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ONLINE – MERGE – OFFLINE (OMO) CLASSROOM MODEL AS INNOVATION TO IMPROVE STUDENTS' MASTERY LEVEL AND ATTITUDE IN TEACHING BALANCING CHEMICAL EQUATION

Prof. Resty C. Samosa
Colegio de San Gabriel Arcangel
Graceville National High School
resty.samosa002@deped.gov.ph
John Glenn C. Maylas
Bulacan State University- Sarmiento Campus
glennmaylas02@gmail.com
Gregor L. Macalam
Bulacan State University- Sarmiento Campus
gregormacalam47@gmail.com

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Abstract:

This study evaluated the effectiveness of online – merge – offline (OMO) classroom model as innovation to improve students' mastery level and attitude in teaching balancing chemical equation. The study determines level of mastery and attitude of the students towards the utilization of the Online – Merge – Offline (OMO) Classroom Model in teaching Balancing Chemical Equation. In juxtaposition, the study tests significant difference that exists between the pre-test and post-test results of using Online – Merge – Offline (OMO) Classroom Model in teaching Balancing Chemical Equation. In addition, the researchers made used of validated pretest-posttest and attitude survey-questionnaire as the primary tools of the study. The findings showed that the students showed a closely approximating mastery as exposed to online – merge – offline (OMO) classroom model had a positive effect on the teaching balancing chemical equation. Affirmatively, it is evident have positive effect on the teaching balancing chemical equation among Grade 9 students as evidenced by the significantly greater mean in the posttest than in the pretest. There was significant difference in the pretest and posttest score of students in the utilization of online – merge – offline (OMO) classroom model had a positive effect on the teaching balancing chemical equation. Engagingly, the students have positive attitude in learning balancing equation as exposed to online – merge – offline (OMO) classroom model. From these findings it is clear pathways for prospective use online-merge-offline (OMO) to other educational institution in the Philippines to integrate towards its vision of educating for the best.

Keywords: Attitude, balancing chemical equation, innovation, online – merge – offline (OMO) classroom model, students' mastery level

INTRODUCTION

One of the most important ways in which chemists can communicate information about a reaction is through the writing of chemical equations. These equations enable chemists from different countries to simply and without error communicate with one another.

Chemical equations can be defined as symbolic and quantitative representations of the changes that occur in the process of chemical reactions, based on the principle that matter is neither created nor destroyed during chemical reactions.

For example, the chemical equation $_xA + _yB \rightarrow _pC + _qD$ shows that A and B are the reactants while C and D are the products. The subscripts x, y, p and q are the stoichiometric coefficients which represent the relative amount of substance of the reactants and products. The single-headed arrow indicates the

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direction of the reaction and shows that the reaction is an irreversible one. The arrow means "gives", "yields" or "forms" and the plus (+) sign means "and".

However, studies have shown that the ability to write chemical equations correctly is not a simple one (Gower, 2017; & Savoy, 2012). It is one that requires a functional understanding of the requisite subordinate concepts of atoms and atomicity, molecules and molecular formula, atomic structure and bonding, valency, use of brackets, radicals, subscripts and coefficient and molar ratio (Savoy, 2012).

Studies conducted by Savoy (2012) and Hines (2010) have reported that chemistry students often have great difficulties in both acquiring and using the skills required to balance chemical equations.

A similar study conducted by Johnstone, Morrison and Sharp (2017) in Scotland revealed that students in high schools are rarely confident about writing chemical equations and then carrying out calculations based on them.

A study by Anamuah-Mensah and Apafo (2014) likewise revealed that students in Ghanaian senior high schools have difficulties in learning certain chemical concepts, including chemical combination. Approximately two-thirds of the students who took part in the study indicated that the topic chemical combination was either difficult to grasp or never grasped.

Findings from research conducted by Lazonby, Morris, and Waddington (2015), and Bello, (2013) have shown that students' persistent difficulties in solving stoichiometric problems are partly associated with their inability to represent chemical equations correctly.

Based on the above, it is clear that over the years, students have experienced serious problems when writing balance chemical equations even though this is a basic requirement in chemistry. Without the proper writing of the balance chemical equation, students cannot subsequently solve or analyze equations. This study thus investigates how students write balance chemical equations given that this skill is central to the development of further chemistry knowledge and skills using Online – Merge – Offline (OMO) classroom model.

Online – Merge – Offline (OMO) classroom model it is the integration of offline teaching effects with online teaching data, and connect all data including offline education, online courses, dual teacher classrooms, and application to form a comprehensive online and offline linkage system. It provides students with high-quality, full-scene, and personalized learning experiences.

According to the founder and CEO of Ai Learning Group, Xu Cheng (2020), the ultimate goal of Online – Merge – Offline (OMO) classroom model is to ensure the best learning results. He stated that Online education should adhere to the same value pursuit as offline education.

Online-Merge-Offline (OMO) is about bridging the gap between online and offline platforms to allow better utilization and cost efficiency without much sacrifice of leaner experiences.

In China the OMO model has transformed the education industry, as it did for many other industries such as mobile payment, shared transportation and autonomous retail (ClassIn, 2020). More and more educators begin to perceive that the core business of schools is to provide students with a learning environment that is open, respectful, caring and safe (OECD, 2006, 2015). In open learning environment, learning activity is a context-dependent exercise that is invariably grounded in the situation, environment and culture. In this kind of culture, new knowledge is realized, acquired and used appropriately (Kasvio, 2011; Zhang et al., 2016). The development of virtual (online) and physical (offline) learning environment has allowed learners at all levels of schooling to access to global communications and various resources. In this case, the combination of online and offline (OnO) features could be regarded as Online – Merge – Offline (OMO) classroom model.

However, that is not enough or supportable for open education in modern society – which is responding to the latest evolution of the internet, the so-called Web 2.0. A learning environment of open education in the context of Web 2.0 is not only an Online-Merge-Offline (OMO) classroom platform that expands access to all sorts of resources from offline to online (and vice versa) but also an interactive environment blurring the boundary between producers (e.g. traditional teachers) and consumers (e.g. traditional students) of content (Seely and Adler, 2008). Therefore, the school environments should be more open, adaptable and flexible for teachers and students (Yang et al., 2018; Zhang et al., 2016; Zhu, 2016). Design of school and classroom is not just a concept of architect, it can and should also care about students' learning needs, teachers' practical necessities and expectations of communities (OECD, 2015). The key issues of constructing appropriate learning environment are not only tech-rich or tech-enabled classrooms, but also learners' OnO access to necessary digital resources, receive relative learning guidance and suggestions at the right time, and interact with teachers and peers anytime anywhere.

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For example, traditional classroom activities confine teaching to a fixed place and are implemented by teachers facing the same student groups in a classroom. In open education, with the emergence of smart classroom (e.g. live classroom and broad-casting), schools can use a live-broadcasting classroom for multi-campus teaching, urban and rural teaching, give full play to the role of outstanding teachers, enable the share of outstanding teaching resources and solve the problem of unbalanced resource distribution and unreasonable allocation (Xie, 2018; Zhang et al., 2016).

However, Petraglia (1998) argued that instructional designers (or educational technologists) sometimes tended to overlook the original, fundamental, epistemological ideas of constructivism. This means that when the design of an online learning environment is ultimately separated from learners' real-life environments, it is inevitably challenging to make online learning authentic. The notion of online to offline (O2O) was proposed by Alex (2010) attracting attention of education, academia and industry. To take the advantages of O2O ideas, Zhu (2016) found that students' learning interest and informal learning behavior could be encouraged by a mobile social network APP. However, considering practical situations in open-education courses, some scholars stated that it would be hard to ensure students' engagement in learning when just heavily relying on online activities (Lee, 2018; Yang et al., 2018). That points to a gap between accepted theoretical ideas of effective online learning and actual pedagogical practices in most of higher-education institutions that are providing online/blended courses to the public (Lee, 2018; Zhang et al., 2016).

In summary, in many classes of open education, teachers' teaching and students' learning mainly are conducted online. However, the interaction and activities in classrooms still play a role in people's learning process. In addition, how to develop a space that can fully support online-merge-offline (OMO) teaching and learning activities for better experience in open education still lack successful cases. As to the design of classroom, although various innovative technology tools are embedded in many so-called smart classrooms or smart learning environments, few practical studies have been done on comprehensive issues such as teaching, learning and management experience. Therefore, the purpose of this study was to explore a new feasible framework of online-merge-offline (OMO) that indicated design principles to build a classroom to meet practical needs of students to development of further chemistry knowledge and skills in writing balance chemical equations among Grade 9 Students of Graceville National High School.

ACTION RESEARCH QUESTIONS

This study aims to determine the effectiveness of online – merge – offline (OMO) classroom model as innovation to improve students' mastery level and attitude in teaching balancing chemical equation.

Specifically, it sought to answer the following questions:

1. What is the student level of mastery based on the pre-test and post-test results using Online – Merge – Offline (OMO) Classroom Model teaching Balancing Chemical Equation?
2. Is there a significant difference that exists between the pre-test and post-test results of using Online – Merge – Offline (OMO) Classroom Model in teaching Balancing Chemical Equation?
3. What is the attitude of the students towards the utilization of the Online – Merge – Offline (OMO) Classroom Model in teaching Balancing Chemical Equation?

METHODS

This study will address the effectiveness of online – merge – offline (OMO) classroom model as innovation to improve students' mastery level and attitude in teaching balancing chemical equation. One-group pre-/posttest design will be used, a variation on this design only a single set of participants is measured on a dependent variable of interest, exposed to a treatment or intervention, and then measured again to determine the change or difference between the initial (pre-) and second (post-) test. If the pretest and posttest scores differ significantly, then the difference may be attributed to the independent variable (Samosa, 2020).

More so, the study involved thirty (30) Grade 9 students who enrolled in K to 12 Curriculum and taught in morning session. This class of Grade 9 students at Graceville National High School for school year 2018 - 2019 was chosen in this study in which those subjects belong to heterogeneous group of classes.

On the other hand, data was based on the test designed by the researchers and the 5- Likert scale attitude survey to measure the perceived acceptability of using Online – Merge – Offline (OMO) Classroom Model towards acquisition of knowledge and skills in balancing chemical equations.

. It contained twenty-five (25) unbalanced chemical equations. This was administered before the treatment and after the treatment. The test was used as pre – test and post-test. The (BCEAT) was to

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measure the learners' ability to recall, relate, and apply any of information received during the treatment. The trial test of (BCEAT) reveals its reliability coefficient of 0.81 using Cronbach's alpha after its administration on set of students different from those in the study.

Meanwhile, the researchers filed a request letter for approval to conduct action research to the Principal of Graceville National High School duly noted by representatives from Bulacan State University-Sarmiento Campus. After retrieving the signed letter, orientation of selected student participants with the supervision of their science teacher and the research adviser is done.

The procedure of the study involved three phases: pre-assessment phase, the experiment phase, and the post-assessment phase. The Pre-Assessment Phase consists of a given pretest on the topics of balancing chemical equations in order to assess their level of academic performance before the conduct of the study. The Experimental Phase is characterized by the researcher using Online – Merge – Offline (OMO) Classroom Model in teaching balancing chemical equations to treat the group. The Post – Assessment Phase consists of a given posttest on the topics of balancing chemical equations in order to assess their level of academic performance after the conduct of the study.

After the implementation of Post – Assessment Phase, the researchers utilized the students attitude test to identify the perceived acceptability of using Online – Merge – Offline (OMO) Classroom Model towards acquisition of knowledge and skills in balancing chemical equations.

After the implementation of Post – Assessment Phase, the researchers utilized the attitude survey to identify the perceived acceptability of using Online – Merge – Offline (OMO) Classroom Model towards acquisition of knowledge and skills in balancing chemical equations.

To describe quantitatively the learners' performance level before and after the experiment using the Online – Merge – Offline (OMO) Classroom Model in teaching balancing chemical equations. Weighted Mean was used to determine the effectiveness of Online – Merge – Offline (OMO) Classroom Model in teaching balancing chemical equations and the attitude towards the utilization of the Online – Merge – Offline (OMO) Classroom Model in teaching Balancing Chemical Equation. t- test was used to determine if there is a significant difference between the pretest and posttest mean scores of the students

RESULTS AND DISCUSSIONS

The data acquired in this investigation was rigorously evaluated and interpreted to ensure transparency and correctness.

Table 1 The Students' Level of academic performance of the students based on the pre-test and post-test results using Online – Merge – Offline (OMO) Classroom Model teaching Balancing Chemical Equation.

	MEAN SCORES	STUDENTS' LEVEL OF ACADEMIC PERFORMANCE
PRETEST	84.13	Moving Towards Mastery
POSTTEST	93.93	Closely Approximating Mastery

Table 1 shows the pretest and posttest mean score of the learner respondents before and after the employing the online – merge – offline (OMO) classroom model teaching balancing chemical equation. The tabulated data revealed in pretest were 84.13, then in posttest were 93.93. Thus, they gained 6.18 % of the possible percentage points they could have gained from pre to post assessment. More so, it can be concluded that online – merge – offline (OMO) classroom model had a positive effect on teaching balancing chemical equation, as evidenced by the significantly greater mean in the posttest than in the pretest.

The findings of the study were supported by Lorenzo (2017) that the students from online – merge – offline (OMO) classroom model perform excellently in their activities and very good in their quizzes and final grades.

Table 2: Test of significant difference that exists between the pre-test and post-test results of using Online – Merge – Offline (OMO) Classroom Model in teaching Balancing Chemical Equation

t–computed value	t–critical value	Decision	Probability Level	Verbal Interpretation
18.92332	**2.045**	**Null hypothesis is rejected**	**P < .05.**	**Significant**

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The abovementioned tabulated data showed the computed t –value obtained of 18.92332 is statistically significant against the tabular value of 2.045 at 0.05 level of probability. This means that there is a difference between pretest and posttest scores in the balancing chemical equation that exposed to Online – Merge – Offline (OMO) Classroom Model. Thus, the null hypothesis (H_0) is rejected.

In line with the study of Rabacal (2018) that the graduate students' academic performance was greatly influenced by the use of online-merge-offline (OMO) classroom model. More so, Hinampas et. al (2018) find the effect of Online-Merge-Offline (OMO) Classroom model on students' academic achievement and practical skills in science laboratories.

This evidence is provided to suggest that online-merge-offline (OMO) classroom model is potentially meaningful when utilized as medium of instruction to enhance both the viability and productivity of significant learning outcomes.

Table 3: Attitude of the students towards the utilization of the Online – Merge – Offline (OMO) Classroom Model in teaching Balancing Chemical Equation

	MEAN SCORE	INTERPRETATION
ATTITUDE	4.47	Positive attitude

The Table 3 established the attitude of the students towards the utilization of the online – merge – offline (OMO) classroom model in teaching balancing chemical equation.

Taking Aside, the data presented on the table showed that students have positive attitude in learning balancing chemical equation based on the mean score 4.47, it indicates that utilization of online – merge – offline (OMO) classroom model, the students has enjoyed, appreciated, and interested in learning concepts.

Javier & Dirain (2018) confirmed that positive attitudes on online-merge-offline (OMO) classroom model has been found contributory to high utilization of Edmodo as medium of instruction. Concomitant to Xiao, Lin & Cheng (2019) that the Online-Merge-Offline (OMO) Classroom for Open Education revealed that all the student participants had a positive attitude towards their learning experience in the classroom.

From these findings it is clear pathways for prospective use online-merge-offline (OMO) to other educational institution in the Philippines to integrate towards its vision of educating for the best.

CONCLUSIONS

The research results of and discussion on the effectiveness of Online – Merge – Offline (OMO) Classroom Model in Teaching Balancing Chemical Equation to Grade 9 students draw several conclusions.

1. The Grade 9 students showed a closely approximating mastery as exposed to online – merge – offline (OMO) classroom model had a positive effect on the teaching balancing chemical equation
2. Utilization of online – merge – offline (OMO) classroom model had a positive effect on the teaching balancing chemical equation among Grade 9 students as evidenced by the significantly greater mean in the posttest than in the pretest.
3. There is significant difference in the pretest and posttest score of students in the utilization of online – merge – offline (OMO) classroom model had a positive effect on the teaching balancing chemical equation.
4. The students have positive attitude in learning balancing equation as exposed to online – merge – offline (OMO) classroom model.

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