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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Introduction

Education has and will continue to be an integral part of an individual's intellectual, social, and moral development. For a long time, there have been very few changes done with the ways and practices used to impart knowledge to students. But with the expanse brought by the emergence of technology it has introduced a new media that can branch out different possibilities for the various aspects of society. Nowadays, the use of the internet and technology has been a staple for almost everybody. Businesses are advertising across the internet, and communication has been enhanced dramatically because of social media, a new platform for entertainment and so much more. Among these collective innovations and systems is Computer-Aided Instruction. Arnold [1] explained that Computer-Aided Instruction (CAI), also known as Computer-Assisted Instruction is an array of computer technologies dedicated to aiding the teaching and learning processes and comprises of various applications such as practical assessments and guided drills as well as computer-based teacher-and-student communication. This technology will provide a way for education to progress into a more advanced and interactive learning platform, which will then help potential users to use such technologies competently.



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The skills and knowledge students can learn through education have also expanded by introducing the K-12 curriculum to the education system, even including computer knowledge into the curriculum to catch up with technological advancements. With these changes in place, it will increase the difficulty for the young students to learn a rather amplified learning curve. In relation to this, Palatino [2] stated in his article that lawmakers questioned the preparedness of the Department of Education (DepEd) in transitioning into a blended type of learning which will require them to conduct training, procure new learning materials, and the installation of internet connections during several hearings in the Congress and Senate. So, in turn, it will seem as though that preschool education is almost a necessary preparation by developing basic motor skills that the children need before stepping into kindergarten and exposed to e-learning. On top of all this, the current pandemic has become a major hindrance to education and society as a whole. According to a survey conducted by the National Institute for Early Education Research [3], children within 3 to 5 years of age have lost their learning opportunities due to the pandemic.

This study is conducted in the City of Cabuyao here in Laguna. Here in Cabuyao, there are several daycare centers and private schools that facilitate preschool learning. The concurrent shift in the educational system and other external factors, especially the pandemic, has proved that teaching outside of schools' premises will be a challenge. Most schools within Cabuyao have also adapted to online communication platforms in order to connect and teach students virtually. But even with an alternative like this, younger students, most especially toddlers, often



need support from their parents in order to navigate through computers or smartphones for their studies.

With this study, the researchers aim to utilize the versatility of CAI technology in providing support for preschool education while also integrating entertainment aspects targeted towards the children in order to keep them engaged in their studies without sacrificing the amount of knowledge that they shall acquire in using this technology which will ensure a fulfilling learning experience.

Statement of the Problem

The study aims to implement Computer-Aided Instruction for Preschool students in the City of Cabuyao. It seeks to answer the following questions:

1. What are the limitations and problems posed by traditional teaching to the pre-school teachers with regards to:
 - a. assessing of children's knowledge;
 - b. keeping children engaged with the lessons; and
 - c. children's cognitive ability?
2. What are the features that the proposed system will contain that would help improve and resolve these problems and limitations?



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3. What is the web development expert's assessment on the proposed system in terms of;
 - a. functionality;
 - b. usability;
 - c. efficiency; and
 - d. maintainability?

4. What are the parents and teacher's assessment on the proposed system in terms of;
 - a. functionality;
 - b. usability;
 - c. efficiency; and
 - d. portability?



Conceptual Framework of the Study

This study aims as the researchers illustrate what will be the output of the proposed system.

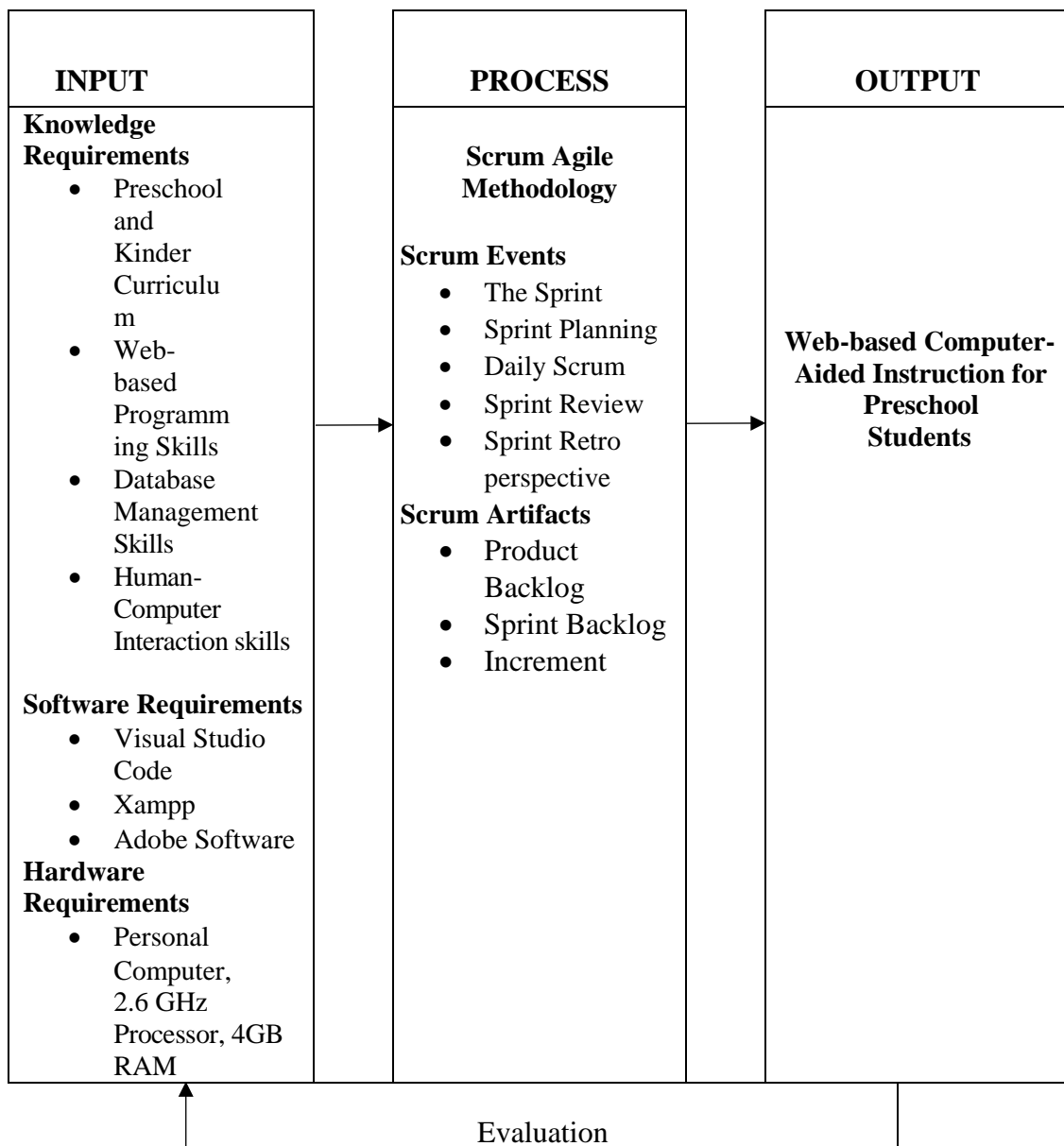




Figure 1. The Conceptual Framework of the Study

The following evaluation needed from the proposed system is composed of input, process and output. The knowledge requirement is based on the Preschool and Kinder Curriculum of the researcher's client. The researchers will use web-based programming tools such as JavaScript, JQuery, and PHP for the programming languages and CSS mainly for web design. Database management skills are necessary for this proposal as it will help to manage the data effectively. Lastly, human-computer interaction skills should be applied to this system since the researchers must have knowledge about the fundamentals of good design and the usage of computer technologies that focus on the interaction between people and computers.

The software requirements include Visual Studio Code, Xampp, and Adobe softwares such as Adobe Photoshop, Adobe Illustrator, and Adobe Animation. Visual Studio Code will be used as the main platform for coding. Xampp is an essential requirement for web-based programming since it allows PHP and MySQL Databases to function. Adobe Photoshop and Adobe Illustrator will be used in the designing the Computer-Aided Instructions by creating the background items and graphic illustrations to be used as the Preschool materials. Lastly, Adobe Animation will be used to create animations for a more dynamic presentation of learning materials that will help convince the users.



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The hardware requirement will be a personal computer that runs on a 2.6 GHz processor and at least 4 GB of RAM to run most of the soft wares mention prior without experiencing issues.

In the process, Scrum agile methodology is a project management system that emphasizes iterative and gradual growth, with requirements and solutions emerging from cross-functional collaboration. According to an article written by Schwaber and Sutherland [4], the Scrum Events- First, there's the Sprint, which is the key component of the scrum where concepts are converted into value and all of the work required to meet the product target is completed. Second, Sprint Planning, which outlines what will be achieved and how it will be accomplished during the sprint. Third, Daily Scrum; to review progress toward the Sprint Goal and, if necessary, adapt the Sprint Backlog and upcoming scheduled work. Fourth, conduct a Sprint Review to assess Sprint's performance and make suggestions for possible improvements. The fifth step is to conduct a Sprint Retrospective in order to develop strategies for enhancing quality and performance. There is a product backlog for Scrum Artifacts, which is a list of what needs to be done to enhance the product. The sprint backlog is the collection of selected product backlog items to complete in a sprint. Finally, the increment represents a concrete step toward meeting the Product Target.

The output, "Web-based Computer Aided Instruction for Preschool Students" will be obtained once the Input and Process are acquired. With this Input-Process-Output or IPO being completed, the



researchers can help solve the problem that the modern education encounters.

Significance of the Study

This study to be conducted by the researchers pose great significance to the transitions needed on improving the ways in which education is presented to the students. With the premise of introducing a platform in which a student can learn from an intuitive system designed for preschool to kinder learning. This will enable the researchers to gain further knowledge into developing education based systems for preschoolers and kindergarten students which can be used as a foothold for further researches regarding more digital learning systems.

The researchers aim to procure a solution to distance learning posed by certain unforeseen factors in order to keep the flow of learning constant. With a crisis much like the pandemic, a large majority of teachers within educational institutions will have difficulty shifting onto digital platforms for teaching. Students will also be affected especially the toddlers whose learning opportunities are hindered by such crises. To develop an alternative way of learning for toddlers will be able to give solutions to the problems to be faced by the people this research is being done for.



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This study will hold great significance towards schools, teachers, students, parents, IT students, the researchers, future researchers, and education system.

Schools. The schools that offer preschool and kinder education will gain a new alternative teaching mechanism for their preschool and kinder students. It will also diminish a significant amount of resources expended by their staff in modular learning, which will benefit their institution greatly, especially during a crisis like the pandemic.

Teachers. Teaching preschool and kinder students about information based on the curriculum will be more accessible with interactive visual learning materials that can be accessed through the system. It will also not require physical materials for lessons as it can be updated within the system by the teachers.

Students. The interactive aspect of the system will provide an alternative way of learning other than modular learning and assessments. It will also immerse the children more into the use of technology and learning through entertainment-based teaching. Learning tasks will also be flexible in such a way that the students will be able to redo them to enhance their cognition and knowledge.

Parents. With the system designed in a way that children can comprehend and interact with on their own, it will lessen the occurrence of parents continually having to teach their kids regarding their lessons.



It will diminish the challenges faced by parents in teaching their kids since the system acts as a learning guide based on their teacher's lessons.

IT Students. IT students will garner concepts and methodologies applied to the system as additional knowledge that will eventually help their course.

Researchers. The study will also benefit the researchers as they can gain a substantial amount of knowledge and improve on different skills that require them to conduct this study and use it in the future.

Future Researchers. This study will be able to provide findings that will be valuable for future Computer-Aided Instruction research and other related researches done in the future.

Education System. This study will be beneficial to the current education system since they can use it as reference in developing an alternative learning tool in the future.

Scope and Limitation of the Study

This study aims for the implementation of a Web-based Computer-Aided Instruction for Preschool students here in Cabuyao. The purpose of this study is to become a stepping stone to help the teachers in teaching children learning modules in a more interactive way. This will also help immerse the children with their lessons with the use of



interactive and straightforward aspects that they can easily navigate through with minimal provisions from their parents. Lastly, this study will also help both the children and teachers to have an alternative in conducting lessons during crises like the pandemic. With this, the researchers aim to help solve the problems encountered in modern education.

The implementation of the system will be held in the City of Cabuyao. As a short background of the city, Cabuyao came from the word "Kabuyaw Tree" which is common in primary and secondary forests throughout the Philippines and native to the archipelago [5]. The city of Cabuyao has a large number of schools based on the website of Department of Education Cabuyao. The said research will be ended approximately six months or more.

There are various features included in the system that help the users to navigate through it easily.

For the teacher's portal, a learning material studio is present, which lets them modify learning materials that they will give to their students. It allows for a dynamic way of adding new learning materials for the students to access, editing the currently existing materials for possible revisions, and deleting learning materials rendered obsolete due to certain circumstances. This feature also lets the teacher track their pupil's progress through the activities they performed in the system.



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Student management is a feature included in the teacher's portal wherein they can modify the participants of their class based on their class list records. This allows them to add students in their class list to give them access to the subject, edit the information in their class list for possible corrections, and remove students that are not supposed to be on the list. Since discrepancies with the student information being a possibility, the same feature is present in the parent's section enabling them to edit the information in cases that the teacher's input is incorrect.

A curriculum section can also be viewed and modified by the teachers. This includes the subjects together with the topics and subtopics to be learned by the children. It also includes the skills to be developed per subject. Modifying the content of the curriculum based on certain official curricular changes is also granted in this section for the teachers.

The student card is a feature that enables the teacher to view and record the children's grades based on how well they performed on the performance tasks in every subject.

A video room is also included in the teacher's portal wherein they can add an educational video categorized based on the lessons that the teacher will provide. They can also delete videos or edit the details of the videos.

A message box feature is also included in the teacher's portal wherein the teachers will be able to send messages to the parent's portal



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about upcoming tasks or assessments for their children, update the parents about their children's overall progress, or relay important announcements made by the school. It also lets them receive feedback or concerns from the parents.

Moving onto the parents section, child information management allows the parents to modify the personal information for possible corrections. Since discrepancies with the student information being a possibility, the same feature is present in the teacher's section enabling them to edit the information in cases that the parent's input is incorrect. Viewing the student progress reports is also a feature in which the parents are able to view all of the units and topics present in the curriculum.

A curriculum section can also be viewed containing the curriculum that their children is currently undergoing. This includes the subjects together with the topics and subtopics to be learned by the children. It also includes the skills to be developed per subject.

A timetable is also included in the parent's section wherein they can monitor the activities done by their children.

A message box feature is also included in the parent's section wherein they can contact the teachers about their possible concerns or feedback. It also allows them to receive announcements by the school or about upcoming tasks and assessments posted by the teachers.



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As for the students, there is a dedicated homepage that they can access after scanning a generated QR code required for them to enter the page. The home page is comprised of multiple subjects they are enrolled to which are progressively unlocked once they meet a certain criteria.

There is also a subject page for students to access. This feature allows the students to navigate through an interactive learning page specific to the selected subject. Learning tasks will be present in this feature which the children can use to learn about the topics on that particular subjects. The interface dedicated to each subject will vary depending on how the design will improve the children's willingness to interact with tasks presented in the system.

The students will also have access to a game room. This feature will contain minigames based on the learning modules which will be designed to be educational and entertaining for the students.

An assessment page is also present under each subject which will be posted by the teachers. These contain graded assessments that will test the student's proficiency and knowledge of topics prior to the learning tasks. Completion of such assessments will unlock the subsequent topics that the student's will learn next.

The programming language of the proposed system will be focusing on the web development tools such as HTML, CSS, JavaScript, Laravel, and Bootstrap. The system will also use dynamic programming tools such as PHP, MySQL DBMS.



HTML (Hyper Text Markup Language) will be used to display a web page's words and images from the browser. It is an essential programming language since it shows the output of the developer.

CSS (Cascading Style Sheets) is a tool that will be used to specify how HTML elements should be presented in a browser. CSS will enhance the look and feel of web pages, including the design, layout, and display variations for various devices and screen sizes.

JavaScript, on the other hand, is a web development scripting or programming language. JavaScript will be used to add complex features to web pages including content changes, interactive design, and animations.

PHP (Hypertext Preprocessor) is a scripting language that is especially suited in web development and can be implemented in HTML. PHP will be the most used language in terms of Computer Aided Instruction since PHP is applicable in adding dynamic content to be added in MySQL Database.

MySQL (Structured Query Language) is an open source Relational Database Management System. The main purpose of MySQL is store the database since the proposed system requires of adding the important contents to be added in Computer Aided Instruction.



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Laravel is an open-source PHP framework that is both sturdy and simple to use. It adheres to the model-view-controller design pattern. Laravel reuses existing components from other frameworks, which aids in the development of a web application. The resulting web application is more structured and functional.

Bootstrap is a CSS Framework that will be an important part of the system since the proposed system should be responsive in any devices.

The other technologies to be utilized in the system will only be an extension of the webpages and as a part of Human Computer Interaction design materials.

Adobe Software such as Adobe Photoshop, Adobe Illustrator and Adobe Animation will be used to create vector materials and simple animation to be applied in the system.

The concept of Computer Aided Instruction will serve as a learning tool for teachers in order to keep in touch with children. The researchers will be responsible for the User Interface of the proposed system. The main interface shall be effective with the end-user's perspective. The said interface shall be clear, concise, familiar, responsive, and attractive. The User Experience will also be a factor to the research since it reflects the overall system. The experience will be interactive and efficient. However, this concepts will be effective once the researchers applied the Human Computer Interaction factors such as



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Task Factors, Environmental Factors and Comfort Factors on the proposed system.

The proposed system will be using a Scrum Agile Methodology. Scrum is a subset of Agile which is the most used one. Scrum is designed to assist teams in adapting naturally to evolving environments and customer needs, with built-in re-prioritization and quick release cycles to ensure the team is continually learning and improving.

Web Developers, Teachers, and Parents will be the important evaluators of the proposed system. The two evaluators will be tasked to evaluate the proposed system. The evaluators may differ in their proficiency in using such systems which will possibly produce different outcomes. The Web developer must be a graduate of Bachelor of Science in Information Technology (BSIT) and have at least five years of experience in web development area and will evaluate the system in terms of capability, accessibility, and maintainability. On the other hand, the teacher and parent will evaluate using a client side perspective mainly focusing in its usability and intuitiveness.

Lastly, there will be limitations in development of this proposed system. The researchers cannot use a particular lesson without the permission of the client. Since this is exclusive for Pre – school which is not handled by Department of Education (DepEd). The learning materials of teacher used in this are limited and may not be included in other books.



Definition of Terms

Computer-Aided Instruction

refers to instructions presented via a computer used to enhance teacher instruction.

Blended-learning

is a style of education where students can learn through digital and online media together with face-to-face learning.

Modular-learning

a form of distance learning that utilizes modules used for self-learning provided by the Department of Education.

Assessment tasks

are instructional strategies used to assess a student's proficiency on a specific course.

Learning tasks

are interactive tasks that keeps the students engaged with the content being taught.

Portability

the ability of software to be transferred from one machine or system to another.

Scrum

is a framework within which people can address complex adaptive problems, while productively and creatively delivering products of the highest possible value.



Sprint	They are fixed length events of one month or less to create consistency.
Sprint backlog	it is a highly visible, real-time picture of the work that the developers plan to accomplish.
Product backlog	is an emergent, ordered list of what is needed to improve the product.
Increment	is a concrete stepping stone toward the goal of the product.
Sprint review	its purpose is to inspect the outcome of the sprint and determine future adaptations.
Sprint retrospective	its purpose is to plan ways to increase quality and effectiveness.
Daily scrum	its purpose is to inspect progress toward the goal and adapt the Sprint Backlog as necessary, adjusting the upcoming planned work.