"WE NEED TO USE BOTH" - THE PLACE OF THE INDIGENOUS LANGUAGE IN SCIENCE LESSONS IN WESTERN SAMOA

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Abstract

Student and teacher responses confirmed speculations that the use of the Samoan language in science lessons can be perceived as a hindrance if students' goals are confined to passing English-language exams and pursuing higher studies overseas. However, when Samoan and English are used in a complementary way in science, Samoan language can significantly assist students to understand scientific concepts and terminology by linking what students are taught in science to what they have experienced beyond the classroom. Western Samoan science classrooms have usually operated on this bilingual basis, even though (until very recently) the Department of Education policy had stipulated English as the medium of instruction in the six years prior to a major English-language science exam. Many science teachers appeared to be unaware of the policy. The implications of a new policy of bilingualism are yet to be addressed.

A nation's choice to use either an indigenous language or an imposed colonial language in classrooms is a political decision with enormous pedagogical implications for its indigenous peoples (McKinley, Waiti and Bell, 1992). Because thought is not merely expressed in words but comes into existence through them (Vygotsky 1986), the choice of which language is to be used in classrooms largely determines how learners interpret new classroom experiences and how they relate them to the way they think about the world at large. As Sutton (1992, p.4) puts it, words not only have thought-crystallising and thought-provoking power, but they also have an enormously important persuasive role.
A growing number of studies which document the impact of English-language terminology on the world view of some indigenous peoples now exist (Moran and Hakuta 1995) and some of these relate specifically to science education. For example, Native American Indian science students find that English impedes their learning because it is too linear in its constructions, it presents unnatural categories, and it has a preponderance of nouns rather than verbs (Middlecamp and Baldwin 1995). Again, for Native Alaskan students the medium of English artificially distinguishes between metaphysical and scientific questions, and the non-use of indigenous languages is causing a large body of local science knowledge to disappear (Kawagley et al. 1995).

The situation in Western Samoa is an interesting local response to this world-wide issue. Until very recently (and even after the present research was completed in July 1995) the Western Samoan Department of Education had stipulated that the use of the Samoan language in the classroom should be confined to the Primary School levels, i.e. years 1 to 6. This meant that from the Intermediate School (years 7 & 8) through to the Senior Secondary level (year 13, i.e. Form 6) the official language of instruction should be English only. A draft Department document had reviewed the situation in the past as follows:

"According to official language policy, Samoan is the language of instruction in the first three years of primary schooling with English introduced orally in Year 2. From Years 4 to 6, English language is taught as a subject with Samoan as the language of instruction in other subject areas. In Years 7 and 8, English is the medium of instruction in all subject areas except Samoan." (Dept. of Education, 1995a; p27).

This mandatory use of English in senior Samoan science education has traditionally been justified by the fact that the international language of science is English. Recently, disappointing examination results have provided further support for the use of English; Chief Examiners' reports (Department of Education, 1991-1994) have shown that students have scored low average grades in English-language Western
Samoan School Certificate Science exams taken at the end of Year 12. Both the Chief Curriculum Development Officer for Western Samoa and the Principal of the Western Samoa Teachers' College have speculated that perhaps one possible explanation for this could be the disparity between the language of instruction (mainly Samoan) and the language of the exam (English), and that candidates therefore do not have sufficient opportunity to grapple with the demands of the language used in the exam.

This policy often appears to contrast with current practice, however. As Mrs Sinapi Moli (principal research officer of the Research and Planning Unit, Department of Education) explained to one of us (Desmond): "In years 9-13, Samoan is taught as a subject and the medium of instruction is supposed to be English. However, in most cases teaching is carried out using both languages -Samoan is particularly used (teachers claim) to make it easier for students to understand what’s being taught". Indeed, cursory observation of senior science classrooms shows that many science teachers have frequent recourse to Samoan, and preliminary informal interviews by one of us (Desmond) with some students indicated that they prefer to be taught science in Samoan because it is the language that they can most easily understand.

The present paper documents and comments on this tension. It describes the way some teachers and students perceive these rival claims about the use of English and Samoan in Western Samoan science lessons. A discussion section offers some conclusions about the present use of English and Samoan in science lessons. Finally, the paper considers future possibilities for Western Samoa, in the context of the current international debates about the use of indigenous languages in science education.

Language and Education in Western Samoa

Today, there are no statistical data available to demonstrate that the population is truly bilingual. However, it is generally accepted that all Samoans can speak their language fluently and that the majority of
Samoan people can also understand English, and most speak it fluently. This section reviews the historical development of language use in Western Samoa, and the relationship between language and education.

Prior to the arrival of the missionaries in the 1830s, Samoan society relied on a single, common, spoken language (Watson 1918, Meleisea 1987). From that time a written Samoan language was born which has developed and grown as the culture continues to enrich it with words. From the 1830s until 1900, Western Samoa was not directly under any colonial rule. Independent attempts by Germany, Great Britain and the United States of America to unite the whole country under one king of their own choice were not successful and thus Western Samoa slowly became a joint protectorate of the three powers (Gilson 1970). In 1900 Germany annexed the Western Group of the Samoan Islands and called it German Samoa (Meleisea 1987). The official language at that time was presumably German.

As in other countries, this era in Samoa was a time when the colonisers introduced their own languages for purposes of administration and higher-level economic exchanges to ensure the smooth running of their colonies. Such "linguistic imperialism" as Hoffman (1991 p.161) puts it, has been responsible for the suppression of most of the indigenous languages and as a result, some were ultimately driven to (or near) extinction. The Samoan language fared better than many at this time.

In 1914, at the beginning of World War I, New Zealand took over German Samoa as a British colony, and from 1945 until 1962 New Zealand administered the island colony as a Trust Territory of the United Nations (Field 1984; Meleisea 1987). The early 1920s saw the establishment of an education system for Western Samoa. This system was a copy of the New Zealand education system at the time. There were efforts to increase the number of district schools, the curriculum was purely academic, and there was minimal consideration of the local context during its initial implementation (Moli 1993a). During the period of New Zealand administration, from 1914 to 1962, the official language was English and the Samoan language was
suppressed. This was very evident in schools, where speaking in Samoan was discouraged by using the cane or other traditional English forms of school punishment. English was to be spoken in the school compound at all times. This continued until 1962, when Western Samoa gained her independence and the Samoan language, together with English, became recognised as the official languages (Government of Western Samoa 1960).

The late seventies saw the establishment of the Department of Education's Curriculum Development Unit (CDU), which has been responsible for the development of relevant curricula for Primary, Intermediate and Junior Secondary Schools in Western Samoa up to the present day. In the mid 1980s the New Zealand Department of Education announced that the traditional New Zealand (English language) School Certificate Exam for Pacific Island Fifth Formers (Year 12) and the New Zealand University Entrance Exam for Sixth Formers in the Pacific would be phased out in 1988. As a consequence, Western Samoa turned to the South Pacific Board for Educational Assessment (SPBEA) to take up the role (Yager, 1993).

The SPBEA defines standards through subject prescriptions as well as setting external exams in a variety of curriculum areas for Years 12 and 13 students. All of the SPBEA exams which Western Samoa utilises are in English. A few Year 12 curricula and exams are now also produced locally in Western Samoa, but these are also in English.

Research Methods

Present day science education in Western Samoa reflects the complex and subtle relationship between the domains of the two major languages, Samoan and English. In the present study, interviews and surveys were used to explore students' and teachers' perceptions of the rival claims made about language use in science lessons. Semi-structured interviews were conducted with twelve Year 13 students and the results were used to construct a pencil and paper survey which was applied to 50 Year 13 students. A second pencil and paper survey was also carried out with five science teachers.
Scope

The investigation was confined to Year 13 students with science background only, all of whom had taken science to Year 12, but who were not necessarily studying science in Year 13. The school that supplied the student subjects for the study was a "one level only" co-educational school, i.e. Sixth Form (Year 13). The choice of Year 13 students was guided by a need to interview articulate subjects who could share their perceptions of a full secondary school science programme in Western Samoa.

The science teachers who were interviewed were all currently teaching science from Year 9 to Year 12. This school’s students graduated to the "one level only" school.

The Student Interviews

Twelve bilingual (Samoan and English) Year 13 students consisting of six current science pupils (three girls & three boys) and six current non-science pupils (also three girls & three boys), were interviewed individually on their language preferences in science and their perceptions of the way their learning was affected by the use of the Samoan language in science while they were in Years 9 to 12. The interviews, which were audiotaped, were carried out in English and/or Samoan, the choice being guided by the interviewee’s fluency and needs.

The Student Surveys

Based on an analysis of the interview responses, a pencil and paper survey was constructed and was later administered to a sample of fifty Year 13 students, all of whom were currently studying science. The survey, which was written in English, comprised eleven items, which probed the same issues as the interviews, as well as furnishing student biographical data, and information about their science teachers’ use of language.
The Teacher Surveys

A pencil and paper survey was also carried out on five science teachers who were currently teaching science at Years 9-12. The survey, also in English, comprised fourteen items, which provided biographical data, and probed the teachers' knowledge of, and feelings about, the language policy of the Department of Education, their own use of language in the classroom, and their perceptions of the benefits and problems of using Samoan and English in science lessons.

Results

The fifty students who responded to the survey are coded S1-S50. In a few instances quotations from the twelve preliminary student interviews are also included. These twelve students are coded S51-S62. The five teachers who were surveyed are coded T1-T5.

The Students' Views

Most of the Year 13 students surveyed were in the 17-19 age group, and most of them were bilingual, i.e., reasonably fluent and comfortable in the use of both Samoan and English. All of them had studied science at Junior Secondary level (Year 9-Year 12) and a majority of them were taught science mainly or exclusively in English because their teachers in Years 9-11 were mainly of European descent, either Peace Corps volunteers or other overseas volunteers. However, the students were well acquainted with bilingual teaching because most of their teachers in other school subjects were Samoan.

Preference for Samoan and/or English

Thirty-five of the fifty students preferred both English and Samoan languages in science, thirteen thought that English alone was more appropriate, and two preferred Samoan only.

The thirty-five who preferred both languages cited the following three reasons:

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The two languages complement each other and hence promote understanding:

"Because we Samoan students can hardly understand English, so we need to use both to make (it) easy to understand." (S1)

(This very widely expressed sentiment generated the title of the present paper.)

"Because with the use of English words the students will get familiar with the terms used and if they don't understand, using the Samoan language will help them understand well and better the difficult terms being used in the subject." (S28)

"As a Samoan, I would really understand further if the teacher use(s) English and translate(s) it to Samoan. Especially in the case of explaining experiments, labs and also it is my first language and I'm more comfortable with it." (S30)

"Because I am a Samoan, I understand more about the subject if the teacher is speaking Samoan. It's better to mix because the exams are taken in English." (S47)

Bilingualism widens our knowledge:

"Because it expands and widens our knowledge about scientific examples found in Samoa and overseas." (S4)

Bilingualism promotes the Samoan language:

"... It's my mother tongue and it helps to promote the Samoan language in education." (S37)

The thirteen who thought that English alone was more appropriate for science in Years 9-12 gave six reasons:
(ii) Samoan is irrelevant overseas:

"I consider English appropriate because if we keep using Samoan then when our scholarships go overseas they do not understand what the teacher is saying in English." (S2)

(iii) The national exams are in English not Samoan:

"Because when the time of National Exams or Certificate Qualifications, the test is in English language no matter whether your teacher teach(es) in Samoan, the CDU (Curriculum Development Unit) do not worry about that." (S16)

(iii) English is better in a multi-cultural situation:

"For the sake of my teachers, I strongly agree English should use because we don’t have any Samoan questions for the overseas exams especially when we will be teaching with different races of students." (S19)

(iv) There is a lack of Samoan words for scientific terms:

"It is because the English language is more appropriate in teaching science. This is due to the fact that some scientific words for science does not have a Samoan word for it." (S40)

(v) English is widely used in other subject areas:

Because English is more important nowadays in order to understand more and many of the subjects are English so it’s better to take English as a language for science." (S15)

(vi) English enables communication with other overseas counterparts:

"Because in reality our society mostly used English and it is very important for us to learn and speak in English so that we
will communicate with other people from other nations." (S44)

The two students who preferred the Samoan language only in Years 9-12 science lessons did so because it is easier for them to understand, and it also motivates them to learn science.

"Because I'm a Samoan and it is very easy for me to understand Samoan." (S17)

"Because this is Samoa therefore it is necessary to speak the Samoan language as each student will have better understanding of the subject. Therefore they will have a willing heart to learn about science." (S42)

Benefits and problems using Samoan

When the fifty students were asked whether the use of the Samoan language in science ever helped them in their understanding of scientific concepts, twenty-nine responded positively, fifteen negatively, and six did not comment.

The twenty-nine students cited the following five benefits:

(i) It is easier to understand scientific words and their respective meanings when they are explained in Samoan:

"It helped me a lot to understand scientific concepts in years 9-12 because some scientific words are hard for me to understand - then (the) teacher translates it into the Samoan language for better understanding." (S12)

(ii) It is easier to relate to local examples when using Samoan:

"Because relating scientific concepts to examples here in Samoa using the Samoan language, helped it easier to understand. I understand better by using Samoan examples." (S4)
(iii) It is easier to express ideas in Samoan:

"Because sometimes I am not able to say it in English had I know it in Samoan." (S29)

(iv) It is easier to memorize in Samoan:

"As a Samoan it is easier for me to remember and keep in mind scientific concepts and their meanings in my own language, and able to translate into English language." (S43)

(v) Inclusiveness - no students are left out:

"The advantage of using Samoan language is that everyone know, everyone both, um ... those who are able to know English more and those who are poor in English, they all know what the teacher is talking about so therefore none is left out." (S57)

The fifteen students who considered that Samoan language had not helped them in science lessons gave the following five reasons:

(i) Some students are not very proficient in Samoan and are therefore disadvantaged:

"My current language in Samoan is not good. I found it hard to understand what the teacher was saying and so I fell behind in my science studies." (S14)

(ii) There is a lack of Samoan words to translate scientific terminology:

"Because there are scientific words which are very hard to explain or are very hard to translate in Samoan." (S17)

"...using the Samoan language it's a disadvantage for the formulas and all that ... you know to... to translate in Samoan
words." (S56)

(iii) Most of the science teachers in the Year 9-12 levels are not Samoans:

"Because through those years teachers who taught me in science never speak in Samoan but through English I understood some of the scientific concepts." (S23)

(iv) Minorities will be disadvantaged:

"...we all know that the English language is the basic language that we must use to educate people and teach them to... that's the disadvantage, if the teacher explain(s) it in Samoan there might be some other half-caste or palagi in that class. They don't know how to speak Samoan, how to study Samoan and they don't even know those Samoan words which the teacher use(s) to deliver... his or her message so they won't understand." (S54)

(v) It perpetuates ignorance:

"... you know, (a) kid like me, if I am dependent on the Samoan language, I, you know, if I grow up I will still be dependent on it, and you know, when I'm given an English word that I don't understand, I... I freak out, you know, I give up." (S57)

The Teachers' Views

The teachers surveyed comprised four Samoans and one Fijian. Three were females and two males. Two of the five teachers taught science in Years 9-10 only, and the remaining three taught science from Year 9 to Year 12. All five teachers were bilingual, i.e. they all spoke English and Samoan fluently. Their teaching experience varied from three to twelve years.
Preference for Samoan and/or English

The teachers surveyed all considered that Samoan is the language which best promotes the understanding of science among their students. Their main justification was that Samoan students can understand the Samoan language instantly and clearly, compared to the English language:

"Because the students understand better when the subject is translated to their mother tongue. This is also supported by the teacher, also from the same culture." (T1)

When questioned about the Department of Education's policy on the use of Samoan or English in science lessons beyond Year 8, one teacher thought that there was no policy:

"I didn't think there was one. I haven't seen any written policy.... not in our school." (T5)

The other four teachers knew that there was a policy but believed it (mistakenly) to be bilingualism beyond Year 8:

"Yes. The language of instruction varies from level to level, that is, from early schooling: Years 1-3, the language of instruction is Samoan. This is to allow development of the child's mother tongue. From Year 4 onwards, the main language of instruction is English. Sometimes it goes hand in hand with the Samoan language. This gives a better understanding for the students to learn." (T1)

Three of these four professed to follow the perceived policy, but the fourth stated that she mainly used Samoan in her classroom. All five supported a policy of bilingualism at all levels.

"Well, the Education Department made this policy for many reasons such as: To provide lifelong education from early-childhood and preschool to adult education. To widen access

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to education, to provide universalisation in schooling through compulsory primary education, etc." (T1)

They supposed that a policy of bilingualism had been sanctioned to promote career opportunities:

"The Department is viewing the future of Samoa's generations - just a door to white-collar jobs, advanced careers (sic) and occupations - and so communicate well with overseas citizens." (T4)

as well as to preserve the Samoan language:

Personally I feel that it is a way of ensuring that Samoan language is spoken and not die away (extinct) slowly." (T2)

Apart from the one teacher who mainly teaches in Samoan, the other four all professed to using English in their science classes, for the following reasons:

"English is used predominantly in my science classroom because there are hardly any Samoan words for some scientific terms used in recommend texts." (T1)

"Because the exams are in English so I have to make sure students are used to hearing and reading in English. Samoan is used in the instructions to ensure full understanding." (T2)

"That's the language I am fluent in and the notes are in English and there are a lot of words in English, not found or clear in Samoan." (T5)

When the teachers were asked how they would react if the Department of Education decided to enforce its policy (which they perceived to be bilingualism), two were unsure of their reactions, but three of the five reacted positively and stated that they would agree with such a move:
"I would definitely nod in agreement together with adjusting it slightly to accommodate (sic) my learners' abilities." (T1)

Four of the five said that if the Department of Education did enforce its policy, they would not change their language of instruction:

"I would still use both languages." (T2)

In summary, the teachers all considered that Samoan is the language which best promotes the understanding of science among their students. However, they were not aware that the Department of Education had a policy that English be the medium of instruction throughout Years 7 to 13. Instead, they generally believed that a bilingual policy was in place, and they supported this in the teaching of science at these levels, mainly on the grounds that it supports student understanding of concepts.

Benefits in understanding, using each language

The teachers were asked to cite specific examples in which the use of, firstly, English, and then Samoan, promoted better understanding among their science students. Benefits cited using English were as follows:

"Scientific terms like: potassium chloride, sulphuric acid, etc. and other terms like mitosis, where you can hardly find a Samoan word for it." (T1)

"Instructions of experiments and discussions as well as field trip instructions." (T2)

"Note taking." (T3)

"Naming equipments, labelling diagrams, forming up experiments." (T4)
"The parts of the body. The English names are specific and the plant names are specific also." (T5)

Samoan was held to promote better understanding in the following cases:

"The biology section of Science, like organs of the body: heart, lungs, etc. as well as diseases affecting the body." (T1)

"Discussing notes especially the hard terms (scientific terms)." (T2)

"Explanation of notes, instructions, experiments and any hard terms in Science." (T3)

"Delivering a new topic, elaborating on context meaning and explaining some options and terms." (T4)

"Certain words describing the weather and surrounding is clearer using Samoan words and examples. The Unit "Food and Us", to use Samoan food names makes it clearer." (T5)

In summary, the teachers found English superior when dealing with the international jargon of science (terminology, experiments, chemicals, equipment), but Samoan was preferred for discussion, clarification, and relating science to the students' world. The fact that "parts of the body" is cited in both lists suggests that the teachers' own familiarity with either language is an important factor.

Discussion

This study suggests that Western Samoan science students and teachers have remarkably similar perceptions about Samoan and English as the languages of science instruction in their classrooms.

Samoan language, with its reassuring familiarity, its greater power to clarify the obscure, its capacity to include all students, and the
richness of its vocabulary about weather, tides, food, diseases and so on, undoubtedly has the potential to create a classroom environment where students will, as one of them put it, "have a willing heart to learn about science."

But a "Samoan language only" situation would also create apprehension for teachers and students alike. Without a good knowledge of English, classroom access to the standard, international terminology of science is reduced; expectations of success in the English language external examinations become unrealistic; and hopes of pursuing further science studies overseas are out of the question.

Given this situation, most science teachers in Western Samoa who take classes leading up to the important external exams act, understandably, in the way that logic would demand; they adopt a bilingual approach, introducing the English terminology for the standard words of science ("potassium chloride", "deflagrating spoons", "homeostasis"), but they rely on Samoan to provide the explanations and to fuel class discussions which are essential in helping students construct meaning.

While teachers and students pragmatically adopt a bilingual approach, this contrasts with the policy of the Western Samoa Department of Education which states that English shall be the medium of instruction for the six years preceding the first exam at the end of Year 12. Conflict arises only infrequently, however, because (as the present study suggests) many teachers appear to be unaware of the policy and/or do not wish to comply with it.

The Future

Since this present research was concluded, the publication in July 1995 of Western Samoa's "Education Policies 1995-2003" in its final form has signalled a highly significant change of policy: "It is generally accepted that a prime objective of the Western Samoa education system should be the production of bilingual individuals, fully literate in both Samoan and English" (Department of Education, 1995b, p.7).
To this end "Samoan and English must be taught systematically, according to an approved bilingual methodology" (p.19). The ramifications of the new policy will be addressed by a task force which ".... will deliberate matters such as the language of instruction and examination at each educational level, methodologies to ensure thorough teaching of both Samoan and English and the achievement of a high level of bilingualism and structures to ensure maintenance and enrichment of Samoan language" (p.7).

Where will the new policy, as it applies to science education, position Western Samoa with regard to other countries in the future? It will distance Western Samoa from the many countries which have pursued an "English-only" policy in the past. In most of Africa, for example, a pervasive sense of urgency has been instrumental in the adoption of a European language at tertiary and usually also at secondary level (Rutherford 1993). The time needed to develop indigenous languages to deal with the terminology of science, the cost of translating materials, the need for an internationally understood language, and the divisive nature of the many vernacular languages are all factors which have driven this choice. However, doubts about the wisdom of an "English-only" policy have been expressed by McNaught (1993), who believes that a genuine bilingualism could infuse the curriculum with the richness of ideas in the Zulu language. Again, Baimba (1993) noted that lack of expertise in English among predominantly native-speaking students in Sierra Leone makes them shy away from coming forward with their ideas, and that students are loathe to talk about traditional beliefs and local examples.

Closer to home for Western Samoa, in the Pacific basin, diverse paths are being followed. While Papua New Guinea basically follows the African model, New Zealand is encouraging plurality. New Zealand provides three options; schools with Maori immersion classrooms, schools with bilingual classrooms (which operate in a manner similar to most Western Samoan classrooms), and classrooms that utilise English only. Reasons for the use of Maori language include the enhancement of self-esteem, achievement and motivation among Maori students; to apply constructivist learning principles (e.g. facilitating the
entry of students' existing knowledge into the classroom discussion); to value the body of Maori scientific knowledge; and to give top priority to the survival of the Maori language (McKinley, McPherson, Waiti and Bell, 1993). This has been supported by the generation of scientific terminology by Te Taura Whiri, i.e. the Maori Language Commission (Harlow 1993). A Maori science curriculum (Ministry of Education, 1994) has been developed, although McKinley (1995) argues that its use of Maori language is not necessarily a legitimisation of Maori knowledge, and its co-option can (paradoxically) be a mechanism for regulation and control.

The implementation of effective bilingualism in science education in Western Samoa clearly needs to go hand in hand with perceptions about the style and climate of teaching and learning as a whole which will be promoted. An effective bilingual future in Western Samoa will be possible if it takes account of current teaching and learning in Samoa as "generally based on the transmission view". In Moli's opinion, this has its origins in everyday life, where children learn mainly by observing what their elders do, and practising or imitating their behaviour themselves. While listening is important, in many instances this is secondary to visual learning. These behaviours are underpinned by a complex set of cultural contexts in which courtesy, obedience, and respect for the elders, whose authority is hardly ever questioned, are of supreme importance. In class, these conforming and conservative aspects of culture result in students remaining passive and very much dependent on the teacher. Students are restrained from asking questions, and "answering back" is rarely tolerated. Moli concludes that "to teach the children to be critical thinkers and to ask questions, as in an inquiry approach, is certainly opposed to the conforming aspects of culture. This presents a real dilemma which needs to be resolved if science education is to be properly promoted and effective in Samoa". The teachers and students who contributed to the present study have suggested clearly that a legitimised and enhanced policy of bilingualism will do much to promote children's critical thinking and questioning in science.
References


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