

The accommodation of multilingualism through blended learning in two Information Technology classes

Jako Olivier

The South African society can be described as culturally diverse and multilingual. However, despite the advantages of mother-tongue education, English is often chosen as the language of learning and teaching at the cost of the other official languages. This article proposes that multilingualism, through the use of languages other than English in the classroom, could be accommodated through blended learning. Blended learning refers to the blending of traditional instruction methods, such as face-to-face instruction, with online learning. For example, through an evaluation of e-learning tools, it was established that wikis could be used for this study. The empirical research in this article focuses on the establishment and testing of a set of steps for the accommodation of multilingualism by means of blended learning in the subject Information Technology. The research took the form of a sequential embedded mixed-methods design, and both quantitative and qualitative approaches were used. Based on the literature and the empirical investigations, blended learning was implemented through the use of a wiki at two high schools in the Free State province, and the effectiveness of the intervention was tested through a quasi-experimental study. In conclusion, it was found that multilingualism could be accommodated through blended learning.

Keywords: multilingualism, multicultural education, blended learning, e-learning, wiki, online teaching and information technology

Introduction

Educational systems should reflect and accommodate the language needs of the societies in which they function (Olshtain & Nissim-Amitai, 2004: 53). Furthermore, Olshtain and Nissim-Amitai (2004: 59) maintain that multilingual speakers should "... be able to make informed decisions about investing future effort in language

Jako Olivier
School of Languages, North-West University
e-mail: jako.olivier@nwu.ac.za
Telephone: 018 299 1486

knowledge and language skills of one or all of the languages they know, in order to promote their aspirations and choices in life". This relates directly to the premise of a learner-centred approach within the South African school curriculum. Thus, the focus is on facilitating learning for individual learners within the context of facilitating the use of languages other than English that are used by learners. Teachers, therefore, become mediating agents in terms of national and school language policies and the actual multilingual language capabilities that are present in South African schools. This context of multilingualism in schools is the first issue explored in the literature overview of this article. Developments in education internationally and in South Africa have seen the emergence of alternative teaching and learning strategies such as blended learning, which is viewed as an integration of traditional (for example, face-to-face teaching) and web-based or online teaching and learning approaches, as referred to in this article (cf. Bonk & Graham, 2006: 4; Holmes & Gardner, 2006: 110; Nel, 2005: 67-68, 109; Olivier, 2011: 85; Oosthuizen, 2004: 14).

The aim of this article is to establish how multilingualism can be accommodated through teaching for "singularities in pluralities" (García & Sylvan, 2011: 386) – adding languages other than English (LOTE) to the learning environment – by means of blended learning in the school subject Information Technology (IT) within the Free State province of South Africa. The reason why this problem needs to be addressed is that, despite the multilingual nature of IT classes, English is mainly used as the medium of instruction. This study proposes the use of blended learning as a solution to an English-only learning environment. IT was chosen as it was one of the few subjects in which a substantial number of computers could be made available in classrooms throughout the province. The theoretical context of multilingualism in education is explored with a literature study, followed by a questionnaire aimed at all the IT teachers in the province. Interviews were also held with subject specialists and blended learning experts. Based on the literature study and the empirical research, blended learning was implemented to accommodate multilingualism at two separate schools in the Free State. The application of the proposed steps was tested through quasi-experimental research based on a non-equivalent group in a pre-test post-test control-group design.

Multilingualism in education

Contextualisation

Multilingualism can refer to the multilingual language abilities of an individual or the state of having more than one language when referring to a society or, more specifically in relation to this research, within a classroom (cf. Baker, 1996: 4; Franceschini, 2011: 344; Herdina & Jessner, 2002: 52; Kemp, 2009: 12; Shohamy, 2006: 171; Van Huyssteen, 2002: 69). The term 'multilingualism', as used in this study, refers to the language diversity of the wider learner community, rather than to the multilingual capabilities of individuals. Hence, societal or even institutional (Franceschini, 2011: 344, 346), rather than individual multilingualism, is relevant for

this study. Societal multilingualism is a reality for many South Africans and in many South African classrooms (cf. Laufer, 2000: 3; Lemmer, Meier & Van Wyk, 2006: 52; Maartens, 1998: 15), and serves as impetus for this study.

Language in South Africa

Historically, mainly Afrikaans (previously Dutch) and English enjoyed official recognition. The two official languages in South Africa, with nine languages recognised in the so-called Bantustans or Homelands, were recognised until 1993. After a period of negotiations, it was decided, as a compromise, to include eleven official languages at national level. This was done officially with the 1993 interim constitution and, ultimately, the Constitution of South Africa (Act 108 of 1996) (hereafter referred to as the Constitution (1996)). The following languages were selected as official languages: Sepedi, Sesotho, Setswana, siSwati, Tshivenda, Xitsonga, Afrikaans, English, isiNdebele, isiXhosa and isiZulu (cf. Du Plessis, 2000: 103-105; Du Plessis, 2003: 106-107; Laufer, 2003: 3, 7; Mesthrie, 2002: 13-18; Webb & Kembo-Sure, 2000: 9). There is no language that qualifies, even as an additional language, to be a common language for South Africa (cf. Alexander, 2001: 116). However, English is regarded as a *lingua franca* or common language that is used for communication in a multilingual context and ultimately should be used in South African schools (Henrard, 2003: 11; Lemmer *et al.*, 2006: 52).

Language in South African schools

A problem in South African schools is the occurrence of subtractive bilingualism where home languages, often African languages, are replaced by English as the language of learning and teaching. Another language - possibly Afrikaans or another African language - is then offered as a subject by a school (cf. Laufer, 2003: 46-47; Van der Walt, 2003: 30). Cushner, McClelland and Safford (2009: 192) note that in South Africa “where the school’s language of instruction is not a learner’s first or home language, effective learning for such learners is usually impaired”. Poor language abilities have a distinctly negative effect on academic performance. This occurs when the language of learning and teaching is not necessarily the learners’ home language, and where they do not acquire sufficient skills in either language (cf. Van der Walt, 2003: 33-38).

Despite the fact that, from a sociolinguistic and educational point of view, mother-tongue education is the ideal (cf. Van der Walt, 2003: 1), English is generally preferred as the medium of instruction at schools, especially by parents who speak one of the African languages (cf. Heugh, 2000: 15; Laufer, 2003: 18; Nkabinde, 1997: 99-105; Van der Walt, 2003: 18, 31; Webb, 2002: 299; Webb & Kembo-Sure, 2000: 6). The right to choose a language of learning and teaching is determined by policies and legislation such as the Constitution (1996), the South African School’s Act (Act 84 of 1996), the Act on National Teaching Policy (Act 27 of 1996), and the Language in Education Policy (1997) (cf. Van der Walt, 2003: 82). It is important to take cognisance of the

fact that there is a perception that a discrepancy exists between what is required by language legislation, and what is actually implemented (cf. Verhoef, 2008: 9-11).

In considering the aforementioned, it is necessary to explore solutions to accommodate languages other than English by means of an approach such as blended learning.

Blended learning as a way of accommodating multilingualism

Conceptualisation

The concept of 'blended learning' is widely accepted as an integrated approach to learning with traditional face-to-face and computer-supported, web-based or online approaches (cf. Holmes & Gardner, 2006: 14, 110; Littlejohn & Pegler, 2007: 1, 26, 226; Mason & Rennie, 2006: 11-14; Nel, 2005: 67-68, 109; Olivier, 2011: 179-184; Oosthuizen, 2004: 14). Masie (2006: 22-25) notes that blended learning refers to the "use of two or more styles of content or context delivery or discovery" and, furthermore, traces the origin of this "blended learning" to a reaction to structural weaknesses of e-learning at the time.

Blended learning, as applied in this article, relates to the use of this approach in a cooperative setting, and hence communal constructivism is a relevant concept. Communal constructivism is an extension of socio-constructivism or social constructivism, and is a term defined by Holmes, Tangney, Fitzgibbon, Savage and Mehan (2001: 1) as "an approach to learning in which students not only construct their own knowledge (constructivism) as a result of interacting with their environment (social constructivism), but are also actively engaged in the process of constructing knowledge **for** their learning community" [Emphasis in original.]. This approach is the key to this study, since only through a blended-learning approach can learners, who might not be geographically together, and yet speak the same languages, be able to construct knowledge cooperatively. Blended learning may also provide a way in which content can be available in more than one language. In this article, blended learning is viewed as a combination of traditional teaching methods such as face-to-face teaching as well as online instruction or e-learning (cf. Fee, 2009: 16; Kelly, 2009: 36).

Blended learning using a wiki

The e-learning instructional tool that was chosen to be used in this study is a wiki. A wiki refers to web software that allows for easy creation of internet or network-based wiki pages that can generally be edited by anyone. Using the same kind of software as used on a site such as Wikipedia, wikis can be created for specific purposes (cf. Ebersbach, Glaser & Heigl, 2006: 1-30; Fee, 2009: 87; Littlejohn & Pegler, 2007: 103; Mason & Rennie, 2006: 130-131; Parker & Chao, 2007: 57; Richardson, 2006: 1, 8, 59-61). Matthew, Felvegi and Callaway (2009: 51) define wikis as "collaborative Web-based environments that allow multiple users to easily and quickly contribute content".

Wikis can be considered as collaborative constructions of knowledge (Matthew et al., 2009: 52; Richardson, 2006: 61, 65). Parker and Chao (2007: 58) also note the collaborative properties of wikis, and confirm that they can act as a platform for a community of practice which, in turn, refers to a group of people who are engaged in learning.

Based on the above discussion, wikis were used as instruction tools in the implementation of blended learning through which multilingualism could be accommodated.

Blended learning and multilingualism

Central to this study is the application of blended learning in a multilingual classroom in order to accommodate multilingualism. However, the use of blended learning in multilingual environments is not a unique South African phenomenon, and has been successfully utilised internationally (cf. Hafsa, 2003; Kushwah & Vijayakumar, 2001).

According to Holmes and Gardner (2006: 63), “today’s Web does indeed reflect the language and social diversity of the modern world”. However, Bonk (2009: 380) affirms that English dominates the Web. This view is supported by Cunningham (2001: 207) who states that English is the “language of the Internet”. Kushwah and Vijayakumar (2001: 2) argue that using English only in e-learning contexts would restrict access to facilities for certain communities, and propose a multilingual e-learning system that accommodates various Indian languages. Projects in India (Kushwah & Vijayakumar, 2001: 2) that are related to this concept proved that multilingual e-learning is possible and viable.

In addition, Holmes and Gardner (2006: 64) observe that studies concerning the cultural aspects of educational technology in multicultural classrooms showed that the usage of computers had a positive effect, especially in terms of minority groups. Blended learning has particular benefits with regard to multicultural and multilingual contexts where, through online collaboration of learners, they can develop cultural sensitivity (cf. Nel, 2005: 20). Nel (2005: 161) notes that online environments can contribute to the development of African languages as mediums of instruction. Van der Westhuizen (1999: 49) is of the opinion that online education can be regarded as being non-discriminatory, as access to virtual classrooms may not necessarily be limited to certain locations or the age, ethnicity, gender, language, and physical limitations of participants. Admirable as this may seem, this view does not account for accommodation in online media for different languages through the provision of multilingual interfaces.

Building on this literature review, an empirical investigation was launched to gather information on current practice in IT classrooms throughout the Free State, as well as on the way in which multilingualism is viewed by provincial and national experts on the subject IT and blended learning, in order to contextualise the issue of language for the subject. Finally, a blended-learning intervention was tested in two different schools in the province.

Empirical investigation

Research design

In this study, a mixed-methods research design was utilised. Following the descriptions by Ivankova, Creswell and Plano Clark (2007: 261-270) and Creswell (2009: 206-216) regarding different mixed-methods strategies, this research design can best be described as a sequential embedded design. The research design consists of two distinct phases, with some processes embedded within the two phases that follow a set order. Both phases contributed towards the aim of the study.

In the first phase of the empirical research, quantitative as well as qualitative data was collected to supplement information gathered from the literature study and to provide substantiated evidence in support of the envisaged experimental research. This part of the research was non-experimental and descriptive in nature in the form of surveys. In the second phase a blended-learning intervention for accommodating multilingualism was developed. This was based on the information obtained from the literature study and the findings from the first phase of the empirical research. By following an experimental design in the form of quasi-experimental research, and based on a non-equivalent group pre-test post-test control-group design (McMillan & Schumacher, 2006: 274), the intervention was implemented and evaluated.

Research participants

The research participants for the first part of the empirical research consisted of the total population of IT teachers at secondary schools in the Free State province (n=17). Only eleven of these participants qualified as either being Grade 10 teachers or who actually returned the completed questionnaire. The rationale for this purposeful sample (McMillan & Schumacher, 2006: 126) is based on the fact that all these teachers work within a similar context in terms of the usage of the same programming language (in other provinces, some schools use Java and not Delphi, as in the Free State). Interviews were used to validate and extend the data gained through the literature study and the questionnaire that was completed by the IT teachers. The interviews were conducted with provincial and national IT subject specialists and blended-learning experts. With the implementation of the blended-learning intervention, the research was conducted at two respective secondary schools that offer IT as subject. Choosing two different schools ensured that the study was representative of the types of schools that presented IT as a school subject in the Free State. One was a multilingual former Model C school, with learners speaking a number of languages and being taught through the medium of Afrikaans and English, and the other a township school, with mainly Sesotho speakers being taught through the medium of English, from a previously disadvantaged background.

Questionnaires

The teacher questionnaires used in the first part of the empirical investigation provided the necessary context within which the rest of the research and implementation of the intervention could be executed. A number of findings that were important to the rest of the study could be identified.

The limited individual multilingual skills of the IT teachers in the Free State were evident from the questionnaire data. Furthermore, the importance of English as an additional language for learning and teaching was apparent. Despite the teacher respondents only having Afrikaans (73%), Sesotho (18%) and Setswana (9%) as mother-tongue languages, the data showed that the language profile of the learners was multilingual in nature. The majority (63.5%) of Grade 10 IT learners in the Free State spoke Sesotho, followed by Afrikaans (17%) as a mother-tongue language. To some extent, different languages were accommodated in class, especially in terms of using Afrikaans, English, Sesotho and Setswana. This was done mainly through code-switching, terminology lists and textbooks. Despite the accommodation of some languages, many other languages that were used by learners were not accommodated. From the questionnaires, it was evident that a number of languages (such as isiZulu, Setswana, Xitsonga, isiXhosa, Greek and Hindi) were rarely, or never, used in class. Finally, in terms of accommodating African languages such as Sesotho, this did not happen in classes where teachers had Afrikaans as a mother-tongue language.

The responses in the questionnaire also indicated that, in terms of the availability of computers in the respective schools that formed part of the research, some infrastructure did exist. The majority of the respondents (64%) indicated that all the computers at their schools are connected to the internet, while in terms of schools where this is not possible, 36% of the respondents indicated that at least some (no more than 10) computers used by staff of the school have access to the internet. Consequently, all schools had some form of access to the internet, which could allow for at least a degree of blended learning to take place, as teachers had access to online resources. In terms of electronic tools used in the class, MS PowerPoint presentations and the internet were favoured, followed by some usage of wikis and a subject portal. Only just over half (55%) of the respondents indicated that they used electronic tools for assessment, and 45% of the respondents showed that they used blended-learning techniques in teaching. Hence, it is important to note that training for blended-learning strategies might be needed to enable teachers to use technologies that are already adequately available to them. The majority of the respondents who used blended-learning methods indicated that they employ it on a daily basis, although it was not used in every lesson. The majority (82%) of the respondents indicated that blended learning could accommodate multilingualism. Multilingualism was explained to the respondents as the use of more than one language in the classroom. This result, and the responses to the follow-up open-ended question, implied that teachers seemed to be positive towards the aims of this

study. The respondents also appeared to be positive in terms of the implementation of a way in which blended learning could accommodate multilingualism.

Interviews

Interviews were held with provincial and national experts on the subject IT and blended learning. All of these participants were associated with the Free State provincial Department of Education or the national Department of Basic Education. This part of the research was conducted by means of face-to-face and e-mail interviewing techniques.

From the interviews, it became clear that the provincial Department of Education was currently focusing on developing access to hardware and teacher ICT skills training without specific focus on e-learning or blended learning. According to the interviewees, very little has been done by the Department of Education, as many teachers still require basic computer and internet skills. Blended learning offers advantages to teachers and learners in terms of learning and teaching abilities. Owing to a lack of the proper infrastructure that is needed for the implementation of blended learning, it is not applied by schools. Schools do not have the financial means to implement sustainable e-learning platforms, as infrastructure is expensive. However, the interviews also showed that the benefits of blended learning outweigh the costs. From the interviews, it was also evident that teachers are not necessarily adequately qualified and committed to exploring new technologies. Support and training will be required for teachers to enable blended learning to be implemented. Blended learning will also not complement poor teachers. Training should be considered to take up a third of the cost of ownership. The interviews also indicated that English is very prominent in schools and on the internet, and despite the fact that all languages can be accommodated, it may be difficult to do so in all subjects. Instruction in a language other than the mother tongue creates a barrier to learning; yet it was noted that with adequate development, languages other than English could be used. Accommodating multilingualism through blended learning may attend to some of the concerns in terms of language-related learning barriers. According to a subject specialist, the new developments in the subject IT, as set out in the Draft Curriculum and Assessment Policy Statement, may have a positive impact on the accommodation of multilingualism. More concrete examples of how the Curriculum and Assessment Policy Statement would be more accommodating could not be elicited from the interviewees.

Intervention

An intervention was set up based on the literature study, the teachers' questionnaire and the interviews with subject and blended-learning experts. A wiki site was set up with multilingual content and areas where learners can interact. A wiki can be used for the following three purposes: storing of information, learner interaction, and generation of cooperative knowledge. Therefore, three different distinct areas

are created in the wiki. First, there are the resources that can be supplied by the teacher, or that can even be collated from work of previous years. This resource section contains basic terminology, explanations, examples and summaries of the contents to be learned. Secondly, learners must have separate wiki pages where they can introduce themselves, and post their individual tasks or contributions. Finally, a common discussion forum or page should be created in order to facilitate discussion and the generation of co-operative knowledge. In this regard, discussion pages can also be grouped according to language or other groupings, as required by the relevant classes. The learners and class context determine the nature of the groups, and the manner in which they are used in the wiki. The grouping of learners can also lead to interaction between learners from different schools, if the wiki is available online and user registration is set up in a way that allows new users to register themselves. However, this approach could potentially lead to security issues since, without proper control, any individual could then register, and become part of the wiki. In the blended-learning process, the teacher must fulfil an administrative as well as a facilitation role throughout the usage of a wiki. Learners should be encouraged to use the medium, but the teachers should also continuously assess the progress made on the wiki. Only through constant dialogue between the learners and teachers – regardless of whether this is done face-to-face or online – can learners be guided towards effective usage of the wiki medium.

The intervention involved the instruction of IT content relating to loop structures used in the computer language Delphi. The design was based on the IT Grade 10 assessment tasks on content used in the relevant classes. The implementation was done in five lessons over a two-week period. Another factor that guided the quasi-experimental design was the fact that the random assignment of the research participants into control (exposed only to traditional face-to-face teaching) and experimental groups (exposed to multilingual online content in addition to traditional face-to-face teaching) at the respective schools was not possible, since the researcher was not in the position to move learners from one class to another. Random assignment only took place by assigning a class to represent the control group and another to represent the experimental group at the respective schools. Instruction was done through the medium of English, with the experimental groups having access to Afrikaans and Sesotho materials on the wiki. They also had the opportunity to communicate on the wiki in any language they preferred. Assessments were conducted prior to and after the instruction of the programming content. The intervention was observed by the researcher throughout the research process and a journal was used for this purpose. Furthermore, the intervention was tested in the second phase of the empirical research by means of a quasi-experimental research design based on a non-equivalent group pre-test post-test control-group design. A t-test was used to determine whether statistically there was a significant difference between the results of the pre-test and the post-test of the combined control and experimental group. These were then compared separately in terms of the two different schools. From the results of the pre-test and the post-test analysis of both

the experimental and control groups' results, it was clear that statistically there was a significant difference in the test scores favouring the intervention. Regarding both the experimental and the control groups of the schools, there was a difference in terms of the pre-tests, but not in terms of the post-tests. It may be deduced that the strategy of blended-learning intervention for accommodating multilingualism had a positive effect on the understanding of the content used in the study. For further validation, observations during the implementation of the intervention were also recorded, and supported the results of the rest of the empirical study.

The following **hypotheses** were set for this part of the research:

- H_0 The implementation of an educative intervention through a blended-learning model to accommodate and promote multilingualism will not lead to a significant change in academic performance in a standardised test.
- H_1 The implementation of an educative intervention through a blended-learning model to accommodate and promote multilingualism will lead to a significant change in academic performance in a standardised test.

In terms of the experimental group, the following data was retrieved using SPSS statistical software:

Table 1

	<i>Paired differences</i>		
	<i>Mean</i>	<i>Standard deviation</i>	<i>Standard error mean</i>
Pre – Post	-16.364	23.411	4.991

In the experimental group, a mean of -16.364 was identified. Furthermore, the standard deviation was 23.411.

Table 2

	<i>T</i>	<i>df</i>	<i>Sig. (2-tailed)</i>
Pre – Post	-3.279	21	0.004

In terms of paired samples correlations, the *t*-statistic is given as -3.279 and a *p*-value of 0.004 was found. This means that a statistically significant difference exists between the pre-tests and the post-tests done by the experimental group. The degrees of freedom are denoted by *df* and have the value of 21.

The same test was done on the pre-test and the post-test results of the control group.

Table 3

				95% confidence interval of the difference	
	Mean	Standard deviation	Standard error mean	Lower	Upper
Pre – Post	0.000	30.394	6.480	-13.476	13.476

In the control group, a mean of 0.000 was identified. Furthermore, the standard deviation was 30.394.

Table 4

		t	df	Sig. (2-tailed)
Pair 1	Pre – Post	.000	21	1.000

With the control group, the *t*-statistic is given as 0.000 and a *p*-value of 1.000 was determined. This implies that there was no difference between the pre-tests and the post-tests done by the control group. The degrees of freedom are denoted by *df* and have the value of 21. Hence the hypothesis (H_1) was proven true in terms of the intervention of the model leading to a significant difference and the null hypothesis (H_0) as false.

The implementation of the proposed intervention did require certain criteria for having full internet access by all computers used in the classroom, as well as certain skills in using wikis by the teacher and learners. Furthermore, the multilingual nature of a class determined whether the language used in a class could be accommodated. Ideally, this could be done for all the languages. Yet, as determined in the empirical investigations, this is a complex matter that may not be possible. In terms of using languages other than English, there was a distinct difference in the way in which it was utilised at different schools. At the former Model C school, the learners spoke only in English, with some individuals writing in their mother-tongue languages. At the township school, the learners spoke English with a great deal of code-switching that bordered on whole discussions in Sesotho. All writing was strictly done in English. It may be concluded that, by introducing languages other than English through the use of a wiki, more languages can be accommodated in classrooms.

Conclusion

This study aimed at creating and testing an intervention through which a multilingual learning environment is created in an English environment and how “singularities in pluralities” (García & Sylvan, 2011: 386) could be accommodated with the use of blended learning in the subject IT.

The first part of the study consisted of a literature overview on multilingualism, and the way in which it was realised in the South African context. This included blended learning in terms of its origins, related theories and standards in the field of teaching and learning. In terms of the manner in which blended learning could accommodate multilingualism, an association between multilingualism and blended learning was drawn, and tentative conclusions were made for developing an intervention to be implemented in the school subject IT.

The second part of the study was aimed at conducting an empirical research, based on a sequential embedded mixed-methods design, that could be categorised into different phases. The first phase of the empirical research was quantitative in nature and was based on a non-experimental survey. By means of a self-developed, semi-structured questionnaire aimed at IT teachers, the researcher wanted to determine the context of language use and application of blended learning in IT classes within the Free State province. The findings of the questionnaire were extended by means of an embedded qualitative survey in which experts in both the subject IT and blended learning (specifically the e-learning part thereof) were interviewed. Based on the data obtained in the first phase of the empirical research and the literature study, an intervention was developed through which multilingualism could potentially be accommodated with the use of blended learning. In the second phase of the empirical research, this intervention was implemented and tested by means of a quasi-experimental design: a non-equivalent group pre-test post-test control-group design, in two different schools in the Free State province. During this phase, the effectiveness of the intervention in terms of accommodating multilingualism was tested. Embedded in this phase were observations for ensuring consistency among groups and for certifying the reliability of the process of implementation.

In conclusion, this study has shown that, through the use of a blended-learning intervention, the use of languages other than English could potentially be accommodated in a classroom.

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