TEACHING MATHEMATICS IN ENGLISH: APPLYING CRUCIAL FUNDAMENTAL TOOLS TO SUPPORT PRE-SERVICE PRIMARY TEACHERS

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Abstract

In the current digital era, many international primary schools and also national primary schools have offered bilinguals subjects in students' studies, especially Maths and Science, so that pre-school teachers should be capable of teaching Maths in English. This article examines the way to use several basic tools in order to increase motivation for Pre-service Primary Teachers who have been equipped academic knowledge fully, can speak English relatively well, and are confident in self practicing and promoting vocabulary.

Keywords: *Primary curriculum, teaching aids, teaching Maths in English.*

DẠY TOÁN BẰNG TIẾNG ANH: VẬN DỤNG CÁC CÔNG CỤ CƠ BẢN ĐỂ HỖ TRỢ SINH VIÊN NGÀNH GIÁO DỤC TIỂU HỌC

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Tóm tắt

Ngày nay, trong kỷ nguyên công nghệ số, nhiều trường tiểu học quốc tế và trường tiểu học công lập đã đưa các môn học song ngữ vào chương trình học, đặc biệt là Toán và Khoa học, do đó giáo viên tiểu học cũng nên có năng lực giảng dạy toán bằng tiếng Anh. Bài viết này đề xuất cách sử dụng một số công cụ cơ bản để nâng cao năng lực giảng dạy bằng tiếng Anh cho sinh viên ngành Giáo dục Tiểu học - những người được trang bị đầy đủ về kiến thức chuyên môn và khả năng tiếng Anh từ khá trở lên - trở nên tự tin hơn trong việc tự rèn luyện và nâng cao vốn từ vựng.

Từ khóa: Chương trình Tiểu học, công cụ giảng dạy, dạy Toán bằng Tiếng Anh.

1. Introduction and research history

1.1. Introduction

Teaching Mathematics in English is not a new issue in the education industry; implementation of teaching Mathematics in English has been carried out in many countries since the 1990s, and in Vietnam since the early 2000s (Chu, 2014; Chu, 2015). With the proliferation and penetration of international schools, advanced learning programs are being implemented in bilingual and specialized schools. Math teachers in English will be taught by qualified Vietnamese teachers in addition to high schools with rich and experienced teachers who are able to apply English well in teaching. Foreign teachers almost entirely teach math and science in English in primary schools. Discovering how elementary school students can develop and practice their ability to use English in math content will serve as the foundation for developing more appropriate development strategies for students. This is also an opportunity for teachers to work with gifted and talented students to improve their critical thinking skills (Kettler, 2015).

1.2. Research history and development

1.2.1. Teaching Subjects in English Issues

Chu (2018) denoted that teaching specialized foreign languages, teaching bilingualism or teaching science subjects in foreign languages has existed for a long time in other countries and even in Vietnam when there was the penetration of foreigners. In addition, the international program into the school, teaching and learning some science subjects (especially Math and science) in foreign languages

has been conducted since the 70s through bilingual classes with modern methods such as CBLT content-based language teaching, EMI English. As a medium of instruction, FLIP Foreign language immersion program, etc. By the 1990s, the CLIL Content and Language Integrated Learning approach was widely applied in Europe. Asian countries are also beginning to realize the benefits of teaching certain subjects in English to improve competitiveness and attract investment.

The practice of teaching mathematics and a few other topics in English in Vietnam dates back to the 20th century, but it is primarily practiced in schools that incorporate foreign cultures through bilingualism. High schools now focus specifically on teaching math in English as of the 2010-2011 academic year (Chu, 2014; Chu, 2015). More than 20 schools have adopted the 2020 foreign language project, which focuses on teaching mathematics in English, but the Ministry of Education and Training (Ministry of Education and Training, 2018; Ministry of Education and Training, 2020) also notes that there are still a lot of issues, such as a lack of clear solutions and a shortage of teachers standards, teachers lack the confidence necessary to instruct in English. Some teacher training schools have introduced the training of teachers who can teach math and science in English, although the outcomes cannot be validated.

1.2.2. Several methods for teaching Mathematics in English

According to Chu (2018, p. 18-22), there are numerous ways to teach arithmetic in English. The following data are based on a few of these methods.

Table 1. Ways to teach arithmetic

Methods	Time		
	The European Commission's Lingua program was launched in 1990, giving undergraduate mathematics majors more options for adding a foreign language to their course requirements		
Teaching a foreign	The European Council for Cultural Cooperation suggested a program in 1993 to use workshops to educate citizens new languages		
language majoring in Mathematics	Finland established a connection between learning math in English and a particular subject in 1994 with the dual objectives of learning the subject's substance and the foreign language		
	Between 2000 and 2006, a European support program called Comenius, Erasmus, and Socrates implemented programs to finance the instruction of foreign languages in schools		

Methods	Methods Time				
	The Netherlands has developed a bilingual and multilingual educational system since 1992. The Netherlands had 300 bilingual schools by 2007				
Bilingual teaching	Hungary has mandated that CLIL schools teach at least three subjects in English since 1987				
	Poland and several other nations have mastered the art of teaching science courses in other languages since 1970. The program was included in the lower secondary school levels by 1999				
	The two nations with the highest rates of primary and secondary school CLIL completion are Finland and the Netherlands. Spain is a pioneer in CLIL research and effective CLIL implementation in Europe				
Teaching that integrates content	Since 2009, the focus of education in the Czech Republic has shifted to many CLIL programs				
and language	1996 saw the completion of the Euro CLIL UniCOM-Finnish University of Jyväskylä Network				
	Since 1994, the term "CLIL" has been used to describe subjects taught to pupils in a foreign language in Finland				

1.2.3. English-language math teaching competence

The Vietnamese Ministry of Education and Training's standard criteria for evaluating teacher competence (Nguyễn, 2006), teaching strategies that integrate content and language, and teachers' proficiency in teaching mathematics are all taken into account when determining a teacher's ability to teach math in English.

Among the aforementioned elements, it can be said that the training program for preschool teachers satisfies the requirements and standards of the teacher competency evaluation conducted by the Vietnamese Ministry of Education and Training and the preschool teacher's ability to teach. Primary teachers' mathematics instruction and integrated teaching strategies. The integration of content and languages, however, is the major issue (English). In order for students to learn math through English and learn English, there must be a seamless link and coordination between the knowledge and skills of math and English while teaching mathematics in English (Ministry of Education and Training, 2018; Nguyen, 2011). English is used when learning arithmetic material. As a result, a teacher of math in English needs to be proficient in "Vietnamese, English, and Math Language."

In the teaching process, teachers play a crucial role. Teachers who can teach math in English must be able to integrate math and English into their lessons,

which requires more than just professional expertise in teaching arithmetic.

Chu (2018, p. 25) also listed five kinds of English-language qualifications for math teachers. But these are skills of being able to impart math and English at the corresponding level B1.

What can students do to be well-equipped with professional information, study English, and put this knowledge together while undergoing education at the University? to best prepare themselves so they may practice giving lectures, planning lessons, and teaching math in English.

2. Research methods and results

2.1. Research methods

Based on survey data on the current situation of using English of primary students in teaching maths in English (Chu, 2015); Franke et al., 2009; Philipp et al., 2002; Kettler, 2015). We gained incredibly important information for the process of teaching mathematics in English by polling students on their perceptions about the usage of English by elementary education pupils. Survey link: https://docs.google.com/forms/d/18mINq7GO7601MZLeENKtOohYqXxGS6HybYBNPMVjSvo/edit.

- Respondents: Primary students at Dong Thap University.
 - Survey content: In appendix.

125 students did the survey. Most of the survey participants were aware of the English language

requirements for their majors (B1 of Vietnam's 6-level Competency Framework) and were passionate about obtaining their degrees so they could teach math in English. However, when asked how to "plan to practice English to teach elementary math in English," up to 116 pupils had no idea where to begin or how to go about it, as evidenced by the opinions shown in Figure 1.

Did you have any plans to practise English for teaching Maths in English?

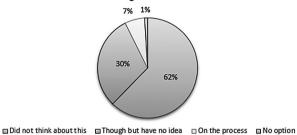


Figure 1. Plans to practice English to teach elementary Maths in English

Students who took part in the poll also disclosed information regarding their proficiency in English. In addition to your primary objective of graduating (48.8%), they also have a secondary objective of getting a better career when you graduate (50.4%). Students acknowledged that English still had a lot of shortcomings, as demonstrated in Figure 2.

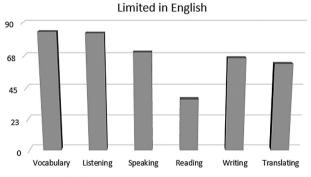


Figure 2. Students' limitations in English skills

The students also discuss how to study alone and practice their English. Thus, even while more than 80% of students practice English independently, less than 90% do so for longer than 30 minutes a day using a variety of self-study methods like reading, listening to music, watching movies online for free, or using software that teaches English. Student participation in English-speaking activities outside of school is, however, extremely low (89.6% of students report not taking part in any activities). As a result, just 14% of students in pedagogical schools really use English during arithmetic instruction.

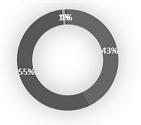
According to the survey, the majority of students have never read math textbooks in English, and just a small percentage (15.2%) have read bilingual books and comprehend math textbooks in English. is likewise very constrained, as depicted in Figure 3.

Analyze survey results:

- The authors discovered the following based on the aforementioned survey results:
- + Students understand the value of math instruction in English for their future jobs.
- + Students are motivated to practice and develop their English language skills in order to teach and study mathematics.

A lack of guidance on how to use the instruments at hand to help the process of self-training and self-study in a straightforward and efficient manner.

Comprehensive levels



- Not understand totally ■ Understand mostly (60%-80%)
- Understand partly (10%-50%)
 Understand totally

Figure 3. Students' comprehensive levels when reading textbooks

2.2. Research results

We provide steps to help students utilize these applications to develop their own material and create practice math content by topic or content. This is done in accordance with personal preferences or orientation based on the analysis results after investigating fundamental and simple applications and polling students.

2.2.1. Steps are used to instruct students on how to use fundamental tools

There are numerous tools and pieces of software available today to facilitate learning English, bilingual math books, etc., but the author of the book writes the material, so it will not be subjective to the editor. In addition, there is an abundance of software and publications, which encourages newbies to educate themselves and create their own learning methods. This makes it simple for them to become confused

and sad. In order for students to practice and enhance their ability to use English properly when teaching themselves mathematics, the writers fully explain each usage and offer very basic and simple steps. Below are steps to appy tools and utilizing each steps.

• Steps to apply in Table 2.

Utilizing each step

Step 1: Prepare for the main topic vocabulary, pictures,... and put them on relationship together.

Depending on the issue, clarify vocabulary. Students can follow these three major mathematical knowledge circuits (General Programs).

- + General vocabulary.
- + Arithmetic.
- + Geometry and measurement.

+ Probability and statistics.

Each main circuit can be broken down into smaller topics. For instance, the division in geometry is as follows:

- + Lines: straight line, segment, ray, line, parallel lines, curved lines, intersecting lines, perpendicular lines, arc, etc,...
 - + Shapes:
- * Triangle: Description (part of a triangle), classification (how many kinds of triangle) and formulas (perimeter, area, etc,...).
 - * Circle: The same term.

This is the most crucial step because users divide themes and choose information to develop according to their own conceptions, interests, and abilities.

Table 2. Steps to appy tool

No	STEPS
1	Prepare the main topic vocabulary, pictures,, put them on relationship together (if have)
2	Choose suitable template on canva and design them. Word - example - Phrase/ sentences - Practise by multiple choice/exercises/self-made questions
3	Create questions by Quizizz to practice by couple, group or by own Multiple choice - Filling in the blank - Open end - Draw - Poll
4	Use - edit - improve

Step 2: Choose the suitable canva templates.

Canva provides free templates for user. With each content, the user should select the best one to support their designation. For example: video, infographic, brainstorms, graphs, presentations, documents, logo or poster...

Just insert the content after selecting the necessary template. Users are made to feel engaging, understandable, and easy to recall by this design. A pdf or png file is simple to download, and students can use their smartphones or printed paper to review the material.

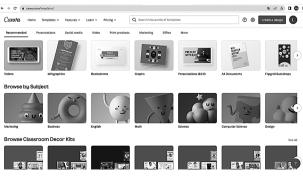


Figure 4. Canvas display

Step 3: Create questions by Quizizz.

Students can sign up and utilize Quizizz very easily using their university-provided email addresses. Quizizz is the greatest option if the Canva design isn't eye-catching enough because students frequently merely observe and practice alone. The questions on Quizizz are quite varied: you may add graphics, sounds, and even videos to explain questions chosen for a specific period of time before being answered. For each topic, users can practice by themselves, in couples, or in big groups while playing a timed online game. They can also play as many times as they like, wherever they are, using a smartphone.

The Canva-designed material should be developed in conjunction with each set of questions, encouraging each set of 10 questions to increase the efficacy of practice.

The entire playing process is also logged on Quizizz's system. In addition to the questions, allowing users to compare, check, and view their own or the team's progress.

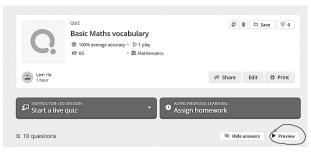


Figure 5. Basic display of Quizizz

Step 4: Use - Edit - Improve

The designer can totally change the content, enhance the question, reset the response time, etc. while the user is practicing on each topic and each set of questions without losing the previously entered content.

I am optimistic that students will be more interested in the mathematical content after a period of selection, practice, and expansion. This information is approachable, simple to use, and you can safely utilize it in practice.

Several designation according to small topic

Phillipp et al. (2002, p. 195-197) contend that future elementary school teachers (PSTs) should interact with students' mathematical thinking while they are taking their first mathematics course since doing so could improve the students' arithmetic learning. That's why PSTs should start off with the skills they need to fully realize their potential.

This content design is based on the research findings of Franke et al. (2009, p. 383-385) on the description of teachers' questioning practices, teachers' questions and students' explanations, how teachers' questions played out during teacher-student interactions, and how to set up questions and use mathematical language correctly and consistently in Vincent Chong's books (2018a-f) for word problems in math.

2.2.2. Examples of two fundamental mathematical concepts

The next two paragraphs serve as examples of two fundamental mathematical concepts. The first group consists of words that are frequently used in mathematical contexts, such as mathematical directives, exercises, and solutions. Below are some examples.

• General vocabulary.

Students can design these basic topic by themselves. Try to put vocabulary in a group by searching in the internet or in the textbooks. Read aloud these word while look at the signal, for example plus and +. Do not need to put them in a full paragraph or a complex sentences first, just begin with a suitable simple phrase in simple situations.

• Basic Maths vocabulary practice.

Practice them by yourselves, whenever you have time and a smartphone, seem playing games.

Here is the link for practice this content: https://quizizz.com/admin/quiz/6273a15d45de04001d45567f/basic-maths-vocabulary.

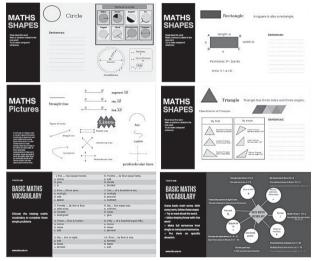


Figure 6. Examples for basic vocabulary

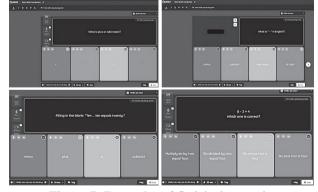


Figure 7. Examples of Quizizz's practice

3. Conclusion

Based on the results of a survey that asked students about their opinions and current situations with the teaching of math in English. Although there are several books and other resources that students can use to enhance their instruction of mathematics in English, they are unsure of how to link these resources

together. The authors suggest a number of crucial applications for user-friendly tools that students might build, practice, and improve in order to use English to teach mathematics.

Testing students directly is a limitation of the current study. The study might be repeated with more primary pupils and students in nursery education to further validate the results. Additional research should explore how to incorporate particular lesson plans and conduct experiments with elementary kids at bilingual or international schools.

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Appendix

PHIẾU KHẢO SÁT THỰC TRẠNG SỬ DỤNG TIẾNG ANH CỦA SINH VIÊN NGÀNH GIÁO DỤC TIỂU HỌC TRONG VIỆC RÈN LUYỆN DẠY HỌC TOÁN BẰNG TIẾNG ANH

I. Thông tin của bạn	Câu hỏi 8: Bạn đã đạt được bằng cấp, chứng chỉ nào				
Câu hỏi 1: Bạn đang là	sau đây? (có thể chọn nhiều phương án)				
□ Năm 1 □ Năm 2		☐ Chưa đạt chứng chỉ nào			
□ Năm 3 □ Năm	$\square A1 \square A2 \square B1 \square B2$				
Câu hỏi 2: Chuẩn đầu r	ra trình độ tiếng Anh đối với	\square IELTS < 5.0			
ngành học của bạn là:	-	☐ IELTS từ 5.0 trở lên			
☐ A2 khung năng lực 6	bậc Việt Nam	Khác:			
☐ B1 khung năng lực 6	bậc Việt Nam	Câu hỏi 9: Bằng cấp, chứng chỉ tiếng Anh của bạn			
☐ B2 khung năng lực 6	bậc Việt Nam	được cấp bao lâu?			
☐ C1 khung năng lực 6	bậc Việt Nam	☐ Chưa được	câp		i 6 tháng
Câu hỏi 3: Mức độ yêu	thích giảng dạy môn Toán	☐ 6 tháng		□ 1 năr	
cho học sinh tiểu học cư	ủa bạn	☐ Trên 1 năm		☐ Khác	
☐ Bình thường	☐ Yêu thích	Câu hỏi 10: Những hạn chế của bạn về tiếng Anh là? (có thể chọn nhiều mục)			
☐ Rất thích	□ Đam mê	☐ Từ vựng	neu muc, Ngl □		□ Nói
☐ Khác:		□ Đoc	□ Viế		☐ Phiên dịch
	g muốn được giảng dạy ở các	☐ Khác:	_		- I men djen
	án song ngữ hoặc dạy Toán	Câu hỏi 11: Những ưu điểm của bạn về tiếng Anh là?			
bằng tiếng Anh sau khi		(có thể chọn nhiều mục)			
□ Có □ Khô		☐ Từ vựng	□ Ngl		□ Nói
Câu hỏi 5: Bạn có đặt m Tiểu học bằng tiếng An	uc tiêu giảng dạy được Toán h không?	□Đọc	□ Viế		☐ Phiên dịch
☐ Có ☐ Khô	•	☐ Khác:			
	ế hoạch rèn luyện tiếng Anh	Câu hỏi 12: Bạn có tự học tiếng Anh?			
	học bằng tiếng Anh chưa?	□ Đọc	□ Viế	t	☐ Phiên dịch
☐ Chưa nghĩ đến kế ho		☐ Khác: Có		•	
☐ Nghĩ đến nhưng chưa biết làm gì		Câu hỏi 13: Thời gian tự học tiếng Anh mỗi ngày			
□ Đã và đang lên kế hơ	pạch	của bạn?	□ 20 nh/	5 4	□ 60 phút
☐ Khác:		☐ 15 phút ☐ Trên 1 giờ	□ 30 phú		☐ 60 phút ☐ Khác:
II. Tiếng Anh của bạn	-	an đã từn			
Câu hỏi 7: Mục đích phải học tiếng Anh của bạn:		Câu hỏi 14: Bạn đã từng học tiếng Anh qua những kênh nào? (Có thể chọn nhiều mục)			
☐ Đủ điều kiện tốt ngh	□ Đọc sách vở				
☐ Vì yêu thích	☐ Nghe nhạc				
□ Vì mong muốn có cô:	☐ Trực tuyến với các trang miễn phí				
☐ Để giảng dạy ở nước	☐ Phần mềm chuyên dạy tiếng Anh				
☐ Khác:	☐ Khác:				

Câu hỏi 15: Ngoài việc học tiếng Anh tại trường, bạn	Câu hỏi 19: Bạn có mong muốn mình có thể dạy Toán			
có tham gia các hoạt động nào có sử dụng tiếng Anh?	bằng tiếng Anh sau khi tốt nghiệp không?			
(có thể chọn nhiều mục)	☐ Chưa từng nghĩ đến			
☐ Không tham gia hoạt động nào khác	☐ Có nhưng không biết cách			
☐ Tham gia học tiếng Anh tại các trung tâm ngoại ngữ	☐ Rất mong muốn			
☐ Câu lạc bộ tiếng Anh	☐ Khác:			
☐ Khác:	Câu hỏi 20: Với những hoạt động bổ trợ dạy Toán bằng tiếng Anh như bên dưới, bạn sẽ chọn hoạt động nào? (Bạn có thể chọn nhiều phương án và bổ sung			
Câu hỏi 16: Mức độ sử dụng tiếng Anh trong rèn luyện môn Toán ở trường sư phạm của bạn?				
☐ Chưa từng sử dụng	thêm hoạt động ở mục khác)			
☐ Thỉnh thoảng sử dụng	☐ Công cụ tự học, bổ sung kiến thức tiếng Anh			
☐ Thường xuyên sử dụng	☐ Xây dựng sơ đồ tư duy kết nối kiến thức Toán và tiếng Anh			
☐ Khác:	☐ Sổ tay ngôn ngữ Toán và tiếng Anh (song ngữ)			
III. Dạy Toán bằng tiếng Anh	☐ Cuộc thi học thuật: giải toán bằng tiếng Anh,			
Câu hỏi 17: bạn đã từng đọc sách Toán hoặc sách giáo khoa Toán bằng tiếng Anh hoặc sách giáo khoa	 ☐ Cuộc thi hùng biện: tranh luận vấn đề toán học bằng tiếng Anh ☐ Sinh hoạt câu lạc bộ tiếng Anh ☐ Giao lưu, trao đổi kinh nghiệm với những gương học tốt 			
Toán song ngữ chưa?				
☐ Chưa bao giờ đọc				
☐ Thỉnh thoảng có đọc sách song ngữ				
☐ Thường xuyên đọc sách song ngữ	☐ Khác:			
☐ Thương xuyên đọc sách tiếng Anh	Câu hỏi 21: Bạn có sẵn sàng tham gia hoạt động trải nghiệm dạy Toán bằng tiếng Anh để thử thách bản thân?			
Câu hỏi 18: Mức độ đọc hiểu sách giáo khoa Toán bằng tiếng Anh của bạn				
☐ Hoàn toàn không hiểu	□ Có □ Không			
☐ Hiểu một ít nội dung (10%-50%)	Câu hỏi 22: Ý kiến của bạn về chương trình đào tạo cho sinh viên đáp ứng được việc dạy Toán bằng tiếng Anh sau khi tốt nghiệp (mời các bạn nhập câu trả lời vào bên dưới)			
☐ Hiểu gần hết nội dung (60%-80%)				
☐ Hoàn toàn hiểu nội dung				
Cám ơn các bạn đã tham gia làm khảo sát! Các kết quả của các bạn sẽ góp phần quan trọng vào sự				

Cám ơn các bạn đã tham gia làm khảo sát! Các kết quả của các bạn sẽ góp phần quan trọng vào sự thành công của đề tài.