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Elementary Teacher Perceptions About Chromebook Technology Use in the Classroom

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ABSTRACT: *Through technological developments and scientific inventions, every walk of life has been transformed. Over the last few decades, the educational process has become part of this change after the introduction of technology in our lives was extended to this important sector. The goal of this study is to explore the use of Chromebook technology in the math and reading achievements of elementary students. The finding indicate that Chromebook technology has a positive effect on the math and reading achievement of elementary school students.*

KEYWORDS: *Chromebook, Technology, Teachers, Elementary School*

I. Introduction

Over the last few decades, the educational process has adapted following the introduction of technology as a viable teaching methodology. This has led to the development and implementation of various forms of educational technology such as teaching, instructional, behavioral and instructional design technologies. Chromebooks have proven to be part of this revolution, saving a great deal of educational time and cost. It is important to note that teaching technology allows education instructors to further develop scientific parts of teaching. Moreover, Chromebook has been found to provide students with a more positive student-centric learning experience that is critical in evaluating Simple DriectMedia Layer (SDL) and Commonwealth of Learning (Col) [1]. This proposed study seeks to determine the effectiveness of Chromebook technology on student achievement because the use of Chromebook has been found to provide the teaching and learning benefits of computers without the usual distractions of technology use in classrooms [2].

In the current world, people are moving from the traditional way of teaching where the teacher was the students' main event in a classroom setup to other designs in which learners are engaged. Technology has ushered in significant structural changes in the way teachers deliver knowledge to students, especially in terms of their math and reading achievements. This allows both parties to achieve major improvements in productivity [3]. The increased use of technology in the classroom, such as the use of Chromebook and other online tools, has left researchers curious of the best technologies to use in improving educational productivity and wars to reduce the cost of obtaining instructional materials [4; 5]. It is also beneficial to explore the perspective of students and teachers on the use of Chromebooks in class. The use of Chromebook improves math and reading skills, which can lead to a better future learning experience for elementary students. With this study and similar studies in the future, a clear list of benefits on the use of various instructional technologies in the classroom setup will be developed. Implementation of Chromebook at the elementary level has proven to be an effective way of ensuring the learning is based on a strong foundation [5].

Therefore, Chromebook are being used as building blocks for future learning activities. Besides, Chromebook expose the learner to launching as well as exiting any program, naming, creating, closing as well as re-opening of any document. These are major skills in the exploration of a digital world to the young minds [6]. Although a great deal of research based on the use of learning technologies has been carried out, very little information is available regarding the use of Chromebook technology within the learning environment. Chromebook provides access to the web's education and collaboration resources, as well as offer centralized management and low total cost of ownership. For instance, asking the respondents regarding the available options, Mrs. Macy opined that" I feel like instruction time is used more efficiently now". In the light of this, this study tried to find the use of Chromebook technology in the math and reading achievements of elementary students.

II. Theoretical framework and Research Guiding the Study

Studies assume that it is possible to replace certain on-site interactions with virtual support of media and Internet-enabled devices such as smartphones and laptop computers (e.g., Chromebook, tablets, etc.). Related studies agree that other than the conventional learning, the advent of image and video technologies affords the provision of auxiliary services such as diagnosis and consulting especially in the medical domain [7]. As such, the studies reach a compromise that telecommunication devices can bolster efficiency in the learning process. Based on the postulates of situational learning, the theories stress the importance of authentic activities and social interactions [8]. The theories assume that learning occurs among colleagues and mentor-learner relationships as provided in cognitive apprenticeship. The model bases its roots from traditional apprenticeship learning ad cognitive theories. According to the model, activities such as learning mathematics, reading and writing best illustrates the working of the model.

According to [8] cognitive apprenticeship is an analogy that explains the optimal way of designing learning scenarios through didactic methods that include modeling, coaching, scaffolding, articulation, reflection and exploration. Specifically, the model assumes that reflection techniques can be enhanced through generated multimedia materials. [9] used this analogy to develop a mediational structure of an activity system that explains learning through multimedia and internet enabled devices. Hickey and Donnelly based their model on [10] conversational framework that helped him frame the leaning scenario for which multimedia enabled devices were used in a workshop. As earlier mentioned, cognitive psychologists support the assumption that learning has a reflective component, a component [10] used to test if the use of technology can help enhance the learning process. According to the [11] education through the use of technology can be defined as the practice of facilitating learning as well as improving students' performance through creation, use and management of appropriate technological processes and resources. According to a study by [12] there is also a common belief that technology can enhance learning and teaching practices and assists in the creation of ideal learning environment. Technology then becomes an essential part of teaching and learning experience. This can also be seen on how technological tools can enhance math and reading achievements:

1.1 Math Achievement

Math achievement assisted through tools is broadly defined as the use of any definite or concrete materials for counting, sorting, measuring and evaluating a mathematical problem. Such tools can be measuring devices like rulers, pictures, blocks, counters, symbols and technology [13]. Studies in mathematics education find that the use of manipulatives has a great impact on students' attitude towards learning and achievement. [14] in his studies of 60 case studies, found that mathematics achievement increased through the utilization of concrete instructional tools and materials. The use also of manipulatives improves the attitude of students towards the subject of mathematics when tools and instructional materials were used by teachers knowledgeable in their applications.

Using instructional and other materials in making sense of mathematics is found to be a powerful, effective learning experience. According to [15] the use of tools assists and helps the students think about mathematics in a flexible manner and this allows the students to put in a more creative approach to solving mathematical problems. The use of tools also allows the students to approach mathematics with less anxiety. [15] also added that using tools when learning mathematics allows the students to develop a deeper level of meaning of mathematics. This discovery is especially true when students apply these tools in various situations or use different tools for one situation. [15] also suggested that mathematical ideas are not outright or automatically seen when the student use tools. Mathematical meaning usually does not reside in the tools. Mathematical meaning only is constructed by the student when they are interacting with the tools. When these tools are used and interacted wisely, the students then is not merely learning mathematics but instead learning to be mathematicians.

1.2 Reading Achievement

As far back as 2001, the [16] suggested that students could benefit from using computer technology for reading achievement and instructions. The reason for this was the emerging computer capabilities that could provide as well as support a complete reading program. The [16] and [17] on the other hand, suggested that with the new literacies beginning to include the ongoing evolution in digital and media technologies, it is proper to make students adjust and understand to these literacy demands since it is crucial and critical to their future work and pleasure. [18] illustrated how students can benefit from the use of computer technology in improving their performance in the entire ICT studies. According to [19] teachers may identify with old models of pursuing reading achievement through pencil and paper, but their conceptions should adopt to ongoing evolution

pertaining to reading and writing, especially with the advent of computers and the Internet. The new literacies that technology has brought are innovative text formats (like hybrid texts and multiple media), new activities (like website publications) and new reader expectations (reading nonlinearly) [20; 17& 19]

1.3 Chromebook

Research from various sectors shows that technology is utilized everywhere. It is incorporated in most parts of people's lives. In addition to affecting the way people connect, socialize, shop and play, technology greatly affects the way people learn [21]. The increase in absorption of technology in our lives has made it possible for education authorities to implement the use of mobile technologies in learning setups. This has resulted in what is known as technology-based curricula where common types of technology are used incorporated in classrooms [22]. Other than Chromebook, other contemporary technologies used in education include flash notes, Lore, Study Blue, LEAP Motion, Papertab, Celly and Flipped Classroom [23].

The introduction of Chromebook in classrooms has proved to be one of the major steps in the education sector. [24] vow that Chromebook allow teachers to achieve the highly effective 1:1 learning environment. Due to this improved ratio, students doing research online only need minimal assistance from the teachers. Making sure that each learner has access to a Chromebook allows the teacher to ensure that all the learners have a great deal of interactive tools, online texts and dynamic applications based on the webs [25]. The use of Chromebook enables teachers to completely monitor activities of the learners. More importantly, this monitoring occurs in real-time, with the teacher's feedback reaching the learner within a few seconds [26]. Therefore, this technology is ideal for use in reducing time wastage on the side of the learners [27]. Much time is dedicated to useful work, increasing learners' productivity and performance. The use of Chromebook in learning gives the learners an opportunity to develop various skills simultaneously. When students are working on a research assignment, for example, they learn how to navigate the internet with ease [28]. As [18] stated in his study, learners also get to know much about improving their typing skills. The research also leads the students to the direction of increasing their knowledge of the web-based programs.

According to [29] the increase in the use of Chromebook in classrooms has allowed learners to share their content easily with their classmates. This creates a real-time discussion in which various topics are explored exhaustively. The technology is secure as every learner has his/her login details to access Google apps, email as well as other important leaning tools. Teachers using this technology ensure that each second in their class count. In this regard, Chromebook boot up in as few as eight seconds in addition to connecting to wireless quickly. This allows the teachers to avoid loss of instructional time associated with other technologies [30]. [31] assert that Chromebook has allowed teachers to keep learners engaged through the entire learning session, preventing cases where learners sleep during such sessions. Most students argue that the technology has made it very easy for them to access information. Others have explained that they have acquired more freedom to learn at their pace in addition to having a lot of fun when using the Chromebook.

The necessity of research on the topic is due to the need to incorporate technological culture to young people. Hence, there will be the development of a new generation of a changed attitude towards technology [18] Learning challenges are also likely to be reduced adequately. Better performances get realized among the learners and ease of duty performance by instructors. Therefore, overall the quality of education improves as technology mostly embraces the current updated learning materials [30]. This research is fundamentally aimed at growing the knowledge of the learners in computer studies and to exponentially boost their skills. The studies used in this research are inclined to support the measures and undertakings that have to be integrated into the Chromebook study for the sake of benefiting the learners. This research backs up most studies in this section of knowledge acquisition that shares similar theme and message.

III. Methodology

This chapter presents the methodology that guided the researchers in the collection, analysis and interpretation of data. It briefly touches on the research design that was adopted, a description of the research process, the data collection instruments and the data analysis method. Foremost, it is vital to stress that the research was primarily qualitative in nature. The research questions were as follows:

1. How do participants describe the use of Chromebook?
2. What are the learning benefits they identify?
3. How do participants describe the challenges of Chromebook technology in learning?
4. How do participants describe the use of Chromebook for elementary students with special needs?

2.1 Procedures

The researchers interviewed four elementary teachers within a school setting in order to gather their views on the subject. Taking one interview per participant, each session lasted around 45-90 minutes each, just enough to collect the necessary information and not so much to create disinterest among the participants. This method was adopted based on the assumption that the interview is acknowledged as one of the best methods of getting first class data that has no interferences [32]. This study also conducted three observations that lasted around 40 minutes each, in order to collect accurate data on the subject. The principals acted as the gatekeepers for the study since they can facilitate the interviews with the teachers.

2.2 Data collection

Interviews and observations were used as the data collection instruments in the proposed study. The methods proposed enabled the researchers to elicit from the respondents answers regarding the use of Chromebook. The researchers applied the method of interviewing as a way of confirming the data they collected through the process of observation [33] the performance be easily evaluated by the data collection from all the participants. The interview similarly allowed me as the data collector to probe and get more information about certain aspects not covered in the interview questions. Additionally, the facial expression of the respondent can be studied when interviews are used in data collection [34]. With this number of participants, were enough to reach a conclusion about the use of Chromebook technology. This study also used supporting data from literary works.

2.3 Data Analysis

In the data analysis the open coding were used as the process of data analysis. The researchers analyzed the interview data and descriptive field notes for emerging themes. Quotes from the interviews were used as the backing up and supporting the themes identified.

IV. Findings

Since teachers mostly manage the learning process, engaging them in a discussion can provide a profound description of the experiences they encounter in their daily activities. Indeed, teaching can be a challenging experience since, as established in the literature, it pertains the transfer of one person's understanding of certain concepts to another party. However, it has emerged that following the integration of certain interventions such as technology, the learning process can be enhanced to ensure that the outcomes of the process are beneficial to both the learner and the instructor.

3.1 Advantages of using Chromebooks in teaching

There are different programs to support professional development, which makes it difficult to make a decision regarding the best way to make use of it. However, asking the respondents regarding the available options, Mrs. Macy admitted that using Chromebook in the classroom has positive results, "…I feel like instruction time is used more efficiently now". This statement by the respondent affirms that Chromebooks indeed have come a long way to the point of them being held in high regard by the educators. From my observations, the Chromebooks appeared more productive and effective, taking less than a minute to power up, boot and load programs.

Their efficiency and productivity were also observed when the researchers noted that even as some students listened to course content through the provided headsets, another set of students could simultaneously read the same content on the screens of the Chromebooks. This implies that in the shortage of the Chromebooks, more than two learners can easily share one Chromebook at a go. Indeed, as stated by the respondents, the integration of technologies in the learning process has several merits to both the learner and the instructor. As evident, despite their mixed views about the outcomes of the intervention, it nonetheless emerges that they all agreed that indeed the Chromebooks have been very beneficial to both the students and the teachers. For instance, Mrs. Tree claimed, "…Some kids I know they don't have books at home, and they read for 1-2 hours in myON every night… So, it's been great to kids that don't have books at home because they have access to them from the Chromebooks".

This assertion provides important facts about Chromebook technology. For instance, in a world going digital where almost most of the office work is computerized, the technology introduces the learners early enough to these developments. [18] illustrated how students can benefit from the use of computer technology in improving their performance in the entire ICT studies. Further, as evident in the response provided by Mrs.

Tree, even learners that had previously no access to course books now have a chance of doing research using the Chromebooks even when in remote areas. This is very critical especially for families that cannot afford the cost of purchasing course books for every new grade coupled with the fact that the Chromebooks play an integral role in championing the course for a greener world since its aim is to phase away the idea of chopping down trees for the production of pencils and books.

The instructors appeared cheerful and looked excited at the prospect of sharing their experiences such that from time to time the concept of time management cropped up with Mrs. Flora stated, "it does save more time," and later said that "it is quick and easy to get feedback". And again Mrs. Macy stated that, "…It's easy feedback, I do like that…as well is I don't have to print every thing for them, I just say go to this website or this page, or go in extra math, or going to biology they can go and they know how to use it". The teachers agreed that the Chromebooks made it easy for them to swap between topics without having to go back to their desks or offices to change lesson materials.

Further, the experiences of four teachers, who at the time of the interview were teaching mathematics and reading at the elementary level using Chromebooks, provides exclusive evidence of these observations, "…They are more engaged, and also, they are excited to do some work because they are using it, because they are using Chromebooks, not paper and pencil… I think it's made it more interactive; I think also give kids a little bit more freedom". They further gave details that students perform better at their learning subjects since they can easily relate to the technology presented to them. Children now more engaged to the classes because they are exposed to technology that they can do with fun. When children are having fun doing their learning, they learn easily. In support of this stand, [30] assert that Chromebook has allowed teachers to keep learners engaged through the entire learning session.

The researchers noted that the learners were quite comfortable with the gadgets, coupled with the fact that the Chromebooks quickly connected to the Internet provided that the learning environment has a high-speed Wi-Fi connectivity. This was also confirmed by Mr. Sam who said that, "…I feel like, it's really helpful… Chromebook is very good low-cost solution because its lower cheap from the laptop and leader, easier to move it around, still a lot of function from the laptop, so it is very very helpful". Similarly supported this argument and said, "…My biggest concern before we get that Chromebook, I was concern that we are going to have problems with Wi-Fi or they are not going to connect or they going to crash… But we are never having problem and we don't really have".

From the instructors' perspective, Not only did the Chromebooks help them bolster their time management skills, even for the students, rather they also learn from the students on how to use the Chromebooks at times. Mrs. Macy stated that, "…They have better skills than we do… We have not taught the kids how to use the Chromebooks… Sometimes they show me how to do different things in the class… So it's interesting they don't taught how to use the Chromebook". Interestingly, it emerges from the above statements that teachers believe that not only do students learn more when Chromebooks are integrated into the learning process; rather the teachers also acquire some skills regarding the technology from the learners. Similarly, the researchers also observed that compared to those that used books during class time, those with Chromebooks appeared more focused and happy. Specifically, they learned concepts fast enough and were even eager to share whatever they have learned with their colleagues.

3.2 Improve learning outcomes

Thus, despite the various skepticism that surrounds the integration of technology particularly in the teaching of mathematics, it nonetheless remains that teaching technologies have the ability to not only improve learning outcomes but also achieve several other results that even what the teachers had anticipated. For example, Mrs. Tree stated that, "…Students are much more engaged and learning… Excited to use them… I really enjoyed it. I think it has made it easier to differentiate sheet for different students because of the different programs that available to us… I wouldn't want to back to teach them without the Chromebooks". The respondent showed how engrossed and addicted she has become to the technology that she could not even imagine teaching her class without the Chromebooks.

The respondent showed that the Chromebooks were helpful for students with special needs and encouraged them to participate in the learning process. One thing noted from the interview is that even though the respondents expressed "fears" regarding the monitoring of the learners, the Chromebooks system is rather efficient such that according to Mr. Sam, "…I can go online and look exactly what the students do in the screen, sometime explore students there are not on the page on the screen that I sign it for the group… sometime it's a lot of more management".

Indeed, it enables the instructors to monitor their student's remotely. Further, the respondents opined that the parents played a big role in ensuring that the success of the program since as argued by Mrs. Macy, "…A lot of time the parents they say that, you know, they ask me if there any thing helps my child in math or reading I can just refer the parents to the website they can use them at home". And again by Mrs. Flora "for parents having available data at home". This shows that through the collaborative efforts of the teachers, the parents and the integrated technology, the learning process is enhanced with the outcomes favoring not just the learners, but also the instructors.

3.3 Challenges associated with the use of Chromebook technology

However, the fact that most of the respondents were still new to the technology implied that they faced several challenges trying to align themselves and their schedules with the technology. Indeed, from literature, it is noted that during the initial times of the adoption of any technology, it is expected that users will find it hard at first to adjust themselves to the new development. As such, even as they replied that the first three weeks were spent in trying to learn how to use the Chromebooks; several challenges still emerged following the introduction of the Chromebooks in the school.

Apart from the constant monitoring the teachers had to do as a way of ensuring that the students only used the Chromebooks for educational purposes, the lack of seriousness on the part of students implied that the teachers had to spend more time trying to make them understand that the Chromebooks were part of the learning process. Still, even as remote monitoring was possible, it nonetheless emerged that it was rather hard to full censure their usage of the devices. For instance, Mrs. Tree opined that, "…If there are at home, I don't have the control of that... so that kind biggest of disadvantages just that feeling how to police them".

Such explains why the researchers observed that at one instance, the teacher begun collecting the Chromebooks from the students and in their place, issued out hardcopy handouts for the learners. Further, even as the teachers could remotely monitor the progress of the students at home, Mrs. Macy argued that the idea of doing homework online made it impossible for them to distinguish, "…if they did it or someone else did it for them". This implies that even as the students were to record improvements in their average score, it is impossible to determine whether it is their effort or it is someone else's.

Such implies why Mrs. Tree was quick to say that "we are less comfortable using them, with Mrs. Macy supporting this position when she stated that the system has, "…taken away the paper and pencil as well". Possibly, the tutors were reluctant at the prospect of phasing away the customary pen and pepper classroom that has occasioned the typical class for decades coupled with the fact that it is possible to determine whether the learner actually did the assignment alone or whether another party came to their rescue. It also emerged from the interview that apart from the cost of purchasing the devices, Mrs. Tree talked of "Wi-Fi problems," coupled with the cost and time for training the teachers who are later expected to share their newly acquired knowledge to the learners.

The paper sought to build a case in support of the integration of Chromebooks in the teaching of mathematics at the elementary level. Taking a thematic approach, the objective of the paper was to present a discussion of some of the strong points the respondent provided regarding the efficacy of the adoption of Chromebooks in the learning process. From the discussion, several themes emerge in support of the integration of Chromebook in the learning process. Not only do technological interventions such as Chromebooks save time, support those that have no access to course books, are less costly than conventional notebook laptops, but they also play an integral role in creating a conducive environment for learning given the learners and their tutors appeared more engaged, focused and less distracted throughout the observation period.

Thus, even as challenges such as the need to closely monitors the learners as a way of ensuring that the work they produced is indeed their and that the learners do not use the Chromebooks for non-educational purposes, the fact that the system supports remote monitoring while also giving parents an opportunity to track the performance of their children at home makes the system even more effective.

V. Conclusion and implications for further study

The technological evolution and advances during the past decades has changed and altered the way modern daily lives are lived. These advances has crept and seeped through every sector of society wherein people try to learn how to adopt them and at the same time improve their lives. Likewise, this technological innovation has also been introduced in the educational sector. This can be seen on the development and implementation of various forms of educational technology such as teaching, instructional, behavioral and

instructional design technologies. In this regards, Chromebook is one of this technology. It is impossible to discount the imperative role technology plays in the education system. Indeed, other than just providing the typical educational assistance, technological interventions have been useful in changing perceptions among students especially in subjects such as mathematics and reading that have always given learners a hard time, studies such as [12] address and take the position that technological interventions such as the Chromebooks can mitigate this challenge if they were to be introduced to schools.

Indeed, the symbolic, abstract and visual nature of mathematics and reading makes these most subjects of the challenging to teach. In line with these challenges, this paper sought to investigate the extent to which Chromebooks can bolster the performance of mathematics and reading among elementary learners. Based on the arguments presented in the literature review, the use of Chromebooks in the classroom is founded on the cognitive apprenticeship model, which initiates learning by making learners gain necessary skills, by working alongside a master that acts as the subject matter expert in the given discipline. This master, (the teacher) initiates the development of the learners' cognitive and metacognitive skills.

However, the effectiveness of the development of these skills is best attained through interventions such as the use of Chromebooks. Indeed, as observed by the researcher, the respondents noted that the learning and teaching process had become easier following the introduction of the Chromebooks. Indeed, the working of the Chromebooks draws from the cognitive apprenticeship model, which states that the acquisition of knowledge best takes place by doing. It was observed that not only did the learners learn fast during the observation exercise; rather they proved right the model's assumption that through eLearning, students are encouraged to gradually accept responsibilities and tasks by using the eLearning resources (Chromebooks) and working with their mates.

What also emerges from the discussion is that compared to the typical learning process, the learners seemed to enjoy learning in the e-environment with the teachers similarly posting praise for the same. The respondents noted that in as much as monitoring is necessary to ensure that the devices are used appropriately, the fact that Chromebooks have an inbuilt remote monitoring system that enhances the efficacy of the system. Here, is noted that such a self-monitoring mechanism, in the long run, inculcates into the learners the necessary self-discipline needed to wade through life. This idea is well supported in the theory of situated cognition, a subset of cognitive apprenticeship, which notes that the use of eLearning technologies gives learners the skills sets necessary while also teaching them how to apply them in the real world. It has been seen that Chromebook technology has brought a positive impact in the math and reading achievements of elementary school students. First, teachers welcome the use of this technology finding that it can help their students and children develop as well as improve on their academic endeavor.

Based on the interview with teachers, students showed improvements in their math and reading skills and achievements. This is mainly attributed to the simplicity and easy access to lesson provided by Chromebook. Students are able to digest as well as absorb lesson in their own pace by accessing the Chromebook. This then led to much noticed improvement in math skills on the part of students as well as improvement in terms of reading comprehension of these students. This finding correlates to the numerous research and study findings wherein introduction of technology to classroom results to positive impact in the learning experience of students. Studies such as [14] and [12] supports and shows that this tool has therefore been applied widely so as to help the students to pass the required skills and strategies especially in the areas of mathematics and reading.

Nevertheless, it is vital to take note of the limitations in the study design that could possibly affect its applicability in other settings. Foremost, the fact that the researcher's role in the study was mostly no participatory implies that not much first-hand information could be gathered from the observation. Specifically, it was possible that the researcher's foreign origin could have had an effect on the respondents such that the responses provided could have been meant to impress the researcher. Thus, incidences of bias could not be avoided. This paper, therefore, urges that future researchers should take a participatory role (ethnographic research design) to ensure that all the characteristics of the respondents are captured in the study and thus reducing cases of bias to minimal levels. Nevertheless, the study design was strengthened by the idea that the researchers created rapport with the respondents prior to the study coupled with the fact that the information provided by the respondents was augmented by directly recording observed information.

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