate
3.41–4.20	High
4.21–5.0	Very high

Source: Score category adopted from Ariffin and Mohamad (1996)

not require or invite a reply". In this study, 176 monologue-type reflections were posted by all students for the entire eight weeks. A dialogue type of message is a message that shows control and reflective focus. It is often controlled by tutors and the reply is socially consistent. There were a total of 47 posts using this type of reflection that involved only 11 students, while the remaining five students did not post any message in this category. The social conversation category deals with messages of a social nature. This is a kind of pattern which does not contribute to learning. In total, 111 posts fell under this category, involving 12 students out of 16 students. Reflective conversation is about messages that involve interaction that is both informative and social. The interaction is exemplified as the negotiation of understanding, contingency and communicative symmetry. There were 49 messages that belonged to this category, which came from the contribution of 11 students.

Table 11 also shows the performance scores from the test taken by the students in Week 8. There were 2 questions for the test and the maximum number of marks were 5 per question. 15 students scored 7 and above, while only 1 student scored below 4.

### 6.5. Analysis of performance in test based on the reflection patterns

Fig. 2 shows the manual decision tree for performance prediction by using the scores and frequencies gathered from the blog content analysis. As illustrated, the scores were divided into three categories namely; less than four, four until seven, and more than and equal to eight. Note that as the score was increased, the frequency for each category also increased.

**Table 7**  
Examples of post/message based on the Lamy and Goodfellow (1999) reflection model.

Types	Example of post/message
Monologue	<p><b>Flash lesson</b>  <i>Tutor:</i> How is your progress with the Flash?  <i>Blogger 12:</i> This time around I want to share about the technique that I have learnt in week 4. The purpose of the button being there is merely to let the viewer gain control on the time they get to view each scene...  <i>Blogger 10:</i> Hi friends. I would like to share how to embed .swf file type inside the blog. The steps are as follows.... That is all I know and I want to share with you.</p>
Dialogue	<p><b>Action Script in scene</b>  <i>Blogger 6:</i> Tutor, I can't even complete my action script on math question. I got problem on the next button. Hope to hear from you soon.  <i>Tutor:</i> Blogger 8 also faced the same problem like yours. So what I noticed is that, the action script at her button layer is not the same. It should be the same in order to work. The second problem was due to the name of the scene. Just be careful with the name as action script is very sensitive.  <i>Blogger 8:</i> Thanks Tutor. I understand what you mean. I have changed it and it is working too.</p>
Social conversation	<p><b>Progress on assignment 1</b>  <i>Tutor:</i> What is your progress on Assignment 1  <i>Blogger 8:</i> I have just completed the link of all parts done by my team member. I almost forgot that I need to do reflection. I will take some time to do it.  <i>Blogger 12:</i> Is the due for the reflection also on 15 November?  <i>Tutor:</i> You have to complete the reflection part until next week.  <i>Blogger 10:</i> Thanks for the info.</p>
Reflective conversation	<p><b>Auto Kern</b>  <i>Tutor:</i> Blogger 8, your problem relies on the Auto Kern. I need you to do a little study on the function of Auto Kern. What is this and when you can use it?  <i>Blogger 10:</i> To my understanding, the auto kern is about the letter spacing but, does auto kern depend on the types of fonts? I have done the exercise and I managed to solve few problems...  <i>Blogger 8:</i> Thanks Tutor and Blogger 10 for the advice. I have solved the problem and will reflect more on the Auto Kern after this.  <i>Blogger 8:</i> Kerning is about the spacing between pairs of characters. In Flash, many fonts have built-in kerning information. For example A and V...  <i>Tutor:</i> Blogger 10, thank you for stating the major problem here and for your question, I hope Blogger 8 had already helped you with it. Blogger 8, thank you for the explanation. Hope it helps you guys.  <i>Blogger 11:</i> Hurmm...problem that I am facing now is answer case sensitive – It is right if "nose" is typed but typing "Nose" becomes wrong. I am still looking for solution. Any idea friends?  <i>Blogger 10:</i> I have trial and error using the if-else statement. So far it works but the code is too long. Now, I try to use code given by Blogger 12.  <i>Blogger 12:</i> At first, I didn't realize about this problem since the answers to my questions are in the middle of the sentences. However, after browsing through some of my classmate's blogs, it was found that some of my friends encountered the case sensitive So, I tried to enter answers that include case sensitive form on my own Flash File and guess what?! I also had the same problem. After reading some materials, I found the solution. What I need to do is that I have to set the Actionscript to change the answer typed by the user toLowerCase() or toUpperCase(): choose either one.</p>

**Table 8**  
Perception regarding the educational benefits of writing a blog.

Item	Questionnaire items	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Writing a blog...								
1	Develops a unique writing	0.0	0.0	6.2	62.5	31.2	4.25	0.58
2	Allows us to share the writing	0.0	0.0	0.0	50	50	4.50	0.52
3	Provides students with a personal space to express their own viewpoint	0.0	0.0	6.2	50	43.8	4.38	0.62
4	Develops individual interest	0.0	0.0	18.8	62.5	18.8	4.00	0.63
5	Assists critical thinking skills	0.0	6.2	12.5	75.0	6.2	3.81	0.66
6	Allows students to outline their perspectives on particular issues	0.0	0.0	6.2	68.8	25.0	4.19	0.54
7	Provides an opportunity for students to shift from surface to deeper level of learning	0.0	0.0	18.8	75.0	6.2	3.88	0.50
8	Empowers mechanized approach where we learn to write well enough for school and work	0.0	6.2	25.0	56.2	12.5	3.75	0.78
9	Assists life-long learning skills	0.0	6.2	31.2	56.2	6.2	3.62	0.72
Total							4.04	0.62

Table 12 shows the output of the data mining which was run using the Weka version 3.6.6 toolkit. The test mode which is the training set was used to evaluate the data. There were 11 nodes which also indicate the size of the tree. As in Table 12, there were 16 instances and 5 attributes used in this data mining. In this case, it was completely accurate which is considered as standard when the training set is used for testing. The tree structures can be viewed as illustrated in Fig. 3.

Fig. 3 denotes the tree structure as predicted by using the decision tree algorithm, including the number of instances that fall under each leaf. The shown tree model was generated from the available full dataset. The first split is at reflective conversation followed by dialogue and lastly the monologue attributes. In the tree structures, the class label is assigned to a particular leaf and it is often written as a decimal number as a way the algorithm works to handle missing values (Witten, Frank, & Hall, 2011). The incorrectly classified instances will also appear. For example: (2/0) means that two instances reached that leaf where both were classified correctly and no instance was classified incorrectly. From the tree, it was concluded that 12 out of 16 students showed the use of reflective conversation and monologue types in order to achieve a grade A in the test.

## 7. Discussion

The assessment of the student's perceptions in regard to the use of blogging was based on the benefits in writing a blog as well as in reading other students' blog and the comments. As a result it was agreed by all the students that writing a blog allows them to share their writing as it provides them personal space to express their own views and this eventually leads them to develop a unique style of writing (Table 8). Writing a blog motivates students because they want to impress the readers (Abdul Kadir, 2009). This could be seen in the present study where all of the students posted at least the monologue type of message every week in order to share what they had learnt during previous lessons in the Authoring System subject (Table 11). According to Abdul Kadir (2009), students are able to test their ideas through the act of writing and they learn that in order to develop a clear and convincing voice of their own they have to make and stick with their opinions (Mortensen & Walker, 2002). Furthermore, more than half of the students shared the opinion that blogging enables them to move from surface to a deeper level of learning and critical thinking is developed as a result of the deeper learning. According to Abdul Kadir (2009), the surface learning is about students' approaches in completing the minimum assessment requirement while the deeper learning happens when students step aside from an experience and seek out the relations between concepts and understand the meaning (Rosie, 2000). Blogging also promotes critical thinking by encouraging students to assess what they read and write. Moreover, the student's engagement with collaborative learning via interaction with others also acts as a channel for critical thinking (Zhang, 2009). This is aligned with the frequency recorded in this study for the high level of reflection which is a reflective conversation with more than half of students making an effort to critically reflect on the Authoring System subject matter (Table 11).

All students agreed with the benefits of reading other students' blogs and comments as it promoted their creative thinking. A similar result was found by Eide and Eide (2005) who found that blogging had a significant positive impact on students and acted as an agent in promoting creativity and insight and triggering thinking. The tutor's approach is also crucial in eliciting students' thinking by asking students questions that lead to the discussion instead of spoon-feeding them with the answer for every single problem that emerges. This enriches students with ideas and active exchange and critique (Abdul Kadir, 2009). Another finding showed that blogging gave the

**Table 9**  
Perceptions regarding the educational benefits of reading other students' blogs and comments.

Item	Questionnaire items	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Reading other blogs...								
1	Promotes creative thinking	0.0	0.0	0.0	68.8	31.2	4.31	0.48
2	Promotes insightful thinking	0.0	0.0	6.2	56.2	37.5	4.31	0.60
3	Triggers thinking	0.0	0.0	6.2	56.2	37.5	4.31	0.60
4	Facilitates meaningful learning for students	0.0	0.0	25.0	62.5	12.5	3.88	0.62
5	Allows us to hear about what others are seeing	0.0	0.0	6.2	62.5	31.2	4.25	0.58
6	Enables peers to identify the personality of the blog writer	0.0	0.0	6.2	62.5	31.2	4.25	0.58
7	Encourages students to participate in the blog	0.0	0.0	18.8	62.5	18.8	4.00	0.63
8	Increases the sense of community in class	0.0	6.2	12.5	75.0	6.2	3.81	0.66
9	Enables students to look at what is going on in their friends' world	0.0	0.0	25.0	68.8	6.2	3.81	0.54
10	Gives students ideas on what to write in the blog	0.0	0.0	18.8	37.5	43.8	4.25	0.78
11	Gives peers feedback from fellow classmates	0.0	0.0	25.0	56.2	18.8	3.94	0.68
Total							4.10	0.61



**Table 10**  
Perceptions regarding the difficulties in engaging reflection through blogging.

Item	Questionnaire items	1(%)	2(%)	3(%)	4(%)	5(%)	Mean	SD
1	I had little experiences using a blog	6.2	18.8	31.2	37.5	6.2	3.19	1.05
2	I never had an experience of doing reflection before	31.2	31.2	18.8	18.8	0.0	2.25	1.13
3	I lacked writing skills	0.0	18.8	25.0	50.0	6.2	3.44	0.89
4	I was still trapped with the traditional mode which focuses on passive learning	12.5	31.2	37.5	18.8	0.0	2.62	0.96
5	It was difficult for me to identify topics to discuss on the blog as I was not the content expert	6.2	12.5	43.8	31.2	6.2	3.19	0.98
6	I had limited time for reflection through the blog	6.2	18.8	25.0	43.8	6.2	3.25	1.07
7	I felt I would jeopardize my final grade by posting some aggressive responses towards the course	0.0	18.8	43.8	25.0	12.5	3.31	0.95
8	I was more an observer person rather than a contributor	0.0	6.2	37.5	50.0	6.2	3.56	0.73
9	I was shy and closed-window person and this create difficulties for me to do my reflection	12.5	31.2	37.5	18.8	0.0	2.62	0.96
Total							2.99	0.46

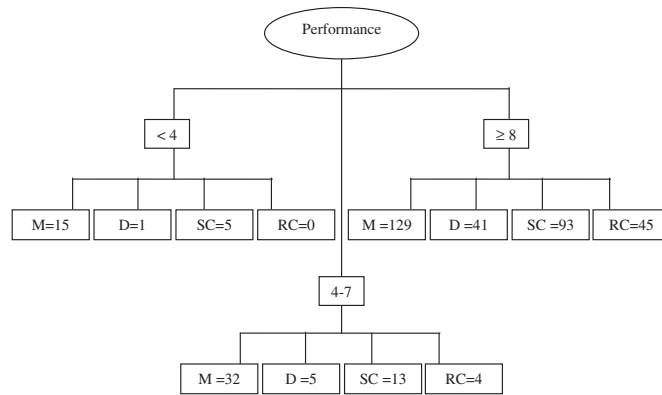
opportunities to hear about what others see and this is in line with Downes's (2004) study which stated that students get to know each other better by visiting and reading other students' blogs where they will discover similarities and differences. The personality of the blogger can also be identified due to the individual style of writing which is reflected in the blog or through the links that are passed along the readers. Getting feedback from peers after commenting on their friend's blogs increased student's motivations to write in a blog (Pinkman, 2005) as well as assisted in building new understanding (Abdul Kadir, 2009). Brandt (2008) also pointed out that as feedback and reflection were incorporated in reflective conversation between teachers and students; both parties gain the benefit from the reflective practices.

In this research study, a number of students made meaningful contributions to learning Authoring System (Table 11). This reflects the result obtained in a study by Abdul Kadir (2009) in which students agreed that visiting other's blogs helped them to gain valuable ideas. From the data gathered in this research study, it can be seen that whenever a student had problems in doing class activities, other students helped them and they usually had done some research on the problem before posting the solution in the blog. They also checked the content several times before posting it online so as to avoid the losing face in case of any wrong information (Yang, 2009). Another benefit of reading someone's blog is that it creates a sense of community in the class. Blogs are often created by people who have the same mutual interests and this is what differentiates blogs from the other types of websites (Godwin-Jones, 2003; Richardson, 2005). It initially acts as a small learning community (Efimova & Fiedler, 2003) but slowly turns into a stronger sense of community when members tend to become more involved (Godwin-Jones, 2003). As an example for this research study, two students that were highly motivated to know more about Flash gathered more information in order to share it with their classmates. A global community is thus formed through blogs.

From this research study, some difficulties can be expected in engaging and doing reflection through blogging despite the positive impact of the use of blogging in learning. Most of the students moderately agreed that they were having some difficulties in engaging in reflection. This might be due to their tendency to be observers rather than contributors and they claimed that listening to other classmate's voice was more interesting (Abdul Kadir, 2009). In addition, since almost all of the students were teachers and taking the program as a part-time course, they were spending most of their time in completing class activities rather than doing reflection as being reflective takes a lot of time and effort (Bashyal, 2007). Even so, they still made an effort doing the reflection after they received comments from their tutors to update the blog since marks would be given for every reflection. A lack of writing skill also contributes to the difficulties in engaging reflection through blogging. This lack was basically due to the student's difficulty in identifying a topic and material to discuss in the blog as they were not the content experts. During the eight weeks time period, most of the students posted more monologue type messages and this explained why the total frequency for monologue type messages far exceeded the other three types of messages (Table 11). Basically, they only explained the Flash activities step-by-step by using the material they received from the lecturer. From this we can see that almost every student had the same blog content since they were referring to the same sources. Posting negative comments about the course was a problem for less than half of the students. Students were anxious that the messages posted would be read and affect their friendship whereas some felt that negative comments would jeopardize their final grade. Yang (2009) believes that it is a major concern when grades

**Table 11**  
Patterns of reflection and performance score.

Students	Monologue	Dialogue	Social conversation	Reflective conversation	Total post	Post-test (10%)
Blogger 1	15	1	5	–	17	3.5
Blogger 2	5	2	1	2	9	8.0
Blogger 3	15	–	18	–	17	9.5
Blogger 4	12	5	13	–	14	7.0
Blogger 5	17	–	–	–	20	7.0
Blogger 6	5	4	8	12	17	10.0
Blogger 7	12	–	–	–	12	8.0
Blogger 8	21	9	10	2	21	10.0
Blogger 9	9	1	1	1	12	9.5
Blogger 10	14	6	21	3	17	10.0
Blogger 11	14	3	15	4	24	9.0
Blogger 12	7	10	15	11	13	8.0
Blogger 13	3	–	–	4	7	7.5
Blogger 14	8	–	1	3	11	9.5
Blogger 15	11	5	3	1	13	9.5
Blogger 16	8	1	–	6	14	8.5
Total	176	47	111	49	238	NA
Average	11	3	7	3	15	8.4



\* M = Monologue, D = Dialogue, SC = Social Conversation, RC = Reflective Conversation

Fig. 2. Decision tree manual prediction.

and friendship are at stake. Cultural differences and educational background might play a role too since Asian students are taught to be moderate, thus speaking stridently in questioning and challenging is inappropriate as opposed to western learning (Yang, 2009). However, the tutors made a clear instruction which favored students questioning and criticizing other students' posts in the blogs just for the sake of learning. Having no prior experience in doing reflection was a major concern for some of the students. A number of students were already in their second semester, thus they certainly had gained experience in doing reflection during their first semester. For students who were in their first semester, some had already practiced reflection during their first degree. Thus, they had no difficulties in engaging with reflection. This is reflected in the statement by Blogger 6 regarding her experiences doing reflection:

**Blogger 6:** "I still remember during my degree program, we had to do reflection for every subject every time we did our practicum in school, there are 8 semesters altogether. So thanks to my LPG lecturer nurturing me this way"

In order to help these inexperienced students and to save the whole discussion from reaching the futile state, tutors instilled a number of approaches, techniques and interests in doing reflection. One approach was through the injection of metacognitive scaffolding and this effort was really helpful in producing students who were given more rather than just accepting things being said by their classmates and eventually caused students to be active and assisted meaning during the learning process (Burton & Carroll, 2001).

A thorough analysis was done on each message that was posted in the students' blogs in order to uncover student's patterns of reflection in learning Authoring System through blogging. Each message was sorted out according to the four categories which were derived from a modification of van Lier's (1996) reflection model by Lamy and Goodfellow (1999). Table 7 showed the example of posts/messages of reflection based on the monologue, social conversation, reflective conversation and dialogue categories.

From Table 11, it appears clearly that the number of monologue messages far surpassed the other three types of messages. Even though this type of message (Table 7) demonstrates confirmation of reflection in the learning processes, it did not show much motivation for learners or tutors to respond to. Even if the students interacted privately, it did not create any further conversation on the blog besides the tutor's attempts to open it up to initiate general discussion. This is the type of controlled discourse where a conversation ends after the learner responds to the tutor's questions (Lamy & Goodfellow, 1999). The prevalence of the monologue type of message could also indicate that students were prone in critiquing themselves rather than critiquing others (Yang, 2009). Their answers did not really show deep reflection. It was also noted that for this type of message, tutors did not make any effort to challenge students' thinking by asking further questions to facilitate student's critical reflection. Therefore, the students might have treated the blog as an exercise where they answered questions and not as an opportunity to evaluate their own learning (Srimavin & Darasawang, 2003).

The next pattern was a conversation with a social focus where tutors asked students about their progress in completing Assignment 1 and stated a few things they needed to do for the assignment. In contrast to the monologue type message that was explained above, the messages in this category (Table 7) were short with topics involving multiple students. Participants used many interactional discourse signs, such as first-person pronouns ("I will try to do..."), and they pointed out clearly to an individual or the group (e.g. "Oh Tutor..."). As students moved from topic to topic (forgot to do the reflection, asking the due date for reflection), the exchanges indicated a less controlled conversation (Lamy & Goodfellow, 1999). Even though the importance of such interaction for social consistency cannot be denied, this type of interaction was unlikely to be significant to action script learning.

Table 12  
Output of data mining.

Run information	
Test mode	Evaluate on training data
Time taken to build model	0 s
Size of the tree	11
Instances	16
Attribute	5
Correctly classified instances	16 = 100%
Incorrectly classified instances	0 = 0%

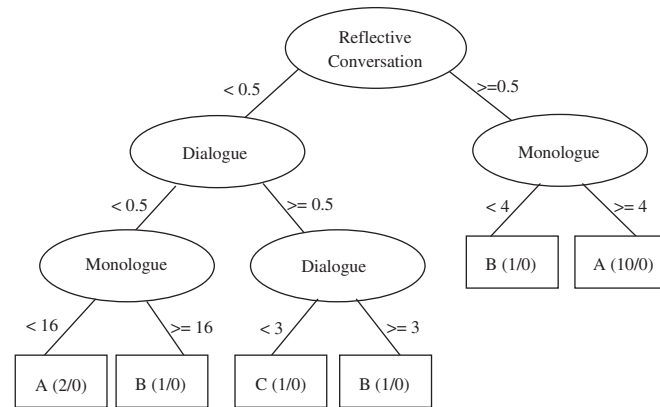


Fig. 3. Decision tree data mining prediction.

For the reflective conversation type of reflection, the messages were continued in terms of discussion length (nine turns). The number of people took part in the discussion (four students and two tutors), content and social orientation (collaborative problem solving). By looking at the messages (Table 7), it can be seen that the collaborative message was demonstrated in the requests by Blogger 8 for help with the “correct” and “incorrect” answers for the text entry question. Tutors provided general hints about what might have caused the problem and asked the inquirer to do some study based on the hints given and reflect back in the blog. Blogger 10 came to her aid and offered two possible solutions. Blogger 8 learned something from the answer she received and later assisted Blogger 10 with her question. The same process was repeated again as another problem emerged. This time it involved Blogger 10 and Blogger 12. Both of them managed to come up with the solution after doing thorough research and undergoing trials and error on the problem. According to Lee's (2008) findings, by linking what was taught in class to personal understanding and questioning given ideas enables students to become reflective practitioners. What can be inferred from this type of reflection is that bloggers in turn become teachers with very different styles of teaching and become experts for each other. Such communication is described as the “negotiation of understanding, contingency and communicative symmetry” (Lamy & Goodfellow, 1999).

Unlike what happened in the previous types of reflection mentioned above, dialogue reflection presents a controlled dimension and reflective focus. As an example of a message in this category, Blogger 6 asked for an explanation on the meaning of a new frame and why the next button never worked. In creating this message for the discussion, she made use of a complex set of communicative and cognitive strategies (Lamy & Goodfellow, 1999). Blogger 6 stated that she did not understand, specified the examples, asked for other student's understanding, sought clarification of the rule of the new frame and button action script and asked someone to show her examples. The reply was socially consistent and educational. Tutors reassured Blogger 6 that Blogger 8 too had the same concern and provided examples to Blogger 6 to increase her understanding. There was a clear point of knowledge about action script learning and students were able to take turns and control the interaction where both learners and tutors set the objective for each other.

The data collected through the blogs and the identified patterns were not sufficient enough to predict student's performance in that course. Thus, the data mining approach was integrated in this study in order to identify the student's performance in the test based on the reflection patterns. Through the manual prediction as illustrated in Fig. 2, it can be stated that an increasing frequency from low level to high level of reflection increased the student's performance score. Thus, if the students performed poorly in reflecting, they will receive a poor performance score in the study. Predicting student's performance via the data mining technique gave a different story as shown in Fig. 3. The decision tree was used as it is a good and practical technique in which the result can be changed later into simple classification rules (Al-Radaideh, Al-Shawakfa, & Al-Najjar, 2006). After building the complete decision tree, the set of classification rules generated five logics. Some of the discovered interesting rules were:

- i. If the frequency of reflective conversation is more than and equal to 0.5 and the frequency of the monologue is more than and equal to 4, then the predicted grade is A.
- ii. If the frequency of reflective conversation is more than and equal to 0.5 and the frequency of the monologue is less than 4, then the predicted grade is B.
- iii. If the frequency of the reflective conversation and dialogue is less than 0.5 and the frequency of the monologue is less than 16, then the predicted grade is A.
- iv. If the frequency of reflective conversation is less than 0.5 and the frequency of dialogue is more than 3, then the predicted grade is B.
- v. If the frequency of reflective conversation is less than 0.5 and the frequency of dialogue is less than 3, then the predicted grade is C.

What can be derived from the tree structures is that only three levels of reflection types remained after running the analysis which were a monologue, dialogue and reflective conversation. While social conversation was left out since it did not contribute much in learning Authoring System (Lamy & Goodfellow, 1999; van Lier, 1996). Students could have achieved Grade A or B if they practiced reflective conversation and wrote monologue type messages in doing reflection. However, it was not the type of reflection that determined their grade but how much they engaged with each of the reflection styles. The more they incorporated the style, the higher the grade they obtained and vice versa. For those who were not very good at using the reflection conversation type of reflection did not have to worry as they could always double the effort by using the dialogue type of message. Since dialogue is closely related to reflective conversation as the learner tends to describe or express the knowledge at the surface level. As stated by Eide and Eide (2005), students can develop creative and insightful thinking just by reading other student's blogs provided that they are reading the useful material. If the dialogue type of message is insufficient during the reflection process, the students tend to obtain the Grade C in the performance test.

## 8. Conclusion

To conclude, there were quite a number of students who found it very convenient to use blog as a medium to emphasize reflection and it seemed like blog motivated them to learn the subject better. Yang (2009) also acknowledged that students feel motivated to learn due to the interactive environment of the blog itself. However, further investigation is required. It was also shown by the result that through blogging students were able to share their writing and knowledge with others as the blog provides them with their own spaces which eventually help them in developing a unique style of writing. They not only became the problem posers but also the problem solvers (Short, Burke, & Harste, 1996) and slowly learned from the surface to a deeper level of learning. Although there were some problems with the reflection through blogging but those were not at all serious. The students tended to be observers rather than contributors and when the students discussed and commented on each other's work. It was not guaranteed that they would involve in critical reflection. However, after several techniques that were incorporated to promote reflective practices among the students, it can be seen that more students were able to put forward the answer to every issue related to the learning and they liked to challenge each other in finding the solution for each given case. Most of the students tended to engage in the monologue type of reflection and practiced reflective conversation in order to perform better in the study. For the tutors, an enormous amount of patience was required when dealing with the students to ensure they were on the right track of learning.

The use of data mining technique to examine and assess student's academic data can improve the course outcome according to the extracted knowledge. Although this analysis incorporated only a small scale dataset, it actually represents the initial information and such information is useful enough to give a bigger picture about student's learning patterns particularly in blogs. Eventually, it gives the lecturer some ideas for teaching the subject better by focusing on delivering the lesson according to the predicted pattern method. This assists the lecturers who have the responsibility to use this technology to challenge the students through new ways of learning.

## 9. Limitations and recommendations for future studies

The findings of this research study recommend a number of directions for future investigation. The first recommended area was regarding the students' attitudes towards practicing reflection. Since they were given only a short amount of time for reflection and the marks allocated for the reflection were very limited hence their attitudes towards reflection were adversely affected. The duration in collecting data should be increased since the students need time to become familiar with the reflection exercises and tutors can give more case studies as the learning progresses. Secondly, it will be a good idea if the blog reflection rubric is introduced to the students during the first meeting so that they will know the criteria needed and how their blog and reflection will be later evaluated by the tutors. The marks given for reflection should be increased in order to motivate the students in reflecting although it might be seen that students will only do the reflection for the sake of getting points. However, once they realize the benefit that they will gain from reflection, they will eventually start practicing reflection in other subjects. Because this research did not have a control group and no baseline score to compare with, thus the improvement on the post-test was assumed to come from the reflection done through the blog that indirectly might improve student's performance in learning Authoring System. Thirdly, since this research study incorporated the use of data mining in the analysis, a large dataset was required in order to have an accurate classification. Another complex model of reflection and classification could be used which suit the data and present better accuracy.

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