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# ACTION RESEARCH COVER PAGE AND DECLARATION

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# Audio Enhanced Manipulatives In The Online Classroom

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## Abstract

The effect of audio enhanced manipulatives during online learning was investigated. Assessment results of the students were subsequently used to measure the change in learning.

In this study, I investigated how audio enhanced handheld toys for students - in this instance stuffed animals fitted with microphones - could be used to enhance learning. Enhanced learning is defined in achieving better test results in reading, writing, listening and speaking in the target language, which in this instance is English. My motivation for focusing on manipulatives was twofold; firstly I noticed my students' learning enhanced when I used manipulatives, especially toys (Stuffed animals). My income is directly related to the rate that the students progress so if this experiment is successful then it will be mutually beneficial.

Secondly I enjoyed playing with the manipulatives and noticed the students were having more fun and were more willing to engage. This made my teaching experience a lot easier, and felt that if both the teacher and the students are having fun in a serious setting like a classroom, then this can only be a good thing.

Traditionally young Chinese students are discouraged from playing during classes. Online teachers however are encouraged to bring manipulatives to class that enhance the current topic. Even though the after school online learning is becoming gamified the students do not bring their own toys to class.

I wanted to bring the students' own toys to the classroom and include them into my lessons.

In this study the students had the opportunity to bring their own toys to class and act out totally novel situations with them as though they had an English speaking friend. For the first time in their classroom experience their toys would reply to them and speak in English.

## 3. Rationale for the Research

As an online English teacher teaching groups of students at New Oriental Education & Technology Group our motto was that no student would have to learn alone. The whole model was sold under the premise that you could learn English as a group and with friends.

During my time teaching over 3000 classes I was encouraged to bring manipulatives to class. It became apparent fairly quickly that these manipulatives, even though the students couldn't touch them, enhanced the class.



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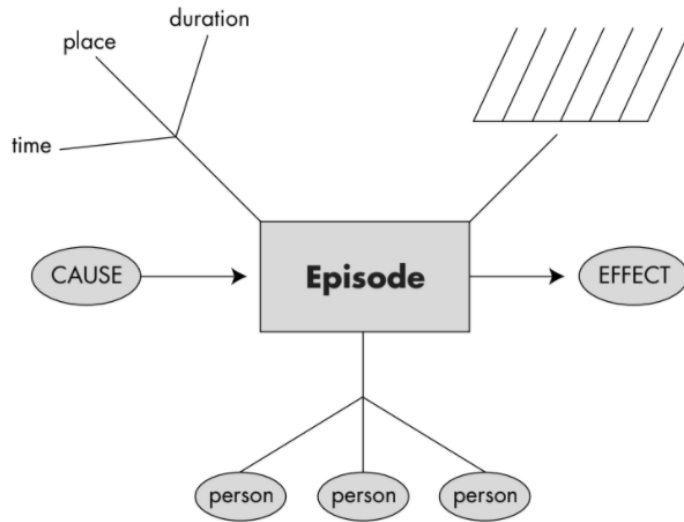
This led to me experimenting with other manipulatives. I then decided to add toys to my repertoire and noticed that the students' engagement increased even further. Over time it became more and more apparent that the students would wish to show other students their toys. When the students started playing with their toys I noticed that they would automatically and instinctively start speaking English to their toys. As all children know, only toys can talk to toys. This meant that my toy began talking to their toys. This in turn leads to the students identifying with their toys and using their imagination to perform different scenarios. I started using scenarios that were aligned with the teaching goals.

I noticed that the students' engagement for the younger age groups (ages 4-10) increased significantly. Their scores also improved substantially. I now always encourage the students to bring their toys to class.

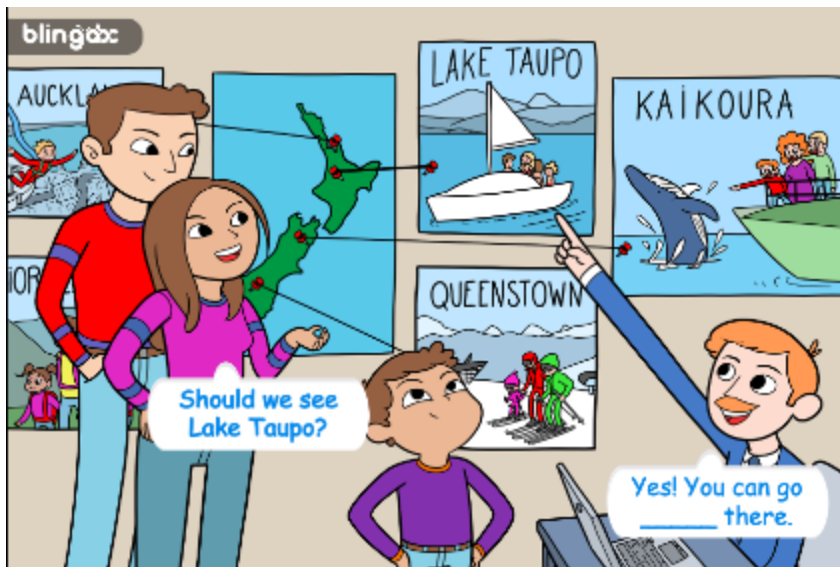
I wish to duplicate this positive result and magnify the learning by adding audio enhancement to the students toys. I hope that the students' results improve and that they have lots of fun imagining different scenarios that they can talk to their toys to in English.

Throughout this study I hope to improve the students' test results by integrating audio enhanced manipulatives.

Using manipulatives is effective in this instance because it creates a real world scenario. Whilst teaching English we would like to simulate and create a scenario that will be beneficial for the students in their everyday lives, and thus lead to them acquiring the target language far more easily. To do this we try to produce multiple episodes that the student can imagine and play along with. As a teacher I typically try to create an Episode pattern as below:



We replace the “persons” with our toys. The place, time and duration are imputed through the picture that determines these factors.



In this example the place is a travel agency, the time is before the students go on holiday and the time will be an unspecified time but sometime after school.



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The time sequence of events is before a holiday. This also explains the tense used. The cause for conversation is meeting the sales representative and seeing the posters. The event or conversation happens and the effect is that the students now are more knowledgeable about their destination. Using toys we are able to get the students to immerse themselves into the episode.

I have personally experienced that students enjoy interacting with speaking toys. One of the toys used would simply copy what the student says in a “squeaky” voice. I observed that the students seemed to be more and more immersed in the simulated episode. By enhancing the toys audibly I wish to increase this immersion and thus have an increased learning effect.

## 4. Research Questions and Research Objectives

Hypothesis:

That audio enhanced toys (controlled by the teacher), that students can physically interact with, can improve the learning outcome for ESL students in an online classroom.

Purpose of the Study:

The primary objective is to increase the test scores of the students whilst maintaining an entertaining learning environment. However there is also an optional objective to make the class more enjoyable for the students. Although this isn't vital, this can lead to a much better learning experience for the students, and in turn help achieve the primary objective much easier.

Action Research Questions:

This paper attempted to answer specific questions such as:

1. What is the effect of audio enhanced toys on the students' learning experience?
2. Will the students interact with the toys?
3. Will the parents leave negative/positive feedback?
4. Will the toys distract any of the students from the learning material?
5. Will the toys encourage the students to speak more?
6. Will the students continue to speak English to their toy, or will they eventually start reverting back to their native language over time?





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7. Will the toys entertain the students in a way that allows for effective learning in an entertaining environment?
8. What further changes need to be introduced to have an optimal learning outcome?

I will aim to answer these questions, and any other unforeseen questions that may arise during this study. From these findings I will be able to determine whether using audio enhanced learning techniques should be more utilised in classroom environments, especially in an online capacity.

## 5. Literature Review

Several studies have been conducted in the education field with particular interest to online learning. As the world progress into the digital era, online classrooms are quickly becoming necessary as the alternative pedagogical practices in both junior and advanced institutions. Recent data from the United Nation showed that more than 87% of students in the world had to resort to online learning due to the effects of the ongoing COVID-19 pandemic (UNESCO, 2020). The uniqueness of the online learning method has necessitated adoption of creative means of lesson delivery, with audio enhancement manipulative tactics being touted as one of the most effective methods in the contemporary education system (Trilling & Fadel, 2009; Montero et al., 2018).

According to a study by Serkan et al. (2014), online classroom manipulative tools had significant positive effects on learner's technology acceptance than the use of traditional methods of teaching. These results are consistent with findings from a research study by Ozel and Yetkiner (2010) who opined that student's conceptual understanding of classroom concepts in online classes was greatly enhanced by the introduction of online manipulative tools. Both studies concluded that there was a higher acceptance of technology by students in the classes where the online manipulative tools were used in delivering the lessons. This shows a positive sign in the education sector where implementation of new technology seems to be the most viable option in a digitalized and globalized world.

Audio enhancement tools in an online class can help students to sharpen their publishing skills and digital communication skills by providing an enabling environment for them to express their creativity (Pape et al., 2012). A combination of audio manipulative tools and visual tools helps to facilitate collaboration between teacher and learners with positive impact and outcomes



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in learning. These tools are effective due to their ability to present to the learners only the essential information that makes them easily remember key concepts by narrowing down their focus on specific information (Anderson-Pence et al., 2020).

Successful use of audio enhancement tools in online learning is usually increased with improved levels of the instructor's and learner's social presence (Tu & McIsaac, 2002). The instructor has to consider the characteristics of the learners and select appropriate tools when designing the course. In trying to overcome the challenges posed by this new area of study, researchers have proposed a myriad of methodologies that are suitable for every available online learning enhancement tool (Perker, 2020). These methodologies are geared towards finding solutions to effectively utilize the untapped opportunities presented by these learning components.

Online learning presents an opportunity for teachers to test emerging technologies and integrate these technologies into the traditional teaching modalities. Elia et al. (2007) explored the importance of integrating various teaching enhancement tools and representations into the traditional classroom. Their findings showed a positive impact on student's learning process since the integration helped to combine the strengths of individual methods and eliminate the weaknesses exhibited by another method if it were to be used as a stand-alone instruction delivery method (Elia et al., 2007). These varying effects exhibited by learning manipulative tools thus require appropriate selection that suits the target audience.

Children's exploration of new ideas usually comes as a factor of the manner in which learning materials are presented to them. According to Manches (2011), digitally augmented physical objects have been proven to have the capability of transforming pre-school children's learning abilities through the interaction with formal abstract concepts. With most children exhibiting a different conceptual understanding compared to adults, their interaction with visual and audio tools tend to be an exciting concept when exploring challenging tasks in the classroom (Serkan et al., 2014).

Perhaps the most important aspect of using technology-based tools such as the audio manipulative tools in both traditional and virtual classes lies in their ability to provide learners with flexible learning options (Satsangi & Miller, 2017). With flexibility in learning, students have had increased autonomy where technological manipulative tools have been used to dispense lessons. The instructors on the other hand have been offered a wide range of options that are vital in helping them accommodate students from diverse backgrounds (Sylla et al., 2015). This collaborative exploration of technological learning tools creates a system that is adventurous and empowering to both the students and the instructors.



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As much as these technological advancements have made strides in the education sector, research has shown that their usage can only be effective if proper strategies and mechanisms are put in place. For instance, Pitler et al. (2012) published a guideline on some of the most effective ways of using technology in the contemporary classroom setting to ensure effective outcomes are realized. They further noted through their studies in various educational institutions that the lesson enhancement tools in the hybrid delivery systems will no longer be considered only as add-ons in pedagogy with the shift in technology. Manipulating these tools in teaching thus seems to be the better way of offering variety to the contemporary learners who are more inclined towards high-tech learning approaches.

## 6. Methodology

### 6.1 Description of participants of the study.

The students are not aware that a study is being conducted as it will be part of their current learning, and their knowledge of a study taking place could ultimately affect the results. The students partaking in the study are all currently enrolled in after school classes with Blingabc (a subsidiary of New Oriental Technology & Education Group). They are all Chinese students between five and ten years old.

Over 90% of my online teaching experience has been with students from China, so this, coupled with the fact that the Chinese market for online tutoring is the biggest in the world, lead to me feeling that this would be the perfect place to conduct this study. In China spoken English is part of the “Gaokao”, the **National College Entrance Examination (NCEE)**, an exam that all students in China must pass to be able to go to university.

The students are accustomed to the online learning platform and to their teachers. They all participate in online and offline classes at English Centers throughout China. All of the students have studied with Bling for at least one term and are able to use the platform and have no technical problems. They are also familiar with the grading and assessment systems. Although the students can request additional classes the average online tutoring time is 2 lessons of 40 minutes per week (the students have 3 weeks a year off).



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As the minimum cost for tutoring is \$4000 per year, the students usually come from middle to high income families. All classes have one teacher and three students. Thirteen of the students in this study are male and seven of them are female.

All students have access to an educational app that supports them through the learning process. This app has features that include educational videos, vocabulary training, grammar training and speaking (AI) training. The main purpose of the online teaching is to motivate the students to use the learnt skills in real life situations with a teacher.

To be placed in an online class the students must undergo assessments. The students will then get placed into groups with students that have similar English skills to their own. These assessments include reading, writing and listening skills. They exclude speaking skills. As such the students will all be able to read, write and understand the lesson material provided. The students tend to differ slightly in their writing ability.

The researcher of this project has over six years teaching experience, four of which are online. He has a Bachelor's degree in Mechanical Engineering and has attained a Qualified Teachers License in the UK. He has previous experience teaching English as a second language in primary schools and English centres in Thailand. He has also been a director of the Language Center Education English Udon Thani School. He has over 7000 hours of online teaching experience and has taught classes of up to 300 students.

We randomly selected one class per level (as mentioned previously, a class comprises of one teacher and 3 students) as a control group and one class per level as an experimental group (a separate class with one teacher and 3 students). With five levels this gives a total number of 30 participants. Level 1 starts with 6-7 year olds, level 2 is 7-8 year olds and so on. The teacher for the control groups and the experimental group was the same.

## 6.2 Description of intervention (treatment) and/or data collection tool(s)/material(s).

- All lessons and assessments will be conducted online using the Zoom video communication platform, as this is the primary platform used for classes in an online capacity for Bilingabc school.
- The 6 week long study will cover five lessons, followed by an assessment lesson, we will then conduct another five lessons and finally a second assessment lesson. Half of the



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groups will receive the intervention during the first five lessons and the other half will receive the intervention during the last five lessons and assessment.

- The results will be monitored in real time by the researcher. These results will be placed in a table and can be analysed from there.
- The students will receive a stuffed animal, in this case a teddy bear. They will be prompted and encouraged to bring the teddy bear to class. This teddy bear will contain a loudspeaker that is connected to the teacher's microphone. Then during the class the teacher can turn his microphone off intermittently and speak through the toy microphone to the student. This stuffed animal can then act as an additional 'teacher' that the students can have an emotional connection with.
- The material practiced with the AET (audio enhanced toy) is part of the standard lessons typically used online for Bilingabc. They include one question sentence and 3-5 possible responses. The target language also includes approximately 5-7 new vocabulary words. The teaching resources will be attached. The aim of each lesson is to enable the student to read, write, understand and speak the target language comfortably. After five classes have been conducted the students will have an inpromptu assessment class that checks for the improvement of each category mentioned above. All students will be prompted and encouraged by the teacher to get their AET and play with them while class is in session.
- The person conducting the study is also the teacher. Because of this the study is not pure experimental research but quasi experimental research. As I am both the teacher and the researcher, I will remain impartial to any kind of reaction - positive or negative - and only react how I would react normally as a teacher so I can achieve the most honest results in this experiment.
- At the end of each study period the students will have an assessment. The progress of the students will be measured solely by this assessment to make the experiment as fair as possible. We will then compare the control assessment results against the results of the intervention assessment.

As I am first and foremost a teacher teaching an online class, this research will not take primary focus. This research will run concurrently with the class, but I will purely be conducting this research in the background. Thus, apart from the new microphone attached to their stuffed animal and the new audio enhanced learning they will be experiencing, the students will be unaware that any intervention will be happening. As far as they are concerned, this was, and is, another aspect of their classroom learning experience.



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## 6.3 Detailed and descriptive data collection

### Procedure.

The total number of points each student can achieve in this exercise is 100.

This will be divided as follows:

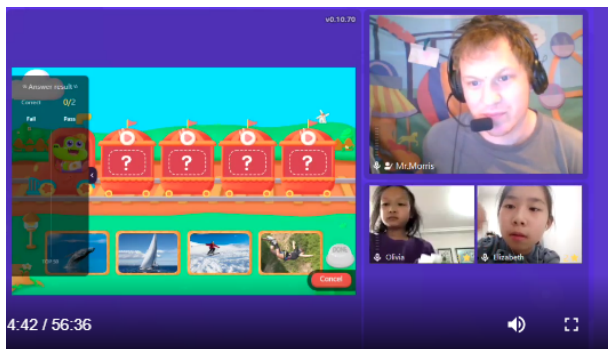
Reading: 16 points

Vocabulary: 20 points

Pronunciation: 24 points

Speaking: 40 points

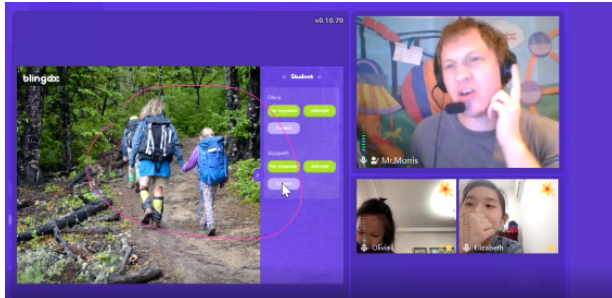
The data will be collected during the assessment (“Show Me”) classes. The assessment will grade the students in reading, vocabulary, pronunciation and speaking.



The first section used will be a classroom exercise called “Listen and Drag”. In this exercise the students will hear a sound and then drag a picture that represents the word that has been said. It is impossible for the teacher to help the students as their audios are randomized and the audio is switched off. So this guarantees that the students can understand the target language on their own accord with no outside interference.

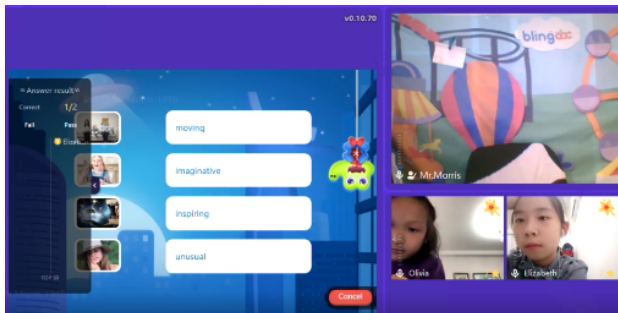


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In the second part the students are required to repeat after the teacher. The teacher will say a word or phrase and the students will then repeat the word or phrase that they hear. The teacher then selects whether the students repeated the word or word phrases correctly.

For the third part the students connect pictures to written words. They will read words that they see on the screen, and match them with which pictures go with the words. The teacher can then reward them with positive feedback if they are correct, or guide them to the correct answers if they have made any minor mistakes.



During the fourth part, the teacher asks a question and circles a picture indicating an answer. The students are then required to answer with the sentence phrases they have learnt in the previous lessons. This review lesson helps the teacher understand if the student has acquired the target language, or if they need additional practice to be fluent using said language.

During the fifth part of the assessment the teacher makes a false statement and indicates the correct answer by circling a picture. The students are then prompted to correct the teacher and give the correct answer. This shows us student comprehension and their ability to find and correct errors in English. This is vital for teaching English as it not only helps the teacher understand whether the students have a full grasp of the target language, but as a student



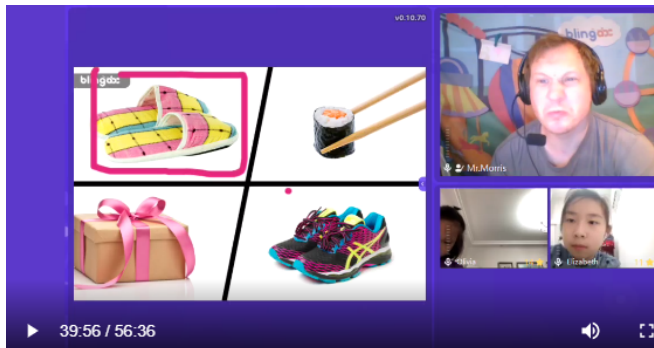
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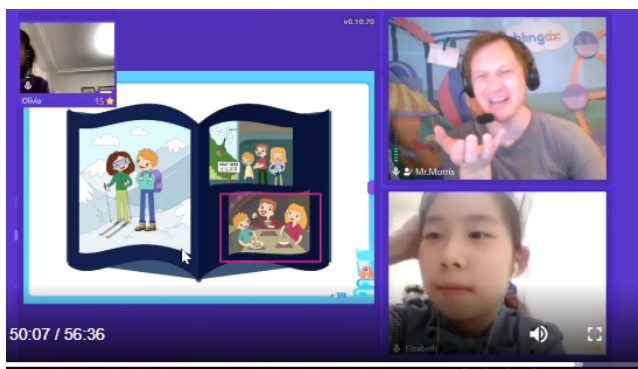
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'teaching' the teacher where the mistake helps them better understand the target language as well by explaining why certain words and/or grammar is incorrect.



During the final part of the assessment the students are shown pictures and prompted to discuss what they can see with each other. They must speak to each other for two minutes about the pictures using the learnt vocabulary and sentence structures. The teacher can interject if necessary to help a student struggling with a certain word, but this should be done at a minimum, as this section is designed to encourage the students to practice what they have learned as much as possible.



Should a student not be able to give a sufficient answer they will be given 0 points. If the answer is correct they will receive 4 points.

The data will be collected by the teacher during the “Show Me” classes and be assessed after the trial has been completed. We will then compare the control group assessments against the intervention group assessments to gather our findings.





## 7. Data Analysis & Presentation of Results of Findings

Student Name	Level	Score Control	Score Intervention	Delta					
Tyler	1	76	76	0	100	0			
Cindy	1	89	94	5	106	6			
HaoBao	1	76	72	-4	95	-5			
Happy	1	90	93	3	103	3			
Joy	1	94	100	6	106	6			
David	1	0	78	0	0	0	Delta level 1		10
Eric	2	87	91	4	105	5			
Elizabeth	2	95	100	5	105	5			
Olivia	2	90	95	5	106	6			
Jack	2	88	90	2	102	2			
Eason	2	88	88	0	100	0			
Amy	2	91	100	9	110	10	Delta level 2		28
Jason	3	100	97	-3	97	-3			
Emma	3	92	94	2	102	2			
Dora	3	96	90	-6	94	-6			
Kiki	3	77	97	20	126	26			
Allen	3	66	60	-6	91	-9			
Harry	3	78	88	10	113	13	Delta level 3		23
Ruth	4	94	90	-4	96	-4			
Jenny	4	96	80	-16	83	-17			
Elsa	4	97	100	3	103	3			



Franci	4	97	97	0	100	0		
Bella	4	100	200	0	200	0		
Han	4	100	200	0	200	0	Delta level 4	-18
HanHan	5	0	88	88	0	0		
George	5	94	90	-4	96	-4		
Luther	5	100	0	-100	0	0		
Steve	5	0	0	0	0	0		
Lisa	5	97	100	3	103	3		
Franci	5	100	100	0	100	0	Delta level 5	-1.1625 35644
		2448	2748	300	112	12		
								112.254 902
						2748 ps		
						2448	100	

Initial reports show that the scores for level 1 students improved slightly while the scores in level 2 and 3 improved significantly. However for the students who were in levels 4 and 5, the scores generally remained the same.

The older students (levels 4 and 5) did not engage with the audio enhanced toys.

## 8. Conclusions, Implications and Recommendations

After extensive research, I found that overall this was a positive influence on the students' learning experience and helped them not only improve their general level of English, but made them feel more enthusiastic to want to engage more often in the classroom environment, which I hope will lead to the students feeling more confident using English in their everyday lives.



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Furthermore, it is my personal opinion that the vast majority of students would benefit from this learning experience as a whole. Of course, I cannot speak for every student in the world due to various factors such as age, culture, comfort using a computer as a tool to learn English, access to items such as stuffed animals and microphones (specifically in impoverished countries), level of English, experience learning English, and so on... But in this example of teaching Asian students online (in this case, Chinese students who have experience with the materials provided) then this was a very positive experience for both student and teacher, and should be utilised more often when appropriate.

The implications of these findings are huge, as this can lead to so many ideas where I can expand on this concept in the future. For example I am already in the process of experimenting with multiple stuffed animals, while using different voices for each animal. Using different tones of voices and exaggerated accents for comedic effect (for example, mimicking an accent of a cartoon character on TV) I predict that we can utilize a child's imagination to its full advantage, and this could potentially have them staging entire conversations and interactions in English while essentially playing and having fun, thus associating classroom learning with playtime. Therefore the possibilities are endless.

My recommendation of using this technique in future classrooms is that it should be on a case by case basis. In short, the students in levels three and below will benefit from this extra interaction, whereas the older students (levels four and above) seemed disinterested in the audio enhanced learning technique and if anything this hindered their learning potential in the classroom. So it is my professional opinion that we don't even consider this technique for the more older students, however students of a younger age would respond positively to the audio enhanced learning, and it can really help them come out of their shell in an environment that can seem very intimidating for a child.

Additionally, I would like to add that even for students in levels 1, 2 and 3, this should also be utilised on a case by case basis. Since in rare cases there were times where a student either didn't benefit at all from the audio enhanced learning, (or in very rare cases a student actually produced worse results than previously recorded) it is my personal recommendation that we begin using the audio enhanced learning technique, but monitor each student's reaction to see if they respond positively or negatively to it. If a student seems bored, or the teacher has an instinct that the student is not enjoying the class, my recommendation would be to remove the audio enhanced



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learning and see how the student responds to it. As every student is unique, I feel that this is the best way to move forward.

## 9. References

- Anderson-Pence, K. L., Tygret, J. A., & Crocker, L. (2020). Leveraging Tutorial Instructional Software to Enhance Classroom Mathematical Discussions: An Exploratory Mixed-Methods Study. *Educational Research: Theory and Practice*, 31(3), 74-93.
- Elia, I., Gagatsis, A., & Demetriou, A. (2007). The effects of different modes of representation on the solution of one-step additive problems. *Learning and Instruction*, 17, 658–672.
- Manches, A. (2011). Digital manipulatives: tools to transform early learning experiences. *International Journal of Technology Enhanced Learning*, 3(6), 608-626.
- Montero Perez, M., Peters, E., & Desmet, P. (2018). Vocabulary learning through viewing video: The effect of two enhancement techniques. *Computer Assisted Language Learning*, 31(1-2), 1-26.
- Ozel, S., & Yetkiner, Z. E. (2010, October). Multiple representation perspective and students' acceptance of an online manipulative tool. In *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 2671-2680). Association for the Advancement of Computing in Education (AACE).
- Pape, L., Sheehan, T., & Worrell, C. (2012). How to Do More with Less: Lessons from Online Learning. *Learning & Leading with Technology*, 39(6), 18-22.
- Parker, A. (2020). Interaction in distance education: The critical conversation. *AACE Review (formerly AACE Journal)*, 13-17.



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- Pitler, H., Hubbell, E. R., & Kuhn, M. (2012). *Using technology with classroom instruction that works*. Ascd.
- Satsangi, R., & Miller, B. (2017). The case for adopting virtual manipulatives in mathematics education for students with disabilities. *Preventing School Failure: Alternative Education for Children and Youth*, 61(4), 303-310.
- Serkan, Ö. Z. E. L., ÖZEL, Z. E. Y., & Cifuentes, L. D. (2014). Effectiveness of an online manipulative tool and students' technology acceptances. *International Journal of Educational Studies in Mathematics*, 1(1), 1-15.
- Sylla, C., Coutinho, C., Branco, P., & Müller, W. (2015). Investigating the use of digital manipulatives for storytelling in pre-school. *International Journal of Child-Computer Interaction*, 6, 39-48.
- Trilling, B., & Fadel, C. (2009). *21st Century Skills, Enhanced Edition: Learning for Life in Our Times*. John Wiley & Sons.
- Tu, C. H., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes. *The American journal of distance education*, 16(3), 131-150.
- UNESCO, (2020). UNESCO rallies international organizations, civil society and private sector partners in a broad Coalition to ensure #LearningNeverStops. Retrieved 7 May 2021, from <https://en.unesco.org/news/unesco-rallies-international-organizations-civil-society-and-private-sector-partners-broad>