Exploring Primary and Secondary School Students' Perception towards Online Mathematics Tuition: A Case Study

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Abstract

Online mathematics tuition could help to enhance primary and secondary school students learning. The question therefore rose as to whether online mathematics tuition would be accepted by the students as an alternative delivery method to support their learning. The objective of this article is to explore the online mathematics tuition for primary and secondary school students and find out their perceptions of the tuition that was designed based on Score A Programme[TM]. The perceptions surveyed into six aspects – Relevance, Reflection, Interactivity, Tutor support, Peer support and Interpretation. The online mathematics tutorial format was a combination of face-to-face tuition and online learning sessions which organised various activities intended to encourage student learning online. The case study utilised online questionnaires and interview methods to assess the student perceptions of the online mathematics tutorial programme. The assessment result from the questionnaires and interview illustrated students behaved individualistic and expected a lot of tutor support rather than from peer support. In addition, the reflective thinking and interaction aspects can be improved by tutor initiating good discourse. Overall, the online mathematics tutorial programme was perceived relevant to school study, excellent tutor support and comprehensive interpretation course. The students reported positive perceptions to the online mathematics tuition. The study concluded that the online mathematics tuition is an effective learning programme for primary and secondary school students.

Keywords: online mathematics tuition, online learning, Score A Programme[TM]

Abstrak

Tuisyen matematik dalam talian boleh membantu meningkatkan pembelajaran pelajar sekolah rendah dan menengah. Namun timbul persoalan sama ada tuisyen matematik dalam talian akan diterima oleh pelajar sebagai satu kaedah penyampaian alternatif bagi menyokong pembelajaran mereka. Objektif artikel ini adalah untuk menerokai tuisyen matematik dalam talian untuk pelajar sekolah rendah dan menengah dan mengetahui persepsi mereka terhadap tuisyen ini yang telah direka berdasarkan *Score A Programme*^{TM}. Persepsi tersebut ditinjau dalam enam aspek – Hubungkait, Refleksi, Aktiviti interaktif, Sokongan tutor, Sokongan rakan sebaya dan Interpretasi. Format tutorial matematik dalam talian itu adalah satu kombinasi tuisyen secara bersemuka dan sesi pembelajaran dalam talian yang menganjurkan pelbagai kegiatan bertujuan menggalakkan pelajar belajar dalam talian. Kajian kes menggunakan soal selidik dalam talian dan kaedah temu bual bagi menilai persepsi pelajar bagi program tutorial matematik dalam talian. Hasil penilaian daripada soal selidik dan temu bual pelajar menunjukkan pelajar bersikap individualistik dan terlalu mengharapkan sokongan pengajar berbanding sokongan rakan sebaya. Selain itu, pemikiran reflektif dan aspek interaksi boleh diperbaiki sekiranya tutor memulakan perbincangan yang bagus. Keseluruhan program tutorial matematik dalam talian itu telah dianggap relevan dengan pengajian di sekolah, sokongan pengajar yang mantap dan kursus interpretasi yang menyeluruh. Pelajar melaporkan persepsi yang positif bagi tuisyen matematik dalam talian. Kajian menyimpulkan bahawa tuisyen matematik dalam talian adalah satu program pembelajaran yang efektif untuk pelajar sekolah rendah dan menengah.

Kata kunci: tuisyen matematik dalam talian, pembelajaran dalam talian, Score A Programme^{TM}

Introduction

Computer technology is becoming important in all fields including in education, it becomes a new way of learning and teaching support for the students and tutors. Emergence of computer technology has brought to the possibility of online tuition which can take the appearance as an online written document, a downloadable audio file or a screen recording. The online tutorial content and list of instructions can be arranged into

modules or sections basis; it is a virtual education that provides multimedia learning resources via the World Wide Web.

In the 1990s, online tuitions started due to the communication technology improved and became more affordable (Hua, 2006). The widespread of online tuitions nowadays is due to the ability of offering tutorials of a wide range of subjects to students of any grade. Through the World Wide Web, the online tuitions serve as platforms for students and tutors undergoing an interactive e-learning process. The importance of online tuitions is ever increasing due to many families with both parents working and consequently having very little time to monitor their children learning progress. Therefore parents prefer online tuition as it can offer extra support and assists their children to stay ahead in their studies (Online Tutoring, 2011). According to Nagel (2009), online learning has grown extensively with nearly 12 million post-secondary students in the United States taking some or all of their classes online, and this number will skyrocket to more than 22 million in the next five years.

The potential benefits of online learning have been examined by a number of scholars and analysts. Beal et al. (2010) found that students who had more online tutorial sessions improved more than those with less access to the software, especially for students with the weakest initial mathematics skills. Balaji and Chakrabarti (2010) discovered that when online discussion forum was used along with traditional classroom, it posted a significant positive effect on student participation, interaction and learning. Reingold, Rimor and Kalay (2008) reported the importance of instructor's feedback in helping students learning through reflective and metacognitive processes. Apart from previous scholars' research, there are other potential benefits and significant contributions of online tuitions. For example, online tutorial programme provides several flexibilities which include the accessibility of learning materials by students at any time and also, students can learn at any location which has internet services. Furthermore, tutors can have a full record of participation and online quizzes taken by students; the activities like learning materials, online assignments and quizzes can be revisit for students to reinforce their learning. Course developers can also reuse the activities and course content from time to time according to syllabus changes.

Objective

The objective of this paper is to explore the online mathematics tuition for primary and secondary school students and find out their perceptions of the online mathematics tuition that was designed based on the Score A Programme™.

Score A Programme™

Score A Programme™ (www.scorea.com) is a fully interactive and effective programme to help the Primary School Evaluation Test (UPSR), Lower Secondary Assessment (PMR) and Malaysian Certificate of Education (SPM) students become examination ready and achieve good grades in their studies. In line with the school syllabus and curriculum set by the Ministry of Education, most of the subjects taught in national schools from Year 1 to Form 5 are covered by Score A Programme™. By using Score A Programme™, students can assess their level of understanding of subjects or topics that they have been taught in school. Students can have unlimited trials and practices to enhance their examination skills and develop their confidence. Kenshido International Sdn. Bhd. owns the Score A Programme™ online education product. The Score A Programme™ was developed due to the findings from Kenshido International that many students practice input learning method through reading, studying, memorising and listening, hence they only receive average marks in examinations. On the other hand, Score A Programme™ focuses on Output Learning™, which is the method to develop students' ability in retrieving and applying knowledge-they have studied or learnt in order to accomplish good grades. Score A Programme™ focuses on objective-type questions because it applies Output Learning™ techniques and tests students on their level of understanding through multiple-choice questions. The mastering of multiple-choice questions will enable students to do well in the objective questions (Score A Programme™, 2009).

Research Questions

Online tuitions could help to enhance primary and secondary school students learning. The question therefore rose as to whether an online mathematics tutorial programme would be accepted by the students as an alternative delivery method to support their learning. The research

questions that explore students' perception of online mathematics tutorial concept include:

1. What is the student's perception on establishing a sense of relevance for them by linking online mathematics tuition to their school experience?
2. What is the student's perception on reflective thinking developed through online mathematics tuition?
3. What is the student's perception on interaction amongst them during online mathematics tutorial class?
4. What is the student's perception on tutor support during online mathematics tutorial class?
5. What is the student's perception on peer support during online mathematics tutorial class?
6. What is the student's perception on interpretation for online mathematics tuition?

Method

The Case: T Tuition Center

The Score A Programme^{TM} online mathematics tutorial materials were utilised to teach the T Tuition Center students. The seven students signed up for the online mathematics tutorial programme, comprised one from Standard 4, one from Standard 5, one from Remove Class, one from Form 1, one from Form 2 and two from Form 4. The average age of the students was 13 years old and there were 4 males and 3 females which was quite a balance between both genders. The course format was a combination of face-to-face tuitions and online learning sessions. It was considered as a dual mode tuition since it included weekly 3 hours face-to-face at the T Tuition Center and utilising Score A Programme^{TM} as the teaching and learning tool in online mathematics tutorial class. Data were collected in two phases; first phase data collection happened after 4 weeks (12 hours) of online tutorial classes and second phase data collection occurred after 8 weeks (24 hours) of online tutorial classes. The course of monitoring began in April 2011 and ended in June 2011.

Survey Method

Two survey methods used for collecting data were online questionnaires and interviews. For online questionnaires, the open source software program, MOODLE (Modular Object-Oriented Dynamic Learning Environment) which consists of online course survey management tool COLLES (Constructivist Online Learning Environment Survey) was used to assess student feedback. The COLLES is the online questionnaire, which was developed from the theory of social constructivism. There were two forms of the COLLES, the Preferred form and the Actual form. To assess the consistency for this case study, "Preferred" COLLES was the tool used for data collection after four weeks of online classes and "Actual" COLLES was the tool used for data collection after eight weeks of online classes. Students have answered the survey based on their experience of the online learning environment.

COLLES questionnaire survey consisted of 24 questions arranged into six aspects – Relevance, Reflection, Interactivity, Tutor support, Peer support and Interpretation. "Relevance" questions assessed how the online tuition was relevant to the students' school life; "Reflection" questions asked if the online tuition stimulated the students' reflective thinking; "Interactivity" questions measured the extent of students' communication about online tuition; "Tutor Support" questions evaluated how well tutors enabled students to participate in the online tuition; "Peer Support" questions assessed if students received support from friends in the online tuition, and "Interpretation" questions asked if students and tutors established a good communication. Those six aspects were concerned with student perceptions of an online experience. To ensure primary school students have better understanding of the survey questions, the COLLES questions were modified as shown in Table 1. The question items utilised a 5-point Likert response scale on which 1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often/Frequently and 5 = Almost Always.

Following the four weeks and eight weeks of online mathematics tuition, the tutor explained the questionnaires in the comprehensive form (as in Table 1) to students before they filled up the grading for each of them.

Table 1   Questionnaires for Preferred COLLES (after four weeks) and Actual COLLES (after eight weeks)

Questionnaire Number	Questionnaire
Relevance	
1	my learning focuses on issues that interest me.
2	what I learn is important for my school practice.
3	I learn how to improve my school practice.
4	what I learn connects well with my school practice.
Reflective Thinking	
5	I learn how to learn
6	I think through my own ideas
7	I think about what other pupils say
8	I really try to understand the things were taught.
Interactivity	
9	I explain my ideas to other students.
10	I ask other students to explain their ideas.
11	other students ask me to explain my ideas.
12	other students respond to my ideas.
Tutor Support	
13	the tutor stimulates my thinking.
14	the tutor encourages me to participate.
15	the tutor shows me how to discuss ideas
16	the tutor shows me how to think things through for myself
Peer Support	
17	other students encourage my participation.
18	other students praise my contribution.
19	other students value my contribution.
20	other students help me when I was challenged.
Interpretation	
21	I make good sense of other students' messages.
22	other students make good sense of my messages.
23	I make good sense of the tutor's messages.
24	the tutor makes good sense of my messages.

The interview questions were conducted after the COLLES survey. The interview conversation was recorded with a voice recorder for further analysis. There were two interview questions:

1.   Do you like or dislike online mathematic tuition?

2. Do you prefer to learn online mathematic tuition individually or in group?

After collecting the COLLES and interview data, case study analysis was performed to explore students' perception with the online mathematics tutorial programme.

Finding and Discussion

The goal of this study, as mentioned in research questions above, is to explore primary school and secondary school students' perceptions towards the six essential aspects namely Relevance, Reflective Thinking, Interactivity, Tutor Support, Peer Support and Interpretation. Although the case study only involved seven students and limited data were available at this point, preliminary findings may suggest the students' perceptions and their experience in exploring online mathematics tutorial programme.

Since the online mathematics tutorial programme is relatively new, therefore the students who have enrolled in the online programme considered themselves as new learners. However, all seven students felt comfortable with the online tuition. They completed the COLLES after four weeks and eight weeks of the online mathematics tutorial course, the mean result of analysed data is shown in Table 2.

The highest score of Relevance aspect attracted for further analysis. Students gave high score for questionnaire number 2 "What I learn is important for my school practice" which scored 4.29 out of 5 points. The questionnaire number 2 was grouped under Relevance aspect and it contributed to achieve 4.04 (after four weeks) as the highest amongst all six aspects. The consistency of results was proven after eight weeks. Although there was a slight drop to 3.96, Relevance aspect perceived by the students remained the highest amongst all and seems the most important aspect for school study. From students' interview question "Do you like or dislike online mathematic tuition?", all seven students liked online mathematics tutorial programme because they could understand and learn mathematics better through online tuition. When compared to traditional tuition class, the online mathematics tutorial programme was capable to display graphics, pictures, animation and interactive learning, which was more attractive and exciting to study. The analysis indicated

that the relevant and interesting online tutorial topics explained by tutor to seek students' involvement, had successfully drawn students' attention.

An interesting finding was revealed when analysing the trending data. The primary school students gave higher score in Relevance aspect but the trend decreased when proceeding to secondary school students' score (Graph 1). This may be due to primary school mathematics syllabus content which was less complex and could be readily covered in online tutorial programme; whereas secondary school mathematics syllabus content was broader. Therefore the coverage of online tutorials programme may not be as comprehensive as primary school mathematics in the online tutorial programme.

Table 2 COLLES scores (N = 7)

Questionnaire number	Questionnaire	Mean (Preferred COLLES) After 4 weeks	Mean (Actual COLLES) After 8 weeks	Mean (Actual COLLES– Preferred COLLES)
	Relevance	4.04	3.96	–0.07
1	My learning focuses on issues that interest me	3.86	3.86	0.00
2	What I learn is important for my school practice	4.29	4.29	0.00
3	I learn how to improve my school practice	4.00	3.43	–0.57
4	What I learn connects well with my school practice	4.00	4.29	0.29
	Reflective thinking	3.11	3.14	0.04
5	I learn how to learn	3.71	3.57	–0.14
6	I think through my own ideas	3.00	2.57	–0.43
7	I think about what other pupils say	2.57	2.71	0.14
8	I really try to understand the things were taught	3.14	3.71	0.57
	Interactivity	3.68	3.14	–0.54
9	I explain my ideas to other students	3.86	3.00	–0.86
10	I ask other students to explain their ideas	4.00	3.71	–0.29
11	Other students ask me to explain my ideas	3.57	3.00	–0.57
12	Other students respond to my ideas	3.29	2.86	–0.43

Table 2 (*Continued*)

Questionnaire number	Questionnaire	Mean (Preferred COLLES) After 4 weeks	Mean (Actual COLLES) After 8 weeks	Mean (Actual COLLES–Preferred COLLES)
	Tutor support	3.96	3.71	–0.25
13	The tutor stimulates my thinking	3.86	4.00	0.14
14	The tutor encourages me to participate	4.14	3.86	–0.29
15	The tutor shows me how to discuss ideas	4.14	3.71	–0.43
16	The tutor shows me how to think things through for myself	3.71	3.29	–0.43
	Peer support	3.11	3.07	–0.04
17	Other students encourage my participation	3.00	3.14	0.14
18	Other students praise my contribution	3.14	3.14	0.00
19	Other students value my contribution	4.00	3.14	–0.86
20	Other students help me when I was challenged	2.29	2.86	0.57
	Interpretation	3.89	3.86	–0.04
21	I make good sense of other students' messages	3.86	3.29	–0.57
22	Other students make good sense of my messages	3.29	3.43	0.14
23	I make good sense of the tutor's messages	4.43	4.29	–0.14
24	The tutor makes good sense of my messages	4.00	4.43	0.43
	Total Mean	3.63	3.48	–0.15

From the analysis of Reflective Thinking aspect and Interaction aspect, students gave average to high score for questionnaire number 5 "I learn how to learn" which was 3.71 (after 4 weeks) and questionnaire number 10 "I ask other students to explain their ideas" which was 4.00 (after 4 weeks). Low score was for questionnaire number 7 "I think about what other pupils say" which was 2.57 (after 4 weeks) and questionnaire number 12 "Other students respond to my ideas" which was 2.86 (after 8 weeks). The possible reason may be that, online tutorial programme allowed students to read, think, reflect and formulate their thoughts in writing, and this has contributed to the average to high score. In order to promote student's higher level of thinking, tutor needs to coach students the practical inquiry model that was effective in facilitating students'

cognitive development in online discussions (Bai and Potsdam, 2009). Therefore, the questionnaire of number 7 and 12 got low scores maybe due to tutor not providing clear goals in shaping discussions. In spite of some low scores in the Reflective Thinking aspect and Interaction aspect, students were given online mathematics tuition to study throughout the course. It will be interesting to look for any changes that might happen on the students' perceptions of online tuition.
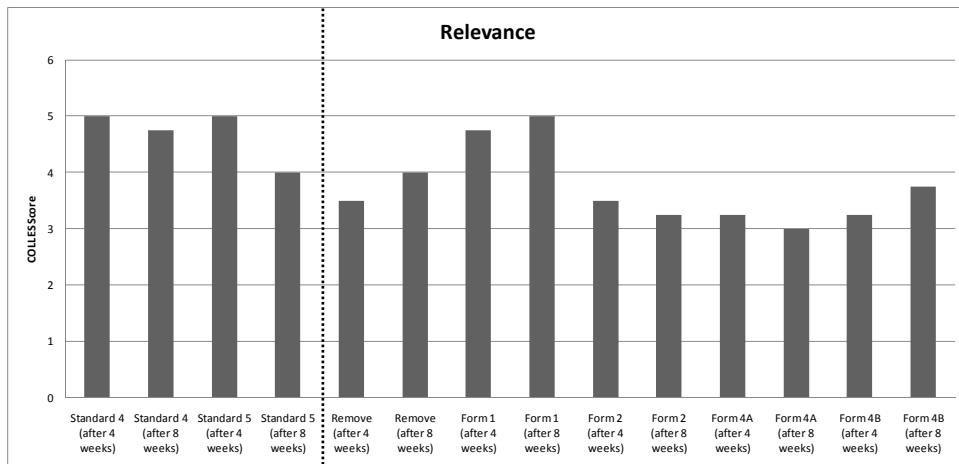

Figure 1 COLLES score for relevance

In terms of the Tutor Support aspect and Peer Support aspect of students' feedback to the online mathematics tutorial course, there are two interesting issues worth discussing. First, tutor support was perceived important for online tutorial. This could be observed from the high score of questionnaire number 14 "The tutor encourage me to participate" at 4.14 (after 4 weeks) and questionnaire number 15 "The tutor shows me how to discuss ideas" at 4.14 (after 4 weeks). The highest mean of those analysed, suggested that the students would seek help from the tutor whenever they needed it. On the other hand, the low means were reported from questionnaire number 20 "Other students help me when I was challenged" at 2.29 (after 4 weeks) and questionnaire number 17 "Other students encourage my participation" at 3.00 (after 4 weeks). This finding may reflect the individualistic behaviour of the students and the little peer support they received during online mathematics tutorial classes. Since

students did not expect peer support and likewise, they did not offer much support to their peers as well.

The individualistic trait of the students could be clearly observed in the Interpretation aspect through questionnaire number 23 "I make good sense of the tutor's message" which got high score at 4.43 (after 4 weeks). However questionnaire number 22 "Other students make good sense of my messages" got lower score at 3.29 (after 4 weeks). From the interview questionnaire "Do you prefer to learn online mathematic tuition individually or in group", although six out of seven students had no objection for group learning and believed group learning could improve their knowledge, they all liked to have the tutor sitting beside them and explaining questions for them because tutors could enhance their confidence in answering the online tutorial questions. The traditional concept of tutor-centered education was buried inside students' mind and this concept was reflected during online tuition. As students believed whenever they faced any issue, the correct thing to do was to ask the tutor who was perceived as the holder of knowledge. Another interpretation is perhaps students were too busy working alone at their computers and they would not share their questions and working together with peers.

From the COLLES mean scores, all the six aspects of Relevance, Reflective Thinking, Interactivity, Tutor Support, Peer Support and Interpretation scored more than 2.5 points Likert scale. This implicated that students' had good perceptions, positive experiences and satisfied with the online mathematics tutorial programme.

Conclusion and Implication

The online mathematic tuition was using the Score A Programme[TM] to explore primary and secondary school students response towards online learning experiences. It demonstrated a virtual learning environment in which students perceived can acquired relevant knowledge to help in their school studies. Reflective Thinking and Interaction were related to tutor initiate good discourse, by asking questions that prompted the desired level of thinking, hence helped students to shape a good interaction model. Facilitate comprehensive discussion is the important factor to assist online tutorial environment for positive critical thinking and interaction.

Students were able to explore and experience online tuition with a tutor coaching them to carry out the online learning activities. However students expected a lot of tutor support rather than peer support and the result from Interpretation aspect also exhibited the same tendency. These findings were consistent with Blocher et al. (2002) who reported that when students seek help, it would probably be from the instructor first instead of peers. The reason for less peer support was due to students focusing and working alone at their own computers. Alternatively, students preferred loads of tutor support because it was an individual's preferred mode of cognitive style. Hence further evaluation of the online tuition research is proposed for a broader target audiences and different levels of students to provide more robust validation.

Finally, it is essential to remember that online mathematics is a dynamic learning environment. This case study provides a perspective exploration of an evolving online tutorial environment for primary school and secondary school students. However, online mathematics tutorial success in this particular case study may indeed support the primary school and secondary school students in their learning activity. Furthermore, this study may serve other Tuition Centers to adopt the online tutorial programme and use it as a reference for self assessment.

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