Research Article

DESCRIBING SCIENCE MOTIVATION AND ACHIEVEMENT OF SENIOR HIGH SCHOOL SUBANEN LEARNERS USING COMPUTER-ASSISTED INSTRUCTION

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ABSTRACT

This research delved into the impact of Computer-Assisted Instruction (CAI) on enhancing science education among Senior High School (SHS) Subanen learners. The incorporation of CAI revealed a significant surge in motivation (mean score of 4.80) and a noteworthy improvement in academic achievement (14% increase in Mean Percentage Score in post-tests) among SHS Subanen students. The study identified a substantial correlation between science motivation and academic achievement among senior high school Subanen learners utilizing CAI. Furthermore, a notable difference in the academic performance of SHS Subanen learners emerged between the pre-test and post-test results when employing CAI. According to SHS Subanen learners, the integration of CAI in their science classes rendered lessons more engaging and comprehensible, attributing this to the incorporation of images, videos, and other interactive learning resources. Despite the positive outcomes, SHS Subanen learners faced challenges during the integration of CAI, including power interruptions, an extensive curriculum, and headaches due to prolonged computer exposure. To overcome these difficulties, students employed strategies such as reviewing topics through computer browsing, approaching challenges with a love for learning, and incorporating relaxation techniques into their study routines.

Introduction

The study examines senior high school Subanen learners' science motivation and academic achievement using computer-assisted instruction (CAI), focusing on pretest and post-test results to gauge academic progress within a one quarter lesson. It seeks to ascertain significant differences in achievement pre and post-CAI implementation. Additionally, it explores Subanen learners' perceptions of CAI integration in science classes, uncovering their views on its efficacy. The study identifies common difficulties faced by Subanen learners when incorporating CAI, emphasizing their coping strategies and resilience in overcoming these challenges to effectively integrate CAI into their science education. Despite the ongoing challenge of limited technology access hindering indigenous people's educational motivation and achievement. Indigenous communities, particularly in remote regions, have increasingly adopted digital technologies for various educational purposes (Reedy, 2019).

Computer-assisted instruction (CAI) has much potential to raise educational standards, encourage participation in academic success, and enhance the quality of instruction. Technology gives students access to a variety of learning pathsboth CAI and conventional methods of teaching improve the level of performance of students in physics significantly. However, when the effectiveness of the two methods is compared, there is no significant difference between their effects on academic achievement. CAI could be used as an alternative teaching method (Rosali, 2020).

Computer-assisted instruction (CAI) can be accessed either individually or in a group, which differs from the traditional classroom setting where students are grouped together regardless of their individual needs and the size of the class. This flexibility allows students to engage with the material at their own pace and in a manner that suits their learning style. In contrast, traditional classrooms may struggle to accommodate diverse learning needs due to their one-size-fits-all approach. By using computers, educators can tailor instruction to better meet the needs of each student, potentially improving overall learning outcomes. Computer-assisted instruction (CAI) offers a more personalized

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and adaptable learning environment compared to traditional classroom settings (Laleye, 2019).

Computer-assisted instruction (CAI) delivery methods are categorized into several types, including drill and practice, tutorials, simulation, problem-solving approaches, educational games, discovery mode, and dialogue level. Among these, drill and practice is the most frequently utilized due to its straightforward nature. This method typically presents a variety of questions in different formats. Throughout the process, the computer consistently poses questions and requests responses in an objective manner, following a repetitive procedure (Eyo, 2018).

Incorporating personal computers, Android phones, tablets, and laptops as crucial tools in the implementation of e-learning involves utilizing networks, software, and the internet (Fidalgo et al., 2020). This approach emphasizes the integration of various digital devices to support the e-learning environment. Additionally, it highlights the importance of network connectivity and software applications in facilitating the e-learning process. The use of these devices enables learners to access educational materials and participate in online activities. Overall, this approach underscores the reliance on digital technologies to enhance the effectiveness of e-learning initiatives.

Google Sites serves as a platform for students to collaborate and discuss lesson concerns or share ideas within their groups (Ma et al., 2018). Through this platform, teachers or peers can support learning by offering more immediate and frequent feedback (Oktalia & Drajati, 2018). Additionally, learning is made more contextualized as teachers can use various teaching materials like videos and animations to connect the subject matter to real-world situations. Google Sites is an effective tool for teachers to deliver abstract content more effectively. By uploading videos or 3-D models on Google Sites, students can visualize concepts more accurately, and these concrete examples help prevent misconceptions from forming.

Achievement motivation encompasses various factors, including ability self-concepts, task values, goals, and achievement motives, rather than being a singular concept. Limited research has explored these diverse motivational elements as predictors of academic achievement among students, independent of their cognitive abilities and prior academic performance. The existing studies suggest that most motivational factors are significant predictors of academic success beyond intelligence. Specifically, students' perceptions of their abilities and the value they place on tasks appear to be more influential in predicting achievement compared to their goals and achievement motives (Steinmayr et al., 2019).

Studies have indicated that there are no significant differences in student achievement when using Google Classroom (Kamberi, 2020). In a survey involving 24 undergraduates to assess the impact of Google Classroom on academic achievement, the results showed limited evidence of its effectiveness (Kamberi, 2020). This suggests that additional technological tools may be necessary to accompany Google Classroom. For instance, proposed that combining YouTube (Google Sites) with WhatsApp could enhance academic achievement (Olagbaju and Popoola, 2020). Their research implied that using supplementary tools alongside Google Sites may be beneficial for improving academic outcomes.

Some recommendations range those governments and educational institutions should prioritize providing computers in schools and ensuring their effective use for teaching and learning. Teachers need to be educated about the significance of Computer-Assisted Instruction (CAI) in primary school learning. It is essential for governments to offer CAI services in primary schools and address any challenges associated with these services. Governments should also find solutions to the issues hindering the effective implementation of CAI in schools. Overall, there should be a concerted effort to integrate computers and CAI effectively into primary school education (Lucky, 2022).

The study's findings revealed that administrators, technology personnel, and elementary classroom teachers all recognized the value of interactive technology for instructional purposes. They emphasized the importance of internet connectivity, considering it a crucial element for effective implementation of interactive technology in the surveyed school districts. Participants in the survey expressed a readiness and enthusiasm to utilize technology in their classrooms to create genuine learning opportunities for students. They showed a willingness and keen interest in using technology effectively to enhance their teaching practices. Overall, the survey participants acknowledged the significance of interactive technology and expressed a strong desire to incorporate it into their teaching methods (White, 2018).

The results of the study indicated that additional training is needed for both teachers and students to improve the implementation of technology in the classroom. The study also highlighted that while students are generally more engaged with and comfortable using technology, it can sometimes pose management challenges. Furthermore, the study emphasized the importance of providing further training to enhance teachers' and students' ability to effectively utilize technology. It also pointed out that while students' proficiency with technology is high, there is a need for strategies to address potential issues related to managing technology in the classroom. Overall, the findings underscored the importance of ongoing training and support to maximize the benefits of technology in education (Carstens, 2021).

Motivation plays a crucial role in driving learners to achieve their learning goals, highlighting its significance in effective teaching. It is recognized as perhaps the most critical factor influencing learning outcomes. Learning is a challenging process that requires pushing the brain to its limits, making motivation essential for it to occur. Merely attending class does not guarantee a student's desire to learn; motivation is what truly drives learning. Highly motivated students are more likely to learn effectively and make teaching enjoyable, whereas unmotivated students may learn very little and make teaching a challenging and frustrating experience. Given the compulsory nature of modern education, teachers cannot assume that students will be inherently motivated, emphasizing the need for teachers to actively cultivate and sustain student motivation (Filgona, 2020).

As technology becomes more prevalent in education and the workplace, it's crucial for students to become familiar with various digital tools. Integrating technology into the curriculum not only helps students expand their skills and achieve academically but also prepares them for life after graduation. Shifting the learning environment from teacher-centered to student-centered, educational technology requires thoughtful implementation by teachers. With numerous technological applications available, teachers should guide students to prevent them from feeling overwhelmed. Providing ongoing feedback to students as they use technology is also essential (D'Angelo, 2018).

Elevating Education: CAI's Influence on Subanen High School Learners

Several indigenous groups of people inhabit the Philippines. Thriving in Misamis Occidental is the Subanen tribe, which

possesses a distinct way of living and culture. Coexistence with non-tribal settlers in the area exposes the Subanen learners to the influence of the majority group (UNESCO, 2022).

The Subanen tribe is one of the most prominent indigenous people that settled on Mindanao Island. They are mixed-blooded Negrito considered the first settlers of the island who used advanced technology and knowledge in living during the period compared to the earlier ancestors on the island. Subanen people avoid violent conflict. If their number is in the majority, they will dominate the areas, but if they are outnumbered, they will migrate to other places to avoid conflict with other tribes. They are willing to share their territory and allow other migrants to settle in because they believe everyone has the right to own a piece of land. For them, having visitors or having new migrants settle the territory does not constitute an "invasion" in Subanen belief, but coercing the belief and culture is equivalent to war according to their faith (UNESCO, 2022).

Education in upland barangays in Jimenez Municipality, Misamis Occidental Philippines, especially in barangay Carmen, was given precedence by the parents, considering their living circumstances due to their poverty and the distance between their home and the school. At present, there are at least 50 SHS learners who belong to the Subanen tribe studying in one of the secondary schools situated in Barangay Carmen, Jimenez, Misamis Occidental. Despite the limited resources, the school prides itself on imparting Science and technology among its learners, including the SHS Subanen learners.

The availability of technology varies with the fiber internet connection that is available and funded by the MOOE of the school. One laboratory room is available with 50 personal computers and 20 units of tablets provided by the government. At the same time, other students have their own Android phone devices and personal laptops.

Recognizing the cognizant role of educational technology by using Android phones, laptops, tablets, and personal computers using video applications in student academic engagement and motivation to improve student academic achievement has immensely motivated the researcher to study the utilization of computer-assisted instruction (CAI) in science among senior high school Subanen learners. Many of the previous studies on the utilization of technology in the teaching-learning process focus on students who belong to the mainstream and need more diversity among students who are members of indigenous people such as the Subanen. Hence, this study will contribute to filling the knowledge gap on the use of educational technology among indigenous people in the bare education landscape.

The study explored in depth the connection of integrating computer-assisted instruction (CAI) in the academic engagement and student motivation of 15 senior high school Subanen learners in one of the public secondary schools in Jimenez, Misamis Occidental Division during the S.Y. 2023-2024. It employed triangulation and used a standardized questionnaire on student academic engagement and motivation to be answered by the leading research participants before and after integrating computer-assisted instruction (CAI) in their science classes. Likewise, the study utilized a standardized interview guide for gathering qualitative responses from the students of the research locale.

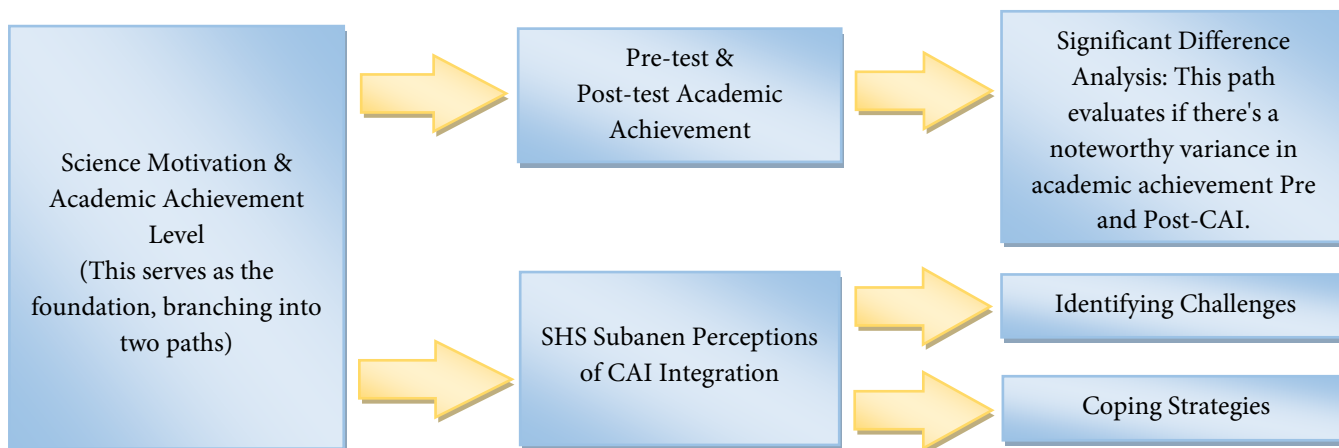**Figure I:** *The Schematic Diagram of the Study*

Figure 1 illustrates the link between science motivation and academic achievement, measured through Pretest and Posttest in Academic Achievement and SHS Subanen perceptions. The study focuses on integrating computer-assisted instruction (CAI) and explores its impact, using the "Technology Acceptance Model" (TAM). TAM suggests that technology acceptance depends on perceived usefulness and ease of use.

It explains SHS Subanen learners' attitudes toward CAI integration, addresses challenges in incorporating CAI into science classes, and provides insights into coping mechanisms. TAM serves as a theoretical framework for understanding learners' adoption of CAI, aligning with the study's objectives on technology integration in education.

Statement of Problem

This study investigates the impact of computer-assisted instruction (CAI) on senior high school Subanen learners in science education:

- What is the correlation between science motivation and academic achievement levels in senior high school Subanen learners exposed to CAI?
- How do post-test and pretest results in academic achievement differ among senior high school Subanen learners using CAI?
- Is there a significant difference in academic achievement between pretest and posttest results for senior high school Subanen learners using CAI?

- What are the perceptions, difficulties, and coping strategies of senior high school Subanen learners regarding the integration of CAI in their science classes?

Significance of Study

This study holds significant implications for various stakeholders. Firstly, it stands to benefit senior high school students, particularly those from the Subanen community, by enhancing their learning experience in science through the implementation of computer-assisted instruction (CAI). The focus on motivation and improved understanding suggests that the study aims to empower students, allowing them to learn at their own pace and fostering enthusiasm for academic pursuits. Additionally, the findings may guide teachers in tailoring their approaches to meet diverse student needs, incorporating technology to create a more engaging and effective learning environment.

Moreover, the study's impact extends to educational institutions, administrators, and policymakers. School administrators and supervisors can utilize the insights to design targeted interventions and curricular enhancements, aligning them with the unique requirements of Subanen learners. Importantly, the Department of Education can leverage the study's results to inform broader curriculum development strategies, recognizing the importance of individualized learning methods and the integration of CAI to improve academic achievements in the field of science. The research not only benefits the immediate participants but also provides a valuable foundation for future researchers, facilitating ongoing exploration and understanding of effective educational practices.

Research Method

This study employs an explanatory sequential mixed methods approach to explore the effectiveness of computer-assisted instruction (CAI) on academic achievement and motivation among senior high school Subanen learners. The research design begins with quantitative data collection and analysis, followed by qualitative data collection to provide deeper insights and interpretation. The chosen methodology allows for a comprehensive understanding of the survey outcomes, with a focus on describing science motivation and achievement.

Research Environment, Participants, and Instruments: Conducted in a public secondary school in Jimenez, Misamis Occidental, the study involves 15 senior high school Subanen learners enrolled in the General Academic Strand. The choice of Carmen Integrated School, where the researcher is a teaching staff member, ensures a relevant context with a significant number of Subanen students. Research instruments include a pretest and posttest of 50 items for academic achievement, the Academic Motivation Questionnaire, a standardized interview guide, observation notes, and the Academic Motivation Scale. The latter evaluates intrinsic and extrinsic motivation using a 5-point scale across various sub-scales.

Data collection: The researcher obtained necessary permissions and approvals to conduct the study. Schedules were set for participant orientation, parental consent collection, and the administration of the Student Academic Motivation Scale. A learning plan in science, emphasizing CAI integration, was implemented for one quarter. Following this, one-on-one interviews were conducted, adhering to ethical considerations.

The collected data, including survey responses, interviews, and observation notes, underwent analysis and triangulation with existing literature to validate the findings. The methodology ensures a holistic exploration of the impact of CAI on Subanen learners' academic experiences.

Data Analysis

The quantitative phase involved using descriptive statistics, mean, and standard deviation to analyze the demographic profile and measure academic motivation levels among Senior High School (SHS) Subanen learners before and after the integration of computer-assisted instruction (CAI) in their science classes. T-tests were applied for statistical comparisons. In the qualitative phase, in-depth interview and observation results underwent inductive coding, following Miles and Huberman's guidelines, to extract meaningful content and provide deeper insights into SHS Subanen learners' experiences with CAI in science classes (Miles and Huberman, 1994).

Ethical Consideration

The researcher conducted this study in strict adherence to established research protocols and Republic Act 10173 (Data Privacy Act of 2012). Ensuring the data's exclusive use for academic purposes to enhance teaching strategies in Science using computer-assisted instruction (CAI), the researcher prioritized the confidentiality of information, particularly respecting the cultural considerations of the Subanen tribe. To maintain research integrity, efforts were made to prevent any form of deception or misrepresentation in recording participants' responses. Informed and voluntary consent, obtained from both participants and their parents, underscored the voluntary nature of involvement without coercion. Privacy, confidentiality, and anonymity were rigorously upheld throughout the research process, aligning with Republic Act No. 10173, safeguarding participants' identities and upholding their right to privacy.

Results and Discussion

The presented data on the level of science motivation, and academic achievement of senior high school Subanen learners using computer-assisted instruction (CAI) of one of the public secondary schools in Jimenez, Misamis Occidental Division. Essential excerpts from each research participant-responses were stated in this chapter to provide the readers with an authentic account of the SHS Subanen learners' perceptions of integrating computer-assisted instruction (CAI) in their science classes and their common difficulties and challenges encountered in integrating computer-assisted instruction (CAI) into their science classes and coping mechanisms. A semi-structured interview was employed to gather accurate and reliable data.

The data were transcribed, analyzed, and interpreted to uncover patterns of meaning that come up repeatedly. The selected excerpts were considered relevant to the study. The learners from the same school have the following assigned codes: G11-001, G11-002, G11-003, G11-004, G11-005, G11-006 G11-007, G11-008, G11-009, G11-0010, G11-0011, G11-0012, G11-0013, G11-0014, and G11-0015.

Table 1: *Level of Science Motivation of SHS Subanen Learners Using CAI*

Item	Mean	SD	Interpret
1. Because I need at least a high-school degree in order to find a high-paying job later on.	4.13	1.92	Moderate
2. Because I experience pleasure and satisfaction while learning new things.	4.60	1.59	High
3. Because I think that a high-school education will help me better prepare for the career I have chosen.	5.00	2.24	High
4. Because I really like going to school.	4.53	1.60	High
5.I believe that every moment in school is a step towards discovering my passions, gaining valuable insights, and building a foundation for a fulfilling future."	3.47	1.96	High
6. For the pleasure I experience while surpassing myself in my studies.	4.73	1.94	High
7. To prove to myself that I am capable of completing my high-school degree.	4.87	1.73	High
8. In order to obtain a more prestigious job later on.	5.13	1.88	High
9. For the pleasure I experience when I discover new things are never seen before.	5.33	1.45	Very High
10. Because eventually, it will enable me to enter the job market in a field that I like.	4.27	1.79	Moderate
11. Because for me, school is fun.	4.60	1.68	High
12.I am now motivated by the opportunity for continuous growth, learning, and the prospect of shaping a meaningful and successful future, encouraging me to persevere with confidence.	4.40	2.29	Moderate
13. For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.	5.40	1.92	Very High
14. Because of the fact that when I succeed in school, I feel important.	5.27	1.62	Very High
15. Because I want to have "the good life" later on.	5.47	1.68	Very High
16. For the pleasure that I experience in broadening my knowledge about subjects that appeal to me.	4.87	2.07	High
17. Because this will help me make a better choice regarding my career orientation.	4.93	1.39	High
18. For the pleasure that I experience when I am taken by discussions with interesting teachers	5.13	1.25	High
19. I am open to discovering the purpose and value in my education, trusting that each day at school brings opportunities for personal growth and future success."	4.00	2.00	Moderate
20. For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.	5.27	1.49	Very High
21. To show myself that I am an intelligent person.	4.67	1.91	High
22. In order to have a better salary later on.	4.73	2.12	High
23. Because my studies allow me to continue to learn about many things that interest me.	5.27	1.75	Very High
24. Because I believe that my high school education will improve my competence as a worker.	4.73	1.53	High
25. For the "high" feeling that I experience while reading about various interesting subjects.	3.93	1.98	Moderate
26. I am confident that my educational journey holds valuable lessons and experiences that will shape a positive and meaningful path for my future.	3.47	1.88	Low
27. Because high school allows me to experience personal satisfaction in my quest for excellence in my studies.	5.40	1.64	Very High
28. Because I want to show myself that I can succeed in my studies.	5.20	1.74	High
29. Because high school allows me to experience personal satisfaction in my quest for excellence in my studies.	5.40	1.59	Very High
30. Because I want to show myself that I can succeed in my studies.	5.67	1.54	Very High
Overall	3.47	1.88	Low

Mean Range: 1.00 – 1.85 = Extremely Low; 1.86 – 2.70 = Very Low; 2.71 – 3.55 = Low; 3.56 – 4.40 =Moderate; 4.41 – 5.25 = High; 5.26 – 6.10 = Very High; and 6.11 – 7.00 = Extremely High

Table 1 shows the level of science motivation of SHS Subanen learners using CAI. Thirty (30) items were answered, with an overall result of 4.80, the mean, and 1.77 as the S.D. Hence, the data shows that SHS Subanen learners are highly motivated in science when CAI is used.

This high mean score suggests a commendable level of motivation among learners, aligning with Zomeren's (2012) reference to Keller's ARCS model (1987). The ARCS model emphasizes four key elements—attention, relevance, confidence, and satisfaction—as crucial factors in stimulating and sustaining learner motivation. The substantial mean score reflects that learner using computer-assisted instruction (CAI) in science education are significantly motivated due to the instructional material's ability to capture attention, establish relevance to their lives, boost confidence in understanding scientific concepts, and foster satisfaction in their learning experiences.

The theoretical implication underscores the applicability of the ARCS model in understanding and enhancing motivation within the computer-assisted instruction (CAI) context. Practically, these findings highlight the effectiveness of computer-assisted instruction (CAI) in engaging and motivating learners in science education, emphasizing the need for educators to integrate

these motivational elements into instructional design to enhance student motivation and learning outcomes further.

Science Academic Achievement of SHS Subanen Learners Using CAI.

Table 2: *Level of Science Academic Achievement of SHS Subanen Learners Using CAI*

Science Achievement	Mean	SD	MPS	Descriptive Equivalent
Pretest	6.70	2.41	45%	Average
Posttest	8.86	2.84	59%	Average
Overall Increase in MPS			**14%**	

MPS: 96 – 100% = Mastered; 86 – 95% = Closely Approximating Mastery; 66 – 85% = Moving Towards Mastery; 35 – 65% = Average; 15 – 34% = Low; 5 – 14% = Very Low; 0 –4% = Absolutely No Mastery

Table 2. The information you provided indicates a positive impact of Computer-Assisted Instruction (CAI) on the Science academic achievement of SHS (Senior High School) Subanen learners.

The results based on the pretest and post-test: Pretest Results: Number of items: 50. Pretest mean score: 6.70. Pretest standard deviation: 2.41. Mean Percentage Score (MPS): 45%. Posttest Results: Posttest mean score: 8.86. Posttest standard deviation: 2.84. MPS for posttest: 59%.

The Comparative Analysis of the pretest performance has a mean score of 6.70, the standard deviation 2.41, and the mean percentage score (MPS) 45%. The post-test performance has a mean score of 8.86, standard deviation of 2.84 and the MPS: 59%. The overall improvement: Mean Score Increase: 8.86 (Posttest) - 6.70 (Pretest) = 2.16 points improvement. MPS Increase: 59% (Posttest MPS) - 45% (Pretest MPS) = 14% increase.

The results demonstrate a substantial improvement in academic achievement after the implementation of Computer-Assisted Instruction (CAI). The mean score increased by 2.16 points, and the mean percentage score (MPS) showed a significant increase of 14%. This suggests that the use of CAI positively impacted the Science academic achievement of SHS Subanen learners.

The increase in the mean score indicates that, on average, students performed better in the posttest after utilizing CAI. The rise in the MPS suggests that a higher percentage of students achieved a passing grade after the CAI intervention. The standard deviation values provide insights into the consistency or variability of scores within the group.

These findings support the effectiveness of integrating CAI into the teaching and learning process, suggesting that it

contributed to significant academic advancement in Science for SHS Subanen learners.

The theoretical grounding in extrinsic motivation provided underscores the relevance of external incentives in shaping learner satisfaction and academic achievement. The practical implication of this data is profound, highlighting CAI's efficacy in engaging and motivating students and substantially improving academic performance (Czubaj, 2004).

It emphasizes the instrumental role of extrinsic incentives in fostering learner preparation and success in science education, prompting educators to integrate such motivational strategies within CAI to enhance academic outcomes further.

Testing the Hypotheses

Before testing the hypotheses of this study, analysis in assessing the normality of the data through measures of skewness, kurtosis, and z-values before hypothesis testing is crucial for ensuring the appropriateness of the statistical tests used (Ghasemi & Zahediasl, 2012).

Confirming that the dataset falls within the normal distribution range allows for applying parametric tests like the Pearson Correlation Test and Paired Samples T-test.

The theoretical implication lies in validating assumptions required for these parametric tests, affirming that the data adheres to the assumptions necessary for reliable statistical analysis.

This strengthens the credibility of the subsequent hypothesis testing results. On a practical level, this validation gives researchers and practitioners confidence in the validity of the statistical analyses conducted, ensuring that the chosen tests are suitable for the dataset at hand. It underscores the importance of initial data assessment in ensuring the robustness and accuracy of subsequent statistical analyses in research.

Table 3: *Testing Relationship between Science Motivation, and Academic Achievement*

Variables	Pearson "r"	Interpretation	p-value	Interpretation
Science Motivation and Academic Achievement	.487*	Low Positive Correlation	.019	With Significant Relationship

*. Correlation is significant at the 0.05 level (2-tailed).

Pearson "r" Scale: 0 – ± 0.30 = Negligible Correlation
                 ± 0.31 – ± 0.50 = Low Correlation
                 ± 0.51 – ± 0.70 = Moderate Correlation
                 ± 0.71 – ± 0.90 = High Correlation
                 ± 0.91 – ±1.00 = Very High Correlation

The results in Table 3 disclosed that there is a significant relationship between science motivation and academic achievement of the senior high school Subanen Learners using computer-assisted instruction (CAI). Hence, the utilization of CAI affords a more enhanced level of motivation among the learners in learning Science. This motivation significantly improves their

academic achievement, as manifested by the p-value of .019, which is lesser than the significance value of .05. Besides, the Pearson r value of .487 reflects a positive effect size between the two variables.

This aligns with the study by Güneş, M. H., & Çelikler, H. (2010), that investigate the effects of modelling and computer assisted instruction (CAI) on students' academic achievement.

The practical implication of the study reveals that students learned more by doing and were more successful when supplementary tools were being applied.

Table 4: *Testing the Difference of Students' Academic Achievement Using CAI*

Paired Variables	Mean	T	df	p-value	Interpretation
Pretest	6.70	-6.920	49	<.001	With Significant Difference
Posttest	8.86				

Significant at .05 level of significance

The findings from Table 4, which shows fifty (50) items answered comparing the pretest and posttest academic achievement scores of students using computer-assisted instruction (CAI), reveal a substantial and statistically significant improvement. The pretest mean score of 6.70, with a t-value of -6.920, 49 degrees of freedom, and a p-value < .001, contrasts significantly with the posttest mean score of 8.86. The interpretation of these results indicates a significant difference between the pretest and post-test scores, signifying that using CAI profoundly enhances students' academic achievement in science.

This aligns with the theoretical framework referencing extrinsic motivation by showcasing how external incentives can be pivotal in driving academic improvement (Czubaj, 2004).

The practical implication of this outcome underscores the effectiveness of CAI as a potent educational tool, highlighting its ability to engage, motivate, and substantially enhance students' academic performance in science. It emphasizes the practical utility of leveraging extrinsic motivators within educational technologies like CAI to foster improved learning outcomes and academic success among learners.

Table 5: *Perceptions of the SHS Subanen learners' perceptions of integrating computer-assisted instruction (CAI) in their science classes*

Theme 1	*It makes science lessons easier to understand and more interesting."*
Theme 2	*Increasing students' interest in learning Science."*

Table 5 presents the perceptions of the SHS Subanen learners' perceptions of integrating computer-assisted instruction (CAI) in their science classes. After exploring, two themes emerged: It makes science lessons more straightforward to understand and interesting and increases students' interest in learning science.

It makes science lessons easier to understand and interesting. It is one of the themes that emerged regarding how the research participants perceived the integration of computer-assisted instruction (CAI) in their science classes. The students believed that CAI has made their lessons easier to understand and interesting to learn because of the inclusion of images, videos, and other learning resources. According to them:

"It is easier to learn and explore around the world." G11-01,
"Mas ganahan ko maggamit sa CAI kay dali ko makat-on, makakita ko sa mga images ug videos nga actual." [I like using CAI because I learn easier, I can see the actual pictures and videos.] G11-02
"Learn more about the subject." G11-003
"I can browse and explore the topic using the computer anytime." G11-05
"Mas dali nako masabtan ang leksyon kung maggamit ug CAI." [I can understand clearly when using CAI.] G11-06
"Daghan ko makita nga picture ug vedio." [I can see lots of picture and vedios]. G11-08
"Mas ganahan ko maminaw sa leksyon ug daghan me makat-onan kung maggamit me ug CAI." [I like to listen the lesson and I learn more using CAI.]
G11-11
"Mas dali masabtan ang lesson ni Maam ug naay CAI." [Easy to understand the lesson when teacher use CAI]. G11-12

The participants' perspectives coalesce around the notion that the integration of computer-assisted instruction (CAI) into their science classes has notably enhanced the learning experience. Their consensus highlights the efficacy of CAI in simplifying complex scientific concepts and fostering interest through multimedia elements like images and videos, collectively contributing to an overall improved understanding and motivation with science lessons.

Increasing students' interest in learning Science is pivotal when evaluating the effectiveness of educational methodologies like Computer-Assisted Instruction (CAI). The integration of CAI aims to enhance academic performance and stimulate and sustain students' interest in science. The data presented across various measures, such as motivation and academic achievement, inherently reflects the impact of CAI on generating interest in science learning among SHS Subanen learners.

The conversation related to this theme could delve into specific aspects of CAI that resonate most with the learners in terms of generating interest. Students might prefer certain interactive features, visual aids, or personalized learning experiences within the CAI modules that particularly sparked their interest.

Furthermore, educators could explore students' narratives, anecdotes, or reflections on how CAI altered their perception of science learning, making it more engaging, relevant, and enjoyable. Understanding these nuanced experiences and preferences could provide valuable insights for further tailoring

CAI content and features to enhance student interest in science education continually. Additionally, discussions involve strategies to sustain and nurture this newfound interest over the long term, ensuring that CAI continues to inspire and engage students in their scientific pursuits. According to them:

"Mas dali makasabot sa lessons pag naay computer kay gawas nga makita ang mga pictures/images kung unsa na siya, masearch pud nimo ang meaning sa words nga galibog ka." [It is easier to understand the lessons using a computer because aside from seeing the pictures/images, you can also search for the meaning of confusing words.] G11-004

"Mas nindot ug interesado ko maminaw ni Maam kay naa koy makita nga example dayon sa iyang projector basta maggamit ug CAI." [The lesson is interesting to listen if I see some examples using the projector when integrating CAI.] G11-007

"Makalingaw ng makita ang image sa topic ni Maam, ilabina ug naay vedios nga ipakita." [It is entertaining if I see images from the topic of my teacher, especially if there is a vedio-presentation.] G11-009

"Malipay ko ug magklase si maam nga maggamit ug CAI kay dili ko makatulog sa klase." [I am happy when my teacher integrates CAI because I cannot feel sleepy during our class.] G11-0010,

"Makaintertain ang mga image ug powerpoint presentation ug naay CAI." [The image and power point presentation are entertaining when CAI is integrated in the lesson.] G11-0013

"I have experienced a lot in integrating computers during science class. It is easier to visualize the learnings especially because Science should be shown physically or even with the use of the internet.", G11-0014

"For me, including CAI into science lectures has been an interesting experience. After all, viewing science in person or even online helps me understand better." G11-0015

The exploration of Computer-Assisted Instruction (CAI) to boost interest in learning Science among Senior High School (SHS) Subanen learners is deeply rooted in the understanding that sustained interest is crucial for the effectiveness of educational methodologies. The synthesis underscores the multifaceted impact of CAI on motivation and academic achievement, suggesting that the integration of interactive features, visual aids, and personalized learning experiences plays a pivotal role in captivating students' interest.

The proposed conversation further delves into the specific elements of CAI that resonate with learners, aiming to uncover preferences and insights that can inform the continual refinement of CAI content. Additionally, the discussion extends to strategies for nurturing and sustaining the newfound interest, ensuring that CAI remains a dynamic and compelling tool for fostering a genuine passion for science among students.

Table 6: *Students' Common Difficulties and Challenges Encountered in Integrating Computer-Assisted Instruction (CAI) into Science Classes*

Theme 1	*Power interruption*
Theme 2	*Several topics to discuss and memorize*
Theme 3	*Headache due to long hours of computer exposure*

Table 6 uncovers challenges faced by SHS Subanen learners in integrating computer-assisted instruction (CAI) into their science classes, presenting three primary themes: "Power Interruption," "Many Topics Discussed," and "Headaches Due to Computer Exposure." The first challenge, "Power Interruption," disrupts CAI sessions, affecting student engagement and interest in science learning. Power interruptions may lead to frustration and distraction, diminishing the effectiveness of CAI. Conversations within this theme could involve students sharing experiences and coping mechanisms during power interruptions, exploring strategies to mitigate impacts, and brainstorming proactive measures.

The second challenge, "Many Topics Discussed," highlights the overwhelming volume of science topics, posing difficulties in

memorization and comprehension for learners. Managing numerous topics can impact students' overall interest in science. Discussions within this theme may include students and educators addressing challenges in managing topics, exploring how CAI assists in navigating these challenges, and empowering students with effective tools and strategies.

The third challenge, "Headaches Due to Computer Exposure," acknowledges health issues related to prolonged computer use, such as headaches. Managing these health concerns is crucial to ensuring a healthy learning environment. Conversations surrounding this theme may involve students openly discussing experiences of discomfort or headaches, while educators guide strategies for minimizing discomfort, promoting health-conscious practices, and managing screen time effectively.

Table 7: *Coping Mechanism of SHS Subanen Learners in Overcoming Difficulties and Challenges in integrating computer-assisted instruction (CAI) in Science Classes*

Theme 1	*Reviewing the topic being discussed by browsing the computer.*
Theme 2	*Facing all the challenges with love and passion to learn.*
Theme 3	*Relaxing themselves.*

Table 7 delves into the coping mechanisms employed by SHS Subanen learners to address challenges in integrating computer-assisted instruction (CAI) into their science classes, revealing three key themes: "Review the Topic by Browsing the

Computer," "Facing All Challenges with Love and Passion for Learning," and "Relaxing."

The first theme, "Review the Topic by Browsing the Computer," aligns with efforts to heighten students' interest in

learning Science through CAI. Students leverage the internet and digital resources to supplement their understanding of scientific concepts, engaging in online exploration, collaborative learning, and critical evaluation of information. This theme fosters discussions on effective strategies, responsible online research practices, and the integration of digital resources with CAI.

The second theme, "Facing All Challenges with Love and Passion for Learning," encapsulates a resilient and positive approach to education, particularly in the context of increasing interest in Science through CAI. Anecdotes shared by students and educators underscore the transformative power of overcoming obstacles, fostering a growth mindset, and drawing inspiration from a genuine passion for science. The associated conversation aims to inspire peers, emphasizing the pivotal role of a positive mindset and sincere passion in navigating challenges and sustaining enthusiasm for continuous learning.

Theme 3, "Relaxing," underscores the importance of relaxation and self-care within educational settings, especially when employing CAI. Techniques such as stress management, mindfulness, balanced screen time, and creating a conducive study environment contribute to maintaining mental well-being and optimizing learning experiences. The ensuing conversation encourages the exchange of tips and practices, cultivating a supportive environment that prioritizes not just learning but the overall well-being of individuals amid the demands of educational technology.

Key Findings: A Comprehensive Summary

The study assessed the impact of Computer-Assisted Instruction (CAI) on the science motivation and academic achievement of senior high school (SHS) Subanen learners. Results indicated that learners exhibited a commendable level of motivation in science when exposed to CAI, aligning with Keller's ARCS model (1987). The ARCS model emphasizes attention, relevance, confidence, and satisfaction as crucial elements in stimulating and sustaining learner motivation.

The implementation of CAI led to a substantial improvement in academic achievement, with a notable increase in mean scores. There was also a significant relationship between science motivation and academic achievement, highlighting the positive impact of CAI.

Learners perceived CAI as making science lessons more understandable, interesting, and enjoyable, leading to increased overall interest in learning science. However, challenges such as power interruptions were identified, emphasizing the need for strategies to address disruptions.

Coping mechanisms, including online research and a positive mindset, were crucial in overcoming challenges, underscoring the importance of fostering a supportive learning environment during CAI sessions in science education.

Conclusion

The study emphasizes the positive influence of integrating Computer-Assisted Instruction (CAI) on the motivation and academic performance of Senior High School Subanen learners in the field of science. The study highlights a substantial improvement in academic outcomes, as evidenced by the significant difference observed between pretest and posttest results. The perspectives of the students indicate that CAI serves as a catalyst, playing a pivotal role in enhancing the comprehensibility and appeal of science lessons. This, in turn, contributes to an increased interest in learning, facilitated using various media resources. The acknowledgment of CAI as a

valuable tool in education suggests that incorporating technology into the teaching and learning process can have a meaningful impact on students' engagement and understanding of the subject matter. Despite facing challenges such as power interruptions, information overload, and discomfort from prolonged computer exposure, the learners demonstrated resilience. Their ability to revisit topics, maintain a positive attitude towards challenges, and prioritize self-care reflects a proactive approach to overcoming obstacles associated with the integration of technology in education. The study underscores the overall positive impact of Computer-Assisted Instruction on both the academic achievements and motivation of Senior High School Subanen learners in the realm of science, despite the challenges encountered during the implementation of this instructional approach.

In conclusion, the findings emphasize the positive influence of CAI on Subanen learners, acknowledging its transformative role in improving academic engagement and motivation, while recognizing and addressing challenges to ensure continued success. The study not only highlights the current impact of Computer-Assisted Instruction (CAI) on the science motivation and academic achievement of Senior High School Subanen learners but also points towards promising future prospects. As educational technology continues to evolve, there is potential for further enhancements in CAI methodologies tailored to address specific challenges faced by Subanen learners. Future prospects include refining CAI content to better align with the unique cultural context of the Subanen tribe, addressing challenges like power interruptions through innovative solutions, and incorporating feedback from learners to continually enhance the effectiveness of CAI. Additionally, ongoing efforts should focus on expanding technology infrastructure and providing resources to ensure equitable access for all Subanen students.

By recognizing and addressing these future prospects, the educational community can foster a sustainable and inclusive learning environment, ensuring that CAI remains a dynamic tool for advancing science education among Subanen learners in the years to come.

Recommendations

To effectively integrate Computer-Assisted Instruction (CAI) for science education among Senior High School Subanen learners, it's essential to consider the benefits and challenges observed. Here are some recommendations:

- **Strengthening Infrastructure:** Address power interruptions by ensuring a stable power supply during classes or having backup plans in place to minimize disruptions.
- **Diversify Learning Resources:** While multimedia elements like images and videos were appreciated diversify these resources further to accommodate different learning styles and preferences.
- **Implement Breaks and Rest:** Acknowledge the potential strain caused by prolonged computer exposure. Encourage periodic breaks during lessons to reduce fatigue and alleviate discomfort.
- **Enhance Teacher Training:** Provide educators comprehensive training on effectively utilizing CAI tools to optimize their potential and address varied learning needs.
- **Encourage Collaborative Learning:** Foster a collaborative learning environment among students, where they can support each other in understanding complex topics and coping with challenges related to using CAI.
- **Continued Research and Evaluation:** Regularly assess the effectiveness of CAI implementation, gather feedback from

students and teachers, and adapt strategies based on these evaluations to continually improve the learning experience.

- **Support Student Well-being:** Emphasize self-care practices among students, encouraging relaxation techniques and maintaining a healthy balance between screen time and other activities.
- **Adapt Lesson Structure:** Consider restructuring lessons to accommodate the extensive topics in science subjects, ensuring a balanced approach that supports comprehension without overwhelming students.

By addressing these recommendations, the integration of CAI into science classes for Senior High School Subanen learners can be further optimized, leveraging its benefits while mitigating associated challenges for an enriched and effective learning experience.

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