Attitudes towards English Medium of Instruction in Engineering Courses in Rwanda Polytechnic

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Abstract: Like many African countries, Rwanda uses a foreign language as a medium of instruction, despite being a monolingual society. Rwanda has made English a medium of instruction at all levels of education, mainly because English has become a global lingua franca. However, prior research has reported difficulties in implementing English medium of instruction (EMI) in Rwanda due to limited English proficiency in both students and teachers. This study investigates the students' and lecturers' attitudes towards learning and teaching engineering courses through the medium of English at Rwanda Polytechnic. The mixed research design was used to collect data. A Likert scale questionnaire was used to collect quantitative data from three Polytechnic Campuses in order to explore students' attitudes regarding the use of the English medium of instruction in engineering courses. Qualitative data was collected from students through Focus Group Discussions to deeply understand the students' perceptions, challenges, and coping strategies regarding the use of EMI in engineering subjects content. Semi-structured interviews were conducted with twenty content lecturers. Data analysis was done by merging quantitative and qualitative data to get an integrated understanding of students and lecturers views about EMI. The findings show that there are mixed perceptions about the use of EMI in engineering subjects. On one hand, both students' and lecturers' view EMI as an opportunity for their career prospects. On the other hand, they disagree with the use of an English-only medium of instruction because both students and lecturers experience difficulties in accomplishing academic tasks due to limited English proficiency. As a result, L1 is predominantly used to facilitate content teaching and learning. The preference for code-mixing is meant to increase students'

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participation, and explain domain-specific terminology, thereby maximizing the comprehension of the subject content. Recommendations for workable policy changes of the instructional language are made.

Keywords: Start-up, entrepreneurial model, conference interpreting, effectiveness, *kaizen*-type approach.

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Introduction

Rwanda is among a few countries that remain linguistically monolingual, i.e., people share one language, Kinyarwanda, as their mother tongue (Tabaro, 2019). Apart from being a unifying factor, Kinyarwanda dominates in all interactions ranging from recreational, social, and cultural to religious sermons. According to NISR (2014, cited in Sibomana, 2014), more than 99% of Rwandans speak Kinyarwanda. It is therefore evident that for a foreigner to effectively communicate with most Rwandans, s/he must use some Kinyarwanda. Even Rwandans who are proficient in other languages like English and French feel more comfortable when they are interacting in their mother tongue.

English as a foreign language gained influence in Rwanda from July 1994 by the time Rwandan refugees were returning to their country from the neighbouring Anglophone countries (Uganda mainly, as well as Kenya and Tanzania). The choice to set up English as an official language was made in 1996. Several Rwandans liked the idea of making English an official language as a way to improve connections with other countries across the world, ease access to overseas education, and contribute to Rwanda's economic growth (Samuelson & Freedman, 2010). Rwandans realized that the future of globalization is in English, and they wished to take part in that new world. The process of making Rwanda an English-speaking country continued until Rwanda became a member of the East African Community and joined the Commonwealth in 2009. French and English were obligatory subjects from 1996 (Obura, 2003) until 2008 when the Government of Rwanda made the English language a primary medium of instruction in all state schools from primary schools to institutions of higher learning. However, studies reveal that learning and teaching academic courses through a medium of English (a foreign language in this case) poses problems for both students and teachers whose mother tongue is not English (Pearson, 2016). From 2009, the new policy came into force immediately, requiring students and teachers to study and teach in English as the only medium of instruction. This change was primarily motivated by political, economic, and social debates to keep up with globalization trends (Kagwesage, 2013). Despite the effort made to

improve English proficiency among teachers and students, many still struggle to teach and learn academic courses in an English-only medium of instruction due to limited proficiency in English even though English has been made a medium of instruction for more than a decade now. The failure to acquire English in Rwanda can be attributed to an environment that does not favour second/foreign language acquisition. English is not widely used across the country except in academic settings (Dulay et al., 1982). Yet, language acquisition necessitates a conducive environment that exposes the language learner to everything related to the target language, i.e. interactions in shops and restaurants, chats with friends, television programs, signposts on the streets as well newspapers. Language environment, therefore, plays an important role in learning a language. Rwanda's language environment (markets, churches, streets, shopping areas, local radio/TV programs, taxis, and in many non-academic workplaces, etc.) does not favour the exposure to enough English language inputs, thereby reducing the chance of mastering English. Kinyarwanda, on the other hand, is the language that most people are exposed to in everyday activities and events. Worse still, Kinyarwanda dominates even in informal interactions among lecturers and students in academic environment and therefore reduces chances of improving proficiency in English. Both formal and informal acquisition of English as a second language in Rwanda is still a challenge because many teachers still have limited proficiency in the target language and also due to a lack of exposure to sufficient input of English language in an almost Kinyarwanda-only speaking community. Even though prior research has found out that Rwandans welcomed the English medium of instruction (Tabaro, 2019; Kagwesage, 2013 & Sibomana, 2014), it is still not widely used in society and some students and lecturers reluctantly use it in everyday academic activities.

It is for this reason that this study aims to explore the students' and teachers' attitudes towards using the English medium of instruction in teaching and learning engineering courses at Rwanda Polytechnic. Our interest in this topic was also triggered by the negative attitudes shown by the general public towards a notice from one of the Colleges of Rwanda Polytechnic that requested all teaching staff to use English only in academic activities[1], something which might not have

[1] https://twitter.com/iprckarongi/status/1131301388963713027?lang=bg– Reactions of the public to the notice instructing lecturers to teach in English only

been well perceived by different stakeholders in education. This research is therefore aimed to find out how students and lecturers view the use of English medium of instruction in learning and teaching engineering courses.

The significance and objectives of the study

The significance of this study lies in the fact that knowing someone's attitudes may help in predicting how they will behave over a period of time (Baker, 1992). In clear terms, attitudes may help predict what people are likely to do and may determine the outcomes as positive or negative. It is the attitudes that determine the motivation of doing an action by investing some energy in it (Heckhausen, 1991). In exploring the students' and lecturers' attitudes towards the use of EMI in engineering courses, it will help predict whether or not they (students and lecturers) are motivated to engage in academic activities through the medium of English and how their perceptions would be favourable or unfavourable for academic progress. The findings would therefore help in providing important suggestions for reconsidering the needs of students and lecturers, while at the same time revisiting the instructional language policy in higher education in general and more particularly rethinking the effective use of EMI in hands-on skills courses like Engineering.

This study aims specifically at (i) exploring the students' and lecturers' views regarding the use of English ¬medium of instruction in learning and teaching engineering courses, (ii) showing how using English medium of instruction (EMI) in engineering courses is beneficial and challenging to lecturers and students, and (iii) finding out how students and lecturers cope with learning and teaching engineering courses through the English medium instruction.

Materials and methods

The mixed research method has been used to collect and analyse data. The convergent parallel design has been used for this research to explore the students' and lecturers' attitudes towards learning engineering course content in the medium of English and to get an in-depth understanding of their views about the advantages and

challenges of using EMI in engineering classes. Data have been collected by the use of a questionnaire and interviews, then quantitative and qualitative data have been integrated at the level of analysis and interpretation to have a holistic picture of the problem under study.

Participants

The study was carried out on engineering students and lecturers at Rwanda Polytechnic. Due to limited time and financial constraints, three colleges were selected for this study i.e., IPRC Musanze, IPRC Karongi, and IPRC Kigali. In order to avoid the homogeneity of the sample, the researcher selected different engineering programs from the sample colleges as follows:

- Agriculture engineering from IPRC Musanze;
- Mechanical engineering and Electrical and Electronics engineering from IPRC Karongi;
- Civil Engineering from IPRC Kigali.

The variance of colleges and engineering programs is deliberately meant to diversify the responses.

The selection of students and lecturers was based on criterion sampling, as the researchers aim to include participants from different engineering programs. In a criteria study, the researcher first defines the criteria that are essential to the study. Researchers then identify participants who have the necessary information and look for cases that meet these criteria. Participants are selected based on their ability to provide information because they have knowledge and experience of the phenomenon of interest. (Cohen & Crabtree, 2006). This technique increased the chance of finding out attitudes towards the issue under study.

Data collection instruments

This research relied on both quantitative and qualitative approaches to get accurate results and sufficient data from the respondents. Questionnaires have been developed and administered to 150 students to get an understanding of the attitudes and opinions of

the students towards learning and teaching through EMI. The researchers were interested in knowing the students' language background and their self-reported English proficiency, which might help in determining their level of readiness to study engineering courses in English. The questionnaire has also included questions about students' attitudes towards studying Engineering through EMI, their confidence in learning engineering courses through EMI, content comprehension and students' participation, challenges faced as well as ways used to understand academic content taught through EMI. A Likert scale of four response options was used to explore students' attitudes towards learning engineering courses in English. The Likert scale ranges from Strongly Disagree to Strongly Agree. It does not include a "Neutral" option to reduce the likelihood of respondents who would choose it to show that they have no opinion when they really do. By removing the neutral option, respondents are forced to use their cognition to give their true perceptions on the topic, thereby minimizing the impact of social desirability bias (Garland, 1991). Semi-structured interviews have been conducted with 20 lecturers. Lecturers have answered questions about their experience in teaching engineering courses in English only. We also tried to find out lecturers' self-reported English proficiency and their confidence in teaching through EMI. There were questions about the perceived benefits and challenges faced by lecturers while teaching engineering courses through EMI, and how they cope with the challenges. With this tool, we were able to obtain detailed information about lecturers' attitudes, and it allowed for detailed information from the respondents. Due to their tight schedules, 10 lecturers were interviewed by telephone, and they were audio recorded with their consent.

For students, there have been four Focus Groups with 5 students each. Students who formed focus groups have been selected from those who had participated in answering the questionnaires, i.e. five from mechanical engineering, five from Electrical engineering, five from civil engineering and five from agriculture engineering. Focused group Discussions included semi-structured questions meant to collect in-depth information about how students feel while learning engineering courses through EMI, the challenges they face and strategies they use to cope with learning academic courses in English only.

For validity reasons, interviews have been conducted in a language that participants understand better to help participants express themselves fully and clearly. Then, data have been audio recorded, transcribed and translated into English from Kinyarwanda (L1). Three lecturers who specialize in the English language and who are also natives of the Kinyarwanda language worked in collaboration with the authors to translate qualitative data from Kinyarwanda into English.

Data analysis

Data from the questionnaires have been presented in the form of tables showing frequencies and percentages for easy analysis. Microsoft Excel has been used to present and analyse quantitative data. The quantitative analysis of the data focused on students' and lecturers' attitudes regarding the use of EMI in engineering courses, and the findings were then discussed in line with the research objectives. Data from Focus Group Discussions and interviews with lecturers have been transcribed and translated into English. Qualitative data have been presented in form of narratives under different themes. 'Taguette', an online open resource for qualitative data analysis, was used to code and categorize qualitative data into themes for easy analysis. Lecturer's quotations have been labelled with (Lect.) for lecturer, while those of students have been marked (FGD) for Focus Group Discussion and (Stdt.) for Student.

The presented quantitative and qualitative data have been merged to create comprehensible and convincing interpretations regarding the research questions.

Limitations of the study

As previously presented, due to limited time and financial resources, the researchers have preferred to choose IPRCs that were easily accessible and the sample size of 150 might not allow findings to be generalised considering the number of all students in 8 IPRCs. However, the selection of different engineering options from three different IPRCs guarantees the representativeness of the findings, since the data collected shows an overall image of how students and lecturers

view learning and teaching engineering courses through EMI. The study focussed on Year 2 &3 students in the academic year 2021-2022. Year 1 students were not involved because they were deemed not convenient as they had just been admitted to higher education, hence experiencing a low frequency of exposure to class lectures at University.

Findings and discussions

Quantitative and qualitative data were presented and discussed side by side to give a comprehensive understanding of the topic under study. The presented findings and discussions revolve around (a) the students' and lecturers' attitudes towards EMI (b) their perceived benefits and challenges of EMI and (c) the strategies used by both students and lecturers to cope with EMI.

Response rate

The students' response rate was 80% i.e., 120 questionnaires out of 150 were returned fully completed. For the Focus Group Discussions, all the five groups composed of five respondents each were interviewed. And all the selected 20 content lecturers were interviewed.

Students' attitudes towards the use of EMI in engineering courses

Students' attitudes regarding the use of EMI in engineering courses were investigated by giving attitudinal statements with which the respondents had to agree or disagree, as shown in Table 1 below.

Table 1. Students' attitudes towards the use of EMI in engineering courses

Statements	Alternatives, Respondents & Percentages			
	Strongly Disagree	**Disagree**	**Agree**	**Strongly agree**
It is hard to learn engineering subjects in English	5 4.2%	26 21.7%	67 55.8%	22 18.3%
It is unfair to study engineering subjects in English because students with lower English proficiency may score lower grades	6 5.0%	34 28.3%	40 33.3%	40 33.3%
Studying engineering courses in Kinyarwanda and English is desirable to me	2 1.7%	24 20.0%	43 35.8%	51 42.5%
I like it more when the instructor is teaching engineering courses in English only	19 15.8%	88 73.3%	13 10.8%	0 0.0%
Studying engineering courses in English only increases my chances of passing the exams	28 23.3%	82 68.3%	10 8.3%	0 0.0%
Studying engineering courses in Kinyarwanda and English increases my chances of passing the exams	0 0.0%	0 0.0%	82 68.3%	38 31.7%

From Table 1 above, findings show that the majority of students find it challenging when they learn engineering courses in English. 74.1% of respondents find it hard to learn engineering courses in English; 66.6% of respondents have shown that studying engineering subjects in English is unfair, as students with lower English proficiency may score lower grades. This is in line with the assertion of Kirkpatrick (2011) who claim that students cannot learn from English if they don't understand what is said in English. Respondents (80%) also indicated that if the subject content is taught in English, they spend much time revising the content. Students (91.6%) disagree that studying engineering courses in English only increases their chances of passing the exams, while 100% of the respondents are in favour of mixing Kinyarwanda and English while studying engineering courses because it helps them pass exams. The results show that studying engineering courses in English only poses limitations in terms of academic performance, as students fail to revise the subject content, which reduces their chances to succeed in exams. In addition, the interviewed

student added that "Even some lecturers seem not to master English and use Kinyarwanda in class and I don't find it a problem because it makes the content much clearer."(FGD 2-Stdt 4). The students' perceptions about the use of EMI in engineering courses imply that the students' low proficiency in English may impair academic knowledge acquisition and negatively affects class participation and therefore impact the student motivation to learn (Kang & Park, 2005).

The students' preferred EMI in engineering courses

Table 2 below indicates that 102 (85%) respondents preferred the use of code-mixing (Kinyarwanda and English) rather than using English only as a medium of instruction (15 %).

Table 2. Rasons for students' preferred EMI in engineering courses

Ideas	**Frequency (n = 120)**	**%**
English only		
Studying in English will improve my English proficiency level	7	5.8
Studying in English will increase professional opportunities (international jobs and scholarships, access to research)	10	8.3
Many technical terminologies have no Kinyarwanda words, so English would be the best language to study engineering courses	1	0.8

Ideas	**Frequency (n = 120)**	**%**
Bother English and Kinyarwanda (*Code-mixing*)		
Because it helps us understand the meaning of new terminologies used in the course	19	15.8
Kinyarwanda helps clarify difficult material	8	6.7
Both languages complement each other in comprehending the content	10	8.3
Mother tongue helps in internalising the content instead of memorising it, and improves active participation in the lesson as well as academic performance	38	31.7
Kinyarwanda helps to fill the English language gap I had in primary and secondary, so when an explanation is given in	19	15.8

Ideas	**Frequency (n = 120)**	**%**
Kinyarwanda, I can easily understand		
Some lecturers are not proficient in English, if they explain in English, it becomes rather confusing, but when they switch to Kinyarwanda, everything is clear	2	1.7
After all, Kinyarwanda is predominantly used at local labour market, that is why Kinyarwanda should also be used	4	3.3
Promotion of mothern tongue is needed	2	1.7

When the respondents were requested to explain their preferred medium of instruction in engineering courses, they identified reasons to justify their choices and the researcher tried to categorize and quantify the respondents' explanations regarding their preferred medium of instruction. It was therefore found out that only 18 respondents (15%) managed to explain why they are in favour of an English-only medium of instruction. They believe that studying engineering courses in English only would help them get different opportunities such as international jobs, scholarships as well as access to research most of which is available in English, and were also of the view that studying in English only would improve their English proficiency level. Findings show that 102 respondents (85%) chose code-mixing (English and Kinyarwanda) mainly because mixing the two languages during instruction "helps in internalizing the content instead of memorizing it, and it improves active participation in the lesson as well as academic performance" (FGD 2-Stdt. 1). They also have reported the need for code-mixing as a good way to fill the English language gap they had in primary and secondary education. With code-mixing, the content can easily be understood as one respondent put it "When an explanation is given in Kinyarwanda, I can easily understand" (FGD 4-Stdt.5)

Other respondents think that code-mixing is helpful when it comes to explaining technical terminologies that are hard to understand when presented in English only (15.8%). 8.3% of the respondents believe that both English and Kinyarwanda complement each other to make the subject content more comprehensible.

The fact that most of the respondents prefer code-mixing to an English-only medium of instruction, is evidence that students view EMI

as a barrier to effective learning and teaching of subject content. If students dislike learning through English only, they will have difficulty using the disliked language, thereby creating a feeling of disappointment or hopelessness, which might in turn affect their self-confidence. This situation impedes students' academic progress (Agajie, 2020).

Perceived benefits and challenges associated with EMI

Respondents were asked to show their degree of agreement with the statements regarding the relevance of learning engineering courses through EMI. The respondents' perceived benefits of EMI show their attitudes towards the English language in general and English as a medium of instruction in particular.

Table 3. Perceived benefits of EMI

Statements	Alternatives, Respondents & Percentages			
	Strongly Disagree	**Disagree**	**Agree**	**Strongly agree**
Studying engineering courses is only beneficial to me	29 24.2%	41 34.2%	37 30.8%	13 10.8%
Studying engineering subjects in English is very necessary at the university level	0 0.0%	25 20.8%	71 59.2%	24 20.0%
Studying engineering subjects in English will help me get a well-paid job	2 1.7%	30 25.0%	58 48.3%	30 25.0%
Studying engineering subjects in English helos me improve my English proficiency	0 0%	27 22.5%	48 40%	45 37.5%
Studying engineering subjects in English will increase opportunities for scholarships in international universities	25 20.8%	7 5.8%	40 33.3%	48 40.0%

Findings in Table 3 above show that learning in English is important at the university level in terms of improving the level of proficiency in English (77.5%), getting a well-paid job (73.3%), and having scholarships opportunities abroad (73.3%). Though participants

view EMI as useful, most of them do not believe that an English-only medium of instruction is beneficial to them (58.4%).

It can therefore be deduced that respondents find EMI important because the English language is used for wider communication and career development as one respondent said "Nowadays, it is important to study in English because it might increase opportunities for getting good jobs anywhere in the world, I can say that if someone said that English is a world language, it wouldn't be a lie."(FGD 4-Stdt. 3). Although respondents want to benefit from the opportunities that come with English, they think that using it as the sole medium of instruction in engineering courses wouldn't benefit them as it constitutes an obstacle for them to acquire the desired skills since their low proficiency in English seem to complicate the comprehension of the subject content thereby creating gaps in knowledge and skills acquisition.

Although EMI is viewed as beneficial, respondents identified some hindrances in using EMI in earning and teaching engineering courses, as shown in Table 4 below. Limited English language proficiency constitutes a major issue for EMI learners and more especially when English-only is used in academic activities for learners who rarely use English outside the classroom. If students don't hear nor use English as much as possible, they can hardly learn from it (Kirkpatrick, 2011).

Table 4. Students' perceived challenges linked to EMI

Statements	Alternatives, Respondents & Percentages			
	Strongly Disagree	**Disagree**	**Agree**	**Strongly agree**
I fail in the assignments and exams mainly because my English level is low.	0 0.0%	11 9.2%	53 44.2%	56 46.7%
I memorise what I have studied in English without understanding the meaning	0 0.0%	7 5.8%	68 56.7%	45 37.5%
In class, when the lecturer asks me a question in English, I respond in Kinyarwanda	0 0.0%	5 4.2%	76 63.3%	39 32.5%

EMI versus academic work

From Table 4 above, findings have shown that 109 respondents (90.9%) fail assignments and exams due to their low level of English proficiency. The same problem was raised during Focus Group Discussions, where a respondent pointed out that:

> There is a big difference between the way we are taught and what is required to do during assignments or exams. A course we were taught in English only requires us to memorize the content in the hand out and reproduce it exactly as it appears in the hand out. For the courses where lecturers predominantly use Kinyarwanda, during exams I try to translate what I was taught into my poor English which affects the clarity of my ideas resulting in low grades. If a lecturer fails to understand what I have written, he either marks it wrong or gives me a low score. … Luckily enough, almost all exams are written which reduces pressure and nervousness to use English however bad it may be. The problem arises when we have assignments to present orally, we fail not because we don't know the content but because of our poor English. (FGD 3-Stdt.3)

Another respondent further revealed that

> When you try to answer the exam questions in your own words in English, you get low marks may be due to our poor English which lecturers fail to understand. You see, what you write in English may convey a wrong meaning to the lecturer and as a result, you lose marks. (FGD 2-Stdt.1)

This is in line with what authors like Choi (2018); Sawahel (2015) and Plonski et al. (2013) wrote asserting that EMI policy led to passive participation of students in the classroom activities, lowered lecturers and students' confidence, hindered content comprehension thereby affecting academic performance. The research conducted by Evans & Morrison (2011) shows that students in Hong Kong had difficulty producing written content in compliance with the proper academic style required by a certain content discipline. Thus, directly affecting the students' academic performance (McKinley & Rose, 2022). The findings of this research also confirm what Kırkgöz (2009) says

about speaking challenges in EMI classes where students have difficulties in expressing the subject content in English.

Impact of EMI on cognition

Respondents (94.2%) also showed that they have to memorize the content without necessarily understanding it. When the respondents were asked about the challenges they face in using English to study engineering subjects, one responded that "*The problem is memorizing the content that I don't understand, if you want to succeed, just memorize everything even if you don't know what they mean only for the sake of getting marks.*" (FGD 2- Stdt.4).

The findings about the impact that EMI has on cognition are in line with those of Ball & Lindsay (2013) who show that it is a big concern if a learner can't produce content knowledge in English because he/she hasn't assimilated it. McKinley, J. & Rose, H. (2022) point out that EMI students simply engage with the content in a passive way thereby by making the processing of the content very shallow.

Discussions with different students through Focus Groups reported that they face challenges in performing certain activities such as remembering the basic content such as basic elements; terminologies, etc. of their subjects as shown by a respondent account

> Since some terminologies are completely specific to a certain field, I fail to recall the right words to say what I exactly want to say. For example, in Automobile Technology there are terminologies specific to automobiles only which you can't find in another field like electricity. If you don't remember such words, then you fail the Continuous Assessment test (CAT) or exam. (FGD 3-Stdt.5)

EMI seems to affect more the theoretical content than the one that requires practice as it does not involve remembering concepts but steps as noted by one respondent who says:

> This problem[of remembering the basic content] occurs when a lecturer tells you, for example, to describe in writing the steps to "assemble the engine", you don't get the right terminologies and fail as a result but when it is about assembling the engine in practice, you do it successfully, because you remember all the steps without

> necessarily associating them with their corresponding terms. (FGD 2-Stdt.2)

The findings above are agreement with what Chan (2015) found out that the content comprehension in EMI is compromised when specialized vocabulary is frequently used.

Regarding how students reflect on, analyse and understand engineering-related concepts and theories to apply them in real situations, respondents revealed that EMI complicates the learning process as indicated in a respondent concern:

> It is hard to internalize the content if you haven't understood it. Theories are normally hard to understand. Imagine if those theories are taught in a language, you don't understand well. It is more complicated... it is difficult to analyse something you don't understand. The content is complicated in English. In addition, you are dealing with the content that you are not very familiar with…. for you to analyse something, you need to have fully understood the content surrounding the idea you are analysing. Most of us fail to understand part of the content that might help us to critically analyse a given situation. The root cause is the language (English) barrier. (FGD 1- Stdt.1)

EMI obstructs learning more in theoretical subject content than in practical sessions. English complicates theoretical courses as they are abstract in nature and require lengthy explanations and literature, while practical courses are taught by using concrete and practical demonstrations which make them much easier to understand. A respondent attested it in these words:

> I don't experience any problem of putting the learnt theories into practice because practical sessions help me to understand the theories I couldn't understand in English. Since practice is about more of demonstrations, there is no much language (English) involved……I can easily understand practical courses when the lecturer is teaching them, but when I am asked to explain a practical task in English, I don't manage to do it confidently. But I can do it in Kinyarwanda…… Again, if for instance, the practical part is not taught, and I am asked to apply the theories I learnt in English, I may not be able to do it because most of the time I don't understand theories to a point of translating them into reality. The big problem is that the theoretical part is taught in too much English, which hinders comprehension. (FGD 4- Stdt 4)

It is evident that the students' low proficiency in English creates a barrier to effective learning, as it is shown that the students' cognition is hindered by poor English language skills. According to IvyPanda (2019), understanding the message depends only on the appropriate perception and interpretation of the words and sentences. People's perception and recognition of words are related to how people master the language, i.e., its words and structure. So, if students are taught in a language they don't master, it is very likely that their cognitive processes like remembering, analysing, problem-solving, and understanding will be affected, thereby inconveniencing students' academic progress. Thus, there is a close connection between human cognition and language processing.

EMI versus students' participation

Findings in Table 4 have shown that students (95.8%) opt to answer in L1 (Kinyarwanda) when they are asked to participate in learning activities as one respondent said

> Every time a lecturer asks a question in English, I try to answer it in Kinyarwanda, I push in Kinyarwanda because I can't express my ideas clearly in English. Sometimes I don't understand well what is asked, and I seek clarification in Kinyarwanda. (FGD 1-Stdt.5)

Respondents also noted that anxiety to use English makes the class more passive. This feeling of nervousness was raised by one respondent,

> sometimes, I have ideas to give in class or questions I want to ask lecturers, but the problem of my English makes me keep quiet! There are some lecturers who require us to use English if we want to say anything in class. If you don't know English well, you chose to keep quiet instead of feeling humiliated by poor English..... participation reduces in lectures delivered through English and even questions to seek clarification are always asked in Kinyarwanda. (FGD 3-Stdt.3)

Coping strategies

Students devise ways to adapt to challenges they face while learning through EMI. All the strategies used are meant for content comprehension while at the same time mitigating the impact of EMI on academic performance. The respondents pointed out the commonly used strategies to cope with EMI in engineering courses.

Table 5. Students' techniques to cope with EMI

Question	Alternatives	Respondents (n=120)	%
What strategies / techniques do you use to understand the content you learn in English?	*I have no problem of understanding the content I have learnt in English*	14	11.7
	I seek support from my classmates who know English	105	87.5
	If I fail to understand the content, I leave it	0	0.0
	I use a dictionary to find the meaning of words I don't understand	95	79.2

Peer support in L1

Data in Table 5 reveal that students try to mitigate the challenges related to EMI by seeking support from their peers who seem to master English (87.5%) and use dictionaries to look up terminologies they don't understand (79.2%). Only 11.7% of respondents reported having no problem with EMI. Since student-student interactions take place in Kinyarwanda (see Table 4), peer support becomes the effective strategy to get an enhanced understanding of the domain-specific content and to convey meaning as well as construct knowledge (Kagwesage, 2013). Peer support strategy was also highlighted in the words of a respondent in Focus Group Discussions: "*Most of the time, we revise the lecture notes in groups and through peer coaching to manage to make sense of the notes*" (FGD 1-Stdt.4).

Memorization

Students memorize the content which they don't understand so that they can pass exams, as one respondent noted: "*To tell the truth, the content I don't understand I memorize it for the sake of passing exams* [...]" Students also try to guess the meaning of words from the context in which they are used. A student said, "[...] *from technical terms used in the lecture notes, we can predict the meaning, the only problem is when a terminology is not familiar, and it makes the content hard to understand.*"(FGD 4-Stdt.1). This implies that EMI favours rote learning (Kırkgöz, 2005 &Kagwesage, 2013) where students commit everything to memory hence undermining the development of cognitive processes such as understanding, analysing and problem-solving.

Use of the internet

The internet is also used to search for meanings of words as indicated by a respondent,

> We also ask google [internet] to find out the meanings of difficult words. At times, we fail to understand the meanings given and search for related images or videos, if you are lucky you land on an image or video which clearly portrays the difficult concept you are searching. (FGD 2-Stdt 4)

Although the internet may be used to make sense of EMI content, students need to have smart electronic devices such as smartphones, tablets, laptops, etc. to regularly use them in academic activities. However, not every student can afford these relatively expensive devices and therefore the most reliable coping strategy remains peer support because the content can be clearly explained and fully understood since L1 is used.

Lecturers' attitudes towards EMI

One-on-one semi-structured interviews were used to explore the views of the lecturers regarding the use of EMI in teaching engineering courses. Due to the lecturers' tight schedules, they couldn't be available

for face-to-face interviews, and then telephone interviews were conducted with them. Twenty (20) academic staff, preferably, who teach domain-specific courses were interviewed.

The interviews with lecturers revolved around their language experience and professional details, i.e., their language background and English proficiency. The interviews also focused on exploring lecturers' attitudes towards EMI in general, as well as their attitudes towards teaching engineering courses in English. The respondents were given the opportunity to give their opinions on EMI-related issues that they think might not have been discussed. The interviews were conducted in a conversational tone, and follow-up questions were asked to get a deep understanding of the lecturers' attitudes towards teaching through EMI.

In trying to find out how lecturers perceive teaching engineering courses in EMI, they were asked the following question: "*What do you think about teaching engineering courses in English?*" The lecturers' general attitude towards EMI is mixed, as their narratives indicate.

> It is good, since English is dominating in world affairs, we must use English to meet international labour market needs. The only problem is that both lecturers and students have no standard level of English, which might affect teaching and learning. More effort is needed to improve our English proficiency if we are to compete with other countries (Lect. 1).

> English is good as it is an international language. Since we don't have Kinyarwanda words for every terminology we use in engineering, English is the best language to teach engineering though it may affect comprehension of the content to some extent, especially for us Rwandans who have had a language shift, I want to mean we changed from French medium of instruction to English (Lect. 4)

EMI is viewed as useful in teaching engineering courses because English is a global language that provides many opportunities such as employment, scholarships, access to scientific research, etc. The lecturers share the same view with students that EMI is beneficial in studying engineering courses (See Table 3). Both lecturers and students disapprove of the use of an English-only medium of instruction, as it might hamper content comprehension (See Table 1).

When lecturers were asked how they feel about teaching engineering courses in English, they expressed feelings of nervousness, embarrassment, discomfort, and dispassion. Respondents expressed their feelings as follows:

> Using English only doesn't make the class more interesting. For the lecturer to motivate students and sustain their attention, there should be use of humour, telling stories, etc. When students love you and your course, you feel encouraged to teach as well (Lect. 5)

> I really feel very nervous because some students are good at English and might identify errors in my English and lose confidence in me (Lect. 19.)

The lecturers' feeling of discomfort with EMI will most likely affect their teaching self-efficacy. Research has shown that the language of instruction influences teachers' teaching self-efficacy, thereby improving "teachers' teaching performance (Wang, 2021). Fruitful teaching and improved students' learning will depend on lecturers' higher self-efficacy. If a teacher is proficient in the language of instruction, they will feel able enough to successfully perform teaching activities.

Challenges faced by lecturers regarding EMI

Low English proficiency has been a source of pedagogical challenges for both students and lecturers (Kang & Park, 2005; Kirkpatrick, 2011 & Tsui, 2017). The interviewed lecturers have reported challenges linked to the use of EMI in teaching engineering courses. To find out what kind of challenges lecturers are facing, the following item was included in the interview; "*Are there any special challenges in using English to convey the basic elements of the subject (terms, basic concepts, etc.)?*" and respondents highlighted the following:

> There is no challenge with delivering terminologies since most of them(terminologies) are very familiar because I am used to them even right from secondary school. The only problem would be the right pronunciation because I pronounce them the way I studied them, but

> sometimes you find that even my former teachers were mispronouncing them (Lect. 10).

> I don't have any problem with domain-specific vocabulary unless another vocabulary or expression which is not commonly used in my field of specialization is used. I might not understand it (Lect. 9).

It is observed that lecturers experience fewer problems regarding teaching domain-specific terms, as they are very used to them. The only point of concern may be the right pronunciation of the terminologies.

Lecturers, however, reported challenges in explaining complex notions such as principles and theories in English as described below:

> For explaining theories and principles, you need to know English very well so that students can understand what you mean. As for me, I use both English and Kinyarwanda so that I give an explanation clearly and for students to grab what I mean because when you explain in English only students don't understand. (Lect. 12)

> You see! My English proficiency is somehow not good enough, and the same applies to that of students. Theories and principles necessitate too much explanation, which is difficult to give in English only. Even if I tried, students won't understand due to either my inadequate English or the students' poor English. (Lect. 14)

Findings have shown that since teaching theories and principles require verbosity in English, it makes it hard for both students and lecturers whose English proficiency is low. On the contrary, lecturers experience fewer problems while teaching practical topics in English because it is more of demonstrations than oral presentations, as one respondent quoted saying:

> Teaching application is much easier than theories because explanations are brief, whereas concrete demonstrations are more elaborated. So, the English to be used in application is simple (Lect. 8).

Even though practical topics are simpler to teach in English, respondents cautioned the likelihood of the poor quality of imparted

and learnt skills if instructions or explanations are either poorly given by lecturers or misunderstood by students whose English proficiency is poor.

> English causes more problems in application. You know in technical schools; the most important part is translating theories into practice. So, using English only make students miss out one some key skills. For instance, if you are teaching how to apply some irrigation techniques, you use a language in which students might feel comfortable to ask questions. Most of the time if students have not understood how to apply something they can make mistakes, some of which are hazardous (Lect. 10).

> English limits us in giving clear instructions and explanations regarding the application of knowledge. To avoid any misinterpretations by students, we mix English and Kinyarwanda (Lect. 11).

Lecturers' coping strategies in the use of English medium of instruction

The key instructional role of a lecturer is to prepare and deliver the subject content to the students in a comprehensible manner. Language is the ultimate tool to negotiate and convey the meaning of the subject content. For this to happen, lecturers should use a language they understand. If lecturers don't master the medium of instruction, they devise their own strategies to deal with the language issue, provided that the main goal is achieved: content comprehension. For this study, the interviewed lecturers highlighted different coping strategies when giving instruction in English.

Use of code mixing and/or code-switching

Respondents revealed that due to either their own poor proficiency in English or that of students, they mix English and Kinyarwanda during content delivery, as shown in the extracts below:

> For sure, content delivery is the most challenging part. Imagine delivering a three-hour session in English. I can't manage. Firstly, I

> can't explain everything clearly only in English, I choose to mix English and Kinyarwanda for the benefit of students. They themselves have problems in English. (Lect. 1)
>
> I use both Kinyarwanda and English, since we don't have any international student who would be inconvenienced if I taught in Kinyarwanda. (Lect. 3).

Research has proved code-switching to be a useful strategy for content teaching in EMI classes when the lecturer and students share the same language. However, code-switching may not be relevant if there are international students as it may prevent them from participating and understanding the content (Curle et al., 2020). The findings of this research are in line with the research on applying EMI in EFL class conducted in Indonesia by Anne Ratna (2017) where students with limited English proficiency would only understand the content if the lecturer explained using both English and mother tongue.

Use of the internet

Like students, lecturers also reported using the internet while preparing lectures to search for the meaning of difficult concepts, as exemplified in the respondents' quotations below:

> I take time and prepare the lessons as usual…, English is not a big issue when I read the content, I understand it and the problem arises when it comes to delivering the content. My English-speaking skills are still low. I also use internet to check for the pronunciation of some English words because if I pronounce them badly, students might learn the wrong pronunciation from me (Lect. 7).
>
> For me, I at least master French, when I face English problem, I use internet to translate the content from English into French so that I can understand. But I am starting to get used to English. (Lect. 15)

The internet is also used for translating the English content into the language the lecturers understand better, especially French. For practical courses, lecturers can access YouTube videos on the Internet because the videos are more concrete and understandable than

writings in English. However, lecturers still struggle when it comes to oral presentation of the prepared content in English.

Support from colleagues

Peer support is the commonly used strategy by people who seek support from the more knowledgeable and experienced co-workers. This research has found out that lecturers with low level of English proficiency to look for support from their proficient colleagues. This was revealed when respondents were asked how they manage to set exams, assignments and homework in English, and they responded as follows:

> All exams are set in English and then subjected to proofreading or internal moderation by colleagues to remove any errors, including grammatical mistakes. (Lect. 4)

> For class or take-home assignments, I set them in English and then give clarification to students in Kinyarwanda so that no one misinterprets the questions. For exams, there are in English, and I don't think setting exams in English is as challenging as preparing lecture notes. Setting exams in English is easier (Lect. 6).

To mitigate the effect of lecturers' low proficiency in English, peer support is needed in terms of proofreading or moderating exams for identifying possible English language errors. Lecturers also use Kinyarwanda (L1) to clarify the assigned tasks so that all students have a common understanding of the given assignments.

Conclusions and recommendations

The findings show that both students and lecturers view EMI as beneficial in terms of career development and global integration. On the other hand, low proficiency in English for students and lecturers has caused a negative attitude towards learning and teaching engineering courses through EMI, as it obstructs subject content comprehension. Despite the obstacles linked with their limited English proficiency,

students and lecturers have mostly used code-switching among other strategies to carry out academic activities.

Findings on EMI challenges suggest that there is a need to develop the students' receptive and productive skills in English. This would be possible if a preparatory period was put in place for the newly admitted students to undergo intensive English courses. The current practice of having English courses alongside other domain-specific courses overloads the students to the extent that they have less time to learn English.

Proficiency in English should be a requirement for graduation at all levels of education in Rwanda so that learning English is taken seriously. English proficiency qualifications should be required for teaching jobs, preferably a B1 (Independent user) or C1 (Advanced) level. Otherwise, teachers with poor English proficiency will most likely produce students with limited English proficiency as one lecturer complained,

> [...] Look! I was taught in English by lecturers who didn't master English, and I didn't master English as well. So, do you expect me to teach in English only when I was not taught in English only? Do you expect my students to know English if they were taught by lecturers like me? It is a cycle, and I don't know when that cycle will be broken (Lect. 4).

Education stakeholders should also put much effort into nursery, primary and secondary education levels as it is easier to manage students' academic and extracurricular activities such as debating clubs. In addition, it is at the lower levels of education that the chances of learning a second language are higher than those of adults, as Scovel (1988) explained that second language acquisition declines with age in what is known as the Critical Period Hypothesis. The need to scale up the English proficiency from the lower education levels is shared by the interviewed lecturers. One respondent suggested that: "[...] *policymakers should enforce EMI in primary and secondary education, it will then be automatic at tertiary level since everyone will have become proficient in English* [...]" (Lect. 4).

English language can be effectively learnt if students are helped to use English in different contexts. Therefore, schools can play a vital role

in developing the students' communicative competence i.e. the discursive competence (fluency), grammatical competence (precision), sociolinguistic competence (adequacy) and strategic competence (efficacy) (Alejo, 2014). In Rwanda, schools are almost the only conducive environments for learning English, as students are exposed to English language input in form of class lectures, readings, presentation of assignments, and interaction with teachers.

Since the findings have shown that code-switching and the predominant use of L1 are common practices in engineering classes, Higher Education Council (HEC), as a regulatory agency, should establish regulations for the effective use of L1 or code-switching. Curle, S. et al.(2020) pointed out that L1 is used in EMI classes to increase classroom interaction and enhance comprehension by providing explanations of domain-specific terminologies. Guidelines about the use of L1/Code-switching would limit the excessive use of translanguaging while at the same time helping students and lecturers with limited English proficiency to successfully accomplish their daily academic tasks.

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