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Perceptions of Secondary School Science Teachers Regarding English-Medium Instruction: A Case Study

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Abstract

Although English is used as a medium of instruction to teach science subjects in secondary schools in Pakistan, the perceptions of secondary school science teachers have remained underexplored. Therefore, this study aimed to explore the perceptions of secondary school science teachers regarding English as a medium of instruction in Pakistan. Using a qualitative case study approach, in-depth semi-structured interviews were conducted with four secondary school science teachers who were selected purposefully. The interview findings revealed that teachers considered English as a gateway to learning resources, but they highlighted its insufficiency in the context due to students' poor language background. Therefore, teachers employed native language and other scaffolding strategies to make students understand complex scientific concepts. Besides, the teachers also highlighted that English as a medium of instruction led to low participation of science students in class. The majority of the findings of this study cohere with other studies in the context; however, the positive attitude of science teachers towards English as a medium of instruction is slightly in contrast to the previous findings. Moreover, the use of different scaffolding strategies emerges as a significant finding of the study. The study concludes with the recommendations that proficiency of science teachers in English, training in pedagogical skills, provision of context-specific teaching resources, and inclusion of teachers in policymaking are imperative for successful implementation of the policy of English as a medium of instruction.

Keywords: perceptions, English as a medium of instruction, science teachers, secondary school, case study

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Introduction

English is an international language, and it has taken the role of a lingua-franca in recent times. Not only English is a language of business and trade, but also of education, research, and communication. Because of its ever-increasing importance, English has been declared as the medium of instruction in many originally non-English speaking countries such as Sri Lanka, Nigeria, Hong Kong, and others (Macaro, 2018). Similarly, English has been the medium of instruction in Pakistan at secondary and higher secondary levels of education at different points in history (Mahboob, 2017).

Since English was introduced as a medium of instruction in the Sindh province of Pakistan in 2014, teachers who used to teach science in their native language were compelled to teach science in English. However, no prior teaching was conducted for teachers to equip them with the skills required to teach science subjects in English. This was reported by teachers in the study of Bashir and Batool (2017) which was conducted in Punjab, the biggest province of Pakistan. Besides, according to the School Education and Literacy Department (n.d.) of Sindh, a SAT (Standardized Assessment Test) was conducted in 2014-2015 "to assess the progress of student learning for grade V and VIII in public schools, in the subjects of Languages, Math and Science". Around 4,389 students took the exam and a staggering 97.86% of them could not pass the 33 marks threshold in science. Given the lack of training among teachers and the poor performance of students on these tests, it is essential to study the perceptions of secondary school science teachers. The perceptions of content teachers hold great importance due to the fact that they are key stakeholders in the implementation of English as a medium of instruction (henceforth EMI) policy. Without their capabilities, the policy goals could not be accomplished. Since the literature lacks the voice of secondary school science teachers on English as a medium of instruction, the present study aims to explore the perceptions of secondary school science teachers regarding EMI at a secondary school in Sukkur, Pakistan.

Research Question

What are the perceptions of secondary school science teachers regarding English as the medium of instruction at a public sector school in Sukkur, Pakistan?

Literature Review

Globalization and the increasing technological advancements have created a new global order which demands a shared medium for communication (Marsh, 2006). Since English language has fulfilled this requirement, it has become a lingua-franca of the present world (Conrad & Mauranen, 2003). It is not only the language of trade and commerce but also of education, science and technology, and many other fields of life. Therefore, over the years, English became an integral part of the curriculum of many countries from pre-school to higher education (Marsh, 2006). In the domain of education, it has become a language of research, a means of meaningful exchange of knowledge, and a medium of instruction (Mahboob, 2014).

Kyeyune (2003) described the medium of instruction as "an enabling tool that facilitates the learning of subject content…" and gives learners a way to construct meanings of the world around them. EMI is defined as "the use of English language to teach academic subjects in countries or jurisdictions where the first language (L1) of the majority of the population is not English" (Dearden, 2014).

English has been adopted as a medium of instruction in many non-English countries of the world. Some of them have adopted it because of globalization, whereas others have done so due to their colonial history. The colonial history with either Great Britain or the United States has an effect on the institutional role of English (Kirkpatrick, 2011). The policy of EMI was introduced in Sri Lanka in 2001. A case study examined the challenges in the implementation of the medium of instruction policy since its start and it also looked at the expansion of English medium classes in schools. The findings revealed that the policy had been successful but better infra-structured classrooms with the latest technologies, effective training of teachers, and support by management of the schools were required to produce better results (Wijayatunga, 2018).

A similar policy has been adopted in Nigeria where English is taught as a subject in primary classes (i.e., classes one to three), but it is the medium of instruction in secondary classes (Ibrahim, Shafaatu, & Yabo, 2017). An integrative study conducted in Hong Kong pointed out that primary education is given in the mother tongue, but secondary education is given in English because students have to study in English at universities (Kong & Hoare, 2010). Schools in Singapore have English as the medium of instruction for all disciplines except foreign languages (Kirkpatrick, 2011).

Influenced by the argument of globalization, English is being used to teach science subjects as well. Othman and Saat (2009) stated in their

research that Malaysia adopted the policy of teaching science subjects in English at school and university level in order to be declared as a developed nation by 2020. Likewise, a survey study conducted on seventh-grade students in Germany stated that Physics is taught to them in English because international development has necessitated profound subject knowledge as well as command of English (Haagen-Schützenhöfer & Mathelitsch, 2001).

In the same way, given the importance of EMI, Pakistan also adopted a policy of English as a medium of instruction despite having Urdu as the national language. According to the National Education Policy 2009, "the curriculum from Class I onward shall include English (as a subject), Urdu, one regional language, mathematics along with an integrated subject" (Ministry of Education, 2009). However, provinces were given an option for 05 years not to participate. Aziz after 05 years, it would be mandatory to teach content subjects in English. Whereas, the policy clearly stated that "English shall be employed as the medium of instruction for sciences and mathematics from class IV onwards" right away.

On the contrary, the latest education policy, published in 2017 by the Ministry of Education, declares the national language (Urdu) or a local language as the medium of instruction at the primary level (Ministry of Education, 2017). However, National Education Policy 2017 does not state anything explicit about the medium of instruction at the secondary level which indicates a continuation of the previous policy.

After the eighteenth amendment to the constitution of Pakistan in 2010, the mandate of the development of the national curriculum has remained with the Federal ministry. However, the implementation and planning under the guidelines of national education policy have been the subject of provinces (Aziz et al., 2014). Therefore, every province made a slightly different decision regarding the implementation of English as a medium of instruction in schools. The Government of Punjab implemented the policy forthwith in 2009 declaring that all public schools will teach all subjects, especially science and mathematics, in English (Saeed, Iqbal, & Azam, 2012). However, the Government of Sindh adopted the policy of EMI in schools from class VI onwards in 2014 (Education and Literacy Department, 2014).

Though the EMI policy has been in place for some years now, very little research has been done regarding perceptions of teachers who are key stakeholders in this process. A qualitative study conducted in Punjab regarding perceptions of teachers revealed that sudden enforcement of English as the medium of instruction in the government schools of Punjab was later recognized as an unplanned decision (Bashir & Batool, 2017).

Saeed, Iqbal, and Azam (2012) concluded that teachers were not ready for the (sudden) change of medium of instruction. The qualitative research study conducted by Bashir and Batool (2017) in the same province found teachers saying that they were neither informed nor trained about this before the implementation of this policy. Thus, they were quite uneasy with it. Likewise, a study conducted in Sindh by Channa (2014) on perceptions of primary teachers about EMI revealed that the primary teachers had a positive yet concerned attitude towards EMI. They believed that the policy was good and would be fruitful for students in many ways. However, they expressed concerns regarding the implementation of the policy and training of the teachers to meet the necessary requirements.

Previous studies on the topic reveal that students have mixed attitudes towards EMI. However, these studies have been conducted with primary school teachers in the cities of Punjab and Sindh. It is of utmost significance to study the perceptions of secondary school science teachers regarding EMI because students' content knowledge develops during these precious years of study. Thus, this study aims to fill the gap by exploring their perceptions of secondary school science teachers regarding EMI.

Methodology

Research Design

The present study employed a case study design to study the perceptions of secondary school science teachers regarding EMI. The case study design was used because it enables researchers to study a phenomenon in depth using a case or multiple cases (Cook & Cook, 2016). In the words of Yin (2018), the case study approach is suitable to study a complex phenomenon in its real setting.

Participants

This case study research was conducted at a public sector school in Sukkur, Pakistan to explore the perceptions of secondary school science teachers regarding EMI. A sample of 04 science teachers was selected for the purpose of this study using purposive sampling. Purposive sampling was done because it allows a researcher to choose participants on the basis of the qualities they possess because such choice suits the purpose of the study (Etikan, Musa, & Alkassim, 2016). Besides, Duff (2018) proposes that a sample of three to six participants is sufficient for a case study. These

teachers were recruited to the school after an extensively rigorous process of test, demonstration, and interview. Since these science teachers taught their respective subjects in English in the given classes, they were found to be appropriate for the study purpose. The science teachers were contacted over the telephone and were briefed about the research study. All four teachers contacted willingly agreed to be a part of the study. The participants were asked about their consent prior to the interviews and were ensured of their confidentiality and privacy. Therefore, the participants were coded, and the data produced was labeled the same way.

Data Collection

The data for this study was collected using semi-structured interviews. Semi-structured interviews are a tool that allows researchers to interview the participant(s) to elicit information from them by asking pre-determined questions. It allows the participants to highlight the issues that are of importance to them (Longhurst, 2003). Besides, according to Creswell and Creswell (2017), participants can share their perceptions very conveniently in semi-structured interviews, and thus the gathered data is rich enough to make meaning out of it. The interview guide was prepared in the light of the previous studies in the domain focusing on the perceptions of schoolteachers about EMI. After expert validation, the interviews were conducted in both English and Sindhi (regional language). All the interviews were conducted in a comfortable room after receiving participants' consent.

The interviews were recorded using a smartphone and were later transcribed and translated to English from Sindhi so that they can be properly used for coding purposes. Some of the quotes presented here are translated versions of the transcripts. Each interview took ten to fifteen minutes.

And mainly focused on three areas: how teachers perceived EMI, what challenges they faced, and how they dealt with those challenges.

Data Analysis

Once the interview data was translated and transcribed, it was coded and classified into categories using Microsoft Word. In order to analyze the interview data, a thematic analysis technique was used. The method of thematic analysis is used for identification, analysis, and reporting of patterns emerging from the data (Miles, Huberman, & Saldaña, 2018). As the themes emerged from the data, categories were formed to make meaningful interpretations of the data.

Results

Access to Resources

Participants believed that English as a medium of instruction is useful for teaching science subjects because it gives students access to valuable resources available in English. A participant coded as 1GSUK said, "World is working on technological advancement […] all of it is in English. Internet is flooded with useful material so it is good if they study science in English".

Moreover, they said that since there are no equivalents of scientific terms in Urdu (national language) or Sindhi (regional language), the English terms cannot be easily replaced. Students become acquainted with those terms in English. Even if there are equivalents in their native or regional language, they are not so commonly used and are difficult for students to remember and even pronounce. So, familiarity with terms in English helps them get to the related learning material online as well. Therefore, English is important in science classes.

Students' Poor Language Background

Although participants acknowledged the fact of English being useful in science classes, they opined that English is insufficient as a medium of instruction in their context. Upon exploring, it was revealed that poor language background of students impedes their understanding in science classes. The students listen to the lecture, but their facial expressions tell that they do not grasp anything or understand very little. A participant (1BLRK) said, "When I explain any concept of Biology in English, only a few students nod and raise questions which is a sign they are getting my point. The rest of them remain at a standstill and their faces tell they have not understood anything […] When I ask them what they got, they ask me to explain same things to them in Urdu".

Supporting Strategies

When the participants were interviewed about how they taught students complicated concepts or scientific procedures in English, they said that they used certain supporting strategies for scaffolding students' learning. One of the participants (1PHYD) said, "I take frequent pauses during my one-hour class and give students time to make some notes easily because

they cannot do both listening and notes-taking simultaneously".

Another teacher (1GSUK) shared that he used visual aids such as videos and diagrams to support students' learning. Another participant (1BLRK) said that he used the demonstration method or used real objects more and more to show students what something is and the way it works. However, all the participants said that they switch to their native language, if necessary.

Need for Code-Switching

Science teachers also had interesting views regarding code-switching in science class. Code-switching (CS) is a linguistic phenomenon in which a speaker makes an utterance in several languages (Zeng et al., 2018). One teacher coded as 1MNBS said, "I use native language in my class most of the time because of the average students because their understanding matters most. […] Good learners understand whatever strategy you employ and language you use but it is the average students who suffer because of non-native language." Another participant (1BLRK) considered code-switching indispensable because students do not have so much exposure to scientific knowledge at homes in our [Pakistani] context.

Course Completion and Cramming

Course completion was another important aspect related to EMI which was discussed during interviews. Participants had varied views regarding this aspect. One participant (1GSUK) believed that EMI did not restrict course completion time, but it slowed its progress a little. Another participant (1BLRK) said that he could complete the course despite using EMI in secondary classes, but students did not develop a full understanding of the course which, he said, was revealed in their poor exam results.

Class Participation

Teachers believed that EMI worked as a barrier for students as they couldn't explain clearly what they thought. Some students listened to their teachers and fellow students discuss something in English carefully but they themselves participated very little in discussions and QA sessions. Participant (1PHYD) said, "When they (students) are asked to respond to

questions in English, they do not utter a word. This gives an impression to the teacher that they didn't understand the concepts explained to them in class. Whereas, when I allow them to speak in Sindhi (their native language), they sometimes explain the bits and parts of a topic". On the other hand, other participants said that those students who had good or satisfactory command of the English language could convey their ideas well and participated more actively in the class.

Discussion

The results show that access to resources is much easier for students if they are taught science in English because the reference material is readily available online. So, the teachers' perceptions are positive about the use of EMI. Even the primary teachers were found to have similar perceptions in the study conducted by L. A. Channa (2014) on primary teachers in the province of Sindh. Likewise, Channa (2012) also reported that teachers at the university level considered English very beneficial for students in science classes. However, Saeed, Iqbal, and Azam (2012) in their study conducted on secondary school teachers in Punjab reported that 68% of the teachers considered the native language to be useful for teaching science, which is in contrast to the findings of this study.

Despite having positive perceptions towards EMI, the participants of the study pointed out its insufficiency. They believed that students' educational and social backgrounds do not support EMI. These findings corroborate with the findings of L. A. Channa (2014) and M. A. Channa (2012) in their studies on primary and university teachers respectively. Because of having these issues in the class, the teachers stated that they took to the native language of students to make them understand the content because it mattered most in a science class. This result gets support from the study of M. A. Channa (2012) in which even university teachers admitted that native language is used in classes because "students can perform better in their regional language."

The findings also suggest that course completion was not an issue for the teachers despite using EMI. However, they hinted that students could not grasp the topics well because of EMI. Cankaya (2017) reports the same issue of poor understanding of concepts by students because of EMI. This also affirms the findings of this study regarding issues in understanding academic content in science class. As for the class participation of students, the participants held EMI as a barrier in communication for some students. They believe that students could participate well in class but because of less language proficiency, they are unable to make a

contribution in class. This may shatter the confidence of the students who may know something but cannot express it because of a foreign language. Cankaya (2017) also refers to the problem of low confidence among students because of EMI which affects their participation level in class. The most important theme to emerge from the data was supporting strategies the teachers used in their classes. Audio-visual aids and demonstration of realia (real objects) were the resources they used in order to make students understand scientific concepts. None of the studies referred for this research purpose mentioned the use of any such things to scaffold students' learning in science class using English as a medium of instruction. The possible reasons for this can be exposure of teachers to different ways of teaching, convenient availability of resources and strict school policies.

Conclusion

The study aimed at exploring the perceptions of secondary school science teachers regarding EMI. In-depth interviews conducted from the teachers of different branches of science revealed that teachers had very positive perceptions towards EMI. However, they considered it difficult to use English continuously for a longer period of time because they believed that students had trouble in understanding the academic content in English. Poor educational background of students in the English language was said to be the primary reason for this. Findings also highlighted that EMI restricted students' participation in class because they were unable to communicate in English. Because of this, they could not share or explain what they knew in fact. This created the need for teachers to switch to their native language in order to make the students understand core concepts. Although EMI didn't hamper the progress of the course as a whole, it required teachers to devise scaffolding strategies for better understanding and retention of topics by students.

Recommendations

On the basis of the findings of the research, the following recommendations are made:

- Policymakers must conduct research into the challenges teachers are facing in EMI classrooms so that effective strategies could be developed well in time.
- Policymakers and other stakeholders such as administrators should

assess the local situation before implementing any such policy in the spirit of meeting global needs and demands.

- Science teachers- of both primary as well as secondary schools- must be made proficient in English if the policymakers want EMI policy to be successful and produce desired outcomes.
- Teachers should be equipped with up-to-date pedagogical skills so that they can use multiple teaching strategies as an aid to teach scientific concepts in English.
- Teacher education should be revamped in order to produce qualified teachers for future needs.
- Teaching resources – books as well as online - should be made available in plain English so that teachers may use them for better understanding of students and of their own.
- Classroom teachers from rural and urban areas must be made a part of policy formation after all it is they who have to implement the policy at the grass-root level.

This research focused on getting the views of secondary school science teachers regarding EMI through semi-structured interviews. The study has revealed some useful insights from the participants which may prove helpful in improving the status of English as a medium of instruction in Sindh, Pakistan. In this study, science teachers were interviewed whereas teachers teaching Arts and Humanities subjects were not a part of this study. Their perceptions should also be studied. Secondly, these participants were recruited from a school situated in an urban center; teachers teaching science in remote areas might have different perceptions. Moreover, this study was conducted in the pre-COVID world, the perceptions of science teachers about EMI in the post-COVID world must be explored due to the increase in online teaching and learning. The small sample size was selected due to time constraints. Although small sample size was used for this study, it does not stand as its limitation because the aim of this study was not to generalize findings rather to study the phenomenon in depth in its specific context (Creswell & Creswell, 2017).

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