Integrating Coding and Artificial Intelligence in English Language Teaching: A Study at Cihan University-Duhok

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Abstract

Coding and language acquisition are highly valued in the present world, not only in the educational system but also in daily life and earning a living. In terms of Artificial intelligence (AI), Machine Learning, Deep Learning, etc., coding is becoming more and more integrated into daily life. Applying coding to increase the visualization of English learning by smart systems employing AI in the classroom, in the context of English Language Teaching (ELT), may have a significant influence on how students learn. Any civilization needs language to facilitate social interaction because it allows people to communicate their ideas, opinions, and feelings to others while also advancing their knowledge. English is a language that everyone may use to communicate with one another. As a result of the growing tendency of linguistic globalization, bilingualism is becoming a fairly common phenomenon in today's world. This paper will investigate the potential effects of coding on undergraduate students' academic performance and English language comprehension. It tries to assess both levels of learning English and vocabulary by coding using the survey data by SPSS. Additionally, it will make an effort to link the teacher's study level and outside-the-classroom teaching methods. A thorough literature review has been done and a research gap has been found. Then for the study, 60 undergraduate students from the Department of English, Cihan University- Duhok were chosen, and they were requested to take a pre-test to gauge their level of English proficiency. Additionally, the faculty were picked to gauge how easy it was for the students to grasp the language. After introducing coding and smart systems into the learning process, a post-test was conducted, and the outcomes were evaluated. The AI and smart system in the ELT can enhance the way and interest of learning. This study has led to the conclusion that coding can be added to ELT to enhance learning.

Keywords— Coding in ELT, AI-enhanced Language Learning, Language Acquisition through Technology.

I. INTRODUCTION

For English language learners (ELLs), explicit code and comprehension education is crucial. Several major results from research on young ELs learning to read for the first time in English can provide recommendations for creating efficient code-based instruction for the kids. Students who are studying English for academic purposes are known as English language learners (ELLs), and they typically have non-English-speaking parents or backgrounds. By allowing instructors to spend less time giving tests and more time teaching and supporting student learning in the classroom, the coding-based automated assessment may improve teacher evaluation.

Language is essential for social interaction in any society because it enables people to express their thoughts, feelings, and views to others while also expanding their knowledge. And to learn the language there are different techniques to learn English in a better way including incorporating the coding system or code-switching, advancing the mobile apps, etc. Using different UI/UX is also a great way. Among these, coding incorporation is one of the efficient and easy ways in the current education system context.

So understanding how the students will learn English, with help of computer science incorporating coding and machine learning is an important step for this as a whole. This study tries to show that ELT can be better

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when coding will be incorporated into the education system. Students will learn more efficiently.

Programmers create code to provide computers with detailed instructions on how to do computer science-related tasks. Coding is a common term used to describe this procedure. The process of creating a set of instructions using tools that are simple enough for young children is now referred to as "coding," as opposed to the term "coding," which was historically used to denote the act of generating in complicated programming languages. For instance, in the 1960s, the well-known Logo Turtle and the Logo programming language were created with the intention of teaching kids the fundamentals of computing. Seymour Papert, a pioneer in the teaching of computer science to children, developed the idea for the Logo in 1993 as a tool to inspire kids to think critically and find solutions to problems.

The researcher advocated that students utilize programming as an expressive tool to learn about other subjects rather than as a skill to be taught in order to develop it, in contrast to computer languages and robotics. Papert's objective is currently being achieved, despite the fact that programming has been taught in K12 schools for the previous 50 years. In addition to being a talent for work in high-demand areas, coding increasingly incorporates elements of creativity, cooperation, and expression. Proponents of the movement contend that learning how to code is a talent that is required for many sorts of 21st-century employment and that all undergraduate students should have the chance to do so.

But using coding in the education system for making learners more efficient or making English Language Teaching (ELT) better, is a huge process and not yet possible to incorporate in most schools. Learners also may need time to understand how this system may work, and due to lack of proper demonstration of the coding incorporated education system, the problem arouse of not being able to make such a system in action. The major issue is the level of implementation of such technologies and developing the coding application that enables quality learning.

The focus of this study is to understand how well the students' vocabulary develops and how well the students learn the English language. This will help the programmers to understand the situation existing and according to that develop the UI/UX of the apps or websites. It will also help to understand what kind of content have to be kept.

II.   REVIEW OF LITERATURE

Coding is a more complicated ability that is part of the four core digital literacies of language, connections,

information, and (re)design, according to different researchers (Dudeney et al., 2013). Where should they start if English teachers desire to promote this new style of literacy to their students? (Skinner, 2016).

Children—or adults, for that matter—can develop crucial skills like logic, critical thinking, and problem-solving by learning to code (Ohakamike-Obeka, 2016). Through programming, we discover that there are typically several solutions to a given problem and that often simpler and more efficient solutions are preferred (Branke et al., 2016). Meaningful language exercise can come from examining and debating how critical thinking and problem-solving work (DEROUICHE, 2019).

Although this paradigm may be used in different subject areas, the article's main point is how it applies to teaching English. More particularly, it focuses on how encouraging students to work with code may be coupled with English education such that the two together can assist students to enhance their language abilities and instill some of the 21st-century talents described above (Vladimirou, & House, 2018). Scratch is a free object-oriented programming language developed by MIT that is commonly used by teachers who wish to include coding in their language learning lessons.

Kim and his team employ Scratch in their ESL lectures and have their students code short conversations. Scratch is a drag-and-drop (Kim et al., 2017) programming language that Cohen uses with his students to have them code conversations that cartoon characters show in speech bubbles. He underlines how easy it is to use and how the resultant code may be written in any style thanks to its drag-and-drop interface (Kanbul, & Uzunboylu, 2017). The teacher listens to the groups as they plan their stories and corrects any pronunciation issues as necessary. The children then perform their programs and share their stories with the class. Any spelling or grammar errors can be corrected by the class and teacher (Orsini et al., 2013). Other advantages come from the coding activities. They instruct in preparation and reasoning.

The chronological organization of the poetry must be represented mathematically. A Markov process that uses directed trees to link each word to others in the dictionary can be used to represent the word order. Each node in this tree corresponds to a word, and each edge has a transition probability given to it that indicates the likelihood of moving from one word to another (Papert, 1993).

The folks who develop the computer programs that drive everything we see and do on a computer are known as programmers or coders. Most students spend a lot of time playing online games, but few are skilled game designers (Johnson & Wintgens, 2015). Students who learn to code

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are inspired to use technology as producers rather than merely consumers (Wong et al., 2015). All can develop critical thinking, reasoning, and problem-solving skills by learning to code. Coding teaches us that there are usually several solutions to a given problem and that frequently simpler, more efficient solutions are preferred (Vladimirou & House, 2018). Although other subjects in the curriculum can use this paradigm, the article's main point is how it applies to teaching English (Saunders et al., 2006). More specifically, it highlights the relationship between encouraging students to work with code and teaching English so that the two combined may help students develop their language skills and instill some of the aforementioned 21st Century skills (DEROUICHE, 2019).

Morrison claims that if coding is to be used in schools, a significant investment in teacher training will be necessary (Morrison, 2013). Laura Kirsop, a teacher at Code Club, tells Morrison that there is more work to be done before educators feel confident enough to teach these skills. She says that throughout her own education, she did not get this sort of instruction (Papert, 1993).

The phrase "21st-century learning" is commonly used in relation to this (Zhang et al., 2016). According to researchers, the term "21st-century skills" is "often used to refer to a variety of significant talents including collaboration, digital literacy, critical thinking, and problem-solving that advocates claim schools should teach to help children thrive in today's society" (Hall et al., 2010). Employers are looking for young people who are able to learn on the job and who possess the three C's: creativity, communication, and cooperation in a time when schools are aware that they are training students to thrive in professions that have not yet been formed. In order to adapt to constantly changing work environments, connect with others locally and remotely, and so absorb on-the-job training through teamwork, these skills are important (Nguyen, & Terry, 2017). For example, researchers (Learning, 2017) expand on these C's by including a fourth C for critical thinking in addition to the information, media, and technical literacy skills. In an infographic that explains this, the World Economic Forum (2015, p. 3) provides a comprehensive analysis of 21st Century Skills (Proctor et al., 2020).

Gap:

From the literature study, we understand that there is development happening for coding and application that may be incorporated into English Language Teaching (ELT) but no research has tried to understand which level the learners can be impacted by this system. Or incorporating coding will even be tried to enhance the learning of English and will it make the system more efficient.

Research Questions, Aim, and Objectives:

Research Question:

From the gap of the research, the following questions have been developed for the current research including –

RQ1. Is there any relation between the coding-incorporated education system and the level of English learning of the students?

RQ2. What relation is there between the same system and the vocabulary level of the student?

Hypothesis:

There is a positive relationship between the coding-incorporated system of learning and the level of English learning.

There is a positive relation between coding incorporation and the level of vocabulary knowledge of students.

Students can easily learn things if virtuality is added.

Aim:

The aim is to understand how well the students can use the coding system-enhanced English learning techniques to enhance their knowledge.

The major objectives are –

- To understand the research gap from the literature study.
- To do the statistical analysis among the level of student and their learning level and level of vocabulary.
- To develop an understanding of the future prospects of the research.
- To develop recommendations about how the system can be carried forward.

III. METHODOLOGY

Steps of Method:

The whole research has been done in 3 major steps.

A sufficient quantity of literature review has been conducted, to start. The research's main component is its literature evaluation, which aids in comprehending the idea of coding, smart systems, AI, and their connection to ELT. The gap in the research is that no study demonstrates the relationship between coding and ELT or the effectiveness of AI in this regard.

Next, participants in the study were chosen from the Department of English, Cihan University - Duhok. They

were initially questioned about how traditional education is doing. They were then instructed or trained using coding, artificial intelligence, and other cutting-edge technologies. Following that, a post-test was administered to gauge how the student's perspectives and comprehension had changed.

For an accurate analysis, the study requires a minimum of 60 data points. Following the collection of 60 students from the Department of English, Cihan University-Duhok, the data were analyzed using IBM SPSS, and the relevant charts were created for the data analysis to be shown. Descriptive statistics were initially calculated, followed by independent samples and paired sample t-tests, to see how coding may affect the ELT. The normality of the score distribution was further assessed using the Kolmogorov-Smirnov test (Heift & Schulze, 2007).

The faculty has also been asked to judge how well the students performed following the training time and how well they understood English utilizing the conventional method of learning (Hutchinson et al., 2016).

This in-depth, time-consuming research aid in improving understanding. Primary surveys, inferences, and references from secondary sources were all used in the data collection process. The data pooling has also been done from secondary sources like books, case studies, journals, or research papers. Even while gathering this kind of information is time- and money-consuming, it usually ends up being insufficient and inappropriate for conducting the entire investigation.

Design:

The whole study has been summed up into seven steps including the data required and the type of analysis –

A literature Study has been done to understand the current research trends and find the research gap.

Based on the gap, the research questions have been developed and the hypothesis has been formulated.

Then the aim has been set up and to achieve the aim, objectives have been made.

Next, the survey has been done in terms of pre-test and post-test among the students of the Department of English, Cihan University- Duhok.

- o The incorporation of coding or not incorporation is independent as it's under the choice of the system.
- o The level of English learning and vocabulary is the dependent variable here, along with the decision-making of the participants as based on coding

incorporated system education, the result changes.

- o No other traditional education has been given to the participants during the period of pre-test and post-test.

Then the gathered data has been analyzed. There were 2 types of analysis done –

- o **Descriptives:** To understand the individual scorings how it differs and the mean value change for learning the English and vocabulary level.
- o **Independent Samples Test:** To understand the significance level of the study and the data, if the null hypothesis is true or the alternative hypothesis is true.

Then, based on the results the discussion has been done.

Lastly, the recommendations have been given along with the implication of this study in future research.

Sample Size:

- A total of 60 samples have been taken from the Department of English, Cihan University- Duhok for the study.
- Also, the understanding has been developed from the survey of the faculties.

Limitation:

- The sample has only been taken from the students and faculties of the Department of English, Cihan University- Duhok.
- Only 60 samples of undergraduate students have been taken.

IV.   RESULTS

60 students were selected at random from the Department of English, Cihan University- Duhok to represent the range of English language proficiency. The undergraduate students first examined the description. To comprehend the change, it is analyzed for both the pre-test and the post-test.

The analysis of the survey data taken from the students of the Department of English, Cihan University-Duhok, shows that the mean value of the result of pre and post-test about English Language earnings has increased. All the samples show an enhancement of the score, thus telling that the coding incorporation makes a change that is positive, in terms of learning English.

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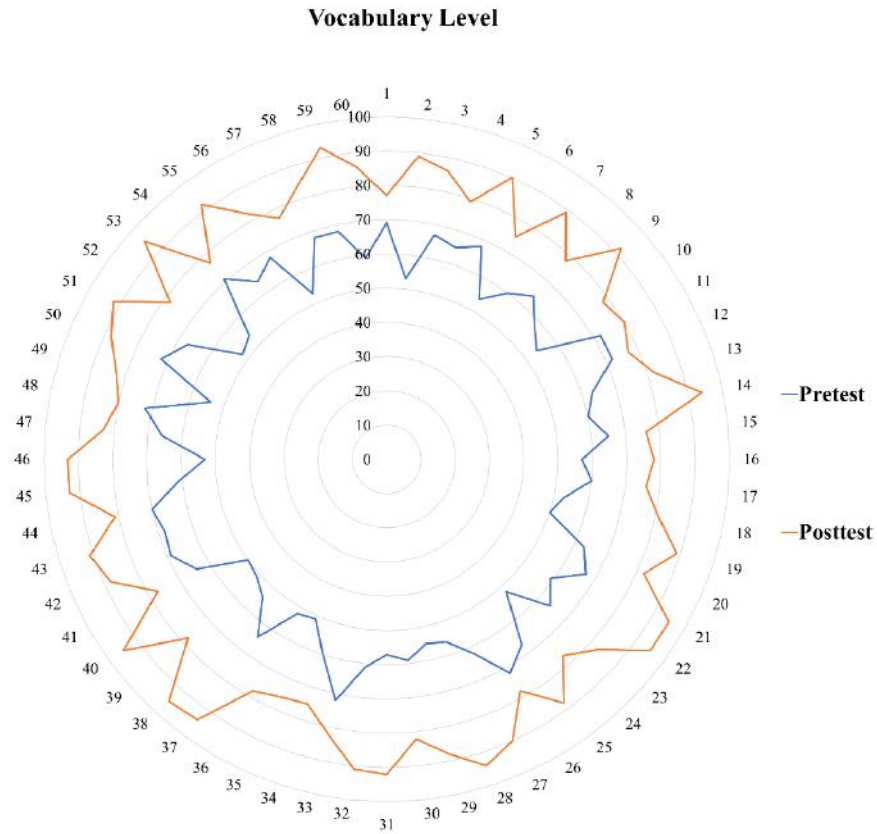| Descriptive Statistics of English Language Learning (A = Pre-test & B = Post-test)					
	Student Test	N	Mean	Std. Deviation	Std. Error Mean
Learning	A	60	59.37	3.350	.432
	B	60	82.32	7.421	.958

First, students' levels of English language proficiency (ELT) were often poor while using the old technique because of the challenges of learning or because of the dull ways. However, the post-test following the training reveals that there has been an increase in the degree of language acquisition once the coding has been included.

English Language Learning
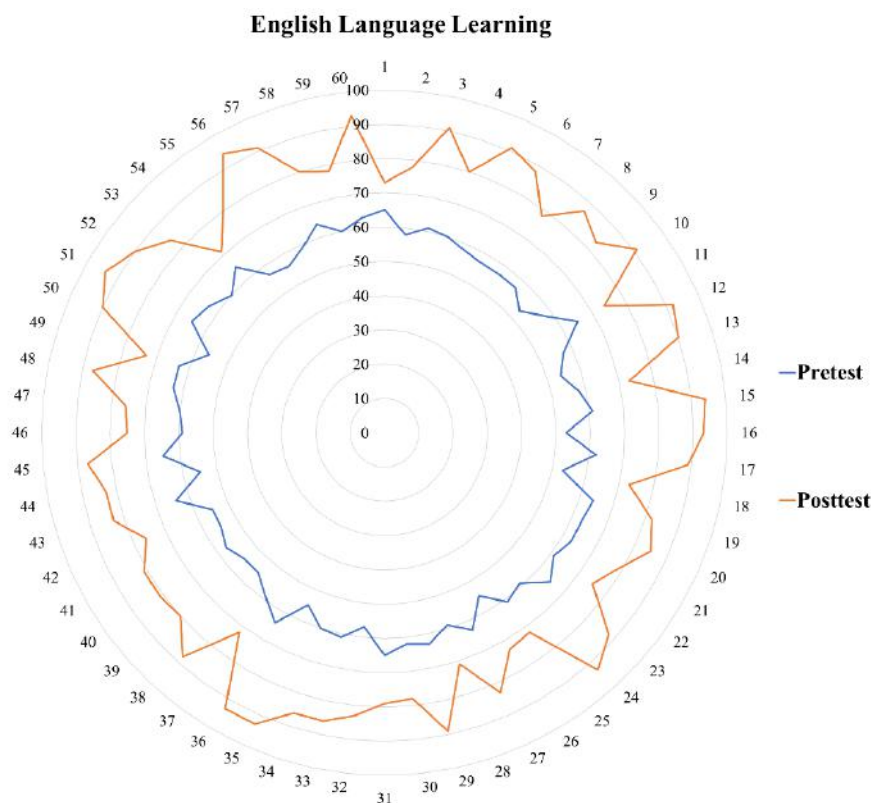
The pre-test had a mean score of 59.37 for learning English and a standard deviation of 3.350. However, after the training utilizing the coding technique or code-induced learning, the mean changed to 82.32.

Descriptive Statistics of Vocabulary Level (A = Pre-test & B = Post-test)					
	Student Test	N	Mean	Std. Deviation	Std. Error Mean
Vocabulary	A	60	58.97	6.577	.849
	B	60	85.43	6.085	.786

After adding coding to the learning system, there is an improvement in vocabulary acquisition as well. Prior to training, the average score for acquiring a new language was 58.97, and it improved to 85.43 after training. Additionally, the standard deviation decreased from 6.577 to 6.085.

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Vocabulary Level

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
									Lower	Upper	
Learning	Equal variances assumed	71.638	.000	-21.835	118	.000	-22.950	1.051	-25.031	-20.869	
	Equal variances not assumed			-21.835	82.083	.000	-22.950	1.051	-25.041	-20.859	

Independent Samples Test - English Language Learning

It indicates how dramatically code integration has influenced the ELT system. Since there is a highly significant difference in ELT levels between the pre-test and post-test that is less than 0.05 (Sig. (2-tailed) < .05), the independent sample t-test reveals that the impacts of the students are positive.

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Independent Samples Test - Vocabulary Level										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Vocabulary	Equal variances assumed	.880	.350	-22.880	118	.000	-26.467	1.157	-28.757	-24.176
	Equal variances not assumed			-22.880	117.295	.000	-26.467	1.157	-28.757	-24.176

Similar to this, levels between the pre-test and post-test are highly significant and lower than .05 (Sig. (2-tailed) < .05), demonstrating a favorable influence on students' vocabulary development.

It is evident from the instructors' personas that by integrating coding, AI, and smart systems into the educational system, children are able to learn more and have greater enthusiasm and engagement in the classroom.

V.   DISCUSSION

The results show that there is a positive impact on the level of coding incorporated English learning system that allows enabling the students to have the potential learning and also allows them to learn the English language more efficiently (Ahmadi, & Reza, 2018). Also, there is a significance level lower than 0.5 that says that the results were statistically significant and the null hypothesis is not significant and not rejected.

Coding can have a positive impact if it is incorporated into the education system, and can be good for the learners learning English. The statistics also show that the results are able to tell the significance level and also can be used for future studies (Sinurat et al., 2021). From the results of the research it is to be understood that there is a scope for incorporating the system of automation and AI, based on the coding with the English language teaching that will enable learners to learn English easier and better.

Other previous research has shown how coding or machine learning and AI systems can be incorporated into the educational system (Backer et al., 2020) but this study makes a new path toward how the impact will be of the same. This study instead of making incorporating coding into education, tells about the level of impact of the existing or modified system (Jie, & Xiaoqing, 2006).

Further, the growth of coding literacy has linkages to traditional literacy that are much more direct and maybe palpable (Gee et al., 2013). We suggest that students might use coding as a learning tool rather than advocating that they learn to code (Papadakis et al., 2016). Children are being introduced to computer science through initiatives like the Hour of Code in an effort to stimulate their curiosity in studying more on their own (Knobel and Lankshear, 2014), (All Otaiba, 2005). However, we think that coding applications and games also teach reading skills in addition to the disciplinary literacies particular to computer science.

The main limitation of this study is that it has been done in a smaller sample size and only from a single university. The other limitation of the study is that this study only focuses on how coding can make learning more efficient in the English language and not other subjects or disciplines.

Finally, the results can be used for the coders to make any system with proper incorporation about how it may be made or coded so that learning will be easier and more approachable for the students. Also, the teachers will be more into the same. This will enable the undergraduate students of the Department of English, Cihan University-Duhok to become more creative and effective learners. They can be more into coding and AI development also, developing some other skills also.

VI.   CONCLUSION

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There are a lot of real advantages to teaching coding in the classroom, and we think they'll help undergraduate students improve their reading skills in the context they're familiar with as well as the need to get them ready for the uncertain future. Well-designed games give problem-solving scenarios with feedback and evident consequences that result in genuine, profound, and important learning, claim researchers. They started out by pointing out that many coding applications are designed to be games. the notion that players must comprehend the specialized or technical language of the game in order to engage in video games. This could get them ready for further academic language learning with a focus on a certain subject.

RECOMMENDATIONS

The following recommendations have been developed from the research –

- There are numerous approaches to introducing coding as a new form of literacy in the context of ELT. Both English language teachers and students don't require prior coding experience because the majority of coding websites offer simple instructions on how to get started.
- Coding must be done in such a way that will help the students to be productive and learn English or any other language or subject so easily.
- No system must make the learning system decapitated and make the student so bored to learn anything new.
- The methods and applications for incorporating coding applications into the classroom are numerous. The use of well-designed coding tools encourages users to produce their own digital content rather than merely consuming it. Building their own interactive narratives, games, and animations requires users to use imagination, logic, and usually collaboration.

Implications:

- This research can be used in the future to understand in any institution about how coding is impacting the students of the organization. This is basically to develop a particular way of developing the simulation models or gaming, apps, etc. to develop a scenario where students can learn things much easier.
- This study makes a way of understanding that, if properly coding and other such analytical tools and AI or machine learning are being used in the education system, then it can be more efficient rather than the traditional way of learning.
- This study helps researchers also to carry forward their research by incorporating computer science in other education systems or any discipline from the point of view of computer science.
- This research also will help institutions to understand the potential of the students and what other disciplinary things they may be able to do.

Similar to this, other researchers claim that a range of online activities centered on well-liked subjects frequently involve cooperative problem-solving communities and help students learn the "ways of speaking" within a domain of activity and participate more fully within it in terms of knowing what to ask for, contributing knowledge and know-how, and becoming more "expert." This kind of involvement offers interesting and beneficial circumstances while teaching specialized vocabulary that may be used in the future.

The disciplinary learning consumed by computer engineers, game designers, graphic designers, and others is also qualified for undergraduate students through coding. Children who have access to coding programs have the opportunity to learn a particular language and are exposed to the categories of analysis and inscription required for any position requiring computer programming.

This research concludes that future studies can be done in various steps taking into account. The future study may be related to the incorporation of different languages in the learning system or may be enhancing the scope of the study by taking different universities into account.

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