Chapter 24: The Effectiveness of using Artificial Intelligence (the robotic ball) to Support Learning Strategies and Improve Metacognitive Skills for Students in Primary Schools in New Zealand

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Abstract: The main aim of this study is to identify numerous benefits associated with the use of artificial intelligence in teaching and learning. For instance, from the information collected from Nasir (2017), the researcher learned that artificial intelligence improves students' cognitive and collaborative abilities and helps them to develop different literacies from an early age. In addition, it helps learners to improve their performance of English, math and coding. Furthermore, the researcher established that artificial intelligence tools, such as the robotic ball to explore the effectiveness of using artificial intelligence and how to support learning strategies and improve metacognitive skills for students in Primary Schools in New Zealand. This was established from the information given by McDowall (2017) who argued that games require critical analysis, which in turn improves the players' metacognitive skills, thereby improving their academic performance. Other benefits identified by the researcher include the promotion of student participation in learning, enjoyable classroom environment, facilitates the storage of students' records, makes teaching and learning easier, helps students grasp what they are taught and makes education cheaper because teaching content can be duplicated and distributed to students.

Chapter 1

Introduction:

Over the years, there has been a debate on the effects of artificial intelligence in the learning process in schools. Artificial intelligence relates to the ability and progress of a computer systems' information technology or other machines to accomplish work that normally requires human intelligence and logical deduction (Ma & Siau, 2018). It is also described as the capability of a machine to function as if it has the aptitude to think like mankind (Chandra & Prihastomo,2013).

Other scholars consider artificial intelligence to be applications of software techniques and algorithms which enable computers and machines to mimic human decision-making processes and perception to effectively accomplish tasks (Murphy, 2019). It is also described as the capability of a machine to function as if it has the aptitude to think like mankind (Chandra & Prihastomo, 2013).

The subsequent study compares teaching in Saudi Arabia and New Zealand and what is the effectiveness of artificial intelligence through the primary school. Also, the Saudi Arabia is looking forward to putting the citizens in schools on the right path toward first-world countries. Also, it is important to achieving our Vision 2030 goals. It is true that this process

may require big efforts but with determination nothing is impossible (Saudi vision 2030, 2016).

Ministry of Education in Kingdom of Saudi Arabia is seeking to develop general and basic skills of all students to enable them, to face modern life requirements, in addition to specialized skills for each profession that covers all professional fields for young generation .The using of artificial intelligence now in KSA is depending on the form of applications and software which depends on the software characteristics of artificial intelligence and expected in the future to expand to serve all fields of education. (Saudi vision 2030, 2016).

This project took place in Kohia Terrace school to highlight the effectiveness of artificial intelligence on New Zealand' education and particularly on how it supports the learning strategies and improve metacognitive skills for students in Primary Schools in New Zealand.

Chapter 2

Literature Review:

The purpose of this literature review is to have a look at different definitions have been presented to describe artificial Intelligence. For instance, according to Tuomi (2018), artificial Intelligence is a computer system having the capacity to do jobs often associated with intelligent beings. However, Grewal (2014) defines artificial intelligence as "the science and engineering of making intelligent machines." Grewal (2014) reveals that this field was established on the belief that intelligence, which is a central property of human beings, can be accurately described that it can be copied by a machine.

Ahmed (2018) thought that artificial Intelligence is a type of technology that makes devices as clever as human beings. On a different perspective, Boyd & Wilson (2017) maintained that artificial Intelligence systems are digital systems that replicate the intelligent behavior. They try to use the data to find many solutions to problems.

During recent years, the New Zealand government has been at the forefront of promoting the adoption of Artificial intelligence in education. Through the Ministry of Education, the government has revised the area of technology learning, to reinforce the positioning of digital technologies in its curriculum (Ministry of Education, 2018).

The change is intended to ensure that all students have a chance to become digitally capable individuals. The government focuses on enabling students to develop their skills, so that they can be developers of digital solutions and users of digital technologies. To ensure the success of this digital system, the government requires schools to use the reviewed learning program into their curriculum by the beginning of the 2020 academic year (Ministry of Education, 2018).

On the other hand, teachers in middle east are embracing artificial intelligence believing that their students will benefit from different spheres, due to its use in learning. Nasir (2017) cited the example of Sreejit Chakrabarty, the robotics manager at Gems Dubai American Academy, who believes that teaching artificial intelligence to students early in their education journey can aid them with their literacy skills. He thinks that artificial intelligence should be made a core subject. Also, the teachers at Gems Dubai American Academy are convinced that artificial intelligence education is about both the technical aspects, and the improvement of

cognitive and collaborative processes through which students can develop a new form of literacy from a young age.

In another words, digitization and artificial intelligence are the major facilitators of these expansive reforms (Jewell, 2018). Al-Kinani (2019) talked about how the government focuses on the artificial intelligence programs to motivate the teachers around the country and how is it important to their students and how will they benefit from different spheres through their learning. Also, he mentions that from September 2019, Misk Schools in Riyadh will adopt artificial intelligence which becoming the first schools in Saudi Arabia to adopt this mothed of teaching. Students in these schools will learn through the artificial intelligence tools which will provide each of the learners with personalized and give their teachers greater insights into the students' performance. Furthermore, the schools will use CENTURY, which is a teaching and learning platform that utilizes artificial intelligence to align learning to each learner's individual strengths, weaknesses, habits, and behaviors.

As a result, artificial intelligence offers students opportunities to improve their knowledge of English, math, and coding. In fact, a lot of various measures taken by the Ministry of Education to develop the process of teaching and learning (Ministry of Education, 2018)

According to McDowall (2017) disclosed that in New Zealand, teachers use metagaming activities in their teaching, a process that entails giving students opportunities to try out and reflect on a variety of games such as digital, tabletop, and role plays. Games are also used to help students have practical exposure to what they are being taught or learn.

Moreover, McDowall (2017) stated that primary school teachers in New Zealand provide their students with opportunities to review different types of games, such as those related to commerce and nature conservation. For instance, one of the teachers in New Zealand allows her students to play with the robotic ball and give responses. The teacher uses this game to teach her students about the conservation of birds. Another teacher demonstrated the digital game the robotic ball to her students using published reviews on the game to help the learners to come up with their own reviews on programming games.

Also, Murphy (2019) established a variety of intelligent Tutoring Systems can be comparatively effective sources of classroom instruction. He mentions that the machines can provide students' information such as school attendance, early test scores, and credits earned, all of which would be noted as predictor variables. As a result, for this system, artificial intelligence is appropriate for primary school teachers who desire to realize increased performance among their students.

Based on Murphy's (2019) findings, teachers can easily determine the future of their students through the technical approach to of artificial intelligence strategies in their enabling them to manage the learners appropriately for better academic outcomes. As a result, the researcher seeks to answer the following research questions.

The TWO main questions are:

1. How effective is the use of artificial intelligence (the robotic ball) to support learning strategies and improve the metacognitive skills for primary students in New Zealand?

2. What are the benefits for using the artificial Intelligence (the robotic ball) in teaching and learning in New Zealand's primary schools?

Chapter 3

Description of Methodology:

In this study the approach will be qualitative which includes survey and interviews. Eyisi (2016) defines qualitative research approach as the method entails reliance on non-numerical data, such as words and pictures relating to the issue under study, to make conclusions. The choice of qualitative research method was motivated by the fact that in psychosocial research, this method helps researchers to collect factual data to answer research questions (Hammarberg, Kirkman, & Lacey, 2016).

The observation allowed the researcher to keep and comment upon impressions, behaviors, non-verbal cues, and environmental contexts that may not be adequately captured through the interview responses (Sutton & Austin, 2015).

Therefore, the researcher will observe both students and teachers and how they apply the artificial intelligence (the robotic ball) in the classroom to support their learning in the classroom and how to improve the metacognitive skills for primary students in New Zealand.

The appropriate data will be collected to contribute to the depth of understanding how the digital technology enhance the learning in NZ schools. Information will be gathered in three ways: survey, interview and observations. The researcher used the questionnaires to gather the teachers' opinions about their view of using artificial intelligence (the robotic ball) inside and outside the classroom and how they find the benefits for that in their students. The researcher used an online survey website and developed the survey with the mentor. The survey was sent to 5 teachers and 31 students by email during the school time. Permission to carry out this study was sought with the principal of Kohia Terrace School.

The interview was recorded in written form with the participants' permission. Notes were also taken during observation. During data analysis the researcher will identify themes. The data was organized and classified into two main categories: one for teachers and another for learners. The researcher opted to use interviews because qualitative research entails gaining insight into people's feelings and thoughts. Through the interviews, the researcher was able to access or understand the thoughts and feelings of the participants (Sutton & Austin, 2015).

As a result, the observation and interview revolved around the research questions that formed the basis of this research. The interview questions included:

1- What is the artificial Intelligence?

2- Do you use the artificial Intelligence (the robotic ball) in your teaching/learning?

3- How often do you use the artificial Intelligence (the robotic ball)?

4- Are there benefits of artificial Intelligence (the robotic ball) in teaching and learning?

5-Do you think that working with the robotic ball – Sphero help you to problem-solve?

6-Did you think differently when you used the robotic ball?

7-What did you learn that you could not have learned in any other way?

Chapter 4

Findings:

The teachers' responses to the questionnaire that are described below:
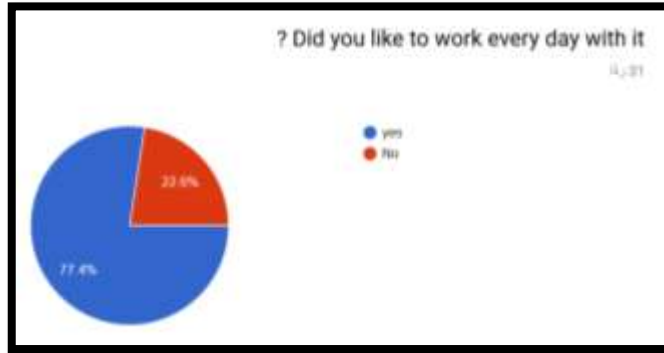

What is artificial intelligence?

In response to the research question "What is artificial intelligence?", the answers presented varying definitions. The respondents comprised 5 teachers and 31 students from Kohia Terrace school in New Zealand. One of the teachers stated that the artificial intelligence is the use of programs in the teaching and learning processes. Another teacher defined the phenomenon as the use of computer software in teaching while another thought the artificial intelligence are items used to substitute manpower to make work easier.

Similarly, the students presented differing views as their teachers. One of the learners said the artificial intelligence is equipment used to make work easy. Another student thought that artificial intelligence is using devices that help in doing work. Also, another student stated that the artificial intelligence is a name used to define instruments that could make the learning enjoyable. Also, another noticed that the artificial intelligence is the use of tools that make work easy and cheaper.

Do you use artificial intelligence (the robotic ball) in your teaching/learning?

All respondents contacted by the researcher indicated that they use artificial intelligence in their school to improve cognitive and collaborative processes. One of the teachers stated that he uses the artificial intelligence (the robotic ball) frequently in the class because it helps the students to develop their computational thinking which is looking at any problem in any way that a computer can help us to solve it. Another teacher responded that the school has acquired computers that are used in learning processes which is an important part in New Zealand curriculum that emphasize to be the digital technologies apart from learning area from the beginning of 2018.

In the same side, the students supported the views of their teachers. One student said that they have artificial intelligence devices both in class and in the field and he likes to work and learn with those devices every day in school. Another student revealed that they play computer games in the classroom and they would like to use computer games in each lesson. They find computer games interesting tools which are fun to play while supporting them to learn the basic of coding and how to design programs. The survey shows that 77.4% of students would like to work every day with the artificial intelligence devices such as the robotic ball.

One of the teachers explained that they used artificial intelligence devices in their class once a week. Another teacher stated that they use it frequently especially while teaching science and language subjects. Another teacher described how can they use the technology tools throughout the school day.

What do you use the artificial intelligence devices for?

The respondents identified different purposes for using the artificial intelligence devices in their classrooms. Two of the teachers stated that they use computer programming and different digital technology tools to make learning very active. New Zealand Ministry of Education recently introduced two new areas for the technology curriculum which included computational thinking and designing and developing digital outcomes. Another teacher noted that she uses online websites to keep their students' records and to interface with parents. One teacher clarified that they supplied the students with the contents of different subjects that they teach with artificial intelligence tools. Also, they try to contact the students' parents and inform them about their children's performance as they work with the robotic ball program. Another teacher described how students learn core programming concepts and how to become creators of digital technologies not just users.

Through the survey, the students presented similar answer which supporting their teachers' responses. One of the students confided to the researcher that everyone in his class has an iPad and a robotic ball during learning. They learn with their classmates about how to use technology, how to work with other people, how to draw the block code and how to use text code. Moreover, another student discussed that he learned computational thinking through the using of the robotic ball and all about coding and problem solving. Another student clarified that he likes to share the play with their classmates during learning. The researcher identified the artificial intelligence (the robotic ball) devices during the visit to the school. The survey shows that 55.1% of students would like to use the robotic ball to the learn coding with the artificial intelligence devices (the robotic ball).
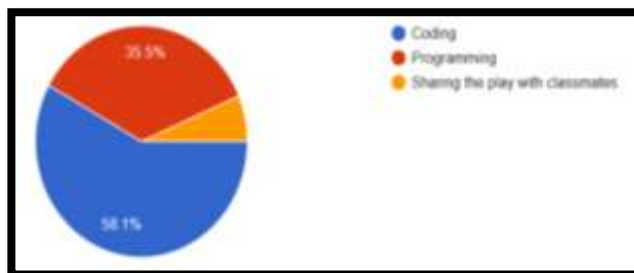
Are there benefits of artificial intelligence (the robotic ball) in teaching and learning?

Many of the respondents confirmed that there are numerous benefits arising from the use of artificial intelligence in learning such as:

- Artificial intelligence helps the teacher to inform students of the required learning so, it is easier for the teachers and parents to track their children's performance.
- Artificial intelligence makes the teaching easier to display to the students what is being taught.

The survey shows that result that 71% of students agree that working with the artificial intelligence devices (the robotic ball) could help them to solve problems.
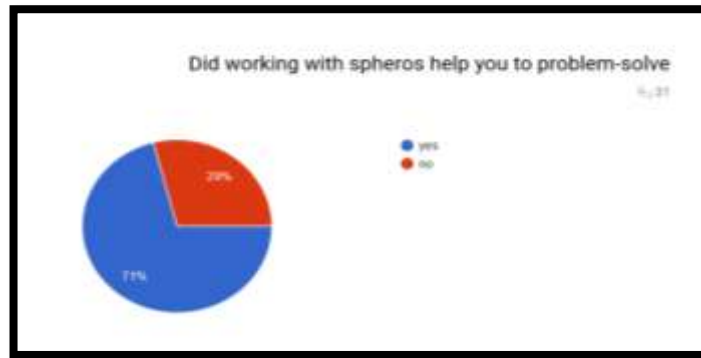
As it shown, the result of the survey emphasizes that almost all students stated that artificial intelligence improves their learning. Also, another teacher said that artificial intelligence makes teaching so easy because the content being taught in schools can be shared among students. The students believed that artificial intelligence gives them better learning outcomes.

For instance, according to one of the learners which he confirmed that the artificial intelligence makes his learning full of fun because through games, they enjoy their lessons. Another student noticed that the computer or digital content makes their learning easier because they can refer it into their iPads. Also, another student mentioned that the artificial intelligence helps them to learn about the pseudocode which is an informal high-level description of high thanking of a computer program. The result of the survey emphasizes that they think the using artificial intelligence tools support their learning and improve their metacognitive skills.

? Did you think Sphero helps your learning
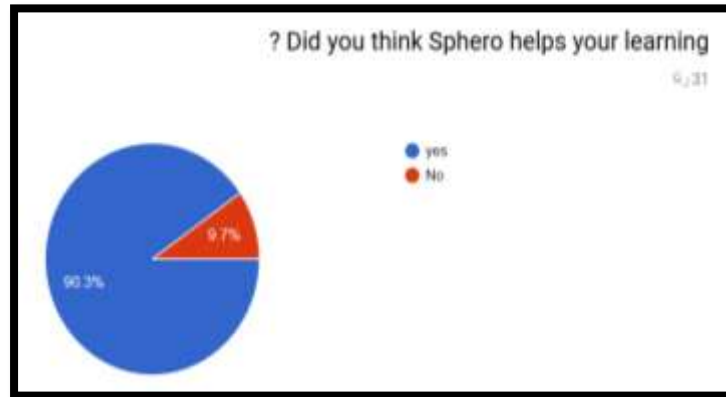
Chapter 5

Discussion of findings:

The researcher established that artificial intelligence has multiple definitions, and therefore, lacks a universally agreed definition. From the definitions presented by the many scholars whose studies were considered in this study and the responses of the respondents to the interview questions, it was apparent that artificial intelligence means different things to different people. For instance, from the information retrieved from Ma & Siau (2018), the researcher learned that artificial intelligence is the ability of information technology facilitated by computer systems or other machines to perform roles usually done by humans. This description resembled that of Chandra & Prihastomo (2013) who believes that artificial intelligence is the proficiency of a machine to function like human beings. Other scholars such as Murphy (2019), Tuomi (2018), Ahmed (2018), and Boyd & Wilson (2017) agree that artificial intelligence involves the use of computers and machines to do human roles.

The views of the respondents reflected these definitions though in different perspectives. For instance, some of the respondents revealed that artificial intelligence (the robotic ball) involves the use of programs in teaching and learning processes to do human tasks. Based on these definitions, the researcher concludes that artificial intelligence in teaching and learning, involves the use of devices such as computers to facilitate learning processes.

The researcher also asked the respondents about their experience of using different artificial intelligence tools on their teaching. Also, teachers' views were sought regarding whether they agreed and disagree about the efficiency with which they could find artificial intelligence tools such as applications and games that matched to the standards of the New Zealand Curriculum. Although, some of the teachers admitted that some commercial applications and programs are not meant for educational purposes, they can be used to teach core curriculum. They revealed that there are a variety of artificial intelligence devices that support the core curriculum.

The researcher established that artificial intelligence in education is one of the initiatives of the New Zealand's government. This is confirmed by the initiation of digital technologies in its curriculum in New Zealand. Also, artificial intelligence is promoted and applied in Saudi Arabia. Students in different schools, like Misk Schools in Riyadh, will soon use artificial intelligence to support their literacy skills.

My plans:

The researcher has some point to start with it in the way of achieving the final goal. The following plans outline a possible implementation:

1-Share the summary of my finding with the ministry.

2-Suggest designing educational software based on artificial intelligence.

3-Suggest analyzing the contents of the Saudi curriculum to consider where the artificial intelligence resources fit is the 'best fit'

4- Develop an active classroom that trials the use of artificial intelligence tools.

5- Using the robotic ball the English class as a method of increasing vocabulary knowledge.

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