

The Extent of Usage of Science Apps as Perceived by Grade 10 Learners, Creative Thinking Ability (CTA) and their Academic Achievement

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Abstract — This Action Research aimed to find out the level of engagement of the students using Science apps in learning Science and how it enhances their Science creative thinking ability. The respondents of this study were taken from the whole population of Grade 10 Azurite and 10 Aquamarine which comprised 100 students who were officially enrolled in Imus National High School at school year 2022-2023. The teacher-researcher utilized the descriptive-correlative method to determine if there was significant relationship between the use of Science apps and their academic achievement in Science. The Extent of Usage of Science Apps among Grade 10 Learners in Learning Science got a total mean of 4.84 which means students are ALWAYS using and integrating science apps when it comes to learning science. The Level of Science Creative Thinking Ability of Grade 10 Learners in Learning Science using Science Apps shows a total weighted mean of 4.60 which described as strongly agree. These results indicated that students are learning when there was an Integration of Science Apps. There were Outstanding and Very Satisfactory Academic achievement of Grade 10 Students in Learning Science (showing 40.00 and 48.75 percent respectively) when there was an integration of Science Apps in Learning Science. There was a significant relationship between the use of Science Apps and the students' academic achievement as evidenced by p-value of 0.0098. The multiple R-value of 0.7889 shows a highly positive correlation between the said variables.

Keywords — *Science Apps, Creative Thinking Ability, Academic Achievement*

I. Introduction

Science as a subject should be given to all students from primary schools to equip students with the ability to think logically, analytical, systematic, critical, and creative, as well as the ability to cooperate. At a certain subject, Science can be regarded as a network concept because it consists of some of the concepts related to one another.

Difficulty in Science often begins early in life and carries long-term consequences for academic achievement. Children who start behind their peers in Science at the beginning of

schooling tend to stay behind throughout elementary, middle, and high school. Science anxiety disrupts cognitive processing by compromising ongoing activity in working memory. Although the causes of anxiety are undetermined, some teaching styles are implicated as risk factors.

A mobile learning app that uses game elements such as leader boards and digital badges may have positive effects on student academic achievement, engagement, and retention, according to a new study. Researchers developed a fully customizable app (personalized Boyles Law calculator) that allowed lecturers to push quizzes based on course content directly to their students' devices in order to motivate them, increase their competitiveness, and keep them engaged with the course (BioMed Central, 2017).

Mobile apps have significantly improved teaching and learning processes, particularly in science education. They offer numerous benefits such as learning gains, motivation, and collaborative learning. (Ateş and Garzón, 2021). Mobile applications are becoming the future of education, providing students with innovative teaching methods, enabling them to solve challenges, and study more effectively. These applications are essential for keeping students updated on school activities and promoting growth. (Ahmed, 2022)

The evolution of media has significantly impacted education, with smartphones and handheld computers igniting a revolution. Emerging technologies, such as big data and the Internet of Things, are transforming educational methods and content, transforming mobile education. The rapid development of educational apps is driven by the popularity of smart phones, Wi-Fi, and 4G wireless networks, increased trust and dependence on educational apps, and the massive online education market space. Educational Apps are becoming a new direction in mobile learning, with mature applications and increased awareness among learners. However, the development of these apps requires balance, high quality, and a clear business model. To improve user experience and revenue, educational apps should be able to offer a rich sales model, combining price and experience, and integrate in micro-levels. This will lead to a new way of learning on the fingertips. (Zhang and Liao, 2015)

Imus National High School excels in different disciplines, specifically in Science. It is considered as the center of excellence when it comes to academic performance in Science among the other schools in the Division. But despite those improvements in Science, the school still needs to enhance their Science creative thinking ability and mastering basic topics in Science. Teachers are always finding ways to bridge and give quality education to the students even though most of the classes are still conducted through online.

To fill in the gap, a descriptive-correlative method of study was conducted to Grade 10 learners of Imus National High School to engage the students in using Science apps in learning Science and to enhance their Science creative thinking ability of the students.

ACTION RESEARCH QUESTIONS

Specifically, this study aimed to answer the following questions:

1. What is the extent of usage of Science Apps among Grade 10 learners in learning Science in terms of:
 - 1.1 Science calculator and;
 - 1.2 Science Basics (contains Biology, Chemistry and Physics topics)?
2. What is the level of Science creative thinking ability of Grade 10 learners in learning Science?
3. What is the Academic Achievement of Grade 10 learners in Science using Science Apps?
4. Is there significant relationship between Science creative thinking ability and their academic achievement in science?
5. Based on the result, what appropriate intervention plan needs to be taken?

Null Hypothesis

There is no significant relationship between the use of Science apps and their academic achievement in Science?

INNOVATION, INTERVENTION AND STRATEGY

To increase the academic achievement of the students in Science, as well as to promote the creative thinking ability and make the teaching and learning process -enjoyable even outside the classroom, the teacher-researchers locally conducted this study to integrated the use of science apps in learning their lessons and encouraged students and other science teachers to use science apps during discussion.

The two targeted sections focused on the use of science apps and to disseminate information regarding its usage.

The use of Science apps as perceived by Grade 10 students served as the independent variable and their academic achievement in science served as dependent variable. The result of the correlation and significant difference of the two variables, an action plan was being formulated.

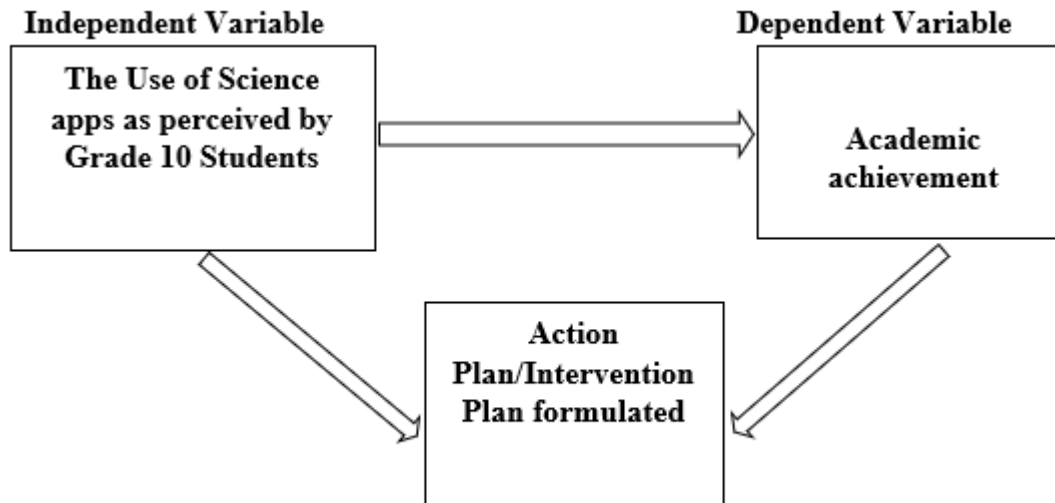


Figure I. CONCEPTUAL FRAMEWORK

II. Methodology

RESEARCH DESIGN

The teacher-researchers utilized the *descriptive-correlative method*. The descriptive-correlational method is a valuable research design that establishes relationships between variables without claiming cause and effect, but it should be used in conjunction with other methods for cause-and-effect relationships. also attempted to determine the level of Science creative thinking ability of Grade 10 learners in learning Science using Science Apps. Analyzing the significant relationship between the use of Science apps and their academic achievement in Science.

RESEARCH INSTRUMENT

The teacher-researcher used a checklist questionnaire to gather information to support and complete the study. Self-made questionnaires were utilized in the study as the primary instrument in gathering the data. It consisted of two parts. Part I was the extent of usage of Science Apps among Grade 10 learners in learning Science in terms of Science calculator and Science Basics (contains Biology, Chemistry and Physics topics while Part II was the level of Science creative thinking ability of Grade 10 learners in learning Science.

After the inclusion of the suggestion made by the panelist during the colloquium instrument was presented to 2 master teachers in science for content/face validation, scrutiny and modification of the research instrument.

In order to establish the instrument reliability, it was tried out to 10 students. Internal consistency was checked through computation of Cronback Alpha which was .852 and its above .7 which is accepted coefficient of internal consistency, therefore the needed level of reliability and consistency where obtained.

RESEARCH RESPONDENTS

The respondents of this action research were taken from the whole population of Grade 10 Sections Azurite and Aquamarine students who were officially enrolled in Imus National High School at school year 2022-2023.

Table 1

Grade Level	Population
Grade 10-Azurite	50
Grade 10-Aquamarine	50
Total	100

Table 1 represents the distribution of respondents. Grade 10-Azurite and Aquamarine has the total population of one hundred (100) and taken as respondents respectively.

Statistical Treatment

Weighted mean, frequency distribution and percentage were used in treating the data. *Pearson Product-Moment Correlation Coefficient* and *simple regression* were also used to determine the relationship between the extent of usage of Science apps and their academic achievement.

DATA COLLECTION PROCEDURES

The questionnaires were distributed to the respondents, and they were given ample time to answer. The respondents checked the box provided for their answer. After the respondents answered all the questionnaires given, the researcher collected and retrieved it. Based on the result, all the data were analyzed and interpreted carefully without any biased.

ETHICAL CONSIDERATIONS

The researcher made certain that all ethical considerations were followed as mandated by the Division of Imus Cavite to avoid engaging in practices that may implicitly or explicitly abuse or exploit those with whom we sought to conduct research.

Informed Consent. Consent forms will be secured from the respondents. It is essential in this research that the respondents agree and give permission to be the source of information about the subject of this research. This will also mean that they willingly accept the challenges given to them.

Safety Protocols. During the conduct of the interview process and floating of the research instruments, the respondents and the researcher will observe minimum health protocols. Both

parties will be wearing of face masks and face shields. They will also sanitize their hands from time to time before and after the conduct of the study.

Data Privacy. It is also important that the right of the respondents towards data privacy will always be remembered in the study. They will be using pseudonyms so that they will not disclose their personal information. It would also protect them and their privacy.

Voluntary Participation. The researcher will also make sure that the respondents will not be forced to be included in the list of the respondents. The researcher also will make sure that they are willing to share their insights, experiences, and stories so that they can share best learnings and insights during the administration of the interview and floating of the research instruments of the study.

Gender Sensitivity. It will also be made sure that the researcher is sensitive of the gender preference and orientation of the respondents. The researcher will make sure that they are always respected in the entire duration of research. Being sensitive is one of the essential qualities must possess as the researcher.

Cultural Sensitivity. Since the research respondents might have different beliefs and cultures, it is therefore essential for the researcher to be sensitive of their own culture. As a researcher, the ideas of the respondents must be respected as well as their beliefs and traditions in the entirety of this journey of working with them for the success of this endeavour.

III. Results and Discussion

Table 2
The Extent of Usage of Science Apps among Grade 10
Learners in Learning Science

Science Apps	WM	DESCRIPTION
<i>Science calculator (Phone Calculator)</i>		
1. Uses to double check my solutions and answers.	4.54	Always
2. Utilizes in mastering science problems involving numbers	4.38	Often
3. Easy and convenient to use.	4.45	Often
4. Easy to access and installed in android phone.	4.46	Often
5. Uses to double check my answer.	4.45	Often
<i>Mean</i>	<i>4.46</i>	<i>Always</i>
<i>Science Basics (any apps that contains Biology, Chemistry and Physics topics)</i>		
1. Utilizes to apply learnings from the class.	3.56	Often
2. Uses to master basic concepts of integers.	3.59	Often
3. Widens my knowledge in solving integers	3.51	Often
4. Enhances my problem solving skills.	3.58	Often
5. Helps improve my rate of accumulation	3.56	Often
<i>Mean</i>	<i>3.56</i>	<i>Often</i>
<i>Total Mean</i>	<i>4.01</i>	<i>Often</i>

Legend: 4.21-5.00 Always, 3.41-4.20 Often, 2.61-3.40 Sometimes, 1.81-2.60 Seldom, and 1.00-1.80 Never

Table II represents the extent of usage of Science Apps in Learning Science. It shows that Science calculator (Phone Calculator) got a mean of **4.46** which reflected as *always* while Science Basics (any apps that contains Biology, Chemistry and Physics topics) has a total mean of **3.56** which reflected as *always*. It shows also that the overall weighted mean of table I was **4.01** which is reflected as *always*.

Mobile apps in science education has proven to be effective as it adds multiple benefits including learning gains, motivation to learn, and collaborative learning De, S., & Nethi, V. (2020) . Mobile apps for science learning offered a number of similar design features, including technology-based scaffolding, location-aware features, and gamification. Zydney and Warner, (2016)

Table 3
Level of Science Creative Thinking Ability of Grade 10 Learners in
Learning Science using Science Apps

STUDENTS' CREATIVE THINKING ABILITY	WM	DESCRIPTION
1. It gives lessons a personal look and encourages me to widen my creativity.	4.20	Agree
2. It helps to improve my rate of accumulation.	4.66	Strongly Agree
3. It helps to develop my habit of asking "why" questions about information, ideas, and beliefs normally taken for granted.	4.78	Strongly Agree
4. It helps to unleash more my creativity, led by example and openly share my original ideas.	4.67	Strongly Agree
5. It allows me to do some work on my own.	4.89	Strongly Agree
6. It permits me to experience concrete terms in learning activities that can promote the idea of self-evaluation	4.18	Agree
7. It stimulates and motivates me to learn and better understand the lesson	4.50	Strongly Agree
8. It helps me to promote meaningful communication and effective learning.	4.72	Strongly Agree
9. It helps me to ensure better retention, thus making learning more permanent	4.83	Strongly Agree
10. It assist me in giving sense of reality to the body of knowledge under discussions.	4.16	Agree
Over-all Weighted Mean	4.60	Strongly Agree

Legend: 4.21-5.00 Strongly agree, 3.41-4.20 Agree, 2.61-3.40 Fairly agree, 1.81-2.60 Disagree, 1.00-1.80 Strongly disagree

Table 3 represents the Level of Science Creative Thinking Ability of Grade 10 Learners in Learning Science using Science Apps. It shows that Question no. 5 and 6 (It allows me to do some work on my own and it helps me ensure better retention, thus making learning more permanent) got the top highest mean of **4.89** and **4.83** which reflected as **strongly agree** respectively.

Meanwhile, Question no. 6 and 10 (It permits me to experience concrete terms in learning activities that can promote the idea of self-evaluation and it assist me in giving sense of reality to the body of knowledge under discussions) got the lowest weighted mean of 4.18 and **4.18** which reflected as both **agree**. Table 3 has an over-all weighted mean of **4.60** which is described as **strongly agree**.

This is in accordant with the study of Jusuf et al., 2020 that mobile application assessing knowledge analysis and creative thinking skills of science teachers can be used to improve their creative thinking ability. digital technology can be used to promote social creativity in science education and enhance students' creative thinking ability. (Aguilar & Pifarre Turmo, 2019)

Table 4
The Academic Achievement of Grade 10 Students in Science

Grades	Frequency	Percentage	Description
90-100	32	40.00	Outstanding
85-89	39	48.75	Very Satisfactory
80-84	5	6.25	Satisfactory
75-79	4	5.00	Fair
74 and below	0	0.00	Failed
<i>Total</i>	80	100	

Table 4 represents the Academic achievement of Imus National High School Students in Learning Science in First Grading Period using or with the integration of Science Apps. It indicates that grades from **90-100** have the frequency of **32** which equal to **40.00%** (outstanding), **85-89** and **80-84** got the frequency of **39** (48.75%) and **5** (6.25%) which described as very satisfactory and satisfactory respectively. Moreover, **75-79** and below **74** has the total frequency of **4** (5.00%) and **0** (0%) and described as fair and failed.

Whereas, this is in consistent with the study of Tavares et al, 2021 that Mobile App for Science Education found that the integration of mobile apps in science education can enhance students' scientific competences development and self-regulated learning. Furthermore, mobile apps have a positive effect on academic achievements in learning, students who used mobile apps in the assessment of their learning and found that 92% of students pointed to an increase in their academic achievements, (Leberada, et al, 2022)

Table 5
Relationship between Learning Science with the Integration of Science Apps as Perceived by Grade 10 Students and Their Academic Achievement

Indicator	R	R²	P-value	Remarks	Decision
The use of Science Apps as perceived by the senior high school students and their academic achievement	0.7889	0.6224	0.0098	Significant	Reject the Null Hypothesis

It was shown in table 5 that there was significant relationship between the use of Science Apps and the student's academic achievement in Science of Imus National High School as evidenced by *p-value of 0.0098*. A p-value lower than *0.05* (level of significance) (*0.0098 < 0.05*) indicated that the relationship between variables are significant.

Moreover, the *multiple R-value of 0.7889* shows a *high positive correlation* between the said variables (*Based on Karl Pearson Interpretation, 1948*). The coefficient variation of *r-squared* which is *0.6624* suggested that *66.24%* of the changes of their academic achievement of the students were due to or affected by integrating Science Apps in Learning Science.

Wu and Yang, 2022 reported that a mobile learning app that uses game elements such as leaderboards and digital badges may have positive effects on student academic performance, engagement, and retention. Furthermore, mobile apps in science education has proven to be effective as it adds multiple benefits including learning gains, motivation to learn, and collaborative learning.

IV. Conclusion

Based on the findings, the following conclusions were drawn:

1. The Extent of Usage of Science Apps among Grade 10 Learners in Learning Science got a total mean of **4.84** which means students are **ALWAYS** using and integrating science apps when it comes to learning science.
2. The Level of Science Creative Thinking Ability of Grade 10 Learners in Learning Science using Science Apps shows a total weighted mean of **4.60** which described as **strongly**

agree. This result indicated that students are learning when there is an Integration of Science Apps.

3. There were *Outstanding* and *Very Satisfactory* Academic achievement of Grade 10 Students in Learning Science (*showing 40.00 and 48.75 percent respectively*) when there was an integration of Science Apps in Learning Science.
4. There was a significant relationship between the use of Science Apps and the students' academic achievement as evidenced by *p-value of 0.0098*. The *multiple R-value of 0.7889* shows a *high positive correlation* between the said variables.

V. Recommendations

Based on the conclusions drawn, the researchers recommend the following:

1. Based on the data above, the teacher should encourage students to continue using the Apps in Learning Science.
2. There should be a formation of club (using personal GC) that will focus on the apps dissemination to other students.
3. Using Science apps in amplifying Science problems must be included in the event like competition in the school so that it could maximize its potentials.
4. To be given opportunity for possible demonstration teaching and sharing apps to other teachers and school for possible replication either f2f or via online.

ACTION PLAN

Based on the recommendations, this action plan was drawn,

Title: *INTEGRATION OF SCIENCE APPS IN LEARNING SCIENCE*

Rationale: The teacher-researcher will introduce the said integration to the principal and teachers who are teaching Science. The following objectives will be achieved:

- a. To encourage students to continue using the Apps in Learning Science.
- b. To formulate club (using personal GC) that will focus on the apps dissemination to other students.
- c. To amplify Science problems and must be included in the event like competition in the school so that it could maximize its potential.

- d. To be given opportunity for possible demonstration teaching and sharing apps to other teachers and school for possible replication.

OBJECTIVES	IN-CHARGED	STRATEGIES	BUDGET	SUCCESS INDICATORS
1. To encourage students to continue using the Apps in Learning Science.	School Principal, Department head, master teacher and science teacher	Conduct meeting to all club officers, science teachers and the researchers to disseminate the info.	TBD	100% students will engage the use of science apps in learning science
2. To formulate club (using personal GC) that will focus on the apps dissemination to other students.	Department Head and Science Teacher	There will be an orientation to all Science subject teachers and Students via online regarding the club and election of officers.	TBD	100% elect officers and establish club that will focus the dissemination of the Apps
3. To amplify Science problems and must be included in the event like competition in the school so that it could maximize its potentials.	Science teachers, Department Head and Master Teachers	It should be included in the teaching-learning process of the students and in teacher's demonstration.	TBD	100% students will learn mathematics through the use of Khan Academy Educational video Clips.
4. To be given opportunity for possible demonstration teaching and sharing apps to other teachers and school for possible replication.	Public Schools District Supervisor, School Principal, and the Researchers	PSDS will conduct online meeting and one of the agenda is regarding the sharing of best practices of the school in learning science amidst pandemic	TBD	100% attain the goal to share the best practices of the school.

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