



# EFFECT OF VIRTUAL FIELD TRIP INSTRUCTIONAL STRATEGY ON STUDENT ACADEMIC ACHIEVEMENT AND INTEREST IN CHEMISTRY IN IKONO LOCAL GOVERNMENT AREA, AKWA IBOM STATE, NIGERIA

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## ABSTRACT

The study examined the effect of virtual field trip instructional strategy on student academic achievement and interest in chemistry in Ikono LGA. The study adopted a quasi-experimental design with a sample size of 86 senior secondary II students drawn from the population using multi-staged sampling technique, three research questions and hypothesis guided the study. The research instrument were chemistry achievement test (CAT) and an interest questionnaire with a reliability of 0.86 and 0.73 respectively. Descriptive and inferential statistics were used to analysed the data collected. The result indicated a significant difference in the academic achievement of student taught chemistry in favour of those in the experimental group with mean difference of 77.30 for students in the VFT group against 59.67 for those in the control. The result also indicated no significant difference in respect to gender and interest. It is recommended that chemistry and science teacher implore the use of virtual field trip in enhancing academic achievement and interest in chemistry

## INTRODUCTION

Science is a systematic process of inquiry that relies on empirical evidence, observation, and experimentation to understand and explain the natural world. The scientific method guides this process, involving the formulation of hypotheses, conducting experiments, and analyzing results. Through repeated cycles of observation and testing, scientists aim to uncover patterns, principles, and laws that describe and predict the behavior of the universe. Science is a dynamic and evolving endeavor, constantly refining our understanding of the world and contributing to technological advancements and innovations.

For example, some scientific concepts (such as weather phenomena and humans' internal structures) are difficult to learn through concrete and direct observation. Chemistry is an exact and a core science subject in Nigerian secondary schools. Chemistry is the study of matter, its properties, how and why substances combine or separate to form other substances and how substances interact with energy. Chemistry is involved in everything we do, from growing and cooking food to cleaning our homes. Chemistry is one of the physical sciences that help us to describe and explain our world.

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There are five main branches of chemistry, each of which has many areas of study. They are: analytical chemistry, physical chemistry, organic chemistry, inorganic chemistry and biochemistry (Ademola in Okebukola, 2020). Chemistry educators echo that curriculum for secondary school chemistry should be designed to give students the opportunity to be actively involved in the process of learning (Oladejo, 2020). This will enable students to solve and decide their daily life problems based on scientific attitudes and noble values. It will also help to develop a dynamic and viable community in line with the latest scientific information and technologies (Ratamun and Osman, 2018). Thus, the chemistry curriculum should lay emphasis on the acquisition of knowledge and mastery of science process skills through practical learning approaches (Akinola, & Oladejo, 2020). Its teaching often requires creativity and improvisation, to make chemistry concepts comprehensible to students, chemistry teachers must employ creative teaching methods and be prepared to respond to queries and explain concepts in an a typical manner (Nbina, 2017). Nbina further pointed out that the widespread poor performance and the negative attitude towards chemistry from secondary school students have largely been ascribed to lack of proper teaching methods. Teachers who adapt appropriate improvisation materials in teaching chemistry will likely be more successful in imparting chemistry knowledge to the novice chemists in their classes. Captivating the 21st-century learner is a challenge, one that can be approached with the integration of various technologies to grasp the learner's interest. Virtual field trips (VFT) is one of such technology that has been integrated into the classroom. VFT is a guided exploration through the World Wide Web that organizes a collection of pre-screened, thematically based web pages into a structured online learning experience. (Foley, 2017). In a narrower sense, 'virtual field trips' can be described as being an electronic exhibition of diverse natural and cultural phenomena that also provide digital simulations of the three-dimensional processes of surveying, observing, exploring and 'adventuring' in some actual field site. It has been reported that VFTs can be an alternative or complementary to field activities because they are able to simulate the realities of the "outside" world in the classroom (Spicer, 2017). Virtual field trips, however, vary greatly in their extent of student participation.

This scope can range from low expectations from students to participate, as seen with videos and podcasts used in classroom settings, to increased expectations for student participation, as with computer-aided instruction. There are quite unlimited possibilities for the incorporation of technology as pedagogical tools of instruction in VFTs. This could range from linear and observational narratives to interactive virtual three-dimensional software-powered environments. Notably, the use of VFTs has increased, given advancements in technological innovations, increasing ease of use, and increasing push by decision-makers in tertiary institutions towards stronger integration of technology and pedagogy. Pham, et al. (2020) successfully applied a 360-degree panoramic Virtual Field Trip System (VFTS) for mobile construction safety education. Jacobson et al. (2019) also reported the development of a series of VFTs to sites around the world with the view to present students with complicated real-world situations, with which to learn critical analysis skills. virtual field trip was applied in environmental chemistry education to conduct a field trip to an overseas site, thus reducing the associated costs and environmental impacts that would have been associated with an RFT. The VFT field trip, thus, presents an environmentally friendly yet innovative approach to allow learning among students, Given the global push for environmental sustainability it is anticipated that interest in VFTs will continue to increase in the future. Recent research has proposed that the presence of VFTs, such as virtual laboratories, video visitations, and augmented reality laboratories can increase student academic achievement (Hehr 2020). the implementation of VFT provides flexibility to staff to perform high-quality research as an essential component of academic promotion and national/international recognition. In addition, VFTs appear to offer a more cost-effective way, which requires less support from faculty administration to deliver modulus, as compared to traditional fieldwork activities. It is important to note, however, that the assumption that VFTs may be as satisfactory, require less staff time, and are cheaper may be flawed, as they can take substantial time to prepare and produce, and investment in video production equipment may be required. Despite these limitations, VFTs allow for increased access, as more students can be accommodated in a safe and controlled

environment. VFTs also promote flexibility, as students can access field opportunities at convenient times and locations without jeopardizing their ability to achieve comparable learning outcomes. VFTs can minimize the physical and psychological barriers to engagement and inclusion that students with disabilities face over RFT,

In order to promote students to choose careers related to science and chemistry areas, we need to develop their interest in these areas (Kang & Keinonen, 2018). Interest has been identified as a key factor for student motivation and learning outcomes (Ainley et al., 2020). One commonality among most definitions is that interest is a "psychological state and a predisposition to reengage particular disciplinary content over time that develops through the interaction of the person and his environment" (Renninger & Hidi, 2017) and most agree it is directed towards an object, activity, field of knowledge, or goal (Krapp & Prenzel, 2018). Interest is considered a domain specific construct (Jansen et al., 2019) meaning that it is specific to subject areas. Students may have more individual interest in a particular domain, therefore more specific topics of that domain, covered within the classroom, may draw on that interest (Ainley et al., 2020). Interest within science can be for a specific subject like chemistry (Kang & Keinonen, 2018).

Constructivist theory by Vygotsky & Dewey (1938) is a learning theory that emphasizes the active role of learners in building their own understanding. Rather than passively receiving information, learners reflect on their experiences, create mental representations, and incorporate new knowledge into their schemas. This promotes deeper learning and understanding. The theory of constructivist learning is vital to understanding how students learn. The idea that students actively construct knowledge is central to constructivism. Students add (or build) their new experiences on top of their current foundation of understanding. The goal of any program should be to engage learners by creating opportunities for them to construct and make sense of their knowledge. Virtual field trips can offer a constructivist learning environment during the program wherein students build upon their previous knowledge. Through quality virtual field trips, students can be provided with activities to discover scientific concepts by applying logical thought to results of interactions with objects and

phenomena. Active participation of students is very important when developing a constructivist approach to learning. Many students who offer chemistry in the senior school certificate examination or who sat for teacher-made tests failed in this subject. Given the shift to online learning during the COVID-19 pandemic, it is crucial to evaluate the impact of virtual field trips on student achievement and interest. The virtual field trip should serve as a valuable resource for high-quality virtual instruction, utilizing effective techniques to maximize student Interest and Achievement. The constructivist's theory encourages students' direct learning with virtual learning environment where the learner incorporate previous learning experience into the new learning situation in order to enhance higher achievement and retention of concepts.

Egwu & Okigbo (2021) examine the effectiveness of the Virtual Field Trip (VFT) towards academic achievement. The results showed significant differences in the mean scores of students taught using VFT compared to students who were taught using conventional method. This collaborates with the result of Salman (2023), who indicated that the students learning from VFTs scored higher than those learning from Actual FTs. Alqudah, & Khasawneh (2023) compared the effectiveness of virtual field trip and real field trip on students' academic achievement and engagement. The result showed that there is a significant difference in the effectiveness of virtual field trip and real field trip on students' academic achievement and engagement. Liu et al., (2022) developed a series of VFT science lessons for primary school students and examined the effects of these lessons on learning outcomes. The results showed that the VFT-based classroom significantly improved primary students' academic achievement and science motivation. Jones & Washko (2022), equally assessed the effectiveness of Virtual Field Trips regarding Academic Achievement in respect to teaching chemistry and to find out the level of interest among students in relation to virtual field trips. The VFT method of teaching is more effective to arouse interest irrespective of levels of locale.

Lawal (2023) compares the effectiveness of virtual and traditional field trip strategies on academic performance and interest of students in conservation concepts of chemistry in North-West Nigeria. The results obtained showed that: significant differences exist between the

performance of students taught using virtual field trip strategy and those exposed to traditional field trip strategy. Khotimah et al. (2024)., observed that the achievement of student learning outcomes from the three trial classes obtained a percentage increase above 5%; (3) the model met the Practical criteria shown by the implementation of learning through VFT. Ugwu (2023), The results revealed that field-trip approach significantly improved students' achievement and interest in biology. Although female students performed better than their male counterparts, there is no significant influence of gender on students' achievement in Biology. Male students gained more interest than the female students but there is no significant influence of gender on students' interest in Biology. Ruberto et al., (2023), results provide clear evidence that high-quality iVFTs can lead to better learning gains than in person FTs. This also agrees with the findings of Garcia et al., (2023), Mokmin et al., (2023) but contradict that of Wolf et al., (2023) whose result are observed to be the results are to be significantly lower in comparison to the corresponding values of a field trip. Laricheva & Ilikchyan, (2023), Explored the Effect of Virtual Reality on Learning in General Chemistry Students with Low Visual-Spatial Skills and found that, while no statistically significant difference in class performance between these two groups was observed, the data showed some improvement in the median scores in the VR intervention group compared to the control. Kim et al. (2022), observed that while the VFT appears to be a successful and innovative use of technology in the classroom, there is not significant evidence that the VFT was the direct cause of academic improvement. The study suggests the need for further research on the use of VFTs in chemistry classroom and the need to design a variety of pedagogical approaches to use these VFTs with students of varying motivation and academic achievement levels. Lasha et al., (2023), observed that Fieldtrip-based Virtual Reality (FVR) positively and significantly influenced cultural learning. First, FVR enhances students' literacy skills by providing an immersive experience. Moreover, its interactive features increase students' interest in cultural learning, subsequently, Sun et al., (2023), also observed that wearable hybrid AR/VR material increased situational interest, engagement, and learning performance in the physical laboratory course.

Brown (2018) quasi-experimental study was to examine the influence of virtual reality field trips on middle-school students' interest in chemistry. The results of the two one-way ANCOVAs, demonstrated that students using virtual field trip scored significantly higher than students participating in traditional instruction on both their academic achievement and interest These findings provide support for the use of virtual field trip in middle-school chemistry classrooms.

Kun-Hung & Chin-Chung (2019) determines the effects of virtual field trip on student interest in chemistry, 24 elementary school students were invited to engage in an immersive virtual field trip which was part of a 2-week summer camp on the learning subject of chemistry. The results showed that the students' interest was generally enhanced, particularly for the diminishment of test anxiety. Jasmin (2021) action research was to determine the impact virtual field trip programs have on elementary students' interest in specific science domains. Findings from this study, though not statistically significant, suggest that participants' interest had a modest increase following virtual field trip programs in all science domains. Qualitative findings also revealed that participants with an initial interest in a science domain expressed an increased interest in the science domain following the virtual field trip.. Eya & Ezeh (2020) examine the influence of gender on student's academic achievement in chemistry in Nigeria.. From the data analysis, it was found that gender generally has small effect on the students' achievement in chemistry. It was also found that the percentage variance in the students' academic achievement attributed to gender is 3.8% which is also small.

Adekunle et al (2021) investigated the use of virtual field trip as an intervention to enhance the performance of female students relative to males in senior school chemistry in Ado Odo Ota, Nigeria. A total of 83 chemistry students in senior secondary year two (SS2) comprising 51 females and 32 males participated in the study. The study found no statistically significant difference between the performance of the male and female students [ $F(1,41) = .04; p > .05$ ]. While there was a statistically significant main effect of treatment on the students' performance, the interaction effect of gender and treatment did not attain statistical significance. Ogunyemi & Bamidele (2019) investigates the influence of gender difference in learning chemistry using virtual field

trip which were spurred towards obtaining an improved academic achievement. Findings from the study showed that there was no significant gender difference in the preferred effectiveness of virtual field trip. However, male students showed more interest in the use of virtual field trip in learning chemistry than female students. Gregory et al (2021) examined the effect of gender on basic science students' academic achievement in secondary school. Result revealed that gender (male/female) had no significant effect on students' achievement in Basic Science and finally, result showed that there was significant interaction effect of treatment and gender on students' academic performance in Basic Science.

### Research Hypotheses

1. There is no significant difference in the mean achievement scores of students taught chemistry using the virtual field trip strategy compared to those taught without it.
2. There is no significant difference in the mean achievement scores between male and female students taught chemistry, regardless of whether the virtual field trip strategy is employed or not.
3. There is no significant difference in the mean interest scores of students taught chemistry with the virtual field trip strategy and those taught without it.

### RESEARCH DESIGN

Quasi-experimental, pretest-post-test non-equivalent control group design was used to compare two groups of SS2, senior school students, a treatment group and a control group. The independent variable was the type of instruction. The students in the control group received traditional instruction, whereas students in the treatment group received virtual field trips to the locations referenced in the traditional instruction. Random assignment was not possible. Therefore, intact groups were used for the treatment group and the control group, based on the class assignments of students.

After participation in the instruction, students were assessed on their academic achievement and interest to learn.

### METHODOLOGY

The instrument used was Chemistry Achievement Test consisting of pre-test and post-test. pre-test was used to establish a baseline for students' prior knowledge about nuclear reaction. The post-test was the same as the pre-test, but questions were rearranged. The test was created by the researcher and looked for specific details and informational items that the students should have learned while interacting with the VFT. The CAT question are divided into two sections, the first section of the CAT question dealt with demographic variable such as name of school and gender of student while the second section contain 25 multiple choice questions. The chemistry achievement test were adopted from the west African senior secondary school certificate Examination (WAEC) past question in the topic nuclear reaction. The CAT question were all multiple choice questions, it has 4 options, one correct answer and three distractions drawn from chemistry topic. This test was used to collect data on how much information the students gained from using the VFT.

Interest questionnaire;  
A likert interest questionnaire of ten questions was administered at the time the pre-test was given to gauge student thoughts and feeling about the VFT and the current chemistry course. The researcher adopted similar surveys found during the review of the literature. The questionnaire was prepared on a four scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). These questions were designed to determine the students' levels of interest in learning chemistry. Reliability of the instrument establishes the consistency of the response to the instrument across time. Kuder Richardson R20 was used to determine the reliability of the achievement test with an index of 0.86. while Cronbach Alpha Reliability method was used to determine the reliability of the interest questionnaire a coefficient of 0.73 was obtained.

Data Analysis and Results

Hypothesis One:

Mean ( $\bar{X}$ ) and standard deviation of students' pre-test and post-test scores classified by treatment groups

Treatment Groups	N	Pre-test		Post-test	
		$\bar{X}$	SD	$\bar{X}$	SD
VFT Strategy	43				
Lecture Strategy	43	12.13	2.4	77.30	9.55
		12.02	2.7	59.67	11.61

Table 1, shows the pre-test and post-test mean scores and standard deviation of scores of the of students taught using virtual field trip (VFT), and lecture strategies. The pre-test and post-test mean scores of 12.13 and 77.30 was obtained for those in VFT group and 12.02 and 59.67 for lecture group respectively, showed that students

in VFT group had a better mean score difference compared with those in lecture group. Whether the observed differences in the mean scores of the two groups were statistically significant is assessed by the results for testing of hypothesis one displayed in Table 4.2.

**Table 2: Summary of Analysis of Covariance (ANCOVA) of the students' post-test scores classified by treatment groups with pre-test scores as covariate**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision at p<.05 alpha
Corrected Model	7174.830 <sup>a</sup>	3	2391.610	21.789	.000	S
Intercept	13818.997	1	13818.997	125.897	.000	S
Pretest	170.811	1	170.811	1.556	.216	NS
Treatment	1049.585	1	1049.585	9.562	.003	S
Error	9000.658	82	109.764	-	-	-
Total	419572.000	86	-	-	-	-
Corrected Total	16175.488	85	-	-	-	-

a. a. R Squared = .444 (Adjusted R Squared = .423)

b. Computed using alpha = .05

**Source:** Author's Field Data, 2024

Result of the calculated F-ratio for the effect of instructional strategies at df 1, 82 is 9.56, while its corresponding calculated level of significance is .003 alpha. This level of significance is less than .05 in which the decision is based; indicating that there was a significant difference between the academic achievement of students taught using

VFT, and lecture strategies. With this observation, null hypothesis 1 was rejected. The post-test mean scores show that the significance was in favour of students taught using Students VFT strategy with mean score of 77.30 compared with 59.67 for those in lecture group.

**Hypothesis Two:****Table 3:** Mean and Standard deviation of the achievement of students based on gender

<b>Descriptive Statistics</b>				
Dependent Variable: POSTTEST				
GENDER	TREATMENT	Mean	Std. Deviation	N
Female	Control	57.4762	6.90376	21
	experimental	77.6667	11.27625	27
	Total	68.8333	13.89525	48
Male	Control	61.7727	14.65454	22
	experimental	76.6875	5.87332	16
	Total	68.0526	13.84069	38
Total	Control	59.6744	11.61018	43
	experimental	77.3023	9.55320	43
	Total	68.4884	13.79492	86

Table 3, shows the pre-test and post-test mean scores; and standard deviation of scores of the male and female in both strategies. The mean scores of male and female students for both groups are 61.77 and 57.47 for the control group respectively, while those of male and female students for the experimental group is 76.68 and 77.66, respectively. These observations show that both the male and female students taught using

both strategies benefited more from the instructions given with both male and female from the experimental group obtaining a higher mean score than the control group. Whether the differences between the mean scores of the male and female students in the two groups were statistically significant is assessed by the results in Table 4 used in the testing hypothesis two.

**Table 3 Summary of Analysis of Covariance (ANCOVA) of male and female students' post-test scores classified by treatment groups and gender with pre-test scores as covariate**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision at p<.05 alpha
Corrected Model	7198.916 <sup>a</sup>	4	1799.729	16.240	.000	S
Intercept	12683.883	1	12683.883	114.453	.000	S
Pretest	309.967	1	309.967	2.797	.098	NS
Treatment	6348.269	1	6348.269	57.284	.000	S
Gender	90.974	1	90.974	.821	.368	Ns
Treatment * Gender	184.600	1	184.600	1.666	.201	Ns
Error	8976.572	81	110.822	-	-	-
Total	419572.000	86	-	-	-	-
Corrected Total	16175.488	85	-	-	-	-

a. a. R Squared = .445 (Adjusted R Squared = .418)

b. Computed using alpha = .05

**Source:** Author's Field Data, 2024

In Table 6, the calculated F-ratio for the main effect of instructional strategies on male and female students' achievement when taught using VFT and lecture strategies at df 1, 81 is .821, while its corresponding calculated level of significance

is .368 alpha. This level of significance is greater than .05 in which the decision is based; indicating that there was no significant difference between the academic achievement of students in the concepts taught given the instructional strategies used in reference to gender. With this observation, null hypothesis 2 was accepted.

**Hypothesis Three Mean (□) and standard deviation of students' pre-interest and post-interest scores classified by treatment groups Group Statistics**

	TREATMENT	N	Mean	Std. Deviation	Std. Error Mean
PREINTEREST	Control	43	10.4651	2.17506	.33169
	experimental	43	10.6977	1.76655	.26940
POSTINTEREST	Control	43	34.0698	3.17277	.48384
	experimental	43	34.2558	3.02445	.46122

Table .5, shows the pre-interest and post-interest mean scores and standard deviation of scores of students taught using VFT, and lecture strategies. The pre-interest and post-interest mean scores difference for the control is 10.46 and 34.06 respectively, compared to those in the experimental group of 10.69 and 34.25

respectively, indicating a close mean difference with the experimental group having a slightly higher mean interest score. Whether the observed differences in the mean scores of the two groups were statistically significant is assessed by the results for testing of hypothesis three displayed in Table 4

**Table 4: Summary of Analysis of Covariance (ANCOVA) of the students' interest scores classified by treatment groups**

Source	Type III Squares	Sum of Df	Mean Square	F	Sig.	Decision at p<.05 alpha
Corrected Model	3.410 <sup>a</sup>	3	1.137	.116	.951	NS
Intercept	3012.164	1	3012.164	307.09	.000	S
Preinterest	2.208	1	2.208	.225	.636	NS
Treatment	.238	1	.238	.024	.877	NS
Treatment * preint.	.127	1	.127	.013	.910	Ns
Error	804.311	82	9.809	-	-	-
Total	101178.000	86	-	-	-	-
Corrected Total	807.721	85	-	-	-	-

a. R Squared = .004 (Adjusted R Squared = -.032)

b. Computed using alpha = .05

**Source:** Author's Field Data, 2024



In Table 6, the calculated F-ratio for the effect of instructional strategies on the students' interest at df 1, 82 is .024, while its corresponding calculated level of significance is .877 alpha. This level of significance is greater than .05 in which the decision is based; indicating that there was no significant difference between the interest scores of students taught using VFT and lecture. With this observation, null hypothesis 3 was upheld.

### DISCUSSION OF FINDINGS

The findings as regard the effect of both strategies on students' academic achievement showed that there was a significant difference in the academic achievement of the students in favour of students taught using VFT. The better enhancing effect of VFT strategy on students' achievement compared with those taught using lecture, is in line with the result of Khotimah et al., (2024), Ruberto et al., (2023), Garcia et al (2023), Sun et al., (2023), Mokimin et al., (2023), Ugwu (2023), Lawal (2023), Algudah and Khasawneh (2023), Salman (2023), Jones and Washko (2022), Liu et al., (2022), and Hehr (2020). This could be attributed to its ability to help learners focus their energy on a task and its inter- and intrapersonal components that allow students to process information, move and interact with a variety of class members to gain a greater perspective on the knowledge or skills that are targeted for learning. Being able to virtually visit places that are thousands of miles away gives students the opportunity to take pride in gaining knowledge from across the world that would not be accessible for them to experience physically. To conduct a virtual field trip instead of having a physical field trip should not be considered a disadvantage, but rather a solution to a problem like conducting a study, which would require days to travel. A virtual field trip is the most practical way to gather facts without spending so much time. Virtual field trips can be great alternatives to enhance student learning without even conducting actual physical field trips. Although nothing can replace physically touching, seeing, or smelling an actual location and object, virtual field trips offer more information that students otherwise would not get to experience physically. However, this result is in contrast with that of Wolf et al., (2023), Kim et al.

(2022) and Lariceva and Illkchyna (2023), who found no statistically significant difference in the achievement of student using VFT strategy. Gender was observed to be not statistically significant with academic achievement given the instructional strategies used. Though it was observed that males and females in the experimental group had a higher mean score than those in the control group, this is in agreement with the findings of Ugwu (2023), Adekunle et al. (2021), Gregory et al. (2021), Eya and Ezeh (2020) but contradict the findings of Akala (2017), Ogunyemi and Bamidele (2019) who observed a significant difference in respect to gender. This result indicates that male and females are at par in science achievement when student centered instructional strategies are employed by science teachers. The finding also showed that interest was not statistically significant with respect to students' achievement. This result is in consonance with the findings of Jasmin (2021), Ihenko and Sopuruchi (2017) but disagree with the findings of, Sun et al., (2023), Iasha et al., (2023), Jones and Washko (2022), Change et al. (2019), and Kun-Hug and Chinchung (2019). Hence, the study concluded that the use of virtual field trip can help bridge the gap between male and female students' performance in chemistry and overall, boost the performance of the students.

### Conclusion

The benefits of virtual field trips allow educators and students to stay motivated, inspired and increase students' creativity and drive to learn about faraway destinations and their different way of life. VFT in teaching and learning of Chemistry have high potency of enhancing students' interest and academic performance in the subject. Furthermore, students are more interested to be actively engaged with representational challenges that included activities such as role play, models, concept maps, particulate, graphical and flow chart representation of chemical reactions and participating in small group and whole-class discussions. It will improve students' academic achievement and learning of Chemistry regardless of their gender.

**RECOMMENDATION**

1. It is recommended that a longitudinal study to examine the sustained impact of VFT instructional strategy on student's academic achievement and interest in chemistry as some science teachers are yet to be familiar with its use in the classroom.
2. Government should provide teacher training and support for successful implementation of virtual field trip strategy

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