DEVELOPING VIRTUAL FIELD EXPERIENCES TO PROMOTE STUDENT'S LEARNING AND PERFORMANCE: BRIDGING LEARNING GAPS IN SCIENCE

JHESSABELLE S. PILAPIL
jhessabelle.pilapil001@deped.gov.ph
Laguna State Polytechnic University, Philippines

ABSTRACT

This descriptive study determines the relationship between the utilization of virtual field experience and students' learning and performance. Fifty-four (54) purposively selected students from grade 4 at Cale Elementary School. It aimed to answer the questions such as the level of virtual field experiences ofstudents, the level of students' learning, the level of students' performance and the between virtual fieldexperiences and students' learning and performance.

The following were the significant findings of the investigation:

In terms of level of virtual field experiences of students, findings show that all the indicators as to of virtual, immersive, interactive, investigative, engaging, experiential and collaborative field are verbally interpreted as "very high".

In addition, in terms of the level of students learning, findings show that item indicators as to discovery, social and constructive learning are verbally interpreted as "very high". However as to multisensory learning is verbally interpreted as 'high".

Moreover, in terms of students' performance as to pretest and post-test is perceived with significant difference.

Furthermore, findings present the significant relationship between the contactless interactions to the students' remote learning tasks. instruction is observed to have a significant weak relationship with the performance tasks motor and sports skills, and knowledge (r=0.283), and aesthetic sensitivity.

Lastly, finding presents the weak negative correlation between virtual field experience in terms of virtual, immersive, interactive, investigative, experiential and collaborative field on students' learning and performance. The results indicate that majority of the p-values are lower than the level of significance ($\alpha = 0.05$) hence, the null hypothesis is rejected. Therefore, there is a negative relationship between the virtual field experiences and student's learning and performance as perceived by the respondents.

However, the results indicate that in terms of engaging field, f the p-values are higher than the level of significance ($\alpha = 0.05$); hence, the null hypothesis is accepted. Therefore, there is no significant relationship between the virtual field experiences and student's learning and performance in terms of Engaging as perceived by the respondents.

The study shows that in almost all item indicators in terms of virtual, immersive, interactive, investigative, experiential and collaborative field, except engaging field that there is a significant relationship between the virtual field experiences and students' learning and performance. The researcher then come up to the conclusion that the null hypothesis is "partially rejected".

It is highly suggested that classrooms may have technology-based classrooms for modifications and improvement for the instruction use so that students will be able to develop engagement and clearly understand the concepts.

It is recommended that the performance monitoring may focus on the students' needs and enable them to learn.

Furthermore, teachers may also emphasize the value of learning science concepts and promotes its importance for the learners. Enhancement program and/or extended activities may help them to fully understand the help of science in their daily lives.

Grade 4 students may not that inclined to classroom tasks and activities, so that it is highly recommended to provide engaging resources and instructional materials wherein their can exhibit their academic skills

Lastly, they may find the meaning of science concepts out of the context if they can experience more hands on activities.

Keywords:

Virtual Field, Immersive, Interactive, Investigative, Engaging, Experiential, Collaborative, Multisensory, Discovery, Social, Constructive

INTRODUCTION

Educational trends have constantly been changing and upgrading due to the changes in society. Moreover, the era of the 21st century is regarded as an era of technology. Technology today plays a vital role in bridging the gap between the school, teachers, and learners.

Application of technological learning in in-person classes became one of the most popular educational trends for education. Of course, with developments in edtech, this is now becoming possible on a large scale. Sped up by the pandemic, schools have been forced to experiment more with the utilization of technology in learning. (Stace 2020)

In connection with this, virtual field experiences have been also immersing in the field of education. Teachers and educators also tries to improve their instructional materials and resources to help the students cope up with the current situation specially in the transition phase of in-person classes.

According to Martin-Gutierrez, et. al., (2021), educational institutions will benefit from better accessibility to virtual technologies; this will make it possible to teach in virtual environments that are impossible to visualize in physical classrooms, like accessing into virtual laboratories, visualizing machines, industrial plants, or even medical scenarios. The huge possibilities of accessible virtual technologies will make it possible to break the boundaries of formal education.

Due to the sudden changes, student's learning style has also been affected. Students need to compromise with the new technologies use for education. Based on study of Acar and Cavas (2020), It is found that the experimental implementation of virtual field experience has a positive effect on the academic achievement of the group students. The findings reveal that immersive virtual experience is superior to frontal teaching by teachers and all other classical materials especially textbooks by delivering students sensory information in virtual dimensions.

Since the transition, again, there is a huge change in the whole educational system, the researcher wants to further implicate and explore the relationship of virtual field experiences in the student learning..

This study aims to answer the following research problems.
What is the level of virtual field experiences in terms of;
Immersive Field;
Immersive Field;
Interactive Field;
Investigative Field;
Engaging Field;
Experiential Field
Collaborative Field?
What is the level of student's learning in terms of;
Multisensory Learning;
Discovery Learning;
Social Learning;
Constructive Learning?
What is the level of student's performance in terms of;
Pre-test;
Post-test?
Do the virtual field experiences have a significant relationship on student's learning and performance?

REVIEW OF RELATED LITERATURE

Multisensory learning is one variable under student learning which found significant in the current study. Students learned through this learning which they grasped knowledge using more than one sense such as visual, auditory, kinaesthetic and tactile. Because of this, the students are able to gather information about the task and can link information to ideas they already know and understand. Baines (2018) stated on how can teachers help students develop the literacy skills that are necessary for learning and retaining information in any subject. Traditional memory tricks, mnemonic devices, graphic organizers, and role playing do little to turn bored or reluctant students into enthusiastic learners. Throughout his explanation, it shows the real classroom examples of how teachers use multisensory learning techniques to help students interact with material more intensely and retain what they learn for longer periods of time. Baines provides a wide variety of engaging lesson plans to keep students motivated, such as Paint-Write: encourages students to use spontaneous painting to interpret their thoughts Soundtrack of Your Life: allows students to use contemporary music to learn about narrative writing Candy Freak: helps students expand their descriptive vocabularies. Then for teachers who are ready to energize their classrooms, it is an invaluable resource for expanding students' capacity to learn and helping them cultivate essential skills that will last a lifetime.
According to Rao (2018), since the world consists of objects that stimulate multiple senses, it is advantageous for a vertebrate to integrate all the sensory information available. However, the precise mechanisms governing the temporal dynamics of multisensory processing are not well understood. He develop a computational modeling approach to investigate these mechanisms then present an oscillatory neural network model for multisensory learning based on sparse spatio-temporal encoding. Recently published results in cognitive science show that multisensory integration produces greater and more efficient learning. Apply the computational model to qualitatively replicate these results. Then vary learning protocols and system dynamics, and measure the rate at which model learns to distinguish superposed

presentations of multisensory objects. When a sensory channel becomes disabled, the performance degradation is less than that experienced during the presentation of non-congruent stimuli. This research furthers our understanding of fundamental brain processes, paving the way for multiple advances including the building of machines with more human-like capabilities.

Multisensory learning has the potential to facilitate learning outcome. However, visual, auditory, and tactile information can be distractive under certain circumstance, and the effect of their combination has not been fully explored. In two experiments, sixty-four participants read Chinese paragraphs and then answered multiple-choice questions with visual, auditory, and tactile distractions, and their combinations. Auditory distraction (deviant sounds and music) increased workload most and slowed down reading speed.

Tactile distraction also increased workload, but combing tactile distraction with auditory distractions did not further increase the workload. Although visual distraction alone did not affect workload, combining it with auditory and tactile distractions further increased the workload. Auditory distraction affects reading the most, so it should avoid or mask irrelevant sounds in the learning environment. Multisensory learning protocols should be tested before being put into practice. (Rau, Zhe, and Wei 2020)

Junker, Schlaffke, Schmidt-Wilcke (2021) explains that multisensory learning profits from stimulus congruency at different levels of processing. To investigate whether multisensory learning can potentially be based on high-level feature congruency (same meaning) without perceptual congruency (same time) and how this relates to changes in brain function and behaviour. 50 subjects learned to decode

Morse code (MC) either in unisensory or different multisensory manners. During unisensory learning, the MC was trained as sequences of auditory trains. For low-level congruent (perceptual) multisensory learning, MC was applied as tactile stimulation to the left hand simultaneously to the auditory stimulation. In contrast, high-level congruent multisensory learning involved auditory training, followed by the production of MC sequences requiring motor actions and thereby excludes perceptual congruency. After learning, group differences were observed within three distinct brain regions while processing unisensory (auditory) MC. Multisensory low-level learning elicited additional activation in the somatosensory cortex, while multisensory high-level learners showed a reduced activation in the inferior parietal lobule, which is relevant for decoding MC. Furthermore, differences in brain function associated with multisensory learning was related to behavioural reaction times for both multisensory learning groups. Overall, the data support the idea that multisensory learning is potentially based on high-level features without perceptual congruency. Furthermore, learning of multisensory associations involves neural representations of stimulus features involved in learning, but also share common brain activation (i.e. the right IFG), which seems to serve as a site of multisensory integration.

Muray & Sperdin (2013) stated the processing of unisensory visual objects is impacted by past experiences with multisensory auditory–visual versions of these objects. Single-trial exposure to multisensory objects during an orthogonal old/new discrimination task can incidentally modulate memory performance as well as brain activity. Performance was enhanced when the preceding multisensory stimulus had been a semantically congruent pairing, whereas performance was impaired by pairings with meaningless pure tones. Importantly, these opposing effects occurred despite identical performance patterns with the initial exposure to the objects (and presumably encoding thereof). In terms of brain activity, responses were enhanced to visual stimuli that had been previously encountered in a multisensory context within regions of the lateral occipital cortex beginning just 60 ms post-stimulus onset. Indicate that single-trial learning of multisensory object associations occurs incidentally, is distinguishable from encoding processes, persists despite many intervening stimuli, and manifests as differential brain activity at early processing stages within visual cortices. The consequences of multisensory interactions thus persist over time to impact memory retrieval and object discrimination.

Additionally, Mathias, et.al (2019) stated that the predictive coding theory of multisensory learning, sensory and motor brain regions that encode multisensory information during learning may support later recognition of learned stimuli, even under unisensory recognition conditions. The neurodisruptive effects of inhibitory transcranial magnetic stimulation (TMS) was used to investigate whether sensorimotor cortical responses causally contribute to the auditory translation of foreign language (L2) vocabulary following multisensory L2 training. Twenty-two participants learned L2 words and their native language translations over 4 consecutive days. Words were learned in two conditions: In one condition, participants viewed and performed gestures as L2 words were auditorily-presented, and in a control condition, participants viewed pictures as L2 words were auditorily-presented. Gestures and pictures were congruent with word meanings. Following training, participants underwent effective and sham TMS as they listened to the L2 words that they had learned and translated the words into their native language. We targeted with TMS a region near the boundary of motor and somatosensory cortices (Brodmann area 4) in both the right hemisphere (offline theta-burst TMS) and left hemisphere (online repetitive TMS).

Discovery Learning is another variable under student leaning. Accoprding to Hammer (2012), teachers' interest in promoting student inquiry often feel a tension between that agenda and the more traditional agenda of" covering the content." Efforts in education reform devote substantial time to addressing this tension, primarily through curriculum reform, paring the traditional content and adopting inquiry-oriented methods. Discovery learning approaches, in particular, are designed to engage students in inquiry through which, guided by the teacher and materials, they" discover" the intended content. Still, the tension remains, for example, in moments when students make discoveries other than as intended.

Mayer (2014) stated that there is sufficient research evidence to make any reasonable person skeptical about the benefits of discovery learning—practiced under the guise of cognitive constructivism or social constructivism—as a preferred instructional method. There are reviews on discovery of problem-solving rules culminating in the 1960s, discovery of conservation strategies culminating in the 1970s, and discovery of LOGO programming strategies culminating in the 1980s. In each case, guided discovery was more effective than pure discovery in helping students learn and transfer. Overall, the constructivist view of learning may be best supported by methods of instruction that involve cognitive activity rather than behavioral activity, instructional guidance rather than pure discovery, and curricular focus rather than unstructured exploration.

Moreover Joolingen (2013) said that cognitive tools defined as instruments that support or perform cognitive processes for learners in order to support learning, can bridge the difference between open learning environments, like discovery learning environments and traditional supportive instructional environments. He discuss the definition of the concept of cognitive tool and its use in learning. Two examples of cognitive tools for discovery environments are presented, and it is made clear how these tools can serve as hooks for anchoring intelligent instruction. Finally design issues for integrating cognitive tools in a discovery environment are discussed.

Furthermore Saab, Joolingen, Wolters (2015) stated that discovery learning and collaborative learning are examples of learning contexts that cater for knowledge construction processes. Significant relationships were found between communicative and discovery activities, as well as five factors combining the communicative process and the discovery learning processes. Communicative activities are performed most frequently during the activities in generating hypotheses, experimental design, and conclusion construction. Argumentation occurs less than expected, and is associated with the construction of conclusions, rather than generating hypotheses. Communicative activities co-occur with discovery activities most of the time, as we expected. Further research should concentrate on means to augment communicative and discovery activities that are related to positive learning outcomes.

Traditional teaching and learning methods do not seem to be able to create the employee businesses look for today. It may be that there are other approaches to learning that would have greater success. Discovery learning seems to be a promising approach for a number of reasons. Discovery learning is an approach to learning that can be facilitated by particular teaching methods and guided learning strategies. The term discovery learning will refer to the learning taking place within the individual, the teaching and instructional strategies designed by the teacher, and the environment created when such strategies are used.

Traditional learning will refer to the use of teaching and instructional strategies typically found in a teacher-led classroom, including didactic, drill and practice, and expository learning. The availability of new technology calls for new research to consider the effectiveness of technology-based discovery learning as compared to the use of technology through a traditional approach. (Castronova, 2012)

Scientific discovery learning is a highly self-directed and constructivistic form of learning. A computer simulation is a type of computer-based environment that is well suited for discovery learning, the main task of the learner being to infer, through experimentation, characteristics of the model underlying the simulation. They observed effectiveness and efficiency of discovery learning in simulation environments together with problems that learners may encounter in discovery learning, and discuss how simulations may be combined with instructional support in order to overcome these problems. (Jong and Joolingen 2013)

Lasty, according to Vassileva (2013), Teachers are teaching a new generation of students, cradled in technologies, communication and abundance of information. The implications are that they need to focus the design of learning technologies to support social learning in context. Instead of designing technologies that confused the learner, the new social learning technologies will perform three main roles: 1) support the learner in finding the right content (right for the context, for the particular learner, for the specific purpose of the learner, right pedagogically); 2) support learners to connect with the right people (again right for the context, learner, purpose, educational goal etc.), and 3) motivate/incentivize people to learn. In the pursuit of such environments, new areas of sciences become relevant as a source of methods and techniques: social psychology, economic/game theory, multi-agent systems.

Constructive Learning is the last variable under student learning. According to Scardamalia, et.al (2012), in schools, discourse usually plays a part in the constructive process. They been developing and experimenting with Computer Supported Intentional Learning Environments (CSILE) that combine the educational advantages of collective discourse with the tactical advantages of individual written and graphic work. It find that students take a more goal-directed and constructive approach to using text information: (1) when students create a context for figuring out how things work by advancing their own provisional theories in advance of taking information from texts; and (2) when students identify gaps in their own knowledge.

Valiande, and Tarman (2012) aim to demonstrate the need for a genuine constructive implementation of information technology in teaching practices and outline how information and technology can enhance and add to the effectiveness of differentiated teaching in mixed ability classrooms by using screening model. Along with the rapid changes in the era of information and technology around the world, education must find the best ways of utilizing new technologies in learning process, targeting to add value for learning outcomes and promote independent learning for all students. Both differentiated teaching and the theory behind the creation and use of educational software is drawn from the constructive learning theory where each person construct its own body of knowledge in interaction with its environment based and combined with prior knowledge and dexterities.

Fang and Lacher (2014) stated that constructive learning dynamically constructs a network to balance the complexity of the network topology with the complexity of the function specified by the training data. In order to evaluate the quality of a constructive learning algorithm, not only the learning efficiency of the algorithm need to be measured, but also the topological complexity of the constructed network has to be examined. Both the learning speeds and the network sizes of constructive learning algorithms. As the backprop requires more nodes than necessary for the network to converge, it is used as a reference to measure the complexity of constructive networks.

A constructive learning algorithm was employed to design a near-optimal one-hidden layer neural network structure that best approximates the dynamic behavior of a bioprocess. The method determines not only a proper number of hidden neurons but also the particular shape of the activation function for each node. Here, the projection pursuit technique was applied in association with the optimization of the solvability condition, giving rise to a more efficient and accurate computational learning algorithm. As each activation function of a hidden neuron is defined according to the peculiarities of each approximation problem, better rates of convergence are achieved, guiding to parsimonious neural network architectures.

The proposed constructive learning algorithm was successfully applied to identify a MIMO bioprocess, providing a multivariable model that was able to describe the complex process dynamics, even in long-range horizon predictions. The resulting identification model was considered as part of a model-based predictive control strategy, producing high-quality performance in closed-loop experiments. (Meleiro, Zuben, Filho 2019)

Pre-test and Post-test are the variables under Students' Performance which found significant in the current study.

The simplest evaluation design is pre- and post-test, defined as a before & after assessment to measure whether the expected changes took place in the participants in a program. A standard test, survey, or questionnaire is applied before participation begins (pre-test or baseline), and re-applied after a set period, or at the end of the program (post-test or endline). Pre- and post-tests can be given in writing or orally according to Davidson (2015)

Shuttleworth (2017) stated that pretest-posttest designs are an expansion of the posttest only design with nonequivalent groups, one of the simplest methods of testing the effectiveness of an intervention. In this design, which uses two groups, one group is given the treatment and the results are gathered at the end. The control group receives no treatment, over the same period of time, but undergoes exactly the same tests. Statistical analysis can then determine if the intervention had a significant effect. One common example of this is in medicine; one group is given a medicine, whereas the control group is given none, and this allows the researchers to determine if the drug really works.

For many true experimental designs, pretest-posttest designs are the preferred method to compare participant groups and measure the degree of change occurring as a result of treatments or interventions. Pretest-posttest designs grew from the simpler posttest only designs, and address some of the issues arising with assignment bias and the allocation of participants to groups.

Additionally, Facione (2021) cited that pre and post testing is an assessment model designed to examine the change in overall critical thinking skills or dispositions in a group of test takers. It's reasonable to posttest as soon as a few weeks after a focused training program in critical thinking, but most often a posttest is gathered months or years after the pretest. One common example for university settings is a pretest at the beginning of a degree program and a posttest sometime toward the end of the program. For businesses, the pretest might be done before an employee training program is begun and a posttest could be set for weeks or months after the program has been completed. Gathering pretest data from entering students enables matched pairs analyses of pretest and posttest data in which each individual's posttest is compared with that same individual's pretest. For this method of analysis to be successful, it must be possible to match pretest and posttest for the same individual. Hence a coding system of some kind is needed, e.g. ID number, investigator designated code number, or test-taker name. Matched-pairs analysis is not the only method of pretest to posttest analysis; contact Insight Assessment educational testing specialists to discuss the specific requirements of your project.

Virtual Field is one variable that is found significant to the study. Accorfint to Cliffe (2017), virtual Field Guides are a way for educators to tackle the growing issue of funding pressures in areas of higher education, such as geography. Virtual Field Guides are however underutilized and can offer students a different way of learning. Virtual Field Guides have many benefits to students, such as being more inclusive, building student skills and confidence in a controlled environment pre fieldtrip and can increase engagement in the topic studied. There are also benefits to the educator, such as reduced cost, more efficient students on fieldwork tasks and the ability to tailor and update their field guides to suit their needs. However, there are drawbacks in the challenge of creation and their outcome as educational standalone tools. This paper reviews the literature around the benefits and draw backs to the creation and incorporation of virtual field guides in geoscience education.

According to Pagano (2013), immersive learning offers an alternative to overcome these limitations not only in the organization providing better training, they are doing so at a much lower cost and higher scalability than apprenticeships, preceptorships, or other live experiential training methodologies. There are no travel costs. There are no expenses trying to develop a live simulation in real-world environments. All costs are associated with the design process and the technology platform selected to develop and deliver the learning experience, which when calculated as a per-learner cost, can become negligible depending on the size of the population that will utilize the immersive learning experience in the organization.

VR has been defined as a complex media system that encompasses a specific technological setup for sensory immersion as well as a means of sophisticated content representation, which is capable of simulating or imitating real and imagined worlds. VR can be accessed through various displays such as a desktop computer, a head-mounted display, or a cave automatic virtual environment.

The degree of immersion is the major factor that determines a VR learning session accessed through HMD and CAVE as differed with a VR session accessed through a desktop computer. Immersion is an objective measure of the brilliancy provided by a system, and the scope to which the system is able of shutting out the outside world. Even though the degree of immersion can interchange depending on the number of senses that are operated by the technology and the quality of the hardware, VR experiences accessed through HMD in a CAVE are normally interpreted as high immersion.

Despite the fact the CAMIL is important for the upcoming and future immersive learning technologies, and is not a technology-specific theory, in this paper, it focus on immersive learning experiences that are accessed through an HMD (which we refer to as IVR) because most of the past research has used this technology due to its wide-ranging availability. This provides a solid description of the process of learning in immersive environments by using a specific technological solution as an example. Simulations or 3D worlds accessed through a desktop computer or tablet are referred to as low immersion or desktop VR in the literature and will only be used as comparisons to IVR in this paper. (Makransky and Peterson 2021)

Interactive learning is a more hands-on, real-world process of relaying information in classrooms. Passive learning relies on listening to teachers lecture or rote memorization of information, figures, or equations. But with interactive learning, students are invited to participate in the conversation, through technology (online reading and math programs, for instance) or through role-playing group exercises in class. In addition to engaging students who are raised in a hyper-stimulated environment, interactive learning sharpens critical thinking skills, which are fundamental to the development of analytic reasoning. A child who can explore an open-ended question with imagination and logic is learning how to make decisions, as opposed to just regurgitating memorized information. Also, interactive learning teaches children how to collaborate and work successfully in groups, an indispensable skill as workplaces become more team-based in structure. (Staff 2021)

Investigative field is another variable used in this study.

According to Washington (2018), investigative field is a key concept that is taking over the trends of education right now. Creating investigative experiences thru online videos and applications that engage the learners is the only way for to compete for their attention.

Engaging field is another variable used in this study.

The truth is, the technologies ensemble the principles of engaging field learning such as simulations, and virtual worlds into this category of immersive learning environments. To a certain extent, all immersive learning incorporates engaging field in each of its principles, Pagano (2013)

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According to Lefton (2022), by engaging students virtual field experiences, students are able to explore experiential field and reflect on it. They are better able to connect theories and knowledge learned in the classroom to real-world situations.

Collaborative Field is another variable used in this study.

Learners can be immersed to a collaborative learning field in virtual field experience, which frees up the significant restriction geography imposes on real-world classes. learning experiences can be collaborative, allowing for learners, mentors, and experts to participate when it's convenient to them. Collaborative virtual learning experiences provide the opportunity to give real-time feedback to a learner during or immediately following activities, Pagano (2013)

METHODOLOGY

This chapter consist the research design population and sampling. Data gathering procedure, data gathering instrument and statistical treatment used in the study.

Research Design

This study aims to further explore the developing virtual field experiences to promote student's learning and performance: bridging learning gaps in science.

The method of research used in this study was descriptive approach and quantitative method.

A quantitative research method that is considered conclusive and is used to test specific hypotheses and describe characteristics or functions. Descriptive research should have a clear and accurate research question/problem. This method enables the researcher to interpret the theoretical meaning of the findings and the hypothesis development for further studies (Fluet, 2021)

Additionally, (Koh & Owen 2000) stated that descriptive research is a study of status and is widely used in education, nutrition, epidemiology, and the behavioral sciences. Its value is based on the premise that problems can be solved and practices improved through observation, analysis, and description.

Respondents of the Study

Fifty four (54) randomly selected grade 4 students from Cale Elementary School will be assessed and used as respondents of this research.

Purposive sampling was applied from a population of 54 students in Grade 4.

According to Arikunto (2014: 183), purposive sampling is the process of selecting sample by taking subject that is not based on the level or area, but it is taken based on the specific purpose. Purposive sampling is where a researcher selects a sample based on the needs about the study. Purposively selected student respondents were used as respondents of the study which were assessed by the researcher.

Research Instrument

The instrument used in the study was be a survey questionnaire-checklist. The questionnaire is a research-made instrument devised to further explore the developing virtual field experiences to promote student's learning and performance: bridging learning gaps in science.

In the questionnaire, a five-point rating scale indicated below was used to determine of the selected respondents.

Scale	Numerical Value	Descriptive Value
5	4.20 – 5.0	Very High
4	3.40 – 4.19	High
3	2.60 – 3.39	Moderate
2	1.80 – 2.59	Low
1	1 – 1.79	Very Low

In construction of questionnaire describe above, the researcher collected ideas and concept through reading various articles and literatures from books, publication and internet sites. The initial draft of the questionnaire was presented to professors and panel members for comments and suggestions.

The final form of the questionnaire was reproduced and administered to respective respondents.

RESULT AND DISCUSSION

Level of Students' Virtual Field Experiences

The students experienced effective virtual integration of teaching (M=5.00, SD=0.00) where they explored activities using varied world wide web organizations (M=4.70, SD=0.46), created memorable experiences (M=4.98, SD= 0.14) and increased motivation through activities that are enjoyable (M= 5.00, SD= 0.00) . These resulted to learning with confidence using virtual field experiences (M= 4.98, SD= 0.14).

The overall mean of 4.93 indicated that the students experienced at a very high level of opportunities to build their confidence, increase their eagerness to learn more and experience fun and exciting activities.

The finding is supported by Cliffe (2017), according to the author, virtual Field experiences are a way for educators to tackle the growing issues in areas of education, such as geography. Virtual Field experiences are however underutilized and can offer students a different way of learning. Virtual Field experiences have many benefits to students, such as being more inclusive, building student skills and confidence in a controlled environment pre fieldtrip and can increase engagement in the topic studied.

Table 1 illustrates the level of virtual field experiences as to virtual field.

Table 1. Level of Field Experiences as to Virtual Field.

The Virtual Field Experiences …	*MEAN*	*SD*	*VERBAL INTERPRETATION*
shows effective integration of virtual application for teaching.	4.98	0.14	Very High
provide memorable experiences through virtual reality field.	4.98	0.14	Very High
guided with the exploration activities using different world wide web organizations.	4.70	0.46	Very High
allow the students to learn effectively with confidence using virtual field experiences.	4.98	0.14	Very High
provide enjoyable activities that increase student's motivation to keep learning.	5.00	0.00	Very High
Weighted Mean			*4.93*
SD			*0.17*
Verbal Interpretation			*Very High*

Table 2 illustrates the level of virtual field experiences as to Immersive Field.

The students increased engagement levels (M= 4.94, SD= 0.23) through an immersive human level and mental activities that capture their attention and will be able to focus on the topics that the teacher is being discussed (M=4.69, SD= 0.47), and being evaluated authentically because of their attitude in learning (MD= 5.00, SD=0.00), being attentive to class through the situations that they can easily relate because of the real-life examples (MD=4.98, SD=0.14). Through those experiences the students will learn more productively (MD=5.00, SD= 0.00).

The overall mean of 4.92 shown that students experienced at a very high level of possibilities to give more time and motivations in learning that will result to their engagement in mental and human level activities.

Table 2. The Level of Virtual Field Experiences as to Immersive Field

The Virtual Field Experiences …	*MEAN*	*SD*	*VERBAL INTERPRETATION*
provide simulations that can help the students to learn more effectively.	5.00	0.00	Very High
incorporate advanced practices and authentic assessments for the learners.	5.00	0.00	Very High
engage students on an immersive human level and mental activities.	4.69	0.47	Very High
provide real-life examples can be a massive help in making your classes seem immediately relevant to students.	4.98	0.14	Very High
uses artificial intelligence that can compel the students to increase their engagement levels.	4.94	0.23	Very High
Weighted Mean		*4.92*	
SD		*0.17*	
Verbal Interpretation		*Very High*	

In support of the findings, virtual field experience is a complex media that encompasses a specific technological setup for sensory immersion as well as a means of sophisticated content representation, which is capable of simulating or imitating real and imagined worlds. This allows teachers to provide a concrete description of the process of learning in immersive environments (Makransky and Peterson 2021).

Table 3 illustrates the level of virtual field experiences as to Interactive Field. The students give full interaction with the lessons through multimedia story-telling (M=4.98, SD=0.14) and can easily access the interactive timelines and materials (M=4.85, SD= 0.36). Through provided slides and presentation that allows then to interact (M=4.96, SD= 0.19) and incorporates social networking and urban computing into course design and delivery (M=4.94, SD=0.23), This resulted them to explore within the interactive course provided (M=4.69, SD=0.47).

The overall mean of 4.89 indicated that students experienced at a very high level of opportunities to explore within synergetic course that is being provided, can easily access interactive timelines and materials and give opportunity for students to interact with the lessons.

Table 3. The Level of Virtual Field Experiences as to Interactive Field

The Virtual Field Experiences …	*MEAN*	*SD*	*VERBAL INTERPRETATION*
allow students to explore within the interactive course provided.	4.69	0.47	Very High
provide interactive timelines and materials that can easily access by the students.	4.85	0.36	Very High
integrate multimedia story-telling and that can give opportunity for the students to interact with the lessons.	4.98	0.14	Very High
provide slides and presentation that allow students to interact.	4.96	0.19	Very High
incorporates social networking and urban computing into course design and delivery,	4.94	0.23	Very High
Weighted Mean			*4.89*
SD			*0.28*
Verbal Interpretation			*Very High*

The findings support the study which states that interactive field experience is a more hands-on, real-world process of relaying information in classrooms. With interactive field experience, students are invited to participate through technology. In addition to engaging students who are raised in a hyper-stimulated environment, interactive field experience sharpens critical thinking skills, which are fundamental to the development of analytic reasoning. A child who can explore with imagination and logic is learning how to make decisions. Also, interactive field experience teaches children how to collaborate and work successfully in groups, (Staff 2021).

Table 4 illustrates the Level of Virtual Field Experiences as to Investigative Field.

Table 4. The Level of Virtual Field Experiences as to Investigative Field

The Virtual Field Experiences …	*MEAN*	*SD*	*VERBAL INTERPRETATION*
allow the students to investigate real-life situation problems.	4.96	0.19	Very High
involve students in a more challenging field and let them identify their needs on the lesson.	4.91	0.29	Very High
give the students an opportunity to take journals record data through an investigative observation.	4.83	0.38	Very High
permits the students to gather data and generate conclusions to reveal important facts.	4.94	0.23	Very High
allow the students to learn from empirical and objective experiences.	4.85	0.36	Very High
Weighted Mean		*4.90*	
SD		*0.29*	
Verbal Interpretation		*Very High*	

The students experienced productive gathering of data and conclusions to show important facts (M=4.94, SD= 0.23) that allow them to investigate real-life situation problems (M=4.96, SD=0.19). It gives opportunity to the students to take journals record data (MD=4.83, SD=0.38) and authorize them to study from objective and empirical experiences (M=4.85, SD= 0.36). This developed their ability to involve in a more challenging field and identify their needs on the lesson (M=4.91, SD=0.29).

The overall mean of 4.90 tells that students experienced at a very high level of possibilities to involve in a more difficult yet exciting field and allow them to examine real-life problems and situations.

According to Washington (2018), investigative field is a key concept that is taking over the trends of education right now. Creating investigative experiences thru online videos and applications that engage the learners is the only way to compete for their attention.

Table 5 illustrates the Level of Virtual Field Experiences as to Engaging Field.

Table 5. The Level of Virtual Field Experiences as to Engaging Field

The Virtual Field Experiences …	*MEAN*	*SD*	*VERBAL INTERPRETATION*

provide games for students and let them enjoy their learning.	4.98	0.14	Very High
give the students an opportunity to choose what activities they want.	4.93	0.26	Very High
relate instructional materials in student's life.	4.98	0.14	Very High
incorporate mysteries and discoveries in lesson.	4.94	0.23	Very High
give specific and positive feedback on student's performances.	4.85	0.36	Very High
Weighted Mean		*4.94*	
SD		*0.23*	
Verbal Interpretation		*Very High*	

In this field, the students enjoyed learning through games as it serves motivation to their study (M= 4.98, SD= 0.14), choosing what activities they want will help them improve in academic performance (M=4.93, SD=0.26). The learning will be more exciting and fun because they can relate the instructional materials in the present situations of their life (M=4.98, SD=0.14) and incorporated mysteries and observation in lesson (M=4.94, SD= 0.23).

This resulted to the positive feedback on student's performances

(M=4.85, SD=0.36).

The overall mean of 4.94 shown that the students experienced at a very high level of possibilities to enjoy learning through fun activities choosing the activities they want and can significantly increase learner's achievement by relating instructional materials in the real-life learning.

In support of the findings, the truth is, the technologies ensemble the principles of engaging field learning such as simulations, and virtual worlds into this category of immersive learning environments. To a certain extent, all immersive learning incorporates engaging field in each of its principles that improves learners' engagement in the classroom. Pagano (2013)

Table 6 illustrates the Level of Virtual Field Experiences as to Experiential Field

Table 6. The Level of Virtual Field Experiences as to Experiential Field

The Virtual Field Experiences …	*MEAN*	*SD*	*VERBAL INTERPRETATION*
uses real-life examples that are related on the topic.	4.83	0.38	Very High

build experiences from in-house situations.	4.72	0.45	Very High
use team challenges and allow students solve real-life problems.	4.96	0.19	Very High
provide real-world and role-specific simulations.	4.96	0.19	Very High
incorporate experiential activities and connect it on a bigger picture.	4.87	0.34	Very High
Weighted Mean		*4.87*	
SD		*0.31*	
Verbal Interpretation		*Very High*	

The students developed better social and situational awareness through solving real-life problems (M= 4.96, SD= 0.19) that are related on the topic that had been encountered (M=4.83, SD=0.38. It enhanced their confidence through their experiences from in-house situations (M=4.72, SD= 0.19) that provides them to real-world and role-specific simulation (M=4.96, SD= 0.19).

This caused to a bigger picture of experiential activities (M=4.87, SD=0.34).

The overall mean of 4.87 stipulated that the students experienced at a very high level of opportunities to face challenges in real-life, home and world.

And it will lead them to a successful and productive life.

According to Lefton (2022), by engaging students virtual field experiences, students are able to explore experiential field and reflect on it. They are better able to connect theories and knowledge learned in the classroom to real-world situations.

Table 7 illustrates the Level of Student's learning as to Collaborative Field

The students improved their interaction with others through collaborative work (M=4.70, SD=0.46) that will help them collaborate in doing the tasks with their group (M=4.96, SD= 0,19) and participate within the class discussion (M=4.96, SD=0.19). It also increased their efforts to share their own knowledge through synchronous and asynchronous ways of learning (M=5.00, SD= 0.00).

This resulted to their ability to follow and submit to the flexible group norms (M= 4.98, SD= 0.14)

The overall mean of 4.92 indicated that the students experienced at a very high level of possibilities to build trust and promote open communication. And it empowers them to be more participative and collaborative to the tasks given to them.

Learners can be immersed to a collaborative learning field in virtual field experience, which frees up the significant restriction geography imposes on real-world classes. learning experiences can be collaborative, allowing for learners, mentors, and experts to participate when it's convenient to them. Collaborative virtual learning experiences provide the opportunity to give real-time feedback to a learner during or immediately following activities, Pagano (2013).

Table 7. The Level of Student's learning as to Collaborative Field

The Student's learning …	*MEAN*	*SD*	*VERBAL INTERPRETATION*
establish flexible group norms.	4.98	0.14	Very High
allow the learners to build trust and promote open communication.	4.70	0.46	Very High
involve the learners in working together activities which ensures that every student can participate.	4.96	0.19	Very High
empower the students to be more participative and collaborative within the class discussion.	4.96	0.19	Very High
allow the students to share their own knowledge and allow them to communicate synchronous and asynchronously.	5.00	0.00	Very High
Weighted Mean		*4.92*	
SD		*0.20*	
Verbal Interpretation		*Very High*	

Level of Students' Learning

Table 8 illustrates the Level of Student's learning as to Multisensory Learning. The students used what they already know to construct new understandings (M= 4.87, SD= 0.34) where they integrate listening, speaking, reading and a physical activity (M=4.83, SD=0.38. Through their ability to understand the relationship between the concepts (M=4.96, SD= 0.19), they will be able to gather information about the responsibilities that will be given to them (M=4.85, SD=0.36) and can perceive the logic ideas involved in solving problems (M=4.91, SD=0.29).

The overall mean of 4.89 indicated that the students grasped at a very high level of possibilities where they can produce more effective and efficient learning.

Table 8. The Level of Student's learning as to Multisensory Learning

The Student's learning …	*MEAN*	*SD*	*VERBAL INTERPRETATION*
student can combine listening, speaking, reading, and a tactile or kinesthetic activity.	4.83	0.38	Very High
students are able to gather information about the task.	4.85	0.36	Very High
student can link information to ideas they already know and understand.	4.87	0.34	Very High
student can perceive the logic involved in solving problems.	4.91	0.29	Very High
student can understand the relationship between the concepts.	4.96	0.19	Very High
Weighted Mean			*4.89*
SD			*0.31*
Verbal Interpretation			*High*

Table 9 illustrates the Level of Student's learning as to discovery learning. The students explored and discovered their own knowledge (M=4.85,

SD= 0.36) where they can apply ideas to their lives, creating memorable lessons that will help them to become lifelong learners (M= 4.89, SD= 0.32), putting knowledge into practice (M= 4.93, SD= 0.26 and can integrate real-world problem solving in their lives (M= 4.94, SD= 0.23)

This resulted to their ability to share personalized learning experiences to their colleagues.

The overall mean of 4.89 determined that the students acquired learning at a very high level of experiences where they can apply what they have known and discovered.

According to Hammer (2012), teachers' interest in promoting student inquiry by adopting inquiry-oriented methods. Discovery learning approaches, in particular, are designed to engage students in inquiry through which, guided by the teacher and materials, they" discover" the intended content.

Table 9. The Level of Student's learning as to Discovery Learning

The Student's learning …	*MEAN*	*SD*	*REMARKS*
student can incorporate real-world problem solving.	4.94	0.23	Very High
student can put knowledge into practice.	4.93	0.26	Very High
students are able to explore and discover their own knowledge.	4.85	0.36	Very High
student can provide personalized learning experiences.	4.83	0.38	Very High
student can apply ideas to their lives, creating memorable lessons that will help turn them into lifelong learners.	4.89	0.32	Very High
Weighted Mean		*4.89*	
SD		*0.31*	
Verbal Interpretation		*Very High*	

Table 10 illustrates Level of Student's learning as to Social Learning The students learned how to respect the people around them(M= 4.83, SD= 0.38), being able to listen and communicate with other people(M= 4.91, SD= 0.29), developed emotional skills by learning how to manage it(M= 4.93, SD= 0.26) and will produce a good communication with others (M=4.94,SD= 0.23).

This will yield to a good relationship of students to the people in their environment (M=4.81, SD= 0.39)

The overall mean of 4.89 determined that the students learned at a very high level of opportunities to have a good interpersonal relationship with other people by controlling their emotions and respecting others.

In support with the findings, according to Vassileva (2013), teachers focus on the design of learning technologies to support social learning in context of virtual field experience.

Table 10. The Level of Student's learning as to Social Learning

The Student's learning …	*MEAN*	*SD*	*REMARKS*
Student can build good communication with other people.	4.94	0.23	Very High
student shows respect with the people around them.	4.83	0.38	Very High
student knows how to listen and communicate with other people.	4.91	0.29	Very High

students are able to develop emotional skills.	4.93	0.26	Very High
student knows how to manage their relationship with the people in their environment.	4.81	0.39	Very High
Weighted Mean		*4.89*	
SD		*0.31*	
Verbal Interpretation		*Very High*	

Table 11 illustrates Level of Student's learning as to Constructive Learning.

The students constructed new insights in connection with the previous knowledge they have (M=4.83, SD=0.38) and utilize it on the lessons and topics (M=4.93, SD=0.26). This will help them to create solutions to cognitive dissonance (M= 4.89, SD= 0.32) and will serve as a challenge for them to strive better (M=4.93, SD=0.26).

This resulted to their improvement to reflect on their own learning (M=4.94, SD= 0.23).

The overall mean of 4.90 stated that the students absorbed learning at a very high level of opportunities to create solutions on the problems and challenges they have and to give back on their own learning experiences.

In line with result, Valiande, and Tarman (2012) demonstrate the need for a genuine constructive implementation of information technology in teaching practices and outline how information and technology can enhance and add to the effectiveness on learners constructive learning using virtual classroom resources.

Table 11. The Level of Student's learning as to Constructive Learning

The Student's learning …	*MEAN*	*SD*	*VERBAL INTERPRETATION*
students elicit prior knowledge on the lessons and topics they have.	4.93	0.26	Very High
students can create new knowledge in relation with the pre-existing knowledge they have.	4.83	0.38	Very High
students are able to create solutions in cognitive dissonance.	4.89	0.32	Very High
students can construct solution on the problems and activities that challenge them.	4.93	0.26	Very High
students know how to reflect on their own learning.	4.94	0.23	Very High

Weighted Mean	*4.90*
SD	*0.29*
Verbal Interpretation	*Very High*

Level of Student's Performance in Terms of Pre-Test and Post-Test

Table 12 presents the level of student's performance in terms of pre-test and post-test. Out of a total number of fifty four respondents completed the pre-test and post-test.

For Pre-test, out of 54 students, 22 of them attained satisfactory level of performance (40.74%) where they answered the questions based on the knowledge they have. 29 of them got a fairly satisfactory level (53.70%) because the questions in pre-test are not yet discussed and they have no idea about the concepts in the lesson. And 3 of them did not meet expectation (5.55%) meaning that their ideas about the lesson are not encountered totally.

Table 12. Level of Student's Performance in Terms of Pre-Test and Post-Test

Scores	Pre-test		Descriptive Equivalent	Post-test		Descriptive Equivalent
	f	%		f	%	
32-40	0	0.00	-	30	55.55	Outstanding
24-31	0	0.00	-	22	40.74	Very Satisfactory
16-23	22	40.74	Satisfactory	2	3.70	Satisfactory
9-16	29	53.70	Fairly Satisfactory	0	0.00	Fairly Satisfactory
1-8	3	5.55	Did not meet Expectation	0	0.00	Did not meet Expectation
Total	54	100		54	100	
Weighted Mean *SD* *Verbal Interpretation*	24.70 13.70 VS		Fairly Satisfactory	25.70 14.18 VS		Very Satisfactory

For Post-test, 30 out of 54 achieved outstanding level of performance (55.55%) where their virtual field experiences brought them an increase engagement in the topic studied. 22 of them gained very satisfactory level (40.74%) meaning that they are ready to accept the challenges given by their experiences in Virtual Field. Lastly, 2 of them attained satisfactory level (3.70%) where they understand the concepts but there are topics that are not clear to them. They are not able to comprehend the questions and the topics discussed and encountered.

Facione (2021) cited that pre and post testing is an assessment model designed to examine the change in overall critical thinking skills or dispositions in a group of test takers and is expected to increase students test score on post-test.

In Table 13, it was found that there was a significant difference in the students' pre-test and post-test scores. The t-value of -26.86 is significant at 0.000 probability level.

There was an increase in the level of performance in post-test that is differed from their scores in pre-test. This determined how virtual field experiences became very effective to the students where it gave more opportunities to the students to reflect on their experiences.

Table 13. Difference in the Students' Performance based on Pre-Test and Post-test Scores

	Performance	t-stat	p-value	Analysis
Student's Performance	*Pre-test*			*Significant*
	Post-test	-26.86	0.0000	

Table 14 presents the strategies between virtual field experience and students' learning.

The correlation coefficient in some areas is weak and negative. This means that the students' abilities and learning are not the same. Others learned through multisensory learning such as visual, auditory, kinesthetic and tactile sense, some gained understanding through discovery learning which they found out things through themselves.

Students exposed in Virtual, Immersive, Interactive, Investigative, Engaging, Experiential and Collaborative Field Experiences where their holistic personality is developed. Their learning was increased and will be able to share their knowledge to others.

The results indicate that majority of p-values are lower than the level of significance (α=0.05) and the value of r suggest as *weak negative correlation*; hence, the null hypothesis is rejected.

Table 14. Strategies between Virtual Field Experience and Students' Learning.

Students' Learning		Virtual	Immersive	Interactive	Investigative	Engaging	Experiential	Collaborative
Multisensory	r-value	-0.385	-0.385	-0.361	-0.279	-0.239	-0.333	-0.364
	p-value	0.004	0.004	0.007	0.041	0.082	0.014	0.007
	Degree of Correlation	Weak	Weak	Weak	Weak	Weak	Weak	Weak
	Analysis	Significant	Significant	Significant	Significant	Not Significant	Significant	Significant
Discovery	r-value	-0.42	0.397	-0.394	-0.304	-0.26	-0.383	-0.397
	p-value	0.002	0.003	0.003	0.026	0.057	0.004	0.003
	Degree of Correlation	Moderate	Weak	Weak	Weak	Weak	Weak	Weak
	Analysis	Significant	Significant	Significant	Significant	Not Significant	Significant	Significant
Social	r-value	-0.397	-0.376	-0.373	-0.287	-0.246	-0.304	-0.376
	p-value	0.003	0.005	0.005	0.035	0.072	0.026	0.005
	Degree of Correlation	Weak	Weak	Weak	Weak	Weak	Weak	Weak
	Analysis	Significant	Significant	Significant	Significant	Not Significant	Significant	Significant

Constructive	r-value	-0.308	-0.291	-0.289	-0.223	-0.191	-0.258	-0.291
	p-value	0.023	0.032	0.003	0.105	0.166	0.06	0.032
	Degree of Correlation	Weak	Weak	Weak	Weak	Not Significant	Weak	Weak
	Analysis	Significant	Significant	Significant	Not Significant	Not Significant	Not Significant	Not Significant

Scale	Strength
± 1.0	Perfect (Positive/Negative) Correlation
$\pm 0.80 - 0.99$	Very Strong (Positive/Negative) Correlation
$\pm 0.60 - 0.79$	Strong (Positive/Negative) Correlation
$\pm 0.40 - 0.59$	Moderate (Positive/Negative) Correlation
$\pm 0.20 - 0.39$	Weak (Positive/Negative) Correlation
$\pm 0.00 - 0.19$	Very Weak (Positive/Negative) Correlation
0.0	No Correlation

CONCLUSION

On the basis of the foregoing findings, the following conclusion was drawn.
The students increased their knowledge through relatable videos, true-to life situations that could really help to connect in the real-world, sharing what they have learned and applying those things in their lives. And those will give a good reflection to them.

RECOMMENDATIONS

Based on the drawn conclusions resulted to the following recommendations.

1. It is highly suggested that classrooms may have technology-based classrooms for modifications and improvement for the instruction use so that students will be able to develop engagement and clearly understand the concepts.
2. It is recommended that the performance monitoring may focus on the students' needs and enable them to learn.
3. Furthermore, teachers may also emphasize the value of learning science concepts and promotes its importance for the learners. Enhancement program and/or extended activities may help them to fully understand the help of science in their daily lives.

4. Grade 4 students may not that inclined to classroom tasks and activities, so that it is highly recommended to provide engaging resources and instructional materials wherein their can exhibit their academic skills
5. Lastly, they may find the meaning of science concepts out of the context if they can experience more hands on activities.

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"The Reseacher"

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