Differentiated Instruction in Plane Trigonometry Class

Julita Notarte-Alburan

1University of Eastern Philippines-PRM Campus, Catubig, Northern Samar, 6418, Philippines.

Author’s contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/ARJOM/2020/v16i1230254

Editor(s): (1) Dr. Ruben Darío Ortiz Ortiz, Universidad Michoacana de San Nicolas de Hidalgo, Mexico.

Reviewers: (1) G Donald Allen, Texas A&M University, USA.
(2) Unodiaku, Stanlis Sochima, Enugu State University Of Science And Technology (Esut), Nigeria.

Complete Peer review History: http://www.sdiarticle4.com/review-history/64796

Received: 12 November 2020
Accepted: 23 January 2021
Published: 10 February 2021

Abstract

This study aimed to determine the effectiveness of differentiated instruction on students’ achievement in Plane Trigonometry. It tried to determine the pretest and posttest performance of experimental and control groups, the difference on scores of students in the pretest and in the posttest, and the difference from pretest to posttest scores in the two groups of students. The quasi-experimental design was used in the study. Two intact class of first year college students enrolled in Plane Trigonometry in School Year 2017-2018 were purposively sampled and used for the study. One class was randomly assigned to experimental group while the other served as the control group. Instructions were made using flexible groupings and varied formats (cooperative learning, individual or group projects, and whole-class discussion) with various strategies such as agenda, compacting, cubing, vocabulary choice boards, tier assignment, think-tac-toe, and RAFT activity. The students explored, collaborated, worked in pairs or groups in different activities. Data were tabulated and analyzed using frequency counts, percentages, and t-test for independent samples with the aid of the statistical package for Social Sciences (SPSS) software. The findings revealed that the experimental group and control groups showed significant improvement in students’ performance in plane trigonometry. However, the score suggested that the improvement of the scores under the experimental group was defined and noticeable. Generally, the results revealed that students who were taught differentiated instruction performed better than those taught using the conventional instructional approach.

Keywords: Differentiated instruction; traditional instruction; plane trigonometry.

*Corresponding author: E-mail: julitaalburan9@gmail.com;
1 Introduction

Individual differences in academically related characteristics can make a success or failure in one of life’s most important pursuits—obtaining an education. Adolescents are in varied stages of development such as physical, emotional, cognitive and social as they move from childhood to adulthood. A teacher happens to be one of the persons directly involved in the development of a child. With increasing complexity of problems, expectations from the teachers are also on the rise. The teacher should create a learning environment where student differences are seen as opportunities not as difficulties.

However, in a closer look at the college classrooms today, most of the teachers are engaged in conventional approach to teaching. There is an assumption that all students have the same capacity and rate of learning. Students are not given the opportunity to develop, improve and learn according to their own capacity of understanding and rate of completing and learning a task or knowledge. According to Wilson [1], the lecture-discussion method is the least instructional strategy with only 5 to 10 percent retention of lesson after 24 hours. This method demonstrate major problems for the slow, average, and advanced learners. The slow or struggling learners are faced with high expectations of the school system but are left alone in their own devices to figure out how to cope with these expectations. The fast learners, on the other hand have to catch up and as a result, they are limited for learning more complex and challenging concepts and skills.

Traditional instruction may not be outdated but because of the advancement of technology, students’ way of life is changing, so is their behavior towards learning. This dilemma is aggravated by several factors that affect both the teacher and the students’ performance. The lack of reference, inadequate facilities, class size, inappropriate teaching strategies, overloaded teaching assignments, and learners’ negative attitude towards mathematics are just some of the problems arising in classroom which create a problematic situation resulting to learners’ poor performance in mathematics.

During the 2006 State of Education Address, Lapuz [2] admitted that the quality of education in the country had sunk to its lowest level. He said that students continue to perform poorly as revealed by the ranking in the Trends in International Mathematics and Science Study (TIMSS) and the lackluster in the National Achievement Test. This confirms within University of Eastern Philippines—Pedro Rebadulla Memorial Campus based on the registrar’s records, that the performance of the students in Plane Trigonometry class has been low for the last three years (academic years 2014-2016) with a weighted mean of 2.75 or equivalent to seventy-nine percent (79%). As such, students’ achievement in trigonometry an mathematics in general is a great concern of the education stakeholders.

This situation suggests methods used by teachers in teaching geometry and mathematics in general have failed over the trends of poor performance of students on the subject. There is need therefore to sought for alternative method/approach that can enhance the performance of students on the subject.

Therefore, different methods and approaches of teaching mathematics have been proposed by educators to improve teaching strategy. For instance, a teacher can adopt a teaching approach which considers the nature of students, their interest and maturity, and the availability of resources. Differentiated instruction appears to be the most suitable for this approach. For instance, Tomlinson (1999), a leading expert in this field, noted that differentiated instruction is a student-centered approach used to reach and engage students based on their diverse interests, strengths, weaknesses, and how they learn best. Students are more motivated to learn when they feel a connection to what is being taught and when they believe that they can be successful. However, if the task is too easy, they feel bored, and if the tasks are too difficult, they become frustrated. She stressed that educators are diagnosticians, prescribing the best possible learning for their students. The situation suggests that alternative approach to traditional method of teaching trigonometry is inevitable. Such approach as differentiated instruction can hopefully provide possible learning outcomes for the students and hence enhance their performance on the subject.
Students learn and process information in different ways. It is important that educators utilize a wide variety of teaching activities to address learning preferences of the students and teaching them with an informed awareness of those differences. This can assist students to achieve better academic result and improve their attitudes towards learning [3]. There is no specific study on differentiated instruction known to the researcher has been conducted in the graduate studies of the College of Education, University of Eastern Philippines.

This study determined to evaluate the effectiveness of applying differentiated instruction among freshman students enrolled in Plane Trigonometry class. Specifically, it aimed to: (1) determine the pretest performance of the experimental and control group of freshmen students; (2) find out the significant difference in the pretest performance of the experimental and control group; (3) determine the posttest performance of the experimental and control group; (4) find out the significant difference in the posttest performance of the experimental and control group; and (5) find out the significant difference in the performance between pretest and posttest of the two groups of students.

To answer questions based on this experimental study, the following null hypothesis were tested: (1) there is no significant difference in the pretest performance of the experimental and control group of freshmen students; (2) there is no significant difference in the posttest performance of the experimental and control group of freshmen students; and (3) there is no significant difference between the pretest and posttest performance of the experimental and control group of freshmen students.

2 Methodology

Locale of the Study: This study was conducted in the University of Eastern Philippines Pedro Rebadulla Memorial Campus, a satellite campus of the UEP Main in Catalan, Northern Samar. It is situated north west of the municipality. It has a total land area of 706,055 square meters which comprise the school, plantation, and crop and animal production. Currently the UEP-PRMC offers six courses in the college level namely: Bachelor of Science in Agriculture, Bachelor of Science in Industrial Technology, Bachelor of Science in Hospitality Management, Bachelor of Science in Criminology, Bachelor in Elementary Education, and the school has a Laboratory High School because of its Education program. The UEP-PRMC Laboratory High School offers the Basic Education Curriculum of the Junior High School and two strands in the Senior High School Curriculum, the General Academic Strand (GAS), and the Science and Technology, Engineering and Mathematics (STEM) strand.

Research Design: The study adopted a Quasi-experimental research design in comparing two variables, the control and the experimental group using the pre-test and post-test. This is to determine the effectiveness of differentiated instruction in terms of improving the academic performance of the students in the experimental group. Non-equivalent group design using purposive sampling technique was employed in two groups, heterogeneous in nature, in freshman students that the researcher was teaching.

| GROUPS                      | PRE-TEST | X   | POST-TEST |
|-----------------------------|----------|-----|-----------|
| Experimental Group          |          | X   |           |
| (Differentiated Instruction)|          |     |           |
| Control Group               | 0₁       |     | 0₂        |
| (Traditional Instruction)   |          |     |           |

![Fig. 1. Two group pretest-posttest design](image)

The Variables of the Study: Generally, there were two variables included in this study, the independent and dependent variables. The independent variables were the traditional lecture method and the differentiated instruction. The dependent variables were the mathematics performance of the freshmen college students.
Population and Sampling: The participants in this study were the two (2) intact section of college freshman students enrolled in the second semester school year 2017-2018 of the University of Eastern Philippines – Pedro Rebadulla Memorial Campus. The students’ subjects were assembled according to their class schedule. This study followed the quasi-experimental design procedure where groupings of the students were based on the actual class.

Subjects of the Study: the subjects of the study were two (2) classes of students taking Plane Trigonometry during the second semester, school year 2017-2018. One class composed of BS Criminology of forty-seven (47) students served as experimental group. The other class was a combination of BS Industrial Technology of twenty-one (21) and BS Agriculture of twenty (20) students which served as the control group. The experimental group was exposed to differentiated instruction while the control group was exposed to traditional method of instruction. Both classes met twice a week having one and half hour per session, a total of fifteen hours for two months.

This study made use of the following strategies for differentiating instruction: agenda, compacting, cubing, exit cards, jigsaw, learning centers, tiered assignment, think-pair-share, and RAFT activity as specified below:

Agenda includes three sets of practice problems. The first group is called imperatives, and students complete all of the problems. This set of the problem is generally a review of the basic concepts. The second section is called negotiables, which generally includes three problems of varying difficulty. Students select at least two problems to complete based on their interest. The last section is options, which includes an optional, more challenging problem. Depending on each student’s progress, the number of problems assigned can be varied.

Compacting is a three-step process that (1) assess what a student knows about the material to be studied and what the student still needs to master, (2) plans for learning what is not known and excuses the student from what is known, and (3) plans for freed-up time to be spent in enriched or accelerate study.

Cubing is a method of instruction that allows teachers to provide six concepts or ideas to students in a simple way. Cubing is a great tool for providing differentiated instruction.

Exit cards require students to answer particular questions on a piece of paper that is turned in before they leave the class. These cards provide teachers with immediate information that can be used to assess students’ understanding, monitor students’ questions or gather feedback on teaching.

Jigsaw is cooperative learning technique that reduces racial conflict among school children, promotes better learning, improves students motivation, and increases enjoyment of the learning experiences.

Learning centers can be “stations” or collection of materials learners use to explore topic or practice skills. Teacher can adjust learning task to readiness levels of learning styles.

Role Audience Format Topic (R.A.F.T.) is a writing strategy that helps students understand their rules as writers, the audience they will address. The varied formats for writing and the topic they will be writing about. By using the strategy, teachers encourage students to write creatively, to consider a topic from a different perspective and to gain practice writing for different audiences.

Think-Tac-Toe is a strategy that harnesses the visual pattern of the “tic-tac-toe” game into means of producing a variety of products to broaden students understanding of instructional content, to challenge students who already have some mastery of a subject, and provide a variety of means to assess student mastery in a way that is fun and unusual.

Tiered assignment is a strategy in a heterogenous classroom wherein teacher uses varied levels of activity to ensure that the students explore ideas at a level that builds on their prior knowledge and prompt continued growth.
The experiment was formally started on the first day opening of the classes was conducted within fifteen (15) hours of alternate schedule of classes or approximately eight (8) sessions as indicated in the course syllabus. Before the pretest was conducted, a letter to the Executive Director through the Chair of Criminology Department was submitted to allow the researcher to conduct the study. The researcher administered a pretest composed of 50 items multiple choice questions to both groups in order to determine the comparability of students’ performance before subjecting them into experimentation. Another 5-item pre-assessment given to the experimental group served as the basis of groupings and entry points in adjusting the instruction to a particular topic. Varied instructional materials and formats were provided to the students in each lesson. Thus, they were grouped according to students’ background knowledge and abilities.

**Research Instrument:** To be able to gather from the control and the experimental groups’ sufficient data for analysis, the researcher utilized the diagnostic test to determine students’ readiness before subjecting them to instruction. The research instrument used a 50-item multiple choice test. A table of specification (TOS) was used to develop the items to serve as a guide in determining the distribution and cognitive level of questions. The level of difficulty was classified as 30% easy, 40% average, 30% difficult of the test was patterned from the College of Engineering which as distributed to the school by the Vice President for Academic Affairs as sample. The instrument was organized into two sections (A and B). The topic in the two chapters are the following: Chapter I - Introduction to Trigonometry/Angles and its application covers twenty (20) items; Chapter II - Trigonometric functions consist of thirty (30) items.

**Scoring and Interpretation of Data:** The instruments were scored and interpreted as follows: Pre-test and Post-test. The pre-test and post-test scores of the two groups were transmuted and interpreted according to the standard rating system specified in the University Student Manual.

| SCORE | INTERPRETATION |
|-------|----------------|
| 41-50 | Outstanding    |
| 31-40 | Very Satisfactory |
| 21-30 | Satisfactory   |
| 11-20 | Fair           |
| 0-10  | Poor           |

The instrument was face-validated and reviewed by the Mathematics teachers in the UEP-main campus. A trial run of the achievement test was done with a group of College of Education students, who did not form part of the main study, to determine the language suitability of the items, the clarity of the test directions, and the sufficiency of the time for the test. An item analysis followed based on students’ responses.

**Data Gathering Procedure:** Three groups of students were given worksheets but of different level all throughout the eight (8) sessions. Students with less than adequate knowledge were given freedom to choose problems they can easily be solved. Students with adequate understanding of the activity but needed more practice for mastery of the topic were given more complicated and challenging tasks. Every worksheets being distributed to experimental group were the same worksheets given to the control group.

This study made use of the following strategies for differentiating instruction: agenda, compacting, cubing, think-pair-share, think-tac-toe, learning centers, exit cards, tiered assignment, RAFT activity, and some other beneficial and effective teaching strategies that were deemed responsive to students’ differences in terms of their readiness level. Assessment and learning evaluation were integrated in the instruction through reflection exit cards.

Varied activities such as individual or group projects and research works were given to extend learning. An individual project presentation was made using vocabulary choice boards. The presentations were based on students’ choice of interest (graphic organizer, news broadcast, nature survival guide, creative story, poster board, rap or song, and acting out. For group projects, students interviewed professionals like engineers, architects, and even criminology specialist to learn how trigonometry was being used in their careers. Students identified the misconceptions and offered ways to address the misconceptions. Each group was
asked to address the misconceptions. Some of the misconceptions of students in trigonometry class are improper use of equations, order of operations, and place value of sine, cosine, misused data, misinterpreted language, and distorted definition. Each group was asked to evaluate their classmates’ presentations-based rubrics. Students also keep learning journals to respond to guide questions every after the chapter was finished.

On the other hand, students in control group were taught using the traditional lecture discussion method. The teacher-researcher discussed the lessons in the lecture format and students were given seatwork and written activities. Some students were also asked to explain to the class their solutions in a particular word problem in trigonometry. Furthermore, students were given a written quiz at the end of each lesson.

**Statistical Treatment**: The data gathered in this study were tabulated and analyzed using frequency counts, percentages, t-test for independent samples, and t-test for paired comparisons with the aid of Statistical Package for Social Sciences (SPSS) software. T-test for independent samples was utilized to determine the significant between the pretest and posttest of the subjects and the performance in Mathematics of first year college students of the University of Eastern Philippines-PRMC.

### 3 Results and Discussion

#### 3.1 Performance in the pretest of the two groups of students

Table 1 shows the pretest scores of the subjects in this experimental study. In the experimental group, out of 47 students, 21 or 44.68 percent got fair performance and 26 or 55.32 percent got poor performance in the pretest. In the control group, out of 41 students, 20 or 48.78 percent of the students performed fairly while 21 or 51.22 performed poorly in the pretest. This means that students in the experimental group have poor background in basic mathematics and college algebra than the control group.

| Level of performance | Experimental Group | Control Group | Total |
|----------------------|--------------------|---------------|-------|
|                      | F                  | %             | F     | %     | F     | %     |
| Fair                 | 21                 | 44.68         | 20    | 48.78 | 41    | 46.59 |
| Poor                 | 26                 | 55.32         | 21    | 51.22 | 47    | 53.41 |
| Total                | 47                 | 100.00        | 41    | 100.00| 88    | 100.00|

#### 3.2 Comparison of pretest performance of the experimental and control groups

Table 2 showed the t-test for independent samples used to test for experimental and control groups of students. The computed value of $t= 1.02$ (sig. = 0.308) with a margin of error of $=0.05$ was found not significant. The null hypothesis therefore is not rejected which means that there is no significant difference on the pretest scores between the experimental and control group. (12.72) was not significantly different from the mean score of the control group (13.32). This finding indicate similarity on the performance of student prior to the actual intervention. It can be inferred two groups of students have similar abilities and are therefore comparable.

| Time  | Group     | Mean | SD  | Diff. | $T_{cal}$ | Sig.  | Interpretation |
|-------|-----------|------|-----|-------|-----------|-------|----------------|
| Pretest| Experimental | 12.72| 2.73| -0.60 | 1.02      | 0.308 | Not Significant |
|       | Control    | 13.32| 2.62|       |           |       |                |
3.3 Performance in the posttest of the two groups of students

Table 3. Posttest performance of the two groups of students

| Level of performance | Experimental Group | Control Group | Total |
|----------------------|--------------------|---------------|-------|
|                      | F  | %     | F  | %     | F  | %     |
| Satisfactory         | 20 | 42.55 | 3  | 7.32  | 23 | 26.14 |
| Fair                 | 27 | 57.46 | 33 | 80.49 | 60 | 68.18 |
| Poor                 | 0  | 0.00  | 5  | 12.19 | 5  | 5.68  |
| Total                | 47 | 100.00| 41 | 100.00| 88 | 100.00|

Table 3 shows the posttest scores of the students in this study. In the experimental group, out of 47 students, 20 or 42.55 percent of the students got satisfactory performance, 27 or 57.46 performed fair and no one performed poorly in the posttest. In the control group, out of 41 students, 3 or 7.32 percent got satisfactory rating, 33 or 80.49 percent performed fair and 5 or 12.19 percent performed poorly in the posttest. It means that experimental group had better performance in the posttest than control group. It further means that differentiated instruction have positive impact on experimental group resulting to more satisfactory performance than those students in the control group.

3.4 Comparison of posttest performance of the experimental and control groups

Table 4. Comparison of posttest performance of the experimental and control groups

| Time       | Group       | Mean | SD  | Diff. | T_cal | Sig.  | Interpretation |
|------------|-------------|------|-----|-------|-------|-------|----------------|
| POST-TEST  | Experimental| 25.55| 5.00| 5.65  | -5.20 | 0.000| Significant    |
|            | Control     | 19.90| 5.18|       |       |       |                |

Table 4 shows the t-test for independent samples used to test for significant difference in the posttest performance of the experimental and control groups of students. The computed value of t= -5.20 (sig. =.000) with a margin error of =0.05 was found highly significant. The null hypothesis therefore is rejected which means that there is a significant difference on the posttest scores between the experimental groups. The mean score of the experimental group (25.55) was significantly higher from the mean score of the control group (19.00). This finding indicates better performance on the part of the students with intervention. It means that there is significant increase in the posttest performance of the experimental group compared with the control group.

3.5 Difference from pretest to post-test performance of the experimental and control group

Table 5. Test of difference from pretest to post-test performance of the experimental group

| Time       | Group  | Mean | Diff. | t  | Sig.  | Interpretation |
|------------|--------|------|-------|----|-------|----------------|
|            | Pre-test| 12.72| -12.83| -36.95| 0.000| Significant    |
|            | Post-test| 25.55|       |       |       |                |

Table 5 shows the t-test for paired comparisons was used to determine the significant difference in the performance of the experimental group from pretest to posttest. The computed value of t= -12.83 (sig. =0.000) with a margin of error of =0.05 was found highly significant. The null hypothesis therefore is rejected which means that there is significant improvement on the scores of the students from pretest to posttest. The mean scores of students in the posttest (25.55) was significantly higher from their mean score in the pretest (12.72). This finding mean that differentiated instruction had improved the learning performance of the students in plane trigonometry.
Table 6. Test of Difference from pretest to post-test performance of the control group

| Time     | Group   | Mean | Diff. | t    | Sig.   | Interpretation |
|----------|---------|------|-------|------|--------|----------------|
| Control  | Pre-test| 13.20| -6.58 | -15.83| 0.000  | Significant    |
|          | Post-test| 19.90|       |       |        |                |

Table 6 shows the t-test for paired comparisons used to test for significant difference in the performance of the control group from pretest to posttest. The computed value of t= -6.58 (sig. =0.000) with a margin of error of =0.05 was found highly significant improvement on the scores of students under control group from pretest to posttest. The mean score of students in the post test (19.90) was significantly higher from their mean score in the pretest (13.32). This mean that using differentiated instruction significantly improved students’ performance in Plane Trigonometry.

Fig. 2. Estimated means of experimental and control groups from pretest to post-test

Besides, on these findings, it is obvious that the intervention made using differentiated instruction had positive effect on students’ mathematic performance. As seen in Fig. 2 that prior to the intervention, pretest scores of experimental and control groups were almost similar. However, the improvement of students’ performance under experimental group exposed to differentiated instruction was more defined and noticeable. Results of the mean scores of strategy that of think pair share in the experimental group was 7.44 while the control group was only 4.37; in compacting the experimental group was 5.50 while the control group was 4.20; in cubing, the experimental group got 6.50 while the control got 5.12; in learning centers the experimental group got 8.42 while in the control group got 5.98; in agenda the experimental group got 12.45 while the control group got 9.39, which showed a greater mean percentile score of all the strategies. The findings of this study, therefore, indicate that they are consistent with results of similar research reviewed in literature. It confirmed Tomlinson’s [4] findings that in the differentiated classroom, the teacher plans and carries out varied approaches to content, process and product in anticipation of and response to student differences in readiness, interest and learning needs.

Likewise, the findings of the study corroborate with that of Cox [5] affirmed that differentiating the classroom environment may provide a student with more inviting atmosphere to learn. Moreover, it confirmed Aranda and Zamora’s [6] findings that differentiated instruction based on different learning styles was effective in teaching Filipino subject to grade ten students. Also it confirmed Muthomi and Mbugua’s [7] findings that differentiated instruction improved the curriculum and enhanced strategies and approaches in teaching secondary mathematics in Kenya.
4 Conclusion and Implications

Based on the results, it is concluded that in the pretest, students in the experimental group obtained lower mean score compared with their counterpart. This means that students in experimental group had poor background in basic skills in college algebra being the prerequisite subject compared with those in control group. Students in the experimental group in posttest had better performance than those in control group. This means that differentiated strategies employed in the classroom instruction provided students exposed to it with better opportunity to learn mathematics by themselves; enabled them to acquire appropriate procedural problem; develop in them self-confidence, interest and cooperation. Clearly, even college students benefited from engaging in a variety of activities that encourage students’ readiness to learn mathematics. This confirms the study of Leonardo, Nivera, and Reyes that students taught. Differentiated instruction had significant higher achievement in Trigonometry than those who were taught using the lecture-discussion method. Therefore, differentiated instruction can approach in supporting learners’ diverse needs for it consistently and positively affective students’ mathematics performance. It gives students hands-on learning, more opportunities to communicate and get along with others. It also acknowledges not only the strength and the differences among learners, but also the increasing diversity in the modern classroom. Hence, teachers must employ differentiated instruction in older classes especially in the content, activities, and assessment in mathematics in order for the learners to increase their achievement and for them to be successful.

Competing Interests

Author has declared that no competing interests exist.

References

[1] Wilson L. Models of Teaching and Learning, USA; 2012.
[2] Lapuz JA. Second national ICTs in Basic Education Congress; 2006. Retrieved on September 6, 2017 from Available:http://fit. Ed. Org/congress 2006/messages-home.hmt.
[3] Gregory GH, Chapman C. Differentiated instructional strategies. USA: Corwin; 2013. Retrieved on September 6, 2017 Available:https://books.google.com.ph/books
[4] Tomlinson, Carol Ann. Fulfilling the promise of the differentiated classroom. ASCD; 2003. Retrieved on September 7, 2017 Available:http://images.schoolinsites.com/SISFiles/Schools/TN/GreenevilleCity/GreenevilleHigh/Uloads/DocumentsCategor ies/Documents/Think%2BTac%2BToe.pdf
[5] Cox SG. Differentiated instruction in the elementary classroom. Education Digest: Essential. Daily Jigsaw Puzzles.net; 2008. Accessed on September 6, 2017 Available:https://www.dailyjigsawpuzzles.net/about-jig saw• puzzles.html
[6] Aranda R, Zamora J. Using differentiated instruction in improving the academic performance of Filipino language; 2016. Retrieved on August 23, 2017. Available:www.national.u.edu.ph/wp-content/uploads/2016/08/JSTAR-
[7] Muthomi MW, Mbogna ZK. Effectiveness of differentiated instruction on secondary school student’s achievement in mathematics. Meru County, Kenya; 2004.

© 2020 Notarte-Alburan; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here (Please copy paste the total link in your browser address bar)
http://www.sdiarticle4.com/review-history/64796