Science Motivation and Academic Achievement in Physical Science Through Interactive Supplementary Instructional Materials Using Kotobee Author Application

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DOI: https://doi.org/10.47772/IJRISS.2026.100300377

Received: 17 March 2026; Accepted: 23 March 2026; Published: 09 April 2026

ABSTRACT

The use of educational technology in the Philippines has been gaining attention in recent years due to the increasing demand for quality education and the advancement of technology. Technology integration as supplementary instructional material has been seen as a potential solution to address the challenges of traditional teaching methods. The present study aimed to enhance the academic achievement of students in physical science and science motivation to the use of interactive supplementary instructional material using Kotobee Author Application. The study used a Quantitative Research employing a Quasi-Experimental Research Design. Data were gathered using the Science Motivation Questionnaire II (SMQ II) consisting of 25 items developed by Glynn et al. (2011), and a researcher-made 30-item achievement test. Data were analyzed using descriptive statistics, ANCOVA and Pearson product correlation. The findings revealed that the use of Kotobee Author Application enhances significantly the Science Motivation and academic achievement of the learners. Moreover, results revealed that there is a significant relationship between the level of Science Motivation and academic achievement on students exposed to Kotobee Author Application. These findings provide a benchmark data on the effectiveness of developing interactive instructional materials to enhance content knowledge and motivation in a certain topic while learning in this new normal education.

Keywords: Interactive E-Book; Academic achievement; Science Motivation: Physical Science; Kotobee Author Application

INTRODUCTION

The K-12 program, as it is known today, was designed to meet the diverse needs of learners in a real-world setting. It aims to improve learners' skills and cognition so that they can compete on a global scale. As a result, its primary goal is to promote holistic life-long learning based on the belief that students' educational experiences shape how they construct knowledge and learn (Yildirim & Ortak, 2021).

In the last two years, there have been dramatic changes in the learning environment, and alternative modes of learning delivery have been implemented. However, as part of the gradual transition to the new normal of education, the Department of Education mandated in DepEd Order 34, Series of 2022 that all public and private elementary and secondary schools hold five (5) days of in-person classes regardless of the COVID-19 alert level in the area. In this relation, the minimum health and safety protocols will still be followed.

Several drawbacks were observed at the start of the in-person classes in the new normal set-up, particularly in terms of how the students learn; students have become hesitant about their learning, they have a shorter attention span, and their scores were quite alarming. One of the major challenges teachers face today is student's lack of interest in learning across learning areas especially in science. Zin, Jaafar, and Wong (2009) expounded that the learner attributes these problem to the teachers' teaching method, a lack of teaching aids or materials, unclear descriptions of concepts, and less interaction and feedback after examination. To counteract these difficulties, teaching strategies such as video-based learning, hands-on practice, project-based inquiry and scaffolding and interactive supplementary instructional must be employed (Gunawan & Rachmah, 2021; ShavabYulifar, Supriatna, & Mulyana, 2021; Boadu, 2015; De La Paz, 2013).

Technology has become a crucial part of the teaching process in this educational milieu (Hamill, 2012), it radically contributed to significant changes in students' learning experiences (Sloan & Lewis, 2014). Particularly on the swing back to the main lesson delivery modality as face-to-face classes would agitate the new learning environment adapted by the learners for the two consecutive years. Numerous studies suggested that the effectiveness of distance learning programs that contribute to successful outcomes include effective communication between teachers and learners, familiarity with digital technology, psychological aspects of studying 'at a distance', and course content (Wilczewski, Gorbaniuk, & Giuri). This is the reason, Department of Education (DepEd) has been working towards the integration of educational technology in the Philippine education system through various initiatives. One of these is the DepEd Computerization Program (DCP), which aims to provide public schools with computer labs and internet connectivity. The program also includes teacher training on the use of technology in the classroom. Additionally, the K-12 Basic Education Program implemented in 2013 includes the integration of technology in the curriculum to improve the quality of education.

One technology-enhanced learning approach was the use of Interactive Electronic Book (E-book) using Kotobee Author Application as Interactive Supplementary instructional material. It presented an opportunity for increased individual interactivity, which possessed a wide-ranging selection of adaptivity and personalization features and provide access to learners with different learning needs (Choppin & Borys, 2017). They utilized a combination of multiple strategies integrated in digital formats to accomplish the desired learning outcomes. Kotobee Author Application were basically consisting of hypertext, graphics, audio, video, and animation (Chapman & Chapman, 2004). Additionally, it improved the sensory perception and mental processing of the learners (Paulsen, 2007) and was used widely as a teaching method in a distance learning modality (Eger, 2004). The Kotobee Author application is a tool that allows educators to create a wide range of interactive instructional materials, including eBooks, interactive textbooks, and multimedia-rich materials. It offers a user-friendly interface that makes it easy for educators to create content without needing advanced technical skills.

Several studies have explored the effectiveness of interactive supplementary instructional materials such as Kotobee Author Application in promoting learning outcomes. For example, a study by Roca and Gagné (2017) found that the use of Kotobee Author Application improved student engagement and motivation, as well as their understanding and retention of content. Moreover, the use of Kotobee Author application to create interactive instructional materials has not been extensively studied, making it an area of interest for researchers and educators alike.

In the context of the study, the researchers made, Interactive supplementary instructional material using Kotobee Author Application. It is an authoring tool for creating interactive Ebooks, where the teacher can embed interactive elements, such as video, audio, galleries, 3D models, animations, self-assessment questions, and book widgets among others. It is also available in different formats, such as PDF, Word, or EPub, which can be opened through any digital device. With this application, the teacher had effectively stimulated the learners' minds and provided the potential to develop their higher order thinking skills (Kroeze, 2017).

The crafted Interactive Supplementary Instructional Material through Kotobee Author Application presented a student-centered learning environment and a highly organized, action-oriented methodology which incorporated flexible and independent learning strategies in a virtual setting. It therefore ensured that learners capture, retain,

and use the knowledge and skills taught to them. Furthermore, it enhanced the digital competencies of the learners through the use of available gadgets for learning.

The Chemistry topics in the Physical Science subject were the topics of choice for the Interactive Supplementary Instructional Material through Kotobee Author Application. This decision was anchored on the result of Woldeamanuel, Atagana, and Engida (2014) wherein the students considered Chemistry as a difficult subject because of its abstract nature, confusing technical meanings, and needs numeracy skills. Moreover, it was observed, that students in Lantapan National High School-Senior High School, showed a poor Mean percentage score (MPS) in physical science, because of lack of scientific language and continuous assessment in the present learning environment. On the other hand, there was a teacher-centered instruction and no varied teaching strategy employed and learners cannot see the inter-relatedness of the concepts involved. In the end, the learners had no motivation and interest in the subject. To address this gap, the researchers crafted an Interactive Instructional Material through Kotobee Author Application patterned to Gagne's Instructional Events. According to Gagne (1985), instructional events are also known as external events, which can be controlled by the instructor and to support the internal learning processes, which are then controlled by learners. Hence, effective learning processes should be facilitated by the external events. Therefore, this study aims to explore the effectiveness of using Kotobee Author application in creating interactive instructional materials and its impact on student science motivation and academic achievement.

METHODOLOGY

This quasi-experimental research evaluates the science motivation, and academic achievement of learners exposed to Interactive Supplementary Instructional Material using Kotobee Author Application and those learners exposed to the DepEd Self-learning modules in Physical Science subject at Lantapan National High School-Senior High School HUMSS Students.

A.Participants and/or other sources of data and information

The participants of the study were the Grade 11 HUMSS learners of Lantapan National High School-Senior High School who were enrolled in the second semester of the school year 2022-2023. The HUMSS strand has the highest number of population in the senior high school and based on the mean percentage score in Physical Science, they attained an average level in Chemistry topics for three consecutive years. Thus, two intact classes were randomly chosen from the HUMSS strand with thirty (30) learners in each section. One group served as an experimental group and was exposed to the researcher-made Interactive Supplementary Instructional Material through Kotobee Author Application anchored on Gagne's Nine Events of Instruction (1985) while the other section served as the control group and was exposed to DepEd Self-Learning Modules.

B. Data Gathering Methods

The instruments used in the study were both academic and non-academic assessment. These were then divided into academic achievement and level of science motivation. The following described the different instruments used in gathering, interpreting and analyzing the data collected.

Science Motivation

The researchers adapted a Science Motivation Questionnaire II from Glynn et al. (2011) which was used in identifying the level of science motivation of the learners. It is a self-questionnaire consisting of twenty-five (25) items in a five-point Likert scale, indicating whether the statement is never (0), rarely (1), sometimes (2), often (3), or always (4). It included five factors namely, intrinsic motivation, career motivation, self-determination, self-efficacy, and grade motivation.

The adapted questionnaire was then subjected to a pilot testing by Grade 12 learners from the Science, Technology, Engineering and Mathematics (STEM) strand to assess its reliability with a Cronbach's alpha of 0.860.

To measure the level of science motivation of learners, the following scale was used in interpreting the data, based on Glynn et.al (2011). The overall mean was obtained by getting the average of the mean of responses per learner.

Scale	Science Motivation Scale
0.00-0.05	Low
0.06-1.00	Below Average
1.01-2.00	Average
2.01-3.00	Above Average
3.01-4.00	High

Academic Assessment (Academic achievement)

The researchers designed and constructed a sixty (60)-item multiple choice test to measure academic achievement of the learners. A one-way table of specification (TOS) was utilized to check the content specified along with the levels of cognitive domain of the students. The researcher-made questionnaire was then subjected to a pilot testing by Grade 12 learners from the Science, Technology, Engineering and Mathematics (STEM) strand to assess its reliability with a Cronbach's alpha of 0.875. It was then validated by the panel of experts in science to determine whether test items were appropriate to test learners' academic achievement. After which, the validated test consisted of 30 items and served as a pre-test and post-test.
To measure the academic achievement of the learners, the following scale was used in interpreting the data.

Score Range Distribution	Level of Proficiency
28-30 25-27	Outstanding Very Satisfactory
22-24	Satisfactory
19-21	Fairly Satisfactory
1-18	Did Not Meet Expectations

Interactive Supplementary Instructional Material through Kotobee Author Application

The researchers adapted the Interactive Supplementary Instructional Material from Duave, Lambo and Pay-an (2022) action research study. The Interactive Supplementary Instructional Material was made through Kotobee Author application patterned to Gagne's (1985) instructional events. These material were already validated by a panel of experts at Bukidnon National High School consisting 3 practitioners, who had been teaching the subject for several years of which they are already considered as lesson content experts and the school's LRMDS coordinator. The evaluators used an evaluation checklist and criteria as basis for assessment adapted from Ejem (2011). Content and content accuracy, clarity and appropriateness of the material were the focus of the validation.

Prior to the conduct of the study, a permission from the Secondary School Principal and Head teacher was secured with the information that a study was conducted to Grade 11 HUMSS learners. Furthermore, an assent and consent form were given to the parents and learners respectively, informing them that they were part of the study.

This study only focused on the midterm topics in Physical Science, which comprised 8 specific topics. The study utilized the quasi-experimental research design to determine the academic achievement, and level of science

motivation of learners in Physical Science. A random selection method, specifically lottery method, was used to determine the experimental group and the control group.

A thirty (30)-item researcher-made achievement test, and science motivation questionnaire adapted from Glynn et al. (2011) were administered to the two classes before the proper implementation of the study to test prior knowledge of the learners and their level of science motivation, respectively.

After which, the selected two classes were exposed to the intervention. The experimental group was exposed to the validated Interactive Instructional Material through Kotobee Author Application while the control group was exposed to the adopted modules from DepEd.

After both groups were done with the said modules, achievement test, and science motivation questionnaire were administered again to both classes.

The collected data were subjected to the appropriate statistical tool for analysis and interpretation and to answer the general and specific objectives of the study.

Data Analysis

The data were treated with appropriate statistical tools for analysis.

Descriptive statistics, particularly the mean and standard deviation, were employed to determine the level of motivation of learners, and academic achievement of learners in two groups respectively. Additionally, in determining whether there is a significant difference in the level of science motivation, and academic achievement of two groups, a One-Way Analysis of Covariance (ANCOVA) was used. Since the academic achievement during pre-test and post-test were measured in both groups of learners' (experimental and control), ANCOVA will be used in order to eliminate the unwanted effects of the covariate (pre-test) on the dependent variables.

Lastly, in determining the correlation between the motivation, and academic achievement between the two groups, Pearson product moment correlation was used.

RESULTS

The following table showed the result of the study

Level of Learners' Science Motivation

Table 1 presents the science motivation of learners. As presented in the table, the experimental and control group learners' science motivation level during pretest and posttest as indicated by the overall mean is at above average level. During the post-test, the science motivation score of control group (m=2.10; sd=0.64) lowered while those in the experimental group remained at the same level but with higher mean (m=2.70; sd=0.61). Morover, the pre-test score of the experimental group showed that they were highly motivated as to their career (m=2.11;sd=0.79) but during the post test they were highly motivated intrinsically (m=2.95; sd=0.39). For the control group, their pre-test and post-test scores showed that they were highly motivated as to their career (m=2.21; sd=0.71).

Table 1. Science Motivation of Learners

Science Motivation		Experimental Group				Control Group			
		Pretest		Posttest		Pretest		Posttest	
		Mean	sd	Mean	sd	Mean	sd	Mean	Sd

Intrinsic motivation	1.82	0.72	2.99	0.47	1.99	0.70	2.18	0.68
Self-efficacy	2.01	0.70	2.64	0.38	2.10	0.62	2.08	0.57
Self-determination	2.08	0.75	2.76	0.55	2.08	0.75	1.77	0.54
Grade motivation	2.11	0.83	2.95	0.39	2.17	0.78	2.15	0.73
Career motivation	2.12	0.79	2.13	0.79	2.21	0.71	2.35	0.59
Overall mean	2.03		2.70		2.11		2.10	
Level	Above Average		Above Average		Above Average		Above Average	
Sd	0.76		0.61		0.71		0.64	

Difference of Learners' Science Motivation

To test the significant difference in the Science Motivation between the learners who utilized the Interactive supplementary instructional material through Kotobee Author Application and those who utilized the DepEd Self-Learning Modules, One-Way Analysis of Covariance (ANCOVA) at 0.05 level of significance was used. As shown in Table 2, the group corrected model obtained a p-value of 0.000 which indicates that there is a significant difference in the Science Motivation levels of learners in both groups. This means that both group of learners differ in their level of science motivation after the intervention is given.

Table. 2. Difference of learner's Science motivation.

Group	**N**	**MPS**	**SD**
Experimental	30	2.70	0.61
Control	30	2.10	0.64
Total	60	2.40	0.63

Source	**SS**	**Df**	**MS**	**F-Value**	**Sig.**
Corrected Model	6.975[a]	2	3.487	100.938	
Pretest (Covariate)	1.718	1	1.718	49.718	
Group	5.959	1	5.959	172.471	0.00
Error	1.969	57	0.035		
Corrected Total	8.944	59			
a. R Squared = .780 (Adjusted R Squared = .772)					

Academic Achievement of Learners

Table 3 presents the Academic Achievement of Learners. It can be garnered from the table that during the pretest, both groups of learners set achievement were on the did not meet expectation level. On contrary, Post test results revealed a very satisfactory level in the experimental group (m=24.83; sd=4.69) while satisfactory level in the control group (m=19.03; sd=6.73).

Table 3. Academic achievement of learners.

	Experimental Group			Control Group		
	Mean	SD	Qualitative Description	Mean	SD	Qualitative description
Pre-test	13.27	4.80	DNME	13.50	4.55	DNME
Post-test	24.83	4.69	VS	19.03	6.73	S

Legend: O-Outstanding VS- Very Satisfactory S-Satisfactory

FS-Fairly Satisfactory DNME-Did Not Meet Expectation

Difference of Learners' Academic Achievement

To test the significant difference in the Academic Achievement between the learners who utilized the Interactive supplementary instructional material through Kotobee Author Application and those who utilized the DepEd Self-Learning Modules, One-Way Analysis of Covariance (ANCOVA) at 0.05 level of significance was used. As shown in Table 4, the group corrected model obtained a p-value of 0.000 which indicates that there is a significant difference in the Academic Achievement levels of learners in both groups. This means that both group of learners differ in their Academic Achievement after the intervention given. In favorable of the experimental group. A common factor among the strategies in both experimental and control group is role played by learners in the learning process.

Table 6. Difference of learner's academic achievement.

Group	**N**	**MPS**	**SD**
Experimental	30	24.83	4.69
Control	30	19.03	6.73
Total	60		

Source	**SS**	**Df**	**MS**	**F-Value**	**Sig.**
Corrected Model	529.834[a]	2	264.917	7.833	
Pretest (Covariate)	25.234	1	25.234	0.746	
Group	510.017	1	510.017	15.079	0.00
Error	1927.899	57	33.823		

Corrected Total	2457.733	59			

a. R Squared = .216 (Adjusted R Squared = .188)

Relationship of Science Motivation, and Academic Achievement

Table 5 presents the result of correlation analysis indicating the relationship among the variables under study. The result revealed that there was a positive relationship existing between Science Motivation and academic achievement *(R=0.266, p-value: 0.040)*.

Table 5. Relationship of Science motivation and academic achievement.

Variable	Academic achievement
Science Motivation Pearson Correlation	0.266*
Sig. (2-tailed)	0.040
N	60

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

DISCUSSION

Science motivation of both experimental and control group were at above average level, however there is a decrease mean score on the post test of the control group. Thus the result showed a significant difference on the science motivation of the learners exposed to Interactive supplementary instructional material through Kotobee Author Application and those exposed to self-learning modules. This finding shows that the experimental group learners maintained their motivation in learning the lesson all throughout the midterm topics as opposed to the control group who have, to a certain degree, lost some of their motivation with their lessons.

It can be surmised that the features embedded in the Interactive supplementary instructional material through Kotobee Author Application had certainly maintained the motivation of experimental group learners throughout the quarter. The Interactive supplementary instructional material through Kotobee Author Application utilized by the experimental group had promoted a novel but engaging environment for these learners. It shows that despite the newness of the material, the learners had adapted well with the features of the said application and motivated them to learn the lessons. It had promoted an interactive environment where learners engaged, enjoyed and learned their lessons. On the other hand, control group learners also engaged with the Self-Learning modules. However, it can be noted that their motivation gradually lessened as they approach the end of the midterm topic. Probably, this can be due to their having been accustomed with the structure and appearance of the modules ever since the pandemic started making them excited and motivated once new approach are introduced to them. According to Stoa and Chu (2020), aside from autonomy, competence and relatedness, novelty is now recently considered as motivator in learning. Recent findings on animated and interactive instructional materials used in distance learning showed that motivation to learn increases with increased viewing time and openness to new materials (Barut Tugtekin & Dursun, 2022). In the present study, viewing time is almost the same in both groups given that they are learning at home. But in terms of novelty, Interactive supplementary instructional material through Kotobee Author Application is considered as a particularly new learning experience for these learners who are used to learning with DepEd modules. This factor can be considered as what separates the experience between the two groups of learners. However, Plötzner & Lowe (2004) argued that not all learning materials can be aesthetic and welcoming for all learners so it may not always increase learners' motivation. Additionally, Present day learners are highly visual-spatial and the use of Interactive supplementary instructional material through Kotobee Author Application developed higher motivation to learn science since visual, auditory and kinesthetic learning styles benefit from its features (Barak et al., 2011).

Moreover, on the academic achievement of the learners between groups, the finding suggests that both group of learners had a comparable achievement both in pretest and just differ on the posttest favoring the experimental group, thus, there is a significant difference on the academic achievement between groups. It can also be noted that responses are more similar and scores are less dispersed among experimental group learners. It can be deduced from these findings that the usage of Interactive supplementary instructional material through Kotobee Author Application contribute much on the improvement of the posttest scores of the experimental group. This indicate that the significant difference on the scores of the experimental and control group is an indicative that they have learned something new on the topic, thus their scores fall on very satisfactory level for experimental group and satisfactory level from control group. This may be traced back on the time they spent with the material. On the usage of Interactive supplementary instructional material through Kotobee Author Application, the learners' engagement and motivation was maintained from the start to the end unlike the waning interest exhibited by the control group.

According to the cognitive multimedia learning theory (Sorden,2012), the amount of information that can be accommodated in the working memory at a time is limited. Hence, information must be selected, processed and integrated to ensure it is stored in the long term memory. In the case of the study, the features embedded in the Interactive supplementary instructional material through Kotobee Author Application might be considered as seductive details to some learners causing it to increase their extrinsic cognitive load. To some, the content itself is new and challenging which might have affected their intrinsic cognitive load. Both of these results in a high cognitive load which might had affected the storage of information in their long term memory, thus resulting to increasing trend of their scores during the post test. This result is contrary to the findings in the study of Mayer (2014) that animated and interactive instructional materials did not result in higher academic achievement on an immediate test of near or far transfer or a delayed test.

From being dependent to their teachers, they are now the primary in-charge of their learning. For most of them, two years is still not enough to assimilate this role in their system. In return, practically few features from the Interactive supplementary instructional material through Kotobee Author Application and the self-learning modules have been appreciated by these learners. In a review by Ismail et al. (2018), learner's academic achievement, such as academic achievement, attainment of learning objectives, and acquiring desired skills, is greatly affected by interactive and multimedia instructional materials. However, the main challenge is when the learners are led to using these materials for entertainment and not focus on the learning process. Consequently, the study of Lin and Chen (2017) explained that increasing the learning time with digital learning relatively enhanced the learning achievement.

The result also suggests that the science motivation levels is associated with their academic achievement. Meaning, an increase science motivation would agitate an increase academic achievement of the students exposed to Interactive supplementary instructional material through Kotobee Author Application. This means that the experimental group learners are motivated to learn and interact with the features offered by the Kotobee Author Application compared to the Self-Learning Modules. The Interactive supplementary instructional material through Kotobee Author Application enabled them to engage with the content interactively, learn the concepts on a greater depth due to the video embedded, well-explained text and graphics, answered the exercises and assessment and receive feedback immediately right after, and lastly receive a structured lesson as guided by Gagne's events of instruction. On the other hand, learners from the control group are motivated to learn the Self-Learning Modules but not comparable to the level achieved by the experimental group. The Self-Learning Modules also offered a structured lesson and learning tasks which challenge the learner. However, it may have lacked the interactive feature, immediate feedback and dynamic graphics offered by Kotobee Author Application.

The findings of this study is parallel with previous researchers which showed that motivation and academic achievement are sufficiently related, this negates the findings of Kim and Seo (2013) and Akçakanat and Antalyalı (2016) that academic achievement can be explained by motivation.

Overall, the enhanced academic achievement on the experimental group can be attributed on their science motivation developed among the learners as they go through the Interactive supplementary instructional material

through Kotobee Author Application. This implies that though learners depended on their personal initiative to identify their learning needs, addressing it using various resources other than what was provided, and evaluating their need to learn more, the bulk of their learning relied on their enjoyment and engagement with the Interactive supplementary instructional material through Kotobee Author Application which had contributed to sustaining the learners' interest on the lesson. This is congruent to the results of Eymur and Geban (2011) that academic achievement is influenced by intrinsic motivation.

In conclusion, the Interactive supplementary instructional material through Kotobee Author Application boosts the level of Science motivation, and academic achievement of learners. Moreover, the findings revealed that Science motivation is correlated with academic achievement. These findings provide a benchmark data on the effectiveness of developing interactive instructional materials such as Kotobee Author Application to enhance content knowledge while learning in this new normal set-up. Furthermore, it offers cues for the need to do further research on the importance of interactive electronic book in teaching and learning process.
Based on the findings and conclusions, the following are recommended:

1. Teachers may be incited to integrate an Interactive supplementary instructional material through Kotobee Author Application focused on learning tasks in a new normal education in order to foster familiarity on digital technology and enrich the topic for learners.
2. The teacher may supplement Interactive supplementary instructional material through Kotobee Author Application with other coursework to encourage immediate transfer of learning and promote retention
3. Teachers may be encouraged to foster science motivation in this new normal landscape by providing learner-centered activities that encourage learners to have control over their own learning other than directed instruction.
4. Teachers must be encouraged to have a method to provide timely feedback to learners in this time to promote resonance and self-direction.
5. Further research should be conducted to look into other possible interventions that can enhance the motivation to learn, and academic achievement of the learners.

REFERENCES

1. Akçakanat, T. and Antalyalı, O.L. (2016). Do students need academic motivation and academic anxiety for success? Eurasian Academy of Sciences Social Sciences Journal, 1, 27-38
2. Boadu, G. (2015). Effective teaching in history: The perspectives of history student-teachers. International Journal of Humanities and Social Sciences, 3(1), 38-51.
3. Barak, M., Ashkar, T., & Dori, Y. J. (2011). Learning science via animated movies: Its effect on students' thinking and motivation. Computers & Education, 56(3), 839-846.
4. Barut Tugtekin, E., and Dursun, O.O. (2022). Effect of animated and interactive video variations on learners' motivation in distance Education. Educ Inf Technol, 27, 3247–3276 (2022). https://doi.org/10.1007 /s10639-021-10735-5
5. Chapman, N. and Chapman, J. (2004). Digital Multimedia (3th. ed.). Mississauga: John Wiley &Sons
6. Choppin, J. and Borys, Z. (2017). Trends in the design, development, and use of digital curriculum materials. ZDM, 49(5), 663–674.
7. De La Paz, S. (2013). Teaching and learning in history: Effective and reform-based practices for students with learning disabilities. Learning Disabilities: A Contemporary Journal, 11(1), 89-105.
8. Deped Order No.034 s. 2022. School Calendar and Activities for the School Year 2022-2023.Retreived from deped.gov.ph.
9. Duave,A.J.,Lambo, J., & Pay-an, P.L. (2022). Science Motivation, Independent Learning Skills and Academic Performance in Physical Science through Virtual Interactive Instructional Material. Action Research. Bukidnon National High School, Division of Malaybalay City.
10. Eger, L. (2004). Evaluace e-learningu se zaměřením na pedagogickou stránku. E-learning. Případová studie z projektu Comenius (1th. ed.). Plzeň: ZČÚ Plzeň.
11. Eymur, G. and Geban, O. (2011). Examining the relationship between the motivation and academic achievement of Chemistry teacher candidates. Education and Science, 36(161), 246-255.

12. Ejem, L. (2011). Evaluation Checklist and criteria for Supplementary Materials. Bukidnon State University.
13. Gagné, E. D. (1985). The cognitive psychology of school learning. Boston, MA: Little, Brown and Company.
14. Glynn, S. M., Brickman, P., Armstrong, N., and Taasoobshirazi, G. (2011). Science motivation questionnaire II: Validation with science majors and nonscience majors. Journal of Research in Science Teaching, 48(10), 11591176. doi:10.1002/tea.20442
15. Gunawan, R., and Rachmah, H. (2021). Local history online learning strategies: Teacher's perception. In IOP Conference Series: Earth and Environmental Science (Vol. 747, No. 1, p. 012010). IOP Publishing.
16. Hamill, K. (2012). Changing the landscape of education. Edcompass. https://downloads01.smarttech.com/media/sitecore/en/pdf/smart_publications/edcompass/feature_articles/current_article/edcompass-featurearticle-feb2012.pdf. Accessed 26 December 2022.
17. Ismail, A.O., Mahmood, A. K., and Abdelmaboud, A. (2018). Factors influencing academic performance of students in blended and traditional domains. International Journal of Emerging Technologies in Learning, 13(2).
18. Kim, E., and Seo, E.H. (2013). The relationship of flow and self-regulated learning to active procrastination. Social Behavior and Personality, 41(7), 1099-1114. http://dx.doi.org/10.2224/sbp.2013.41.7.1099
19. Kroeze, M. (2017). Kotobee. Retrieved 12 December 2021 from https://www.kotobee.com/en/products/author
20. Lin, M. H., and Chen, H. G. (2017). A study of the effects of digital learning on learning motivation and learning outcome. Eurasia Journal of Mathematics, Science and Technology Education, 13(7), 3553-3564.
21. Mayer, R.E. (2014). Incorporating motivation into multimedia learning. Learning and Instruction, 29, 171–173. doi:10.1016/j.learninstruc. 2013.04.003
22. Plötzner, R., & Lowe, R. (2004). Dynamic visualisations and learning. Learning and Instruction, 14, 235–240. https://doi.org/10.1016/ j.learninstruc. 2004.06.001
23. Shavab, O., Yulifar, L., Supriatna, N., and Mulyana, A. (2021). Gamification in history learning: A literature review. Advances in Social Science, Education and Humanities Research, 578, 254-258. 10.2991/assehr.k.210918.047.
24. Sloan, T. W., & Lewis, D. A. (2014). Lecture capture technology and student performance in an operations management course. Decision Sciences, 12, 339–355.
25. Sorden, S. D. (2012). The cognitive theory of multimedia learning. Handbook of educational theories, 1(2012), 1-22.
26. Stoa, R., and Chu, T.L. (2020). An argument for implementing ad testing novelty in the classroom. Scholarshipof Teaching and Learning in Psychology. https:// doi.org/10.1037/stl000023
27. Wilczewski, M., Gorbaniuk, O., and Giuri, P. (2021). The psychological and academic effects of studying from the home and host country during the Covid-19 pandemic. Front. Psychol., 12, 644096. doi: 10.3389/fpsyg.2021.644096.
28. Woldeamanuel, M.M., Atagana, H. and Engida, T. (2014). What makes chemistry difficult? AJCE, 4(2), 31-43.
29. Yildirim, R. and Ortak, Ş. (2021). The effects of authentic learning approach on academic achievement and attitudes in social studies course. International Journal of Psychology and Educational Studies, 8(3), 193-208. https://dx.doi.org/10.52380/ijpes.2021.8.3.508
30. Zin, N. A. M., Jaafar, A., & Yue, W. S. (2009). Digital game-based learning (DGBL) model and development methodology for teaching history. WSEAS transactions on computers, 8(2), 322-33