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Code-Switching in Mathematics Classroom: Relationship between Students' Attention and Attitude and their Learning Success

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ABSTRACT

Issues involving code-switching have been widely discussed in many studies. Nevertheless, studies on the relationship between students' preferences of code-switching and their learning satisfaction in content subjects have been scarce. Using mathematics (math) classroom lesson, this paper aims to see the relationship between students' preferences of code-switching and their learning satisfaction used in the math classroom. This study took place in a in university which English is regarded as the medium of instruction. It involved 100 students from different faculties as respondents. They were asked to answer a set of questionnaires and using SPSS, their response was correlated with their satisfaction in learning math. The findings highlighted a significant relationship these two variables have.

Keywords: Code-switching, mathematics, attention, attitude

1.0 INTRODUCTION

Classroom interaction has been the concerns of instructors since it can be a great tool for a successful lesson. A meaningful classroom interaction is believed to contribute to the success of the lesson. This drives instructors to put a lot of efforts to ensure students' well-developed understanding. One of the methods is by practising code-switching. Burenhult and Flyman-Mattsson (1999) believed that doing this practically makes it easier for the instructors to explain and at the same time reduces the chances of confusion among students.

The practice of code-switching does not only occur in school classrooms. In most universities, even though English is used as a medium of instruction, some lecturers do practise code-switching in the classroom and consider this as their teaching strategy (Cook, 1989; 1991). As for students, they often perceive code-switching as an important guide, especially those with low proficiency in English (Badrul & Kamaruzaman, 2009).

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Studies on code-switching mostly have focused on the perceptions of teachers and students on code-switching. Most studies have investigated preferences among ESL learners (Noli Maishara *et al.*, 2010), learners' and instructors' attitudes (Lee, 2010; Kamisah & Misyana 2011), implications of code-switching in math classroom (Jegede, 2011), and using code-switching as a tool in classroom (Zazkis, 2000). Studies on the correlation between students' preferences and their learning satisfaction in content subjects, especially math, however, have been scarce. Thus, this study aims to answer the following research questions:

1. What do students think about code-switching in math classroom with respect to the general idea, students' attention and attitude towards lecturers' code-switching and their learning success?
2. To what extent does students' attention to lecturer's code-switching correlate with their success in learning math?
3. To what extent do students' attitudes to lecturer's code-switching correlate with their success in learning math?

2.0 LITERATURE REVIEW

Code-switching has been discussed widely and the term has been defined by many scholars. Fundamentally, code-switching is defined as the use of more than one language in the same speech. Gumperz (1982) referred the term as using languages with different grammatical systems in the same speech and Adler (1998) defined code-switching as a speech which uses more than one language as alternation. Hoffman (1991) noted that code-switching happens when two languages are used in the same utterance. The term was also further explained by Myers-Scotton (1993) as a situation in which switching of linguistic varieties occurs within a single speech act. Milroy and Musyken (1995: 7) also suggested code-switching as "the alternative used by bilinguals of two or more languages in the same conversation."

In discussing the occurrence of code-switching, Jingxia (2010) found that it takes place unconsciously. In the study, Jingxia found students to be more conscious of code-switching that occurred in the classroom than teachers. In the same vein, Sert (2005) believed code-switching mostly happens automatically and serves a purpose in the classroom setting even though it may not be beneficial.

Despite the wide discussion of code-switching in ESL classrooms, its use in content subject classrooms, especially math has gained attention among researchers. Many studies which have taken place in non-English speaking countries claimed that math teachers or lecturers practise code-switching in delivering their lessons (Lim & Presmeg, 2011; Hafeezah & Masitah, 2014). The main reason for this is because code-switching is considered beneficial by teachers and students. Niesche (2009) argued that code-switching is important in delivering lessons since it enhances students' understanding, especially those who come from rural areas. Webb and Webb (2005) noted that instructions in math classrooms can be easily absorbed by students if the instructors code-switch.

Previous studies have found that code-switching served different functions in a classroom scene. Yletyinen (2004) found code-switching to be practised by teachers and students in giving an explanation, requesting help, helping peers, making self-corrections, moving from one activity to another, and clearing misunderstandings. It also occurred as unofficial interactions and teacher's admonitions. Uys (2010) found similar functions of code-switching in a classroom setting. In the study, Uys noted that code-switching happened mostly when teachers were explaining the subject matter, building students' understanding, confirming students' understanding, using humour, and disciplining students. The findings showed that code-switching does help to ease the teaching and learning process in the classroom. It also leads us to reflect upon our perception on code-switching; whether it hinders students' language development or helps in delivering lessons well.

Students have been the main reasons for code-switching occurrences since their understanding of the lessons is the main priority. Previous studies have shed lights on students' positive attitudes on code-switching. In a study by Abad (2010), even though code-switching had a low occurrence, it was appreciated by the students. Students believed code-switching managed to build their rapport with the teachers and helped to boost their confidence to participate in classroom activities. In a study conducted by Muñoz and Mora (2006), code-switching allowed students to be active participants, bridged the gap between teachers and students as well as built students' confidence. This also helped them to enjoy the lessons without having to think much about the language use.

3.0 METHODOLOGY

3.1 Research Design

This study is a preliminary research on code-switching in math classrooms. It applies a quantitative research method as the interrogative approach.
Before answering the questionnaire, explanation on code-switching was given to students as they were not familiar with the terms used.

3.2 Research Tool

In this study, a set of questionnaires was used to determine students' experience and their perception of the use of code-switching in the classroom. The questionnaire was adapted from Lee (2010), Kamisah and Misyana (2011), Noli Maishara *et al.* (2013), and Lee *et al.* (2014). It comprised six sections including demographic information as the first section. It was followed by students' general idea of code-switching and four other variables; 1) how frequent students thought code-switching was used in their classroom, 2) students' attention to their perceptions on lecturer's code-switching and affective aspect, 3) students' attitudes towards lecturer's use of code-switching, and 4) students' success in learning under lecturer's code-switching exercise.

The general idea of code-switching was measured by four items; 1) Should code-switching be used in math lessons? 2) Do you think code-switching in math lessons helps students learn the subject? 3) How often do you think your lecturer should use code-switching in a lesson? 4) Does your math lecturer code-switch when he/she is teaching? The first variable measured students' perspective

on the frequency of the lecturer practising code-switching while teaching in the classroom in six different situations (items). For the second variable, students' attention to lecturer's code-switching was measured by using six items while lecturer's affective aspects were measured by using four items. The first and second variables were measured by using a 5-point Likert scale; 'never', 'rarely', 'sometimes', 'a lot of time', and 'always'. The third variable was students' attitudes towards lecturer's code-switching measured by using seven variables while the fourth variable was students' success in learning under lecturer's code-switching exercise measured by using four variables. The third and fourth variables were measured by using a 5-point Likert scale; 'strongly disagree' (SD), 'disagree' (D), 'neither disagree nor agree' (N), 'agree' (A), and 'strongly agree' (SA).

3.3 Respondents

A random sample of 100 students from two different faculties; Faculty of Civil Engineering and Faculty of Applied Sciences served as respondents. These students experienced code-switching in their math classroom throughout the semester. Before they started answering, they were given an explanation on code-switching to ensure their understanding of the items in the questionnaire.

3.4 Data Analysis

Three types of analyses were done in the study. The first analysis was a reliability test of the questionnaire used. It was done using Cronbach's alpha on SPSS 24 and the results returned an alpha value greater than 0.8 for all variables which indicated a high level of internal consistency. Then, the descriptive and correlation analyses were run on the data collected using SPSS 24. The former was done to answer the first research question while the latter was to answer the second and third research questions.

4.0 RESULTS AND DISCUSSION

4.1 Students' General Ideas Towards Code-Switching in Mathematics Classroom

The findings based on general ideas of code-switching showed that 81% of the students agreed that code-switching should be used in the math lessons and 86% of them agreed that code-switching in math lessons helped them in learning the subject. Findings also showed that 91% of the students agreed that their math lecturers used code-switching in teaching the subject and only 9% of the students did not agree. As for the next item on the extent code-switching should be used, 57% chose 'Sometimes', 21% chose 'A Lot of Times', and 14% chose 'Always'. The results showed that students had positive acceptance on code-switching in math lessons. However, only 7% preferred code-switching to be used rarely and 1% did not prefer it at all. They also claimed that most of the time, lecturer practised code-switching in different situations, such as giving instruction and feedback,

checking comprehension, explaining words to help students feel more confident and comfortable, and discussing assignments, tests, and quizzes.

4.2 Functions of Code-Switching in Mathematics Classroom

According to Table 1, the results showed that students preferred the lecturer to code-switch in different situations. Most of the students chose sometimes for all the situations listed except when helping them feel more confident and comfortable. The findings were consistent with the results presented earlier in general ideas of code-switching that students preferred the lecturer to code-switch sometimes in the math lesson. This is similar to a study by Lee (2010) who found most students chose 'Sometimes' in all the situations listed above. Situations which received 'Sometimes' at a 42% and above included giving instruction, giving feedback, checking comprehension, explaining words, and discussing assignments, tests, and quizzes. This shows students perceived code-switch to be used only when necessary in the math classroom. Therefore, the English and Malay languages are equally important for the students' understanding in learning math (Noli Maishara *et al.*, 2012).

Most of the students preferred to choose 'A Lot of Times' (34%) and 'Always' (30%) when asked whether code-switch helped them feel more confident and comfortable. They believed that lecturer should practise code-switching in math classroom as this could help them learn better. This result is consistent with Noli Maishara *et al.* (2012), who found students claimed that code-switching was important in helping them to be more confident and comfortable in the classroom.

Table 1 Lecturers' practice on the use of code-switching in mathematics classroom from students' perspectives

How often does your math lecturer practise code-switching in different situations?	Never (%)	Rarely (%)	Sometimes (%)	A Lot of Times (%)	Always (%)
Giving instruction	2	11	46	29	12
Giving feedback	0	8	46	31	15
Checking comprehension	2	15	43	29	11
Explaining words	0	6	43	31	20
Helping students feel more confident and comfortable	0	4	32	34	30
Discussing assignments, tests, and quizzes	0	5	42	33	20

4.3 Students' Attention to Lecturer's Code-Switching in Math Classroom

Table 2 shows the analysis of students' attention to their perceptions towards lecturer's code-switching and affective aspects. Students' attention is divided into two parts which required students to either choose 'strongly disagree', 'disagree', 'neither disagree nor agree', 'agree', or 'strongly agree' with the statements. The first six statements were on students' attention to their perceptions towards lecturer's code-switching. In reference to the first statements "I see my lecturer as trying to make me understand what she is teaching to me by practising code-switching", 48% and 34% of the students agreed and strongly agreed, respectively that they understand math when their lecturer practises

code-switching. The second statement "I feel less stress in my math class because my lecturer will explain the meaning of difficult words in Malay language", 44% and 13% of the students agreed and strongly agreed, respectively that a lot of difficult words in math need to be explained in Malay and this helped them better understand the concepts and terms in lessons. However, 41% of the students neither disagreed nor agreed on the third statement "I feel that it is all right to mix my broken English with another language when I speak and slowly improve by using the standard English" because they failed to understand the lesson by mixing two languages simultaneously. Meanwhile, 40% and 14% of the students chose to agree and strongly agree, respectively to learning in a mix of two languages.

Table 2 Analysis of students' attention to lecturer's code-switching

Students' attention to lecturer's code-switching	SD (%)	D (%)	N (%)	A (%)	SA (%)
I see my lecturer as trying to make me understand what she is teaching by practising code-switching.	0	3	15	48	34
I feel less stress in my math class because my lecturer will explain the meaning of difficult words using the Malay language.	2	7	34	44	13
I feel that it is all right to mix my broken English with another language when I speak and slowly improve by using the standard English.	2	3	41	40	14
I feel more comfortable to learn when my lecturer code-switches.	0	1	24	39	36
It makes the class less boring when my lecturer code-switches, so I enjoy my lesson more.	0	6	16	45	33
I see my math lecturer as less proficient in English because he/she practises code-switching.	6	21	33	20	20
I feel more confident in scoring an A on this subject.	0	4	29	36	31
I feel closer to my lecturer because he/she practises code-switching	0	1	22	43	34
I feel more engaged to the whole class and understand what is going on in class.	0	2	23	43	32
I can concentrate easier because my math lecturer catches my attention in class.	0	3	21	35	41

The fourth and fifth statements refer to the purpose of the lecturer to code-switch in class. 75% students chose to agree and strongly agree that they felt more comfortable to learn when their lecturer code-switches. Besides that, 78% of the students chose to agree and strongly agree that they felt enjoy and less bored in math class. Consequently, the sixth statement showed a high percentage of respondents on the negative effect of code-switching; they saw their math lecturer as less proficient in

English with 40% agreed and strongly agreed while 33% neither disagreed nor agreed, 21% disagreed, and 6% strongly disagreed.

The other four statements were on students' attention to their perceptions towards lecturer's affective aspects. 67% of the students agreed that they felt more confident in scoring A in math and 77% of the students agreed that they felt closer to their lecturer in learning this subject. Code-switching during class enables students to engage the whole lesson and understand better in a class where 75% agreed with this statement. Thus, 76% agreed that they can concentrate easier and give full attention to their lecturer in class. The results above again showed students' positive attitude towards code-switching and are almost similar to what Lee *et al.* (2014) found in their studies except for statements 6, 9, and 10. In the study, they found students to perceive the statements negatively.

4.4 Students' Attitudes Towards Lecturer's Code-Switching

Table 3 exhibits the analysis of students' attitude to their perceptions towards lecturer's code-switching which required students to choose 'strongly disagree', 'disagree', 'neither disagree nor agree', 'agree', or 'strongly agree' with the statements given. The first statement "I would like my math lecturer to minimise the use of Malay language in his/her lectures", had the highest percentage of students choosing neither disagree nor agree which was 56% and this showed that lecturer's code-switching should be used only when it is required. This is supported by the second statement where 54% of the students disagreed when their math lecturer preferred to use only English during lectures. Most of them need their math lecturer to use both the Malay and English languages during lectures to aid their understanding.

Table 3 Students' attitudes towards lecturers' code-switching

Students' attitudes towards lecturers' code-switching	SD (%)	D (%)	N (%)	A (%)	SA (%)
I would like my math lecturer to minimise the use of Malay language in his/her lectures.	3	9	56	29	3
I would prefer my math lecturer to use only English in his/her lectures.	9	45	37	6	3
I need the math lecturer to use both the Malay and English languages for me to better understand the lectures.	0	1	24	44	31
I feel challenged if/when my math lecturer uses English in his/her lectures.	2	19	56	19	4
I feel happy when my math lecturer uses both the Malay and English languages during his/her lectures.	0	3	25	48	24
My math lecturer's mixing of the English and Malay languages is not a problem to me.	0	0	17	41	42
When my math lecturer mixes the Malay and English languages in his/her lectures, I become interested in the lesson.	0	5	12	44	39

The fourth statement, "I feel challenged if/when my math lecturer uses English in his/her lectures", had 56% of the students choosing neither disagree nor agree, 21% disagreed and only 23% agreed to show that the challenges of learning math are by the subject itself. Moreover, 72% of the students felt happy when their lecturer uses both the Malay and English languages during his/her lectures. Besides, 83% of students said there was no problem when their lecturer mixed two languages and hence, 83% of the students found that they became interested in the lesson.

4.5 Students' Success in Learning Under Lecturer's Code-Switching

Table 4 displays the analysis of students' success in learning under lecturer's code-switching practice measured by using four statements. This study revealed that code-switching gives positive effects towards students' learning success. 79% of the students agreed that they were able to understand a difficult concept and idea when their lecturer practises code-switching. Besides that, 75% of the students also agreed that they could learn and understand new words in math lesson using code-switching. They could understand their lecturers' instruction easier and successfully carry out any tasks given when code-switching is practised in class with 81% and 77% students agreed, respectively. However, only 19% and 23% of the students neither disagreed nor agreed that code-switching could make them understand lecturer's instruction and they can carry out tasks successfully, respectively.

Table 4 Analysis of students' success in learning under lecturer's code-switching practice

Students' success in learning under lecturer's code-switching exercise	SD (%)	D (%)	N (%)	A (%)	SA (%)
I am able to understand a difficult concept or idea when my lecturer practises code-switching	0	3	18	57	22
I am able to learn and understand new words when my lecturer practises code-switching.	0	3	22	57	18
I am able to understand my lecturer's instructions easier when he/she practises code-switching.	0	0	19	56	25
I am able to carry out tasks successfully when my lecturer practises code-switching.	0	0	23	56	21

4.6 Correlation Between Students' Attention and Attitude of Code-Switching with Their Learning Success in Math

According to Table 5, the average score for students' attention was 3.898 which showed that most of the students agreed with the use of code-switch during the lesson. Students' attitude also indicated that they agreed with code-switching practices in class with the average score of 3.920. Therefore, students felt learning using lecturers' code-switching can improve their performance in learning

Mathematics with the mean of 3.980. All variables were consistent with the small value of standard deviation less than one and normally distributed with a value of skewness ±1.

Table 5 Mean (M) and standard deviation (SD) for the variables

Variables	M(SD)	Skewness
Students' attention	3.898(0.537)	-0.298
Students' attitudes	3.920(0.518)	-0.040
Learning success	3.980(0.595)	-0.302

Table 6 represents the result of correlation analysis between the students' attention and attitude with their learning success to answer the second and third objectives of the study. The results showed that there is a significant moderately strong positive correlation between students' attention and their learning success ($r = 0.527$, p-value < 0.05). This finding indicates that students' attention to their perception towards lecturer's code-switching during the lesson is positively related to their learning success. The finding also showed a significant moderately strong positive correlation between students' attitude and their learning success ($r = 0.670$, p-value < 0.05). It shows that the students were in favour of the code-switching practices in math lessons and believed that code-switching could improve their performance in the subject.

Table 6 Correlation between students' attention and attitude of code-switching with their learning success in math

Variables	Learning success
Students' attention	0.527*
Students' attitudes	0.670*

*p-value<0.05

5.0 CONCLUSION

The descriptive results above confirmed the findings of previous studies by Lee (2010), Kamisah and Misyana (2011), and Noli Maishara *et al.* (2013) that code-switching is regarded as advantageous by students. It is interesting to note that the current findings showed majority of the students have positive attitudes on code-switching. This can be seen where most of the items received high rating scales. The students also felt that code-switching can facilitate their learning process.

The correlation analyses carried out also implied that students believed the code-switching practices in lectures were very much related to their learning satisfaction. Since English is considered as a second language to all students involved in this study, math lecturers should consider code-switching as one of the strategies in teaching. However, too much use of code-switching can bring negative effects also as it can cause confusion due to different words and meanings used in different languages. Therefore, lecturers should know when it is essential to practise code-switching (Lee, 2010).

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REFERENCES

Abad, L. 2010. An Analysis of Teachers' and Students' Perceptions of Codeswitching in Teaching Science and Mathematics in a Philippine Private High School. *The Journal of Asia TEFL*. 7(1): 239-264.

Adler, J. A. 1998. Language of Teaching Dilemmas: Unlocking the Complex Multilingual Secondary Mathematics Classroom. *For the Learning of Mathematics*. 18(1): 24-33.

Amina, K., & Naheed, A. 2015. Students' Attitude towards Teachers' Urdu Code-Switching in ESL Class-Rooms at University of Management & Technology Lahore. *Journal of Literature, Languages and Linguistics*. 8: 5-16.

Badrul, H. A., & Kamaruzaman, J. 2009. Teachers' Code-Switching in Classroom Instructions for Low English Proficient Learners. *English Language Teaching*. 2(2): 49-55

Burenhult, N., & Flyman-Mattsson, A. 1999. Code-switching in Second Language Teaching of French. Lund University, *Department of Linguistics Working Papers*. 47: 59-72.

Collins, T.G. 2001. (Re)Considering L1 Use in Adult ESL Classroom: Effects on Learner Motivation. In *Pedagogy of Language Learning in Higher Education: An Introduction*. Edited by Brauer, G. London: Ablex Publishing. 61-75.

Cook, V. 1989. Reciprocal Language Teaching: Another Alternative. *Modern English Teacher*. 16(3): 48-53.

Cook, V. 1991. *Second Language Learning and Language Teaching*. London: Edward Arnold.

Gumperz, J. J. 1982. *Discourse Strategies*. New York: Cambridge University Press.

Hoffmann, C. 1991. *An Introduction to Bilingualism*. London: Longman

Jegede, O. 2011. Code Switching and Its Implications for Teaching Mathematics in Primary Schools in Ile-Ife, Nigeria. *Journal of Education and Practice*. 2(10): 41-54.

Jingxia, L. 2010. Teachers' Code-Switching to the L1 in EFL Classroom. *The Open Applied Linguistic Journal*. 3: 10-23.

Kamisah, A., & Misyana Susanti, H. 2011. Code-switching and Code-mixing of English and Bahasa Malaysia in Content-Based Classrooms: Frequency and Attitudes. *The Linguistics Journal*. 5(1): 220-247.

Lee, H. L. J. 2010. Code Switching in the Teaching of English as a Second Language to Secondary School Students. *Malaysian Journal of ELT*. 6: 1-45

Ling, L. Y., Jin, N. Y., Tong, C. S., Tarmizi, M. A., & Sahiddan, N. 2014. Influence of an English Lecturer's Code-switching Practice on Students'Confidence in the subject. *International Journal of Asian Social Science*. 4(2): 226-233.

Lim, C. H., & Presmeg, N. 2011. Teaching Mathematics in Two Languages: A Teaching Dilemma of Malaysian Chinese Primary Schools. *International Journal of Science and Mathematics Education*. 9(1): 137-161.

Lyn, W., & Paul, W. 2008. Introducing Discussion into Multilingual Mathematics Classrooms: An Issue of Code-switching? *Pythagoras*. 67: 26-32

Milroy, L., & Muysken, P. 1995. *One Speaker, Two Languages:Cross-Disciplinary Perspectives on Code-Switching*. New York: Cambridge University Press.

Muñoz, J. E., & Mora, Y. F. 2006. Functions of Code-Switching: Tools for Learning and Communicating in English Classes. *How*. 13(1): 31-45.

Myers-Scotton, C. 1993. *Social Motivations for Code-switching. Evidence from Africa*. Oxford: Clarendon Press.

Niesche, Richard. 2009. The Use of Home Language in the Mathematics Classroom. In: Roberta Hunter, Brenda Bicknell and Tim Burgess, Crossing Divides : Proceedings of the 32nd Annual Conference of the Mathematics Education Research Group of Australasia. *32nd Conference of the Mathematics Education Research Group of Australasia (MERGA)*, Wellington: Massey University College of Education. 704-707.

Noli Maishara, N., Farrah Dieba, R. A, Sharifah Intan Safina, S. Z., & Roslan, S. 2013. ESL Learners' Reactions Towards Code-switching in Classroom Settings. *Procedia-Social and Behavioral Sciences*. 90: 478-487.

Nur Hafeezah, A. S., & Masitah, S. 2014. Examining Classroom Interactions in Secondary Mathematics Classrooms in Brunei Darussalam. *Asian Social Science*. 10(11): 93-103.

Sert, O. 2005. The Functions of Code-switching in ELT Classroom. *The Internet TESL Journal*. 8: Retrieved May 31, 2016 from http://iteslj.org/Articles/Sert-CodeSwitching.html.

Uys, D. 2010. The Functions of Teachers' Code Switching in Multilingual and Multicultural High School Classrooms in the Siyanda District of the Northern Cape Province. Unpublished Master's Thesis. Stellenbosch University, South Africa.

Yletyinen, H. 2004. The Functions of Codeswitching in EFL Classroom Discourse. Unpublished Master's Thesis. University of Jyväskylä, Finland.

Zazkis, R. 2000. Using Code-Switching as a Tool for Learning Mathematical Language. *For the Learning of Mathematics*. 20(3): 38-43.