THE LEXIS PRAXIS OF CODE-SWITCHING BY HIGH SCHOOL TEACHERS IN ELUCIDATING MULTIFACETED PROBLEMS IN SCIENCES AND MATHEMATICS FIJIAN CLASSROOMS

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ABSTRACT: *This explanatory study has investigated the use of code-switching by high school teachers in elucidating multifaceted problems, who are subject-area specialists in sciences and mathematics Fijian classrooms. The data for this study were obtained from twelve science teachers and twelve mathematics from randomly selected high schools ranging from Ba to Rakiraki corridors, Fiji. English as the second language and Fiji-Hindi as the first language was used for the comparative analysis of data throughout this study. A structured and semi-structured research questionnaire was used as a tool to collate the data needed for this study. The collected data was analysed through a coding system using Gumperz's semantic model of conversational code-switching. According to the results of the research, sciences and mathematics high school teachers used code-switching as an applied linguistics learning strategical tool towards assisting the learners in acquiring complex problems using natural language verbalisation.*

KEYWORDS: code-switching, mathematics, sciences, bilingualism, multilingualism, natural language

INTRODUCTION

Education is considered to be the primary purpose to equip individuals with what is necessary to make them productive members of any society. As stated by Cloud, Genesee and Hamayan (2000), typically, the paramount tenet of education is to impart knowledge irrespective of the medium of instruction. Factually, education entails the impartation of skills, abilities and knowledge by developing and awakening the intellectual potentials of a learner, which underscores the point about the role of language use towards the usage of it for instructional delivery. According to Kyeyune (2003), the effectiveness of the teaching and learning processes at different levels in high schools depends on how effectively the communication takes place between the teacher and a learner. Hence, communication plays a pivotal role in imparting the right knowledge in facilitating a highly effective conducive learning milieu.

The medium of instruction in which education in Fiji has been conducted for the past decades has far-reaching consequences in all the subject areas. It has been further stated that the language in which education has been conducted is the language in which all the

basic skills and knowledge are imparted to the learners and the language in which the production and reproduction of knowledge are done (Cummins, 2000). Also, it has been observed that the language in which education is conducted is highly imperative as the selected language may impede or enhance the quality of education being transmitted to the learners (Salami, 2008). Therefore, the language of instruction is an important issue, particularly in multilingual classrooms where we have learners from diverse linguistic and socio-economic backgrounds. Linguistically, the language of instruction could be in any language, however, due to the language policies being placed by Ministry of Education in Fiji, learners are in many instances deprived of using their L1 for easier communication. This is then seen as a detrimental factor to assit mediore and below mediore learners.

In Fiji, the language of instruction in high school classrooms is English except for vernacular classes. After passing the Year 10 National Examinations, learners are supposed to choose five subjects in Year 11 with English and Mathematics being compulsory. Apart from these, they can then chose either sciences or arts subjects suiting their calibre. Many learners tend to choose sciences as their choice of subjects due to various reasons. Due to the advanced analytical skills required in subjects like mathematics and sciences, many learners find it too challenging to comprehend the concepts and apply them. As such, the language of instruction could be a problem, especially when the content being taught is not in learners' first language. To curb this problem, code-switching can be considered as an alternation to assist all those learners, who are finding it too difficult to comprehend the tough concepts in these two subjects. However, due to the language in education policy being implememted by Ministry of Education, Fiji, teachers cannot simply use their L1 to provide assistance to all those learners, who are not competent in understaning the complex problems in sciences and mathematics.

Predominantly, code-switching in Fijian classrooms are highly common but is not considered "linguistically right" to be used in these classrooms. Many learners and teachers are seen switching between their L2 to L1 for many reasons that will be discussed further under the literature review of this paper. In many instances, it is considered to be the last resort as an aid towards assisting the learners in comprehending and fathoming the challenging concepts. According to Auer (2013), the process of using different codes such as languages and language varieties in speech is identified as code-switching. Furthermore, "the juxtaposition of passages of speech belonging to two different grammatical systems or subsystems within the same speech exchanges is referred to as code-switching (Blom and Gumperz, 2000). The practicalty of code-swtiching has long been there in Fiji's education systen, however, it was seen as a bane to be used in the classrooms. The language policy in the education system has always given supremacy to English language, therefore, educators and students alike were oblivious about code-switching and never knew the true value of it until recently.

LITERATURE REVIEW

The Language-in-Education Policy (LiEP) in Fiji

Being a multilingual and multicultural country, Fiji is situated amidst the largest ocean Pacific with over three hundred plus islands scattered over a wider landmass. The home of the Polynesians as well as Micronesians including the island states of Melanesians, Fiji has a number of dialects from both the *i-taukei* and Indian languages with each having its multiplicity (Goundar, 2016). The choice of L2 as a medium of instruction over L1 necessarily advantages the users of L2, however, making the L1 a subservient language. Naturally, in Fiji, this is mainly the case as learners are not allowed to use their L1 in all the classes but in vernacular. The English language is the medium of instruction under the Fijian curriculum, which is taught at lower primary schools and goes all the way up to a university. While for the majority of the learners English is their L2, they are strongly discouraged from using their L1 in day-to-day teaching-learning within the four walls of a classroom.

As asserted by Cummins (1986), it is neither simple to claim that learners will excel using their L2 as much as with L1. Therefore, factors such as societal attitudes, family background and power relationships contribute towards choosing either of the languages to be used as a medium of instruction. All these non-school based factors are needed to be kept in mind while discussing LiEP (Mangubhai, 2002). The inferential is made from the Fiji Education Commission Report (2000), which states that Fiji's education system has fragmented identities of Fijian (*i-taukei*), Indo-Fijian (Fijians of Indian descent) and other minorities. As such, during the colonial era, the knowledge system of these three groups of people was mainly subjugated in many ways. As time elapsed with greater exposure to westernisation and globalisation, the English language gained popularity amongst these fragments, thus, over time together with colonial reasonings, it was made the lingua franca of Fiji.

During the research that was carried out by the Fiji Education Commission of 2000, in totality, six key observations were made to be considered on language policies in Fiji, however, five will be discussed here only. Firstly, it was stated that all languages should be given equal status. It has been aligned with the principles of giving equivalent opportunities to all learners from the varied sociolinguistic background. Currently, languages are unequally given prominence due to economic and historical reasons. Secondly, it has been highlighted that the concept of L1 should be redefined by taking into consideration of regional variations within the language. For Fijians of Indian descent, the vast majority of L1 is Fiji Hindi. This is the distinctive language that is being used by teachers-learners during informal classroom communication other than L2 for formal teaching purposes.

Thirdly, the teaching of the Fijian (*i-taukei*) language from pre-school to tertiary level, training the teachers to teach both the vernaculars, enhancing research and publication in L1 and literary studies should be given utmost priority with sufficient allocation of language resources. Having a rich tradition and oral literature that can be adopted to be used in the curriculum. The presence of oral tradition and literature is considered as a reminder that oracy should not be neglected from the Fijian curriculum (Goundar, 2016). Fourthly and more imperatively, the particular observation was highlighted that the English language should remain a major goal towards multilingual programme and teachers of ESL should be appointed to teach learners for greater professional communication skills. Further, it elaborates that tertiary institutions should ensure that all teachers of ESL, including teachers of content subjects, should have a general understanding of the problems that learners are encountering during the learning pace and respond to their needs accordingly.

Finally, the commission has emphasised that Fiji should recognise and encourage the philosophy and practice of multilingualism. As stated by Goundar (2016), "language planning ought to deal with its complexities, bearing in mind the need to balance the dual objectives of national cohesion and linguistic diversity." A crucial point that has been stated in the commission report (2000), is the active development of multilingual and multicultural education in the school system. Programmes in conversational languages should also be prioritised with subservient languages such as Rotuman, Urdu, Tamil, Gujrati and Chinese be developed and taught across all the levels. Also, inferences were made that experienced personnel from local communities should be considered to teach these programmes.

The Place of Language of Instruction in Fijian Classrooms
Language is considered to play a central towards the construction of meaning in a classroom. This sentence is questionable as to which language is referred here. According to Garcia, Bartlett and Kleifgen (2007), a classroom is a learning space where learners from a repertoire of linguistics and sociolinguistics backgrounds meet, mainly to communicate with each other using two or more languages and try to make sense of their conversations. Learners in a Fijian classroom are engaged mainly in instructional dialogues on their subject contents amongst themselves and with their teachers. These instructional dialogues may take place in learner's L1 other than the language of instruction. However, according to Garcia (1993), teachers tend to attempt in keeping the language of instruction and learner's L1 separate due to progress being evaluated based on the usage of language of instruction.

Generally, one of the rules for all the schools in Fiji for the learners is to communicate in English all the time. However, this simply cannot be controlled as learners in Fijian classrooms are coming from varied linguistics backgrounds and they are ought to use their L1 anywhere within the school premises. There is no control over this, as, despite the

efforts of teachers being made to maintain monolingual classroom ambiance, learners are constantly using their L1 for comprehensible input to understand L2, English language, which is the language of instruction in all the Fijian classrooms. Furthermore, the role of language of instruction in content and language lessons differs. Content subjects such as sciences and mathematics use language of instruction as a medium for learning the subject matter. For content subjects, the teaching of the academic subject is considered to the focus, while the language is the by-product (Zabrodskaja, 2007).

According to readings from the literature, as far as content subjects such as sciences and mathematics are concerned, the teaching of both subjects has seen much research being conducted in the field. The researchers have suggested that one of the many primary obstacles that the learners tend to experience is the lack of understanding of the target language (Giouroukakis and Rauch, 2010; Halliday, 2006; Lim and Mah, 2007). To curb this issue, learner's L1 was used in monolingual content teaching subjects. According to the study conducted by Butzkamm (1998), the teaching of history by the use of English as a Foreign Language to German learners, the learners requested German equivalents of English vocabularies they could not fathom. Butzkamm's argument further led to insight by Setati (1998), who summed up research in one of the African school's stating that teachers code-switching between learners L1 (Tswana language) and L2 (English language) fostered the comprehension level of understanding mathematics, which further prompted active participation in the classroom.

In the same vein, Martin (1996), did a study on the content subjects of history, science, mathematics and geography in Brunei and found out that teachers constantly switched between L1 and L2 to provide clarification and exemplify words or concepts for learners for easier comprehension. Precisely, none of these studies on bilingual content teaching showed any unfavourable effects of code-switching on learners, although deviations were made by teachers from the monolingual language of instruction in the classroom. Furthermore, while studies have dwelled on the usefulness of bilingual content teaching, it has been also highlighted code-switching as a debatable classroom issue. As asserted by Halliday (2004), "in the context of language learning, empirical support for the facilitative effects of code-switching is countered by those highlighting the adverse effects on the development of target language competence."

On the other hand, as stated by Thornbury (1999), in the communicative language learning approach where learners use language to learn it, code-switching could be seen as a subtraction from the amount of target language exposure, thus, providing a bad language model for learners. The language of instruction in Fijian classrooms also consider code-switching as the learner's inability to be called a "smart" learner. The teachers would make sure that no one converses in L1 and in many instances school would encourage an "English-only" speaking policy. As asserted by Skiba (1997), code-switching by teachers in a classroom will lead to an autonomous code-switching behaviour on the part of learners, which can result in the loss of target language fluency and comprehension (Sert, 2005).

More so, when code-switching is seen as a permissible option, learners are not pressed to maximise the use of their existing linguistic resources to negotiate the meaning.

However, research has also indicated that code-switching could be invaluable assistance for language learning to prevail when the intended language is a barrier to learning (Greggio and Gil, 2007; Reini, 2008). According to Reini (2008), an elucidation in Finnish speeds up the learner's comprehension ability of English grammatical rules, which later produces appropriate English output. Despite monolingual policy on language of instruction in Fijian classrooms, teachers' code-switching with learners from varied linguistic backgrounds is highly frequent. Based on the interviews that were conducted by Then and Ting (2010) on the science and mathematics teachers, it was found out that teachers are viewing code-switching as a strategy to aid their learners in comprehending the classroom activities. Code-switching should be considered beneficial and seen as a language resource rather than a detrimental factor in inhibiting learners from understanding the concepts and problems (Setati. et., al, 2002).

More imperatively, based on the related works of literature, the differences in types and functions of code-switching in language and content subject classrooms are not noticeably evident. However, one particular function of code-switching that has been highlighted in much of the literature is the reiteration or sometimes known as reformulation (Setati, 1998; Zabrodskaja, 2007), which depends on the framework of the analysis. Generally, these studies have mainly focused on the types and functions of code-switching towards the facilitation of classroom interactions. Looking at the Gumperz's (1982) model of conversational code-switching has provided an insight into how code-switching facilitates the learning of languages and content subjects in educational settings where learners are coming from a repertoire of linguistic backgrounds.

The English Language Policy Reforms in Fijian Education System
Fiji is a pluralistic community with numerically dominant *i-taukei* (56.8%), Indo-Fijian (37.5%), Rotuman (1.2%) and Europeans, part Europeans, Chinese and other Pacific Islanders (4.5%) (www.indexmundi.com). These ethnic groups and others who have not been included here have distinctive cultures, languages, dialects, religions and all other ways of life. The Fijian society of pluralism originated from the influx of migrant labourers during the indenture system from Indian. The learners in the Fijian high school classrooms come from all these diverse populations with the lingua franca English that binds them all together. With the recruitment of Indians from India to work in the sugarcane plantations by the colonial authorities in the late 1800s, ethnic diversity got further intensified (Powell, 2002). As time elapsed, more nationals from other countries looked at the growing opportunities in Fiji and made their way to the island.

People from countries like China, Australia and New Zealand to name a few had their vast impact on the economy of Fiji. The language of English got stronger and stronger, as it was

the only lingua franca that was used for communication during that period and even now. The religious organisations started to erect their school buildings and introduced their language as a means to maintain solidarity amongst the learners. Over the years through rigorous educational reforms, ethnic diversity made it essential for the Fijian government to develop the Language-in-education Policy (LiEP) in Fiji. This mainly took place when the English language was ascended as the second language for the country and the role of English was not only evident in education but other sectors as well. Since the independence on the 10th of October 1970, language planning in Fiji has gone through three phases of change. The Table 1. below states the changes as per the constitutions:

Table 1. Constitutional Phases of Language Planning in Fiji

Years	Constitutional Phases
1990	English, Fijian and Hindi have the official status, while no national language is specified. Furthermore, the constitution states that "the official language of Parliament shall be English, but any member of either House may address the Chair in the House of which he is a member in Fijian or Hindustani" (Mugler, 1996, p. 273).
1997	The 1997 Constitution recognises that "Fiji is a multilingual state and that the main languages (Fijian, Hindi and English) are equal in terms of status", use and function (Fiji Education Commission, 2000, p. 291).
2013	The 2013 Constitution recognises that "all Fijians are united by common and equal citizenry". It gives equal status to languages of the "i-Taukei, Rotuman, descendants of labourers from British India (Fiji Indians) and Pacific Islanders and settlers as well as migrants" (Constitution of the Republic of Fiji, 2013, p. 1).

During the colonial era, schools were expected to introduce and produce English-educated elite groups in the Fijian society for the civil service (Gaudart, 1987). The schools that were run by the religious organisations mainly catered for learners from typical village families, while the schools that were run by the government had learners from "good" families. Above everything else, the Fijian government needed to have a national language, a lingua franca to foster the national identity (Gill, 2006). According to Omar (1979), the dominant lingua franca of the two major ethnic groups, English was chosen to be the national language. As time passed, the two vernaculars of the major ethnic groups, that is, Fiji Hindi and *i-taukei* was also considered to be added to the list of national languages. Since then up till now, English is the lingua franca of the Fiji Islands, while the two vernaculars are given subservient status.

To add on, the turning point came in the year 1987 when an officially elected government was selected to oversee the proper education of learning and teaching in the country. After the democratically elected government, there were changes in the educational policies that included the status of English and other subservient languages in the education system.

Considering this and other technological advancements, the need to keep abreast with the latest turnovers in the English language, it was crucial for every child to master proper skills of this "branded language". Nonetheless, to keep up with the latest in the English language and beset with the problems associated with it, such as shortage of qualified English teachers (Nordan, 2005; Pandin and Ramiah, 2004; Rusmin, 2008; Shah and Ahmad, 2007; Tan and Chan, 2003; Yahaya et al., 2009) more was expected to be achieved to solve this issue.

The Pedagogical Dilemmas of Code-switching in Fijian Classrooms
As asserted by Adler (2001), code-switching refers to the usage of more than two languages in a conversation between two or more people. It is the mixing of languages in a multilingual setting (David, 2003 and 2006) as what happens in Fiji. In line with David's research, Myers-Scotton (1995) argues that it is too obvious in a natural phenomenon, particularly in a multilingual setting for code-switching to take place. In a learning and teaching classroom setting, code-switching is practiced by teachers as a linguistic tool to aid their teaching for effective deliverance of lessons to their learners. This could either take place directly or indirectly in and outside of normal classroom teaching but within the school premises. According to Barker (2011), code-switching could be used to be developed and considered as a teaching strategy, whereby teachers get to balance out the usage of two languages simultaneously at specific points within a lesson.

For example, switching to the learner's mother tongue while emphasising a new concept, or praising, to justify or clarify, or while quoting someone and reprimanding a mismanaged classroom. Moreover, Cook (2013) also mentions that code-switching could be exploited as a part of actual teaching methodology, particularly when a teacher is fully versed with learners L1. By this, a highly obvious implication can be made that code-switching is anticipated in any classroom where the teacher and a learner knows the same home language. In Fijian classrooms, code-switching amongst teachers and learners are highly prevalent due to diverse linguistic background and the appreciative nature for learning. Even though English only policy is implemented by the MOE in Fiji, learners simply cannot be deprived of using their L1.

In Fiji, literature has revealed that code-switching in Fiji-Hindi to English; i-taukei to English and vice-versa takes place mainly to facilitate student learning of content subjects. According to Narayan (2019), it was found out that teachers in ESL classrooms code-switched mainly to perform the highly effective transfer of knowledge during classroom instructions. The study has also revealed that by the use of speech mode, the learner's learning process is enhanced and collaborative work is also practiced. Also, it was stated that learners tend to fathom lessons better if it is communicated to them in a language familiar to them. Abad's (2005) study in a Christian high school education concluded that code-switching is not a clash but it is a supplementary of two languages to be used as a strategy to improve learner's inability to comprehend difficult lessons and concepts.

Furthermore, in many English as a Second Language (ESL) countries, learners indeed find it challenging to comprehend the difficult concepts and problems in sciences and mathematics classrooms. In multilingual classrooms, code-switching is a highly prevalent phenomenon. For example, in Fijian classrooms during group discussions for mathematics, teachers are ought to switch code into their L2 sentences. A respondent shares his own experience of teaching mathematics during normal classroom teaching where learners had known his L1:

> "Personally, I was compelled by the fact that I had to switch from English to Fiji-Hindi by a sense of helplessness born of the inability to make learners during a group work understand the subject matter for which the main medium of instruction was English…" (Anonymous, 2020)

From the above statement, it is highly apparent that code-switching has been observed as a crucial linguistic feature in aiding the teacher to assist the learners during the comprehension of difficult problems, where they share the same common L1. To supplement this, research was conducted by Cleghorn (1992) in which she states that primary level science classes in Kenya had complex patterns of code-switching but were highly effective. Additionally, she mentions that important ideas were more easily conveyed when the teacher did not adhere strictly to the English only policy of the classroom. Additionally, Setati (2005) analysed a language practice in a multilingual primary school mathematics classroom, whereby he noticed that code-switching was highly practical in learner's home language which is not considered as an issue but a solution for the class.

An example to support this was that the teacher introduces the topic of the lesson in English and further gives more elucidations in learners L1. Also, it was attributed that the use of learners L1 in teaching and learning of mathematics needed to be used as a support, while learners continue to further develop proficiency at the same time learning mathematics. The implication for this is simple as the learners tend to learn mathematics with the assistance of their L1. This may be seen as an effective resource and not a problem to assist a learner to get the deeper understanding of the mathematics being taught. On the other hand, Akindele and Letsoela (2001) state that code-switching also has some demerit points and it all depends on how well a teacher is prepared for the class whose medium of instruction is English. Equally, a study was conducted by Khisty (1993), reveals that teachers felt strongly to use two languages despite being well articulated in English. The major drawback which the writer points out from her research is that it is a serious issue when a teacher uses L1 and is highly competent in L2.

Statement of the Problem

Even though the education community in Fiji has given much attention to the development and enhancement of the English language in the country, little emphasis has been given to the first languages (Fiji-Hindi and i-taukei) to be used in a classroom where the second language tend to dominate as the medium of instruction. As asserted by Tabor and Snow (2001:166), bilingual and multilingual learner's mixing of languages in mainstream L2 classroom is unavoidable, which requires attention for it to be considered as favorable because it is considered as an aid to assist the teachers to effectively deliver the teaching and learning. As a result of this, there is a dire need to thoroughly investigate bilingual and multilingual learner's mixing of languages in mainstream L2 classrooms so that a comprehensive understanding of this phenomenon could be understood in the Fijian classrooms.

According to the studies done by Ncedo, Peires and Morar (2002); Setati, Adler, Reed and Bapoo (2002); and Howie, (2003), code-switching in multilingual sciences and mathematics classrooms is considered a valuable communicative strategical tool for learning the contents of these two subjects. This is highly relatable to Fiji's classroom situation as many teachers ought to practice this strategy even though L1 is "forbidden" to be used in L2 instructed classrooms. While code-switching is being practiced in the Fijian classrooms, the linguistic benefits of it have not been well-examined. Therefore, this study tends to focus on the application of code-switching and its implications as a communicative learning tool in the teaching of multifaceted problems in sciences and mathematics Fijian classrooms.

CONCEPTUAL FRAMEWORK
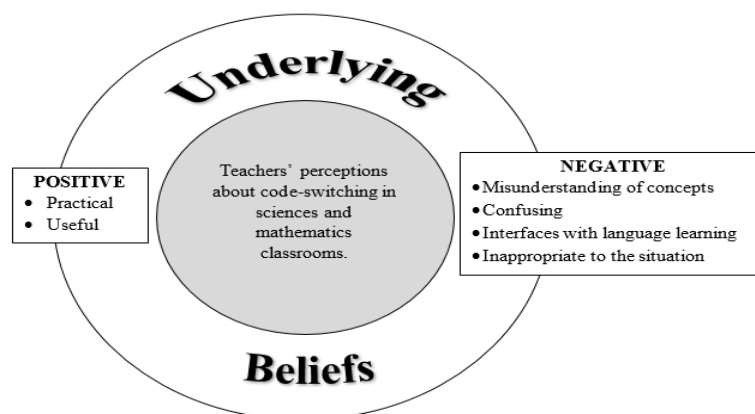
Adapted from"An Analysis of Teachers' and Students' Perceptions of Codeswitching in Teaching Science and Mathematics in a Philippine Private High School, *Journal of Asia TEFL*, *7*(1), pp 239-264.

On the contrary, resorting to code-switching may be deemed as a positive, useful and practical tool for both teaching and learning, particularly in cases where the English language as L2 may not yield highly effective optimistic learning outcomes. Therefore, while teaching when teachers believe that code-switching is beneficial for the various reasons it is serving the purposes during lesson delivery in the classrooms, they are likely to integrate code-switching by modifying the mandatory language of instruction of the classroom as they see it as a fitting strategical tool where English language abounds.

Likewise, code-switching can also be considered as a detrimental factor towards the language of instruction in the classrooms, which may lead to learners misunderstanding the problems and concepts that is ought to be known by them. Though teachers in Fijian classrooms are expected to execute all the lessons in English, except during vernacular classes, this becomes impossible as learners in the classroom come with different linguistics background. More imperatively, the ambiguity regarding code-switching may also cause interference with learning since the development of L2 is deemed to be the teacher's responsibility, regardless of the subjects that they are teaching. As such, most of them do not give regards to code-switching in the formal teaching classrooms, but are feely using their L1 within the school premises. In other words, it could be stated that even though code-switching may not be seen as a strategical tool during in class teaching, it is still used as a boon for all those learners who are considering their L2 detrimental.

METHODOLOGY

Research Design

The study mainly focused on the lexis praxis of code-switching by high school teachers in elucidating multifaceted problems in sciences and mathematics Fijian classrooms. It is explanatory research whereby literature from the previous researches was studied and applied in the Fijian classroom context. According to Boru (2018), explanatory research is mainly conducted when scant knowledge about a particular phenomenon is known but is not clearly applied. It may not provide the conclusive and final answers to the research questions, however, it intends to explore the research topic with varying levels of in-depth information. In many instances, explanatory studies form the basis for rather a more conclusive research and determine the initial designs, research methodologies and data collection methods (Singh, et al., 2007). For this study, structured and semi-structured research questionnaires were designed and distributed to selected teachers in high schools from Ba to Rakiraki corridor to gather the information for this study.

Research Population and Sampling

The research population for this study included twenty-four high school science and mathematics teachers. Out of these, twelve were science and the other twelve were mathematics. These teachers were chosen randomly from selected high schools between Ba to Rakiraki corridors, who are teaching either science or mathematics at intermediate to senior levels. In totality, ten schools were casually selected out of which eight were from

urban areas and two were rural schools. For most of these teachers, their L2 is English and Fiji-Hindi or i-taukei language is their L1. As stated in the literature review, the medium of instruction in all these schools is the English language and learners from a repertoire of linguistics backgrounds come to attend these schools.

Data Collection

The data for this study was collated through a structured and semi-structured research questionnaire, which was divided into open and closed questions. The questions mainly contained regarding language use in the classroom amidst multilingual learners by the teachers. Teachers from randomly selected schools from the corridors between Ba to Rakiraki were used as the samples for this study. Section A of the questionnaire mainly dealt with the biographical information of the informants, while Section B looked into possible reasons for code-switching and if it could be considered as a learning strategy. On the other hand, Section C had fifteen questions on a five-point Likert scale that had questions based on finer details about code-switching concerning the teachers. The scale had ratings of SA, AG, DA,SD; N and responses for all these ratings were converted to hundred percent based on the feedbacks that were received from the respondents.

Data Analysis Procedure

The language(s) that was used during the sciences and mathematics classrooms were identified through the analysis of the questionnaire. The reasons for and features of language(s) were recognised with their implications on the teaching and learning of both subjects. The repercussions of code-switching as a communicative strategical tool in English as a Second Language were also discussed. The analysis of the data was mainly carried out through coding of the received information from the respondents This was closely carried out by following Gumperz's semantic model of conversational code-switching. From the research questionnaire,the assortment was done for Fiji-Hindi responses as L1, while i-taukei L1 was nullified because the researcher himself had scant knowledge about the language. As such,this made the study quite simple because L1 was distinguishable.

RESULTS AND DISCUSSIONS

Demographic Information

The Table 2 below shows the respondent's gender, age range, years of teaching experience and highest academic qualification that defines their professional standing in the area of specialisation. In totality, there were twenty-four respondents out of which twelve were science teachers and twelve mathematics. Most of them held the first-degree with a double major of either Biology, Chemistry, Mathematics or Physics. There were no diploma holders for any of the subject majors. Also, the respondents were all trained from respective teacher training institutions around Fiji and had a thorough mastery of their subject contents. For all of them, the English language was their second language, while Fiji-Hindi and i-taukei language were first. Due to the repertoire of the linguistic background of the

learners, most of the respondents were indirectly forced to communicate in the learner's first language simply because of poor and/or incompetent calibre. Most of the respondents have also mentioned that they were upgrading their qualifications so that they would later have a better understanding about their learners from what they have been studying.

Table 2. Demographic information about respondents

Gender	Age range					No. of teaching experience			Highest qualification				
	25 and below	26-30	31-35	36-40	41+	3-5	6-10	11+	Diploma	1st Degree	Post Graduate	Masters	Ph.D.
Males 12	0	3	5	2	2	0	7	5	0	4	6	2	0
Females 12	0	1	5	3	3	2	6	4	0	6	5	1	0

Language Usage in the Classroom

Under the demographic information in Table 2 above regarding language usage during non-teaching periods in the schools, most of the teachers have stated that they either use Fiji-Hindi 35% or i-taukei 35% language to assist the learners in whichever way possible to comprehend the concepts and explaining the problems by code-switching. However, 30% of the respondents have claimed that they prefer to use English, as they have to follow the policy of language of instruction stated in the educational policy. Those who have been practicing code-switching have stated reasons for resorting to the learner's first language. These include reiteration, quotation, message qualification, addressee specification, objectivisation, personalisation and interjections. Table 3 below will further elaborate on the percentages for the individual reasons of code-switching.

Pie chart 1. Languages used in the classroom
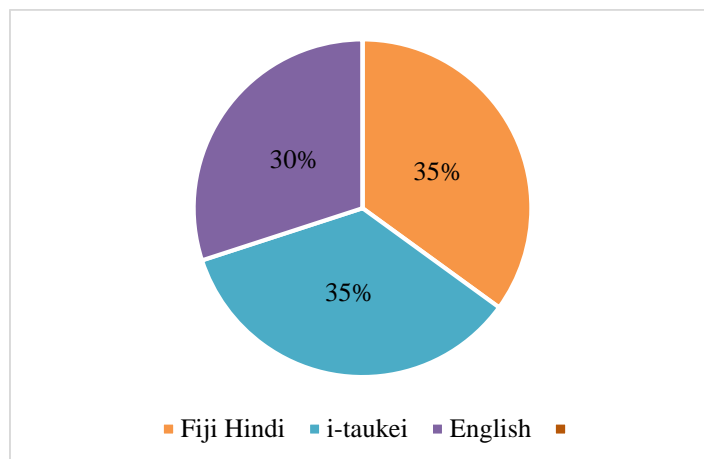
Code-switching Functions

As per the collated data, the frequency of switching from L2 to L1 during classroom teaching and discussions varied amongst all the reasons for switching. According to the reasons stated in the PieChart 1 above, teachers mainly switched for reiteration, quotation, message qualification, addressee specification, objectivisation, personalisation and interjections. All these reasons assisted them to cater for the learners, who had issues and problems comprehending the concepts and other nitty-gritty details.

Table 3. Frequency of Code-switching Functions

Functions of code-switching	First language	Second language	Totals	Percentages
Reiteration	5	3	8	33.34
Quotation	2	3	5	20.84
Message qualification	2	2	4	16.67
Addressee specification	1	2	3	12.50
Objectivisation	2	0	2	8.34
Personalisation	0	1	1	4.16
Interjections	1	0	1	4.16
Totals	13	11	24	100.01

Note[1]: Total percentage does not equal 100% due to rounding error.

According to the statistics stipulated in the Table 3 above, 33.34% of the respondents have claimed that they switch from L2 to L1 to emphasise or reiterate a particular concept should learners are not able to understand. While 20.84% have stated that switching takes place when they have to quote, 16.67% denoted that message qualification also required code-switching. In contrast, code-switching for addressee specification of 12.50% required inter-personal reasoning's that have been identified through teacher discourse data. For the

others, objectivisation during code-switching stood at 8.34%, while personalisation and interjections both was 4.16%. Above all, it can be seen that the dependence on code-switching for reiteration purposes show the most need for L1 in managing the information exchange for a professional interpersonal relationship with the learners.

Code-switching Reasons by Sciences and Mathematics Teachers

Table 4. Percentages of Code-switching Reasons

No.	Item Descriptions	SA	AG	DA	SD	N
1	Teaching the subject solely in one language is helpful to learners.	11 (46%)	4 (16%)	3 (13%)	6 (25%)	0 (0%)
2	Teaching the subject in L1 and English is fascinating to learners.	12 (50%)	3 (13%)	3 (13%)	5 (21%)	1 (3%)
3	Teaching the subject in both languages makes it convenient for the students to comprehend the contents well.	14 (59%)	5 (22%)	2 (8%)	1 (3%)	2 (8%)
4	I get confused when using both languages to teach a topic.	5 (22%)	4 (16%)	10 (41%)	3 (13%)	2 (8%)
5	The combination of L1 and L2 results in the weakness of my L1.	3 (13%)	3 (13%)	12 (50%)	4 (16%)	2 (8%)
6	The combination of L1 and L2 results in the weakness of my L2.	4 (16%)	4 (16%)	11 (47%)	3 (13%)	2 (8%)
7	The combination of L1 and L2 strengthens my English.	4 (16%)	5 (22%)	13 (54%)	2 (8%)	0 (0%)
8	I feel more confident when I teach using my L1 and L2.	18 (76%)	2 (8%)	3 (13%)	1 (3%)	0 (0%)
9	I feel more confident when I teach using my L1 only	7 (30%)	8 (33%)	4 (16%)	3 (13%)	2 (8%)
10	I feel more confident when I teach using my L2 only.	10 (42%)	8 (34%)	3 (13%)	2 (8%)	1 (3%)
11	Code-switching should be strictly avoided.	1 (4%)	2 (8%)	2 (8%)	19 (80%)	0 (0%)
12	Code-switching eases the inability of my teaching to express.	6 (25%)	11 (46%)	3 (13%)	4 (16%)	0 (0%)
13	Code-switching is considered as interference while teaching sciences and mathematics.	3 (13%)	2 (8%)	2 (8%)	16 (68%)	1 (3%)
14	Learners tend to ask more questions when I code-switch.	16 (66%)	3 (13%)	2 (8%)	3 (13%)	0 (0%)
15	Code-switching should be introduced as a learning strategy.	10 (42%)	6 (26%)	4 (16%)	2 (8%)	2 (8%)

Note²:SA-Strongly agree, AG-Agree, DA-Disagree, SD- Strongly disagree, N-Neutral
Note³: Total percentage does not equal 100% due to rounding error.

The Table 4 above stipulates the reasons for teachers of sciences and mathematics to do code-switching during their course of teaching in a school. In regards to teaching the subjects solely in one language (46% strongly agreed) have stated that it is favourable, while (25% strongly disagreed) to the notion that it should not be taught. The remaining (16%

agreed) and (13% disagree). Teaching the subject in L1 and English is fascinating to learners, (50% strongly agreed) to this, while (21% strongly disagreed). The remaining (13% agreed) and (13% disagree) with (3% neutral). According to the data that has been collected, (59% strongly agreed) that they preferred to teach the subjects in both the languages for better comprehension, while (22% agreed) with (8% disagree) and (3% strongly disagree) including (8% neutral). Getting confused by using L1 and L2 simultaneously to teach a particular topic stands at (41% disagreed), while (22% strongly agreed) with (16% agreed) and (13% strongly disagree), (8% neutral) respectively. The combination of L1 and L2 results in the weakness and strengthening of both, with the strengthening of L2 alone at an average of (15% strongly agree), (17% agreed), (48% disagree), (12% strongly disagree) and (8% neutral).

According to the collected data, teachers feel more confident to teach using both the languages that sum up to (76% strongly agree) with (13% disagree) and (8% agree), while (3% strongly disagree). Teaching the learners by using their L1 only has received a favourable response of (33% agree) with (30% strongly disagree) (16% disagree), (13% strongly disagree) and (8% neutral). On the other hand, teaching the learners by using their L2 only has received a favourable response of (34% agree) with (42% strongly disagree) (13% disagree), (8% strongly disagree) and (3% neutral). Interestingly, the majority of the respondents have (80% strongly disagree) towards strictly avoiding code-switching in the classroom, while (8% agree and disagree) respectively with (4% strongly agree). Easing the inability of teaching expressions through switching between the two languages, (46% agree) of the respondents have claimed as per the collected data, while (25% strongly agree) with (16% strongly agree) and (13% disagree). For code-switching to be considered as interference while teaching sciences and mathematics, (68% strongly disagree) with this question, while (13% strongly agree) with (8% agree and disagree respectively), including (3% neutral). According to the respondents, a sense of belongingness is created in the classroom when learners tend to ask more questions if teachers switch into their L1. For this, (66% strongly agree), while (13% agree and 13% strongly disagree) with (8% disagree). A total of (42% strongly agree) for code-switching to be introduced in the classroom with (26% agree), while (16% disagree) and (8% strongly disagree) including (8% neutral) response being stated in the questionnaire.

CONCLUSIONS

The research juxtapositionally examined L1, i.e. Fiji-Hindi and L2 English for various functions of code-switching during this study. The dilemma of switching between languages should not be seen as a detrimental factor in teaching sciences and mathematics subjects. In fact, it should be treated as a teaching strategy to aid the mediocre and below mediocre learners in comprehending difficult concepts in both the subjects. A change in Language-in-education Policy (LiEP) to allow the usage of learners L1 in schools would certainly curb many issues pertaining to the studies of these two subjects. Based on

Gumperz's (1982) code-switching conversational model, the collected data revealed that the paramount functions of teacher code-switching are reiteration and quotation. Most of the elucidations that were done by teachers were mainly for repetition purposes that involved words, concepts or instructions in the Fiji-Hindi language. In addition, the alteration of languages for repeated reiterations provided shreds of evidence that code-switching was mainly exercised for better comprehension purposes during the subject contents discourse while teaching.

The findings of the research also revealed that mathematics teachers were found to code-switch more than science teachers. One of the imperative reasons for this was that mathematics is a compulsory subject and learners tend to take up sciences as an optional. On the same note, the results also showed that science teachers were relatively less dependent on code-switching to elucidate concepts and problems to learners because they could use realia and examples during the process of explanations, particularly in the laboratories. In doing so, the science teachers reformulated the scientific terminologies in learners L1 and circumvented the need for translation. On the weaker side, the strategy of code-switching tends to reduce the opportunity for teachers to negotiate the meaning using the available linguistic resources and with the usage of learners L1, however, on the brighter side of the strategy, teachers can still see code-switching as a boon that will allow all the learners in the classroom to enhance their learning skills in both the subjects of sciences and mathematics by using L1. A disallowance of L1 to be used in the classroom would see learners being deprived of their privilege to use their home language, even if it may not be considered as a strategical tool according to Gumperz, (1982) code-switching conversational model. Therefore, L1 should be considered as a learning tool to be used in the Fijian sciences and mathematics classrooms in a sound and judicious manner.

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