

# The Effect of Multimedia on Children's Education

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## Abstract

The purpose of this study was to devise a way to incorporate multimedia into children's language learning. First, preliminary research about the effect of multimedia was conducted by reading through other research papers. All aspects, including advantages, disadvantages, and experiments of multimedia to prove its impact was thoroughly examined. Two theories related to multimedia, Hoban's visualization theory and Dale's cone of experience, were examined to act as the main criterion for building a multimedia education tool. Some of the experiments previously done in kindergartens and middle schools were incorporated in the study to prove the effectiveness of multimedia. All the secondary research proved that the utilization of multimedia does have a positive effect on children's education and that some of the limitations were not significant enough to hinder the use. Children experienced enhanced listening skills and better engagement in class and teachers showed a high agreement rate to using multimedia during lessons. Hence, a mobile application, CHOA, was created based on the obtained knowledge. The functions and appearance of the mobile application were examined through proven research and theories. Regarding the storybook content, it had a balance of text, illustration, and audio which is appropriate for primary children. For activities, the element of motion was added which could successfully increase the motivation and engagement levels of users. Based on the study, it seems to a large extent that the aspects of multimedia in this mobile application enhance the academic achievement of young students and connects the world outside the classroom with the learner.

## 1. Introduction

### Background Information

The pan-global characteristics of COVID-19 set it apart from other crises, as it has managed to impact everyone regardless of age, gender, ethnicity, etc. Children became the most

vulnerable targets, and COVID-19 has created subsequent consequences and aggravated pre-existing issues. For OECD countries, alternatives sprung up right after the crisis hit, including educational TV programs, digital

devices, and financial assistance. For the low-income countries, in addition to the underprivileged in every country, they didn't have the chance .

"School closures as a result of health and other crises are not new, at least not in the developing world, and the potentially devastating consequences are well known; loss of learning and higher drop-out rates, increased violence against children, teen pregnancies, and early marriages." These global and local issues are derived from a common cause, education inequality and the widening gap. As most countries transitioned to virtual schools, the gap has widened once again as students became digitally divided. Due to the virtual school lessons, the education materials' quality and effectiveness have increased to compensate for the in-class activities. Various corporations have launched or updated programs as a response. Microsoft teams have introduced numerous updates as the reliance on the program Microsoft has increased as many schools decided to set up an online space for lessons. For example, they have personalized learning for every student in the areas of reading and career coach. "Whether educators are helping emerging readers build confidence or teaching English as a foreign language, Reading Progress enables readers to practice their skills in a safe, student-centric environment." "Career Coach, a Microsoft Teams app powered by LinkedIn, provides personalized guidance for higher education students to navigate their career journey. Career Coach uses an AI-based skill

identifier and LinkedIn integration that aligns a student's comprehensive profile with job market trends." This is limited to privileged ones, and those that cannot offer desktop devices or laptops are excluded. "For millions of children, the idea of an online virtual classroom is an unattainable dream. In April, UNESCO revealed startling divides in digitally based distance learning, with data showing that some 830 million students do not have access to a computer."

This study will attempt to resolve the education gap by proposing a multimedia solution in this prolonged virtual school situation.

### **Research Objective and Significance**

This research aims to tackle the education crisis in any part of the world without physical limitations. Multimedia and any related technology have the potential to reach out to the different parts of the world without physical barriers such as travel restrictions. It, therefore, provides educational experiences that are interactive and easy to access to those who can offer them on their own. The education gap has existed in the past. Hence, the significance of this research is emphasized as it is not a temporary project, rather a long-lasting innovation that could impact future education methods.

### **Research Question**

"To what extent can the theories of multimedia and visualization be realized in a simple mobile app?"

Throughout the subsequent sections, the Importance of utilizing multimedia in education and the related theories that should be considered will be discussed.

## **2. Theoretical framework**

The development of multimedia has been slowly transitioning the education methods into a more technology-oriented way. Now that the pandemic has changed education environments in all parts of the world, virtual schools have become prevalent in all aspects regardless of their wealth or size. The Importance of using multimedia stands out even more than before. This section will discuss the history, advantages, effectiveness, and Importance of multimedia and support preliminary research. The crucial audiovisual theories to consider when developing an educational source and multimedia will be discussed and examined.

### **2.1 Multimedia assisted language learning (MALL)**

#### **MALL definition**

Mayer (2009) defined multimedia as a demonstration technique of educational material that utilizes text and images and displays data in a visual and linguistic form. The text is verbal and printed, while the image includes affective graphics (illustrations and photos) and dynamic graphics (animations and videos). It is a system that sends and receives information, edits, and plays the content while interacting with the user. Therefore, it can be said that it is an interactive system with a

computer device as its foundation and uses text, illustration, and Audio to create, save, send, and play a particular network (Byeon & Kim, 1997).

#### **History of MALL**

The history of multimedia in Korea begins with Audiovisual education. Audiovisual education started to appear in classrooms in the 1960s, and there was also an audiovisual teaching method for language education.

Ever since the 1980s, computer devices have become publicized, and hence programs for educational use have been developed. Computer-assisted language learning (CALL) evolved through combining applied linguistics, programmed learning/individualized instruction, and computer science (Kim, 1999). In the 1960s, there were still computers present. Still, people had difficulty combining the three areas as there were debates about the correlation between foreign language learning and the educator's teaching ability. Although computers were present in the 1960s in the education fields, they didn't receive much attention. As portable computers became publicized around the 1980s, many educators considered using computers as a selective tool during lessons. By the 1990s, the former CALL (computer-assisted language learning) concept had developed into MALL (multimedia-assisted language learning). During these 40 years of computers slowly joining the education field, many theories and concepts related to language learning also evolved.

### **Advantages, Importance, and effectiveness**

It is differentiated from traditional media in that it processes diverse forms of data (video, text, music, Audio) simultaneously and allows bidirectional through the digitalization of data. It shows multiple formats at once through one platform.

#### **Advantages are as follows:**

1. Can capture the attention of the learners in diverse ways and allows the emotional approach of the visual-dependent generation from the audio-dependent generation
2. Allows abstract area to become concrete and hence enhance understanding and memory
3. Can utilize text, video, illustrations, photos, audio interdisciplinary and hence maximize the effect of education
4. Can choose appropriate media or content according to the development levels and hence can expect effective results
5. More effective to target the new generations whose lives are heavily dependent on media and videos

Older generations tend to be more vertical, rational, and have a one-sided ideology. New generations are emotional, anti-ideology, horizontal, and have bidirectional values. These changes of the education paradigm show directions of how education should change according to the beliefs and values of the current generation.

According to Mackey (1985), the criteria for selecting an education material should be authenticity, relevance, challenging, intellectually stimulating, and all of this can be amplified when using media along with traditional paper-based education materials.

The educational effects obtained through the educational use of multimedia are also outlined in Back (1998):

1. Allows the learner to participate actively in the learning process and hence develop a self-directed learning style
2. Offers experience similar to reality
3. Eliminates boredom from the learning process
4. Has the same effect as using diverse media at once
5. Can regulate the amount and frequency of interaction during the learning process
6. Learner can regulate their own pace
7. Makes the learning independent
8. Can persist a high-quality lesson
9. Can monitor the learner's progress frequently and give an overall evaluation
10. Lessons can be based on real-life simulations
11. Have fast access to saved data

Brinton (2001) summarized the reasons for media being used as the following:

1. The learners who practice the language outside of the classroom can get definite motivation when they see it through media inside the classroom
2. audiovisual materials provide learners with the content, meaning, and procedures. These materials are given as language items leading to practice and contextualized situations
3. Media grants reality to in-class situations; it connects the classroom with the outside world
4. It satisfies the needs of both the visual-dependent learners and the audio-dependent learners
5. As stated in Krashen (1986), input is critical in language learning, and the media provides diverse inputs to the learners
6. According to the Schema Theory (People usually rely on pre-existing memory from experience when we encounter new information), media maximizes the learner's schema
7. media provides data to the teacher in a practical and precise matter to save time and allow the teacher to stimulate the learner's senses for them to process information in an easier way

A survey was conducted at the middle school in Daejun, Korea, on April 26 and 27, 2007. There were two different forms each for the 21 teachers and the 342 students. Both consisted of questions about their abilities and purposes of using computer devices, the frequency of

multimedia in a lesson, and their awareness of multimedia.

The teacher respondents were 38.18% of the total number of teachers, while the student respondents were 26.53% of the total number of students currently enrolled.

Questions 1 and 2 asked the teachers which subjects they were in charge of and whether they utilize multimedia in lessons.

The results were that 76% of them replied yes to the second question.

Question 3 asked about the purpose of using multimedia in their lessons. English teachers mostly used computer programs to display class materials to the learners and utilized multimedia in assessing their performances.

Question 7 asked about their opinions on the use of multimedia and the reasons behind them.

Considering the 100% agreement rate of the use of multimedia during lessons by the English teachers, it is evident that multimedia holds that potential for a more effective class teaching, especially when it is language classes. The opinions of the English teachers were that utilizing multimedia in lessons leads to more effective teaching as it gives visual and auditory stimulus to the learners and allows them to play arcade. Multimedia motivates students, and the stimulation it provides leads to the long-lasting effect of education. In other words, multimedia lessons give learners diverse stimuli, which activates their curiosity to increase learning motivation. Hence, they remember what they

covered in the study much longer, resulting in enhanced lesson effectiveness. Lastly, making multimedia teaching material from a teacher's perspective is more complicated and lengthy. Still, it can be edited and shared quite easily throughout their community once it's made.

However, multimedia also has its drawbacks or considerations that should be addressed before implementing multimedia in every class. The following opinions were given by the teachers who participated in the survey. Shifting every education material into multimedia might lower the efficiency and concentration of the learners as they may get distracted through the vivid imagery stimulations. Some of the teachers have also expressed their opinions related to the poor environment. Since technological issues are still prevailing in many schools, teachers use their devices during lessons and connect them with the projector in each classroom. This process is very time-consuming and sometimes malfunctions. There have also been suggestions that teachers and learners should be trained appropriately to apply multimedia in regular classes. All these should be considered, yet these opinions strengthen that multimedia doesn't contain many defects.

More evidence follows in another experiment conducted at the H Kindergarten and I kindergarten in Iksan, Korea. Previously stated were the opinions of teachers. This study focuses on the effects shown on learners, which in this case are the kindergarteners.

The experiment was designed by creating two groups of kindergarteners. The experimental group of 30 kindergarteners from H kindergarten went through a 25-minute extended multimedia-based learning with a beam projector twice a week. The non-experimental group of 32 kindergarteners from I kindergarten went through a 25-minute lesson using textbooks and a tape recorder. This experiment took three months. The two groups' enthusiasm, confidence, participation, and interest were measured after three months, along with their listening and speaking skills scores through a test.

Another significant difference was that the experimental group was provided with the textbook, workbook, and CD-ROM. They could continue their learning even at home with the internet. On the other hand, the non-experimental group provided a textbook, workbook, and an audio CD. The classroom had educational tools, blackboard, and audio systems. However, they were not allowed to continue their learning at home through the internet. (This is evidence of why I decided to create a mobile application) Results were as expected. The group of students who participated in multimedia lessons experienced a more significant increase of 12.1 in their listening skill scores for the listening part. The other group that didn't use multimedia experienced a 5.15 increase.

For the speaking part, there wasn't that much of a difference in the scores before and after compared to the listening part. However, both groups managed to obtain a better result in the end. Once again, the group that experienced multimedia learning achieved a 6.3 increase while the other group recorded a 0.7 increase. Therefore, the effect of multimedia is proven. It seems that sight, the strongest of five senses, and hearing are vital for children's education. (This is why I decided to add the audio function)

Moreover, while measuring their interests, CD-ROM title, Audiotape, and videotape all contributed to raising the kindergarteners' interest, with CD-ROM title contributing the most. Furthermore, the group that utilized multimedia seemed to be less affected by the teacher's skills, looking into the classroom situations. In contrast, the non-experimental group showed differences in their interest levels depending on the teacher.

Evidence for the benefits of multimedia seems abundant. As mentioned above, the problems associated with the teaching experience can be resolved through technological advancement. However, multimedia itself could also use some improvement as well. Multimedia is a platform that mainly activates your sight, hearing, and touch. Out of the five senses, sight is the most convenient and hence used most frequently. Therefore, more research on the effect of visual learning should be considered.

## 2.2. Audio and visualization theory

### Hoban's visualization theory

In 1973, C.F Hoban published <Visualizing the curriculum> and insisted on visualizing educational materials by stating that language not linked to a specific experience is merely a pronunciation/sound. Hence, for an adequate education to take place, there should be an effort to connect language with expertise, which is to be supported by the teacher.

According to Hoban's visualization theory (Hoban, 1937), Hoban categorized media into abstractness and concreteness. He emphasized visual media from the teaching and learning processes, therefore stating that concrete media such as real-life models, pictures, and photos should be utilized in the learning environment in priority and then move on to the abstract language media.

His theory supports that educational comics contain highly concrete pictures and the language system is also conversational, hence not that abstract.

In the case of comics, some illustrations are concrete visualization methods, and the language used is colloquial language, which also has less abstractness than others.

An experiment was conducted by Back and Han (2014) with elementary school students in 4th grade. This research aimed to present the need to guide students with the comics of their preference and the practical guidance. After developing a reading guidance program designed

for eight lessons, the experiment was done twice. The results showed that fair use of educational comics could increase motivation and learning abilities for both learning and reading underachievers. Moreover, further development into appropriate guidance methods should be considered. Their interest in a specific area of knowledge mentioned in the educational comics can further increase their motivation to study those areas.

### **Principles and relevances**

Out of the five senses, sight is the most convenient and hence used most frequently.

Characteristics of visual education materials are as follows:

1. Displays pictures and text along with the verbal content and hence can deliver vast amounts of data at once
2. Can simplify complex information visually, reduce the abstractness of language and vocabulary
3. Functions as an advance organizer in the learning process
4. We can see clearly which points should be emphasized
5. Dynamic visual information can capture the attention of the learner and motivate them
6. Visual information can be interpreted faster and lasts longer in people's memory compared to information given through language

### **Dale's cone of experience**

Dale (1954) has expanded Hoban's concept in his publication "Audiovisual Method in Teaching" and categorized audiovisual materials into concrete and abstract ones naming them the 'Cone of Experience.' The 'Cone of Experience' determines the property of teaching materials according to whether it provides the learner a concrete or abstract experience.

Dale categorizes the learning experience into 11 stages in the Cone of Experience ranging from verbal symbols to direct, purposeful experiences. These can again be divided into three different learning methods:

Learning through abstractions (symbolic backgrounds)

Learning by observations (iconic experiences)

Learning by doing (direct, purposeful experiences)

Therefore, it can be seen that every stage of learning can be categorized into these three sections. In other words, action, media, and abstractness can help learners form the concept in their heads as they function together.

Dale has recommended that children aged 7 through 9 be exposed to the stage of the iconic experience for their learning process.



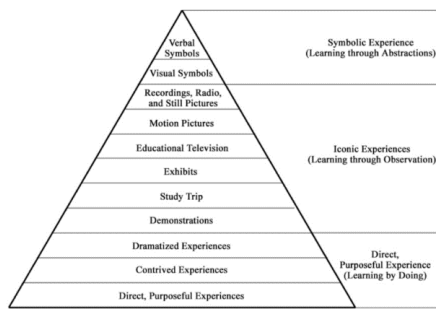


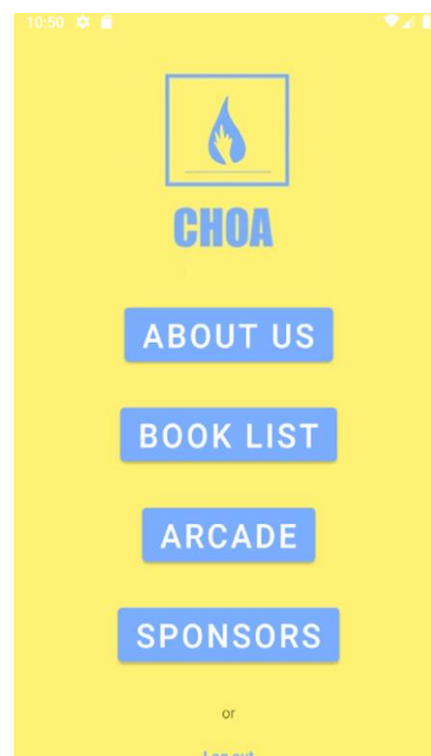
Figure 1: Dale's Cone of Experience

### 3. Application of the Theories



One of the reasons for the utilization of media that Brinton mentioned was that The learners who practice the language outside of the classroom could get definite motivation when they see it through media inside the classroom. This provides the context of developing an educational solution that is not limited to classrooms. Adapting the different concepts and theories mentioned above, I designed a mobile application to provide English and cultural

lessons to children. The app is named "CHOA," coming from a Korean word meaning "A person who is willing to light up the world at the expense of oneself like a candlestick." Considering the immense impact COVID-19 measures have on education globally, it only seems reasonable that a mobile application should be regarded as the ultimate solution to this crisis. Each phase of the app was intricately designed. Korean Folktales were translated and expanded with diverse functions that could help the learning process, including characters, vocabulary, audio buttons, quizzes, and flashcards. English was chosen as the learning language since it is one of the most used and spoken languages. Developing multimedia was to enhance children's learning experience and not specifically learn a new language. Therefore, English was appropriate, especially if we consider the fact that.



### 3.2 Storybook Content

The content of the app was based on Korean folktales. Thus, it focused on sharing Korean culture within the framework of English language learning. If this was successful, the scope could extend to many other cultures to create a globalized community.

#### 3.2.1 Illustrations

As my app was targeted toward the primary students, Dale's cone of experience was accounted for. He explained that children aged 7 to 9 should learn through observation rather than abstract features such as verbal or visual symbols. Still, pictures are part of the learning through the observations stage. Hoban's visualization theory states that concrete factors such as pictures, photos, or models should be utilized in the learning process before the relatively abstract languages are used. Considering these theories, illustrations were chosen to enhance the positive effects of multimedia. Illustrations were hand-drawn at an appropriate level for primary students to further their learning process.

#### 3.2.2 Text

Out of the five senses, sight is the most convenient for humans and hence used most frequently. However, one characteristic of visual education materials is that displaying pictures and text and verbal content can deliver vast amounts of data at once. Therefore, it is crucial to incorporate text into the Storybook to maximize the learner's experience and convey

information accurately. As long as there are illustrations and other methods to compensate, this application holds advantages over the traditional books with just text.

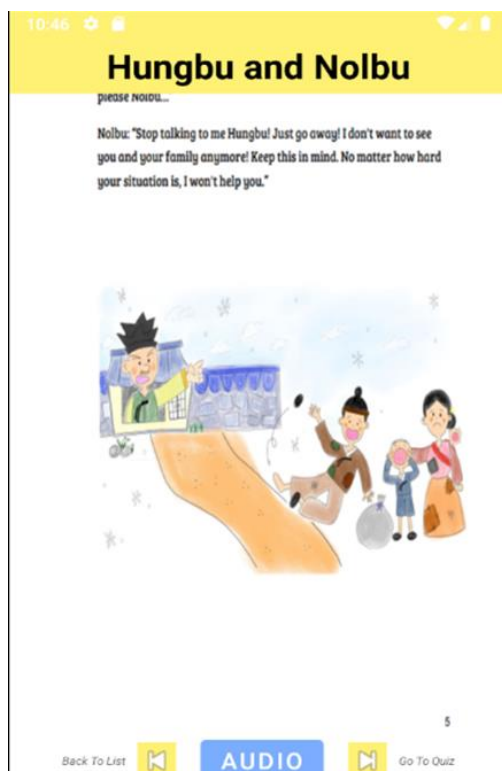
#### 3.2.3 Audio

Audiovisual materials provide learners with the content, meaning, and procedures. These materials are given as language items leading to contextualized situations. Media grants reality to in-class problems. It connects the classroom with the outside world as we learn with both sight and sound in real life.



Recordings are also one of the factors in the learning through observation stage according to Dale's cone of experience. Hence, an audio button was added for pronunciation and to set the overall mood of the storytelling, letting the users stay focused and absorb the text while

reading. The previous research stated that an experimental group that provided a CD-ROM alongside a textbook and a workbook to take home experienced a more significant increase in their listening skills score. Continuous auditory exposure to the educational source does impact the learning. Listening skills are an essential part of the children's future academic career and beyond. It can accelerate the acquisition of a second language and extend their communication skills. Although speaking skills were also measured through the same conditions, that didn't show much difference, and hence, the audio button made its way into the application. Furthermore, the current COVID 19 restriction hinders many teachers from physically making contact with students and, therefore, cannot be reading things aloud. Instead of having live online lessons, this way can be more effective.



### 3.3 Activities

The theories and effects of multimedia started to become realized in this stage of development. The highlight of multimedia is that it is a bidirectional technology where both the learner and the provider interact. As the Storybook was a one-direction communication method, adding activities into this app seemed crucial to fulfilling its purpose.

#### 3.3.1 Motion

One of the advantages of multimedia previously stated was that it could utilize text, video, illustrations, photos, audio interdisciplinary and maximize the effect of education. To be more specific with the phrase "maximize the effect of education" includes the following features as mentioned before:

Allows the learner to participate actively in the learning process and hence develop a self-directed learning style

Eliminates boredom from the learning process

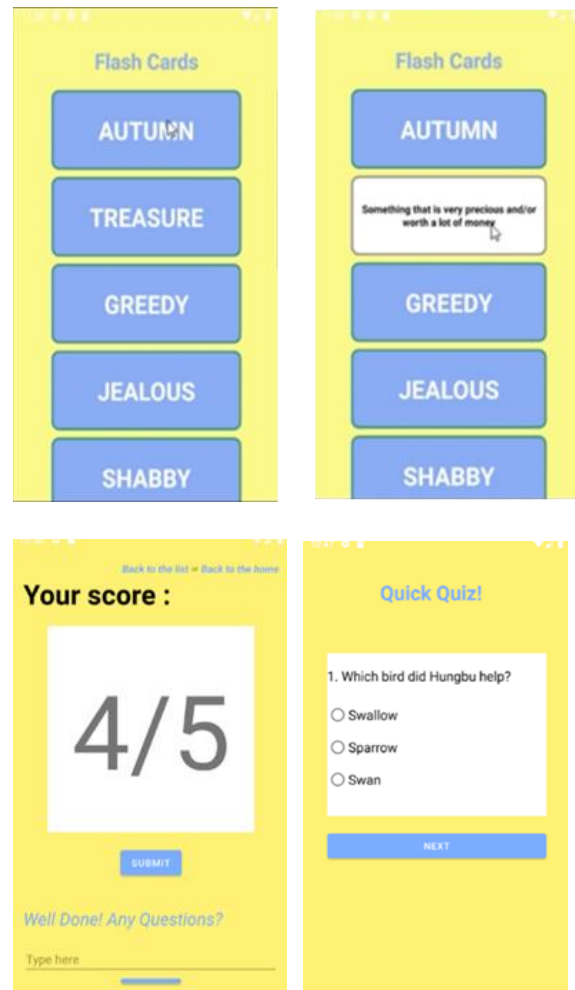
A learner can regulate their own pace

It makes the learning independent

A method devised to incorporate all the potential benefits was the quiz and flashcard. Quizzes and flashcards were added at the end of each story to check the learners' understanding level and provide excitement and commitment. Quizzes are multiple-choice, and scores can be reviewed right after it is submitted. Flashcards can be clicked back and forth with words on one side and definitions on the other. The instant

feedback provided once again eliminates the boredom from the learning process. In addition, the learners can regulate their own pace as it is an independent activity that isn't timed. Therefore, their contribution levels go up as they can spend sufficient time on each step, absorbing all the content.

These would apply to the direct, purposeful experiences of Dale's cone of knowledge as it involves the learners actually engaging with the program instead of passively reading through the application. This stage is also at the lower end of the hierarchy of the cone of experience, which indicates that it is suitable for primary-level students. As stated previously, these interactive and bidirectional methods allow learners to participate and develop a self-directed learning style actively. Repetitive use of flashcards and enhance their memorization. Moreover, learners can moderate their own pace without pressure. It adds the sense of touch to visual and auditory and satisfies the requirements of multimedia-assisted learning. Students can check their level of work. Self-checking is one of the essential skills as a minor as it teaches you how to stay calm and be in charge of your learning. Also, the term "interactive" refers to the person. However, I think this was when people would like to ask questions and included a question section where you can type in and send them to us.



#### 4. Conclusion

This research developed a mobile educational application, "CHOA," using the combination of text, illustrations, Audio, and interactions mentioned in the audiovisual theories as to the basis. The fact that it is designed as a user-friendly and accessible material will break the barriers of education inequality. The application is also planned to be consistently updated with content from diverse cultures. The audiovisual functions will create synergy by absorbing and interpreting different cultures while developing English skills. Illustrations and interactive activities will enhance children's academic

achievements by grabbing their attention and keeping them focused on the task. It can be a self-led study that is not limited to the school classroom, and hence the learning can occur more frequently and in a comfortable space best suited for the students. Continuous exposure to Audio can also increase their listening skills regardless of the content, which is an academic skill necessary for other academic careers and beyond. It accelerates the acquisition of a second language and extends their communication skills. To add on, the motions such as flashcards and quizzes, which are not just a one-directional teaching method, can improve engagement. These are suitable for primary students since they learn through the power of play. It is also mentioned in Dale's cone of experience that the bottom of the pyramid, which is the direct and purposeful experiences, is the most suitable stage for primary students.

To a large extent, it does seem that the benefits of implementing language and cultural experiences to a mobile app are connecting the world outside the classroom with the learner. External or personal reasons for being unable to attend schools or be educated can be resolved. The true meaning of this investigation gets further stretched out as it is still available and worth implementing even after the pandemic ends as the education gap has been existing as the fundamental issue for an extended period.

The limitations of this research are as follows. First, applying the theories on mobile application and the structure of its content was

a process without a real-life experiment. Hence, its effect on children's education cannot be verified at this point. Second, there is a chance that children might lose interest in the utilization due to the increased use of multimedia or other technologies in classrooms. Further study would have to be undertaken for a precise analysis of its effect. The mobile application will be applied to the actual learning environment at an elementary school. Children's satisfaction and performance level will be measured from the instructor's perspective to develop the program.

Moreover, the fact that many underprivileged children do not have access to digital devices was not considered. The proposed mobile application does not require a laptop or desktop device for the learning process but rather a mobile phone or small tablet. However, this still can come as a challenge for the underprivileged students, and a method to target everyone equally should be devised before its launch. One of the biggest challenges each nation and district will face is figuring out a way to find resources and allocate and invest into this issue, including devices for low-income students. Lastly, diverse sources and theories were referenced throughout the research. It includes sources in Korean as well, which means translations were required. Due to the property of languages, some of the ideas and explanations mentioned might misconvey the information.

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