BRAIN-BASED APPROACH AND THE STUDENTS' MOTIVATIONS IN LEARNING PHYSICAL SCIENCE

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DOI: https://doi.org/10.56293/IJASR.2022.5466

IJASR 2022
VOLUME 5
ISSUE 6 NOVEMBER - DECEMBER **ISSN: 2581-7876**

Abstract: The study investigated the effects of Brain-based Blended approach on students' motivations among Senior High School in Physical Science. Motivation is a crucial component of learning and is critical in determining students' achievement. It is an internal process that activates the learners' behavior to engage in science learning activities that is purposely designed in a form of learners' material. Specifically the study aimed to identify six (6) motivational constructs as exposed to Brain-based Blended approach and find out the significant difference on students' level of motivations and Brain-based Blended approach. The use of KACIE Model built on multiple Brain-based protocols on a web interface exposure was employed and Science Motivation Survey questionnaire was used with a reliable Cronbach alpha of 0.78. One shot pre experimental pretest-posttest research design was employed. Findings of the study revealed that students' exposure to Brain-based Blended approach exhibited high motivations in their order of preferences such as control of learning beliefs, task value, extrinsic goal orientation, intrinsic goal orientation, self-efficacy for learning, and test anxiety. Further results show a significant difference between to students' motivations and Brain-based Blended approach. A reflective analysis indicated that students valued and enhanced their learning in Physical Science.

Keywords: brain-based learning, blended approach, KACIE model, constructivist theory

1. Introduction

The current institutional learning urged teachers to employ technology-added teaching aids to motivate and engage students' meaningful learning. As noted, developing educational activities for students that blend real-world and digital learning materials has emerged as an essential and hard study area for science educators.

The present education sector in the Philippines has move from a teacher-led to a student-led and technology-enhanced education appears to have become not only necessary, but also more evident in the age of the new normal (Casal, 2020). Due to the current pandemic situations, students and teachers have been unable to engage in face-to-face learning. As a result, Blended Learning has been implemented as an immediate solution to ensure educational continuity. Thus, the country is currently transitioning to a new normal type of education, and educators' constant innovations and active participation from other stakeholders are the driving forces behind its success (Dangle, 2021).

One of the challenges that educational administrators confront today, is maximizing their ability to supply learning materials that fulfill all of the students' needs. Teachers are having a difficult time encouraging their students to be an independent learner. They are looking for a way to relieve student stress by keeping them engaged and ensuring that lesson practices and homework are fun, accessible from anywhere, and targeted to help them improve their weaknesses, as well as ensuring that learning takes place in a more conducive, less-tense, and less-pressured environment.

Students' motivation has been generally accepted as an essential factor that affects the students' academic success which is viewed as a weakness in the Philippine educational system and meant to be addressed by considering a teaching strategy (Torio and Cabrillas-Torio, 2016). In line with this, the use of teaching strategy that will boost

students' motivation is just one of the many factors that can bring positive changes to the academic performance of Filipino students.

The Brain-Based Learning instructional strategy is a learner-centered and teacher-facilitated approach that accommodates learners' cognitive abilities. This instructional strategy is based on the structure and functions of the brain in various aspects such as learning, assimilating, thinking, and remembering. On the other hand, Blended Learning (BL) pedagogical practices for teaching and learning have become a very promising approach to involve students in motivating learning. In the classroom, the approach is viewed as a strong tool that allows students to learn in a more engaging and non-threatening atmosphere (Wong et al., 2018). Moreover, blended learning approaches have been considered to fulfill multiple learning requirements while nourishing interest among students. Thus, it is anticipated to be a breakthrough in dealing with the issues related to students' motivations in Geology subject, a Physical Science among Senior High school.

The study hopes to generate data and information on the effects of Brain-based Blended approach on the students' motivations among secondary school.

2. MATERIALS AND METHODS

Grade 11 Senior High School students of Central Mindanao University Laboratory High school, Musuan, Maramag, Bukidnon enrolled for School year 2021-2022. These are purposely chosen with one section with 40 homogenously grouped students and were involved as participants exposed to Brain-based Blended approach. One-shot pre experimental pretest-posttest design was employed to examine students' motivations among Grade 11 Senior High school students in Geology, Physical Science subject using Brain-based Blended approach.

The Students' motivation survey questionnaire was adapted from Duncan and McKeachie, (2005). The questionnaire consisted of six (6) constructs namely; Intrinsic Goal Orientation, Extrinsic Goal Orientation, Task Value, Control of Learning beliefs, Self-efficacy for Learning and Test Anxiety. Using Pearson Reliability Test, it obtained a reliability score of 0.782. To determine the students' levels of motivation, a five point (5) Likert scale was used, as shown below:

Scale	Limits	Descriptive Interpretation	Qualitative Interpretation
5	4.51-5.00	Always	Very Highly Motivated (VHM)
4	3.51-4.50	Usually	Highly Motivated (HM)
3	2.51-3.50	Sometimes	Motivated (M)
2	1.51-2.50	Rarely	Low Motivated (LM)
1	1.00-1.50	Never	Very Low Motivated (VLM)

Descriptive statistics was used to obtain the frequency values, means of pre-test and posttest and levels of motivation of the students, percentages and standard deviation when exposed to Brain-based Blended approach in teaching Geology concepts. Paired T-test was used to determine the significant difference on the students' levels of motivation.

3. RESULTS AND DISCUSSION

3.1 Students' Motivations in Learning Physical Science concepts

Table 1 presents the summary of students' level of motivations before and after the exposure to Brain-based Blended approach. A reflective analysis can be gleaned from the data of the current research, the overall mean results of the pretest was 2.51 which indicates "Motivated" while the posttest was 3.73 which indicates "Highly Motivated".

Table 1. Summary of the students' level of motivations in a Brain-based Blended approach

Motivation Constructs	PRETEST		POSTTEST	
	Mean	QI	Mean	QI
1. Control of Learning Beliefs	2.49	Low Motivated	3.99	Highly

					Motivated
2.	Task value	2.28	Low Motivated	3.96	Highly Motivated
3.	Extrinsic Goal Orientation	2.61	Motivated	3.92	Highly Motivated
4.	Intrinsic Goal Orientation	2.83	Motivated	3.76	Highly Motivated
5.	Self-efficacy for learning and Performance	2.76	Motivated	3.63	Highly Motivated
6.	Test Anxiety	2.11	Low Motivated	3.13	Motivated
	OVERALL MEAN	2.51	Motivated	3.73	Highly Motivated

Scale	Limits	Descriptive Interpretation	Qualitative Interpretation (QI)
5	4.51-5.00	Always	Very Highly Motivated (VHM)
4	3.51-4.50	Usually	Highly Motivated (HM)
3	2.51-3.50	Sometimes	Motivated (M)
2	1.51-2.50	Rarely	Low Motivated (PM)
1	1.00-1.50	Never	Very Low Motivated (VLM)

Legend:

Of these, six motivational indicators, all were found "Highly Motivated" except to one indicator on test anxiety which showed "Motivated". The indicators on control of learning beliefs were found to show "high" in posttest mean scores with a mean of 3.99. The reason might be attributed on the use of Brain-based Learning activities designed under a Blended Learning environment which allows the learners to have a strong control over their learning since they are expected to perform independently. On the other hand, the indicator on the test anxiety was found to be at the lowest mean of 3.13 implying that some students exposed in a Blended Learning environment feel uncomfortable and they were preoccupied while interacting with the use of computer and problems with the internet connection that arises during examinations.

These current finding is supported by Araz and Sungur (2007) that student's learning beliefs depends on the effort which had a positive and significant relations with their achievement, learning styles, and learning strategies. More importantly, when students were placed in a highly interactive environment such as in a differentiated instruction that includes playing video clips, embedded games, and cognitive thinking with illustrated concept maps to explain by themselves were notably exercised that manifest direct impact on learning.

These results on motivational factors were found consistent with the study of Sani et al., (2019) that using Brain-based Blended approach appears to have more impact on students' motivation in learning science. When individual brains work it boost the learners' enthusiasm and motivation (Salem, 2017).

3.2 Comparison on Students' Science Motivation

Table 2 presents the difference on students' learning motivations after exposure to Brain-based Blended approach. As gleaned on the table below, an overall mean score of the pretest of 2.51 was computed while the posttest scores was 3.73 with a t-value of -11.27 this means that there is a greater evidence of significant difference and a probability value of 0.000* indicated highly significant at 0.05 level.

Table 2. Difference on students' level of motivations in a Brain-based Blended approach

MOTIVATIONAL CONSTRUCTS	PRETEST Mean	POSTTEST Mean	t-value	p-value
Control of Learning Beliefs	2.49	3.99	-13.13	0.000*
Task value	2.28	3.96	-10.54	0.000*

Extrinsic Goal Orientation	2.61	3.92	-9.77	0.000*
Intrinsic Goal Orientation	2.83	3.76	-7.69	0.000*
Self-efficacy for learning and Performance	2.76	3.63	-7.10	0.000*
Test Anxiety	2.11	3.13	-7.02	0.000*
OVERALL	2.51	3.73	-11.27	0.000*

Legend: *Significant at $p<0.05$

Through Brain-based Blended approach employed in the class, all of the motivational indicators were found highly significant. This finding was supported on the learners experienced that commented *"he learned a lot during the class discussions and the different activities helped him to learn better and enjoy at the same time"*. Similarly, one student added that "*he never thought an online class could be that fun*". More so, "*he likes the way how the lessons is presented such as the PowerPoint presentation which embeds games and music videos which were a great aid in learning the concepts"*. These statements from the students provided an evidence-based that with Brain-based activities employed in a Blended Learning environment, would have equal chances for students to exhibit different styles of learning, and improved their level of motivations.

The current finding was supported by Torio and Cabrillas-Torio, (2016) toward the effects of Brain-based Blended approach on students' motivation when compared between two groups had a significant difference. This was disclosed on the findings of Akyurek & Afakan, (2013); Permana, (2021) that Brain-based were found significantly effective in increasing the students' motivations. The effects of Brain-based Blended approach on motivation among Senior High School students revealed a significant difference and the implemented approach (Apeh, 2021). These findings reject the null hypothesis that there is no significant difference in the student's level of motivations as exposed to Brain-based Blended approach.

4. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations were drawn from the research investigations:

The students' level of motivations, when exposed to the Brain-based blended approach in relation to the six indicators in learning Geology were found highly motivated in their order of motivational preferences namely: Control of learning beliefs, Task value, Extrinsic goal orientation, Intrinsic goal orientation, Self-efficacy for learning and Performance, and Test anxiety. Motivations had been one of most significant variables in teaching Physical Science concepts since students manifested specific motivational construct that would bring the learners' sense of fulfillment and carries meaningful learning in the classroom.

There was a significant difference with respect to the student's level of motivations as exposed to Brain-based Blended approach. Therefore, whenever students are involved with cognitive thinking and utilized his mental tool to interpret geological science phenomena, the learner is motivated to learn.

The learners' motivational preferences were found to lean on toward Control of learning beliefs as compared to other components of motivation. This is a measure of an attributes that with Brain-based Blended approach, the individual demonstrated and exerted more efforts in order to achieve meaningful learning. Thus, educators may look into how this pedagogical approach is being used to improve and enhance students' motivation in learning science.

The teaching approach under Brain-based Blended learning when employed in science class would foster positive learning gains, improve students' motivation and enhances overall performance. Hence, curriculum designers may infuse technology-based instruction which led to a student-centered environment.

Future science researchers may conduct other field research combined with other instructional approaches, since the inception is notably effective for improving students' motivations and affective learning outcomes.

5. REFERENCES

1. Akyurek, E., & Afacan, O. (2013). Effects of brain-based learning approach on students' motivation and attitudes levels in science class. *Online Submission*, *3*(1), 104-119.
2. Apeh, H. A., & Iyiegbuniwe, O. A. (2021). Effects of brain-based learning strategies on secondary school students' motivation to learn in Federal Capital Territory, Abuja, Nigeria. *International Journal of Research*, *10*(5), 19-32.
3. Araz, G., & Sungur, S. (2007). The interplay between cognitive and motivational variables in a problem-based learning environment. *Learning and Individual Differences, 17, 291–297.*
4. Casal, M., (2020). The pandemic is reshaping education, here's how the Philippines is coping. *Rappler.* https://www.rappler.com/brandrap/tech-and-innovation/coronavirus-reshaping-distance-learning-education-Philippines.
5. Dangle, Y. (2021). The implementation of modular distance learning in the Philippine Secondary Public Schools. *3rd International Conference on Advanced Research in Teaching and Education.*
6. Duncan, T. G., & Mc Keachie, W. J. (2005). The making of the motivated strategies for learning questionnaire. *Educational psychologist*, *40*(2), 117-128.
7. Inocian, R. B. (2015). Integrated Arts-Based Teaching (IAT) Model for Brain-Based Learning. *Journal of Curriculum and Teaching*, *4*(2), 130-143.
8. Hermann, N. (2009). The Theory behind the HBDI and Whole Brain Technology. http://www.docin.com/p-90989057.html.
9. Permana, A. A. (2021). Brain-Based Learning: The impact on student's higher order thinking skills and motivation. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, *10*(1), 47-58.
10. Salem, A. (2017). Engaging ESP students with brain-based learning for improved listening skills, vocabulary retention and motivation. *English Language Teaching.*
11. Sani, A. Rochintaniawati, D., & Winarno, N. (2019). Enhancing students' motivation through brain-based learning. *International Journal of Physics.*
12. Sontillano, R., (2018). Impact of whole brain teaching based instruction on academic performance of Grade 8 students in Algebra. *International Journal of Teaching, Education and Learning.*
13. Torio, V. A., & Cabrillas-Torio, M. Z. (2016). Whole brain teaching in the Philippines: Teaching strategy for addressing motivation and academic performance. *International Journal of Research Studies in Education*,5 (3), 59-70.
14. Wong, K., Sahandri, G., & Pauline S., (2018). Blended E-Learning acceptance as smart pedagogical tools: An initial study in Malaysia. *The Turkish Online Journal of Educational Technology*