

The Application of EMI in Higher Education: Learner's Cognition Perspective

Haowen Zheng^{1,a,*}

¹*Institute of Education, University College London, 20 Bedford Way, London, UK*

a. haowen.zheng.22@ucl.ac.uk

**corresponding author*

Abstract: An examination of Chinese college students' cognition about EMI learning is presented here. The findings, based on 112 surveys and a regression analysis equation, provide insight into the complexity and variety of EMI students' thought processes and directly impact their approach to EMI study within their chosen disciplines. As a result of being affected by a wide variety of contextual variables, each participant's learning results were uniquely shaped by the EMI intervention. When trying to put their knowledge into reality, students face several challenges, such as the diction skill, dialectical thinking, and understanding of their EMI teachers. This study argues for a methodical and progressive strategy for advancing and promoting EMI learning with efficient information delivery and skilled cross-cultural communication for EMI implementation in higher education.

Keywords: English as a medium of instruction, learner cognition, student development, EMI application

1. Introduction

As a consequence of the increasing internationalisation of higher education, more and more schools throughout the globe are incorporating EMI (teaching in English) into their curricula and class practices [1]. While the widespread use of EMI is a reflection of and aid to the transition to ELF, which may promote knowledge production, sharing, and intercultural dialogue, it presents significant challenges for children whose complex learning needs are often unmet in multilingual classrooms [2][3]. It is often argued that students in EFL settings, such as China, where the majority of students are not native English speakers, lack the necessary linguistic resources for successful EMI teaching because of their limited second language acquisition (SLA).

Students, who are shaped by their personal experience, cognition, and second language proficiency, have received little attention [4]. While the majority of published EMI research has focused on problems such as pedagogy, interaction patterns, and learning outcomes in EMI classes, little attention has been paid to the students. Using a qualitative and exploratory approach, the current study explores the cognition and satisfaction of a sample of Chinese college students in order to resolve this gap and add to our limited understanding of individuals who have difficulty receiving EMI instruction in higher education. Students' cognition, which greatly impacts 'the Learning Progressions' in their modes of intellection, can serve as a filter with a substantial effect on classroom outcomes and acceptance [5][6]. Specifically, how students comprehend and acquire EMI instruction and how they see themselves as knowledge learners with second language acquisition (SLA) limiting their Learning

Progression tends to be mediated by their cognition [7]. Therefore, studying the minds of EMI students can reveal crucial details about their learning and development, including how they progress, why they differ in their accomplishments, how they deal with obstacles, and what kind of professional support they may need as they continue to thrive in the dynamic and ever-changing environments of higher education.

This research tries to address the following challenges by relying on existing literature on student cognition, student reflection data, and in-depth data analysis: How do EMI students see EMI applications, and how do they use their knowledge in the real world?

2. Methodology

2.1. Research Context and Participants

2.1.1. Understanding EMI

An acronym for ‘English-medium instruction,’ or EMI, is ‘the use of the English language to teach academic subjects (other than English itself) in countries where most of the inhabitants do not speak English as a first language [4]. Previous research has indicated that conversant, constrained, topic-specific language usage is essential for EMI to occur, despite the fact that EMI puts a premium on subject knowledge. For students, it is the fundamental semiotic tool for gaining knowledge of the topic and the surrounding world [8]. Thus, it may be more challenging for students to absorb new target ideas and terminology in a discipline-specific setting if they are delivered in a purely method-based and fragmentary manner.

Consequently, in EMI classrooms, language emphasis is crucial, since the instructor draws attention to language via repeating, protocol, and semantic explication (such as definitions, rephrasing, synonyms, illustrations, and descriptions) to enhance topic acquisition [9]. However, students employ a variety of linguistic resources (both academic and everyday language) in order to bargain and co-construct new information with their peers and teachers via engaging and purposeful assignments. These incidents point to a deeper problem, which is that students who enter higher education with poor second language skills are not given the essential preparation and assistance they need to succeed [4][10][11]. This exploratory research intends to provide light on how students engaging in EMI instruction perceive their learning to be mediated by a variety of personal and environmental factors. focusing on student cognition and using data from student reflections and in-depth data analysis: In what ways do students of EMI conceptualize and apply their knowledge of EMI applications?

2.1.2. Understanding Learner’S Cognition

Previous studies in the fields of a second language and student education have described students’ cognitive processes as complex, contextual, and dynamic, open to (re)shaping via language exposure and bilingualism. Firstly, academics widely believe that bilingual teaching practice may strengthen students’ cognition in completing tasks. For example, Martin-Rhee and Bialystok’s replicated study demonstrated that bilingual children thrive at tasks requiring inhibitory control to disregard a deceptive perceptual signal [12]. The finding that bilingual students outperformed monolingual students in cognitive tests was bolstered by follow-up research that investigated ‘inhibitory control abilities and executive functioning’ [12]. These findings contribute to our knowledge of the generalizability and specificity of bilingual experience’s compensatory effects on students’ cognitive development.

Aside from the positive effects of cognitive development on learning, students’ learning activities may be hampered by their relatively stratified cognition settings. For example, Bialystok, Peets, and Moreno explored metalinguistic awareness in bilingual students in an immersion education program

[13]. It is possible that metalinguistic notions linked with bilingualism would gradually alter without performance surpassing monolingual learning if three separate elements were measured, including derivational morphology, combinatorial consciousness, and language comprehension. [13]. The multiverse analysis was used in Donnelly, Brooks, and Homer's empirical investigation to validate the conclusion that evidence for a bilingual advantage on cognitive tasks is limited. Furthermore, a quantitative analysis tends to rectify estimates for observed publication bias, even though, after substantial examination, there is no agreement on the existence of such a bilingual advantage in the learning process.

Students' cognition, defined as complex, multifaceted, and dynamic, is inextricably linked to their learning process, both positively and negatively, which are mediated by 'social-emotional outcomes in family, school, and peer contexts'. Despite the recent uptick in attention paid to the topic of student cognition, very little is known about how EMI beneficiaries cognition is affected. Recent research by Macaro and Han has shown that students in EMI environments are not automatically empowered by allowing themselves to bridge the gap in English proficiency. On the contrary, EMI teaching could adversely function as a mechanism of exclusion and reinforcement of language standards by a group of elite translinguals'. However, there has been very little research on the complex thoughts of EMI students, how they translate those thoughts into classroom learning, or the factors that moderate the interplay between their thoughts and their practise. This research fills that need by delving into the minds of Chinese students in EMI settings.

To recruit participants for this study, a purposive sampling strategy was used. Undergraduates with prior EMI learning experiences were requested to participate in the study. In the end, 112 students replied to our request and voluntarily participated in the research. The 112 individuals share similar learning experiences (e.g., two to ten years) in EMI learning, although holding varying degrees in their various areas of study. Their EMI learning experience varied from zero to over five years.

2.2. Data Collection and Analysis

After participants gave their informed consent to take part in the study, they were given a questionnaire designed to learn more about their education, work history, and thoughts about EMI education. A total of 20 questions were presented to the students, probing their knowledge of EMI and the potential roles it may play in academic learning, as well as prompting them to describe the characteristics of a typical EMI course they had taken and reflect on the difficulties they had encountered. The assistance they received may have been just what their EMI learning required. The time limit for submitting the participants' completed reflection questionnaire via email to the author was two weeks. Due to this structure, it is anticipated that participants will be able to provide insight into the research issues by intensely thinking about and (re)constructing their own lived experiences of EMI learning.

The questionnaire would be divided into three parts: background information, cognition status, and cognitive influencing factors. The following themes are at the core of this research: a) What influences, and how do they function, does EMI application have on the learner's cognitive status? b) how does the influencing factors of EMI application influence the learner's cognitive status, thus affecting the learning process? c) How do the learning process, learner's cognitive status, and influencing factors of EMI application interact with each other? Based on the above questions, this questionnaire which contains twenty questions is constructed and sent to the participants. As revealed in Figure 1, The Main Aspects Regarding EMI Application and Learner's Cognition, each question would correspond to factors related to EMI application and learner's cognition.

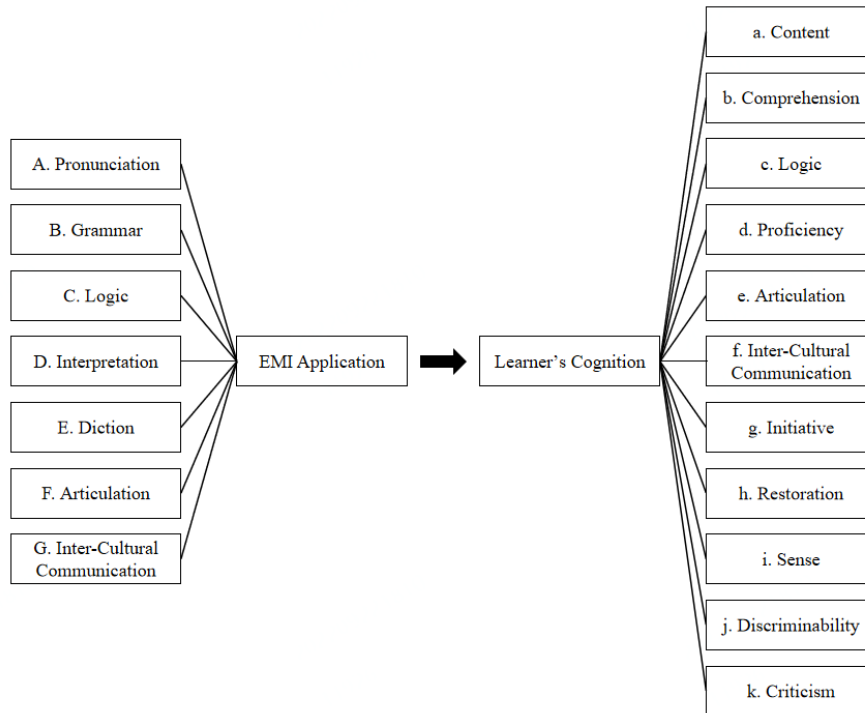


Figure1: The Main Aspects Regarding EMI Application and Learner's Cognition

Then, the equation of linear regression (1) is established to analyze the influence of EMI application on the learner's cognition. In the equation, y refers to factors in the learner's cognition and x refers to factors in EMI application. Particularly, x_A refers to pronunciation; x_B refers to grammar; x_C refers to logic; x_D refers to interpretation; x_E refers to diction; x_F refers to articulation and x_G refers to inter-cultural communication.

$$y = \beta_{\text{constant}} + \beta_1 \times x_A + \beta_2 \times x_B + \beta_3 \times x_C + \beta_4 \times x_D + \beta_5 \times x_E + \beta_6 \times x_F + \beta_7 \times x_G \quad (1)$$

3. Results

3.1. EMI Application's Influence on the Learner's Cognition

As shown in Table 1 Regression Analysis of y_a (Pronunciation) and EMI Application Factor, factors in EMI application would be used as independent variables, while the content (a) would be used as the dependent variable for linear regression analysis. Thus, the equation (2) could be established like this:

$$y_a = 5.597 + 0.049 \times x_A - 0.212 \times x_B - 0.277 \times x_C - 0.079 \times x_D - 0.213 \times x_E - 0.159 \times x_F - 0.035 \times x_G \quad (2)$$

Table1: Regression Analysis of ya (Pronunciation) and EMI Application Factors.

Parameter Estimates ($n=112$)									
	Unstandardized Coefficients		Standardized Coefficients	t	p	VIF	R^2	Adj R^2	F
	B	Std. Error	$Beta$						
Constant	5.597	0.213	-	26.260	0.000**	-	0.689	0.665	F (7,92)=29.095 $p=0.000$
Pronunciation (x_A)	0.049	0.149	0.051	0.330	0.742	7.025			
Grammar (x_B)	-0.212	0.116	-0.205	-1.832	0.070	3.709			
Logic (x_C)	-0.277	0.138	-0.246	-2.013	0.047*	4.432			
Interpretation (x_D)	-0.079	0.157	-0.078	-0.504	0.615	6.996			
Diction (x_E)	-0.213	0.121	-0.228	-1.761	0.082	4.956			
Articulation (x_F)	-0.159	0.150	-0.162	-1.056	0.294	6.962			
Intercultural Communication (x_G)	-0.035	0.146	-0.034	-0.241	0.810	5.972			

Dependent Variable: y_a

D-W: 1.764

* $p < 0.05$ ** $p < 0.01$

As shown in the above table, it can be concluded that the value of R^2 is 0.689, which means that factors in EMI application can explain 68.9% of the causes of variation in y_a . In this study, the F-test of the model could be found to pass the F-test ($F=29.095$, $p=0.000 < 0.05$), which means that at least one of the factors in EMI application will have an influence on y_a . In particular, the value of the regression coefficient of x_C is -0.277 ($t=-2.013$, $p=0.047 < 0.05$), which means that x_C would have a significantly negative correlation with y_a .

When constructing a linear regression equation, the author uses the elements in EMI application as independent variables and uses the components in learner cognition as dependent variables. Both methods are based on the same methodology. It is possible to draw the following conclusion after reviewing the table and the equations: diction has a very substantial inverse link with understanding; logic and diction would have a significantly negative correlation with logic; pronunciation, logic and

diction would have a significantly negative correlation with proficiency; diction and inter-cultural communication would have a significantly negative correlation with articulation; logic and diction would have a significantly negative correlation with inter-cultural communication; intercultural communication would have a significantly negative correlation with initiative; pronunciation, grammar and diction would have a significantly negative correlation with restoration; interpretation and diction would have a significantly negative correlation with sense; pronunciation and grammar would have a significantly negative correlation with discriminability; logic and diction would have a significantly negative correlation with criticism.

3.2. The Negative Correlation Between Two Clusters

The survey was effective in determining how the use of EMI affects learners' cognition, thus we may consider it a success. Figure 2, The Negative Correlation Between Two Factors, has shown that the findings of this research indicate that diction, logic, pronunciation, grammar, and intercultural communication during the application of EMI in higher education play a significant role in influencing the learner's cognition. This conclusion was reached as a result of examining the correlation between two factors that had a negative relationship. At the same time, the position of articulation is considered to be a subordinate one. The fact that diction may have a significant impact on the learner's understanding, logic, competency, articulation, cross-cultural communication, restoration, sense, and critique is perhaps the most convincing finding. In this scenario, the effect of this interaction can be seen across the board, having an effect on the learner's cognitive capacities. Therefore, in the process of implementing EMI in higher education, the diction skill of instructors has to be very appreciated and thoroughly assessed. In the study that was conducted by Sardi et al. the researchers found that an effective educators should have good interaction with their students. Within this interaction, the use of vocabulary was found to be of utmost significance. This is due to the fact that the correct application of a word could improve the efficiency and effectiveness of teaching.

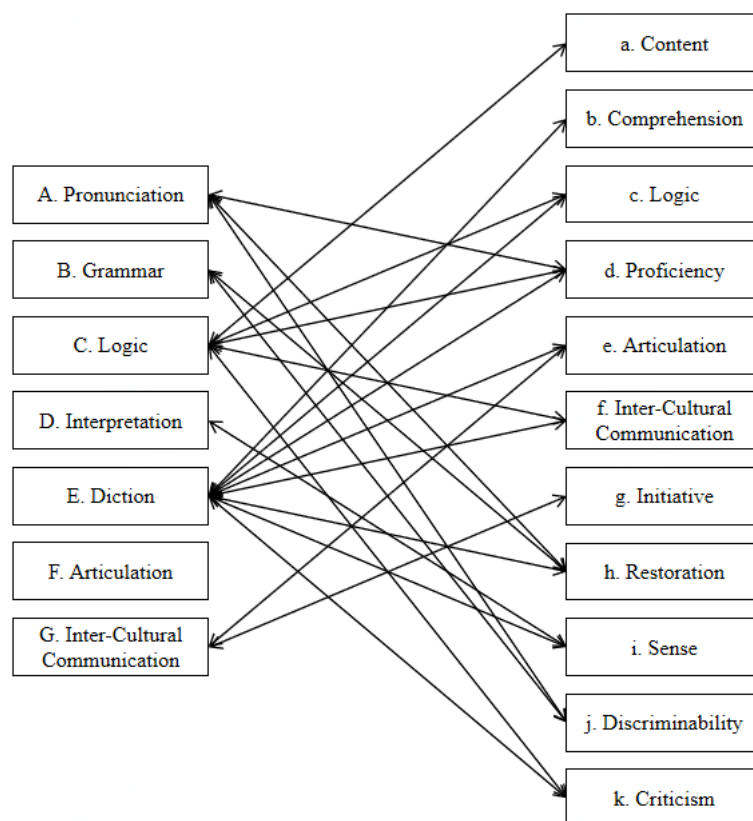


Figure2: The Negative Correlation Between Two Factors

However, the results of this investigation did not find any indication that articulation skill had any bearing on the outcome. An experiment indicated that rather than articulation skill, a superior position was shown by a triadic conversation in a class discourse. This was proved by the experiment. The results of this study are in agreement with those of a significant body of previously conducted research, which found that exposing students to logic education increased their subject knowledge, their ability to communicate their thoughts effectively, and their capacity for dialectical reasoning. Learners' capacity for content retention, future development of logic, and communication skills might all be nurtured if they received instruction in logic while they were enrolled in EMI programmes.

The study revealed that instructors' pronunciation and grammar have been regarded as a reasonably crucial component of students' overall cognitive development. This was the most significant discovery of the research. This finding lends credence to the theory that EMI instructors' command of the English language, which can be gauged in part by their command of the language's pronunciation and syntax, is related to the cognitive state of their students [2]. E-learning, which is one method of interpretation, has the potential to enhance both the 'visual and sensuous experience of the students,' making the relationship between interpretation competence and sense improvement fascinating but not unexpected. According to the findings presented here, earlier research has proven that the potential of EMI instructors to engage in intercultural dialogue will stimulate students and increase the involvement of such students in the classroom.

4. Discussion

4.1. Potential Problems

As can be observed in Figure 3, EMI Teacher's Abilities and Learner's Cognition Categories, this study gives insight into the diversity and complexity of EMI learners' cognitive processes, which connect to a range of cognitive functions and learning outcomes in their distinct higher education contexts. Instead of operating alone, their many facets of cognition more often than not interact with one another and create information for one another [12]. For example, the language competence of the EMI instructor (A. Pronunciation and B. Grammar) has a substantial effect on the attitude (h. Restoration and j. Discriminability) of the students. This influence is shared by all of the EMI teachers, which sparked a host of nuanced views regarding the use of EMI in various contexts (e.g., the assumption that EMI teachers may enhance their students' language skills via deliberate practise). Students expanded their horizons in terms of their understanding of the learning process via critical thoughts on EMI curricula and the ways in which such curricula might be studied to increase the efficacy of EMI education.

These findings are in line with the reasoning presented, despite disagreement with several prior research that there is no evidence for an influence of articulation ability on a learner's cognition. More significantly, there is a significant association between the expressive capacity of EMI instructors (c. Logic; d. Interpretation and e. Diction) and the Learner's cognitive aspects, which include the Learner's acquisition, manifestation, and mentality. For example, the most important aspect, the teacher's diction, would have a significant impact on eight aspects of the learner's cognition, which would contribute to the learner's level of learning effectiveness and efficiency. It is also noteworthy to note that the inter-cultural communication capacity (for example, G. Inter-cultural Communication) might, to some degree, boost students' initiative in the classroom by integrating cultural ideas and distinguishing cultures. This is something that should be considered.

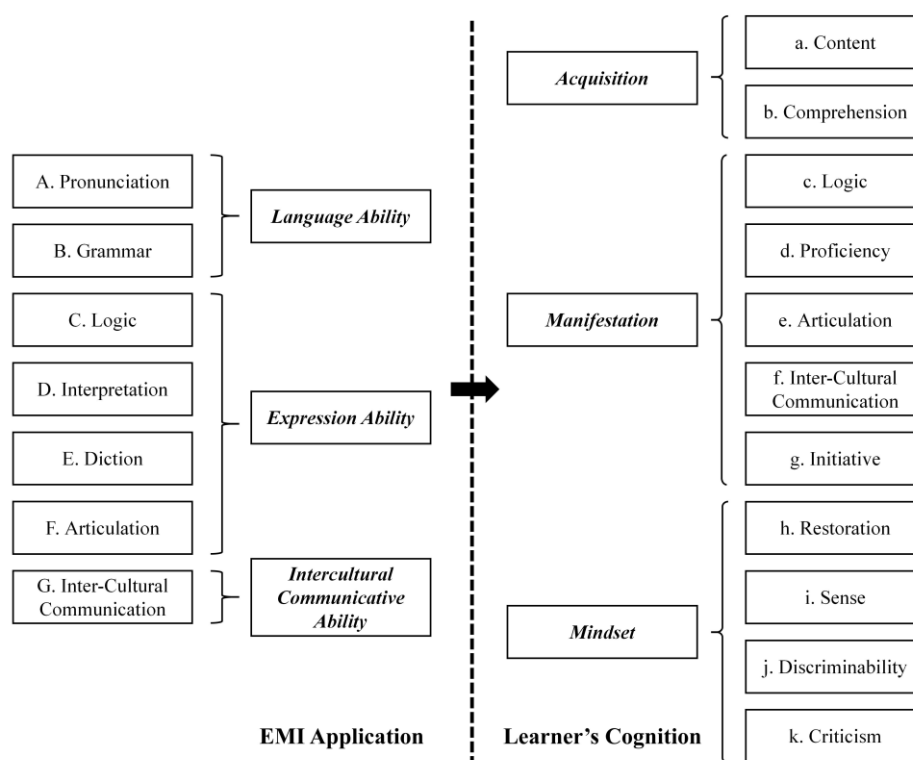


Figure3: EMI Teacher's Abilities and Learner's Cognition Categories

4.2. Suggestions and Further Improvement

Scholars have suggested that, in order for students to make meaningful changes in their ways of thinking, try out novel approaches, and develop a sense of pleasure and self-efficacy that would encourage them to stay motivated, instructors should have them begin with tiny steps in a secure environment. Just as Figure 2 and Figure 3 revealed, the language ability of EMI teachers could enhance learners' content digestion and comprehension of their specific fields of knowledge.

According to the findings, EMI teachers may better facilitate language and content integration if they provide equal attention in class to English and Chinese language materials as well as non-linguistic resources (such as visuals and diagrams). Students who are already skilled in manifestation would benefit much from this in particular. In light of the fact that the teacher's expressive talents provided evidence for such a relationship, this assumption was formed (c. Logic; d. Interpretation and e. Diction). When using an interactive teaching method, the EMI teachers realised they needed to provide students with scaffolding and tools so that the students could comprehend, negotiate, and apply knowledge through concrete language in specific domains. This was done in order to assist students in comprehending, negotiating, and applying knowledge in specific domains [10].

The significance of EMI teachers' logic, interpretation, diction, and other factors related to expression ability has been identified as an important aspect of the development of an innovative mindset as a result of this study. This could result in a more effective restoration of knowledge, discriminability, and criticism. Therefore, in this scenario, an expression-based training method for EMI instructors in higher education would be necessary for the purpose of ongoing growth.

5. Conclusion

Based on the gathering of data and an in-depth regression equation analysis, this research investigates the perspectives of EMI students about the implementation of EMI in higher education. Not only did the findings deepen our understanding of the multifaceted, malleable, and dynamic character of EMI learners' ideas, but they also provided insight on the potential for overlap and conflict between EMI learners' thoughts and other aspects of their brains (e.g., acquisition; manifestation; and mentality). However, a wide diversity of skills possessed by EMI instructors has the potential to lessen the impact of these factors (e.g., language ability, expression ability, and intercultural communicative ability). The research is also significant for EMI students in terms of its practical application, as well as for the continued improvement of higher education policy at institutions.

When implementing EMI in Chinese higher education, it is essential to give careful consideration to the cognitive profiles of the students. This study demonstrates a clear connection between the use of EMI (embedded multimedia instruction) and the cognitive capabilities of students by way of empirical inquiry and the collection of survey data. According to the findings of this research, there is a considerable association between the diction skills of EMI instructors and the cognitive capacities of their pupils. Because of this link, pupils' cognitive abilities are impacted in every possible way. The linguistic logic of the instructor would simultaneously promote the pupils' dialectical thinking as well as their understanding. The level of linguistic expertise possessed by the EMI instructor is another factor that goes into determining the efficacy of the output as well as the vividness of the information conveyed. Lastly, the implementation of EMI in higher education should place an emphasis on the various pedagogical approaches that can be taken, such as e-learning and the development of skills that facilitate better communication across cultural boundaries. These are all significant factors that determine the effectiveness of an EMI instructor.

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