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Impact of project Fruitful Learning in Note-Taking (FLINT) on learners' performance in senior high school classes

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Abstract

This classroom-based action research was conducted to act on improving the learning performance of students in Senior High School (SHS) classes with the implementation of Project FLINT (Fruitful Learning in Note-Taking) which carried out the utilization of Cornell Note-Taking Method (CNTM) to serve as the intervening teaching-learning strategy. Employing a combination of qualitative and quantitative designs, this study involved purposively sampled 98 SHS students. They answered content-based quizzes, which served as the primary quantitative research instrument administered every after accomplishing Cornell notes and surveys and reflections as supporting qualitative research tools. Consonant to the problems set, it was ascertained that Cornell Note-Taking impacts learners' performance positively. Noise, lack of English comprehension skills, and multitasking emerged as the top 3 problems in Cornell Note-Taking. Further, the learners' performance, which was observed to improve in the duration of the research, significantly relates to learners' Cornell Note-Taking skills. Project FLINT had undoubtedly provided a 'spark' for students as they have shown remarkable improvement in their learning. Hence, when such a learning experience is sustained, a 'fire' in learning or more positive results are expected.

Keywords: *Action Research, Cornell Note-Taking Method, Learner's Performance, Senior High School Education*

Introduction

Twenty-first-century learning demands that learners should be very engaged in the learning process so that they would have a better grasp of the concepts undertaken for every lesson. Therefore, passivity in the learning process is discouraged as this would only result in mere attendance and no significant learning would ever take place. Instructional competence is a leading factor in the pursuit of better learning among students. However, it is also sensible to note cognizant of the fact, that the other side of the coin manifests the crucial role of students being one with the teachers as immediate actors of the educative process.

Hence, the teaching-learning process necessitates students' active involvement for it to be inclined to success primarily because the process is two-way and involves both the teachers as facilitators and the students as the clientele. This suggests that both stakeholders of the teaching-learning process must reinforce learning. Reinforcement has a very crucial role in giving meaning to learning. Such reinforcement primarily comes from an outside entity, the teacher, but it would give better meaning if students themselves reinforce their learning as well.

Therefore, students are expected to participate actively in classes. Such vigor can be exhibited through attentive listening,

recitations, performances, and note-taking. Of these, listening can be considered the most important followed and supported closely by note-taking. These are all geared, primarily, toward the retention of knowledge for lifelong learning, and assessment is one of the goals of education (Quintus, et.al., 2012). Notes provide students with tools for identifying and understanding the most important aspects of what they are learning (Marzano, Pickering, & Pollock, 2001). This is apparent especially that lecture, though considered traditional, knows no time and is a pervasive technique across learning areas especially for the presentation of content material (Frey, 2006; Konrad, Joseph, & Eveleigh, 2009).

In fact, in a study conducted by Boyle (2010) and Peverly, et.al., (2007), a large proportion of middle-school and high-school teachers use lectures to present important information and content areas. In consonance, it is widely accepted that in general education, teachers recognize that students must take notes and learn from lectures to do well in their classes, as lecture and note-taking are considered to be common ways of communicating material (Boyle, 2012). DeZure, et.al (2001) concur by considering note-taking a staple activity of academic life, particularly in lectures.

Nevertheless, it is observed that students' note-taking is reduced to a process of writing and copying everything on the board and lacks reflection. Students most of the time concentrate on note-taking and no longer pondering on what they have written. Furthermore, the notes are disorganized and are too informal which may not help students greatly in the recall of lessons in preparation for examinations and a higher level of thinking that connotes relation to prior knowledge. Thus, success in learning is limitedly observed despite the notes that they are taking. Such a situation, suggests the important assistance teachers, being facilitators of learning, could provide in fostering effective note-taking among students. Nevertheless, the success in learning through note-taking still lies on the students/note-takers themselves. Boch & Piolat (2005) and Boye (2012) consider note-taking to serve two purposes, to store information for later use and to aid reflection. Note-taking does not only mean recording information but to have something of your own added to it, thus reflection, which concretizes the learning. This is indeed suggesting that reinforcing learning gives better results in classes.

It is therefore very important that notes be generated by the students themselves, albeit guided by teachers because they better retain concepts in their minds and engage in a deeper understanding of the same (Katayama, 2005; Piolat, Olive, & Kellog 2005; Williams & Eggert 2002; Babb & Ross,2009). Students become immersed in the lessons and therefore influencing them to actively participate because they are personally involved in the learning process.

Generally, research on note-taking indicates that taking notes in class and reviewing those notes have a positive impact on student learning in general and have been found to increase academic achievement (DeZure, et.al., 2001; Boyle, 2007; Boyle, 2010). So, it is expected that teachers accord high importance to the skills of note-taking and listening, and believe that students should have these skills to be successful in class (Boyle, 2010).

Notes are summaries of the material gained through listening and observing during the lecture, and note-taking can also facilitate comprehension through internal connections made during the lecture (Faber, et.al., 2000; Piolat, Olive & Kellogg, 2004). Effective notes help students make connections to information that they already know (Faber, et.al., 2000). These reinforce prior or stock knowledge a student has which strengthens their memory and understanding of concepts. The good thing about this is that note-taking supports information processing and serves as a means of external storage for students to use in a review. Thereby, supporting their performance in examinations and other academic endeavors in a given course (Piolat, et.al.; Boyle 2010).

It is noted that the cognitive effort happening during the note-taking process adds effect to the learning. Boyle (2007) and

Boyle (2010) agree that the actual process of generating the notes is a learning aid and students who add details to their notes during this process find the content more meaningful. When students generate notes themselves rather than having materials given to them, their learning is enhanced (Piolat, et.al., 2004). The actual note-taking is seemingly to reinforce learning and even facilitate students' reflection about it. Contemplatively, note-taking even fosters metacognition (Makany, Kemp, & Dror (2008). Metacognition is the process or skill of thinking about thinking, knowing what we know, understanding how we learn, and being able to discern when and how to apply strategies for learning. (Niderberg, et.al. in Calderon, 2015).

Note-taking is a complicated process that combines comprehension with the production of notes, and this is dependent upon working memory (Piolat, et.al., 2004; Makany, Kemp, & Dror, 2009). It is advanced, therefore, that the activity will be streamlined and guided so that students' learning will be reinforced smoothly. Relatedly, Morrow (2012), in his study which aims to examine the effectiveness of supplying guided notes found out that an overwhelming majority of the respondent subjects felt that guided notes were so important to their success. Gray and Madson (2007), seemingly concur by proposing that when students are shown a structure for note-taking, it often improves the quality of their notes which in turn improves their performances.

This study, therefore, suggests a more formal and guided way of note-taking that would help learners to earn success. Formal note-taking involves a prescribed format that will not require students to only listen and write and copy whatever is discussed in a lesson, but to engage them as well by putting their thoughts in their notes.

Cornell Note-Taking Method is one of the note-taking systems that follow a format that guides students in the organization of ideas about topics. It was originally coined by William Pauk in 1974 to assist Cornell University students in their lecture classes to improve the organization of their notes (Majid Hayati & Jalilifar, 2009). The system facilitates important 5 R's namely: recording, reducing, reciting, reviewing, and reflecting. The recording is the actual jotting of notes as meaningful as possible, reducing is turning notes into concise jottings usually questions useful for reciting, reviewing, and reflecting (Majid Hayati & Jalilifar, 2009). This method facilitates an organized way of recording and reviewing notes about topics particularly those that are presented through lectures.

Strategically designed into two columns with 3 rows, the Cornell note is a guided form of note-taking that contains 3 major parts: the Note-Taking Area, the Cue Column, and the Summary. The Note-Taking Area is where learners put the lecturer's ideas and facts, the Cue Column is where the learners write questions matching main points in the actual notes, and the Summary, as the name denotes, is where meanings are clarified (Pauk, as mentioned in Quintus, et. Al., 2012). Cornell Note-Taking served as the strategy, adopted by the researcher, used in this action research which aimed to impact positively the performance of Senior High School learners. Expectedly influenced by Cornell Note-Taking, learners' performance is the behavior that was evaluated through content-based quizzes, reflections, and surveys in this study.

Objectives of the Study

Generally, this research investigated the impact of Project FLINT in improving learners' performance in Senior High School classes. Specifically, the following research questions were answered:

1. How does the use of the Cornell Note-Taking Method impact learners' performance in Senior High School classes?
2. What are the problems considered by the learners in using the Cornell Note-Taking Method?
3. Is there a significant relationship between the Cornell Note-Taking skills as measured by a 10-point rubric covering the three general skills of Recording, Recalling, and Reducing and the learners'

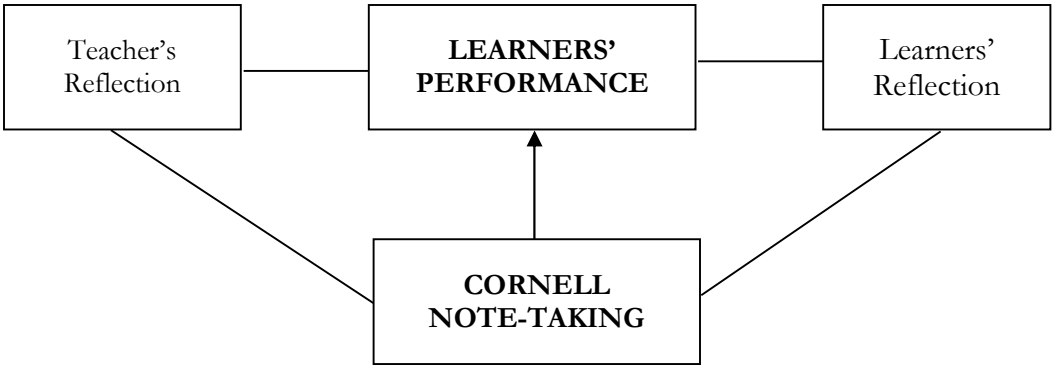
performance as measured by four 20-point content-based quizzes in Senior High School classes?

4. Are there significant differences in the performance of the learners in Senior High School classes as denoted by their scores in the content-based quizzes in the duration of the intervention?

Conceptual Framework

The following diagrammatic scheme guided the conduct of this research. The research operated on the following conceptual tags: Cornell Note-Taking, Learner's Performance, and Teachers' and Learners' Reflections.

Cornell Note-Taking Method was utilized to improve students' way of organizing their learning in the subject involved in this research. Its impact on their performance was assessed through content-based quizzes. In enriching the interpretation of the analysis of numerical data, the teacher-researchers and learners' reflections were qualitatively described.



With the aforementioned suppositions, the researcher took on setting the "spark" and consequently "fire" on learners' performance in Senior High School classes with Project FLINT or Fruitful Learning in Note-Taking.

Methodology

This study employed an action research method as the researcher aimed to respond to a learning barrier. Denscombe (2010) stipulates that an action research purpose is to solve a particular problem and to produce guidelines for best practices.

The total enumeration of the Grade 11 SHS population of the involved school was considered since the research did not only seek to find answers to the problems considered in this study but to expose every student to a project involving a learning strategy that is widely accepted to be engaging.

Such consideration is founded on the principles of purposive sampling which is a form of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research (Oliver, 2006).

Quantitative and qualitative data were gathered to satisfy the objectives of this research. For quantitative data, content-based quizzes were administered after each unit is finished. Moreover, a survey on learners' perceptions regarding the benefits and use of Cornell notes was administered.

On the other hand, qualitative data were primarily gathered through the Cornell notes themselves and from the overall reflection paper to be accomplished by the learners at the end of the last unit. The reflection paper was unrestrained. In like manner, incidental reflections of the researcher were also reckoned.

Before the exposure of the students to the use of Cornell Note-Taking, which is a defined and formal way of taking down notes, it was presented first to all the classes using a PowerPoint presentation. Samples were given

for the students to be guided accordingly on accomplishing Cornell notes.

Additionally, validation was taken into consideration before data were gathered especially concerning the content-based quizzes and the perception surveys. Results of the validation of the three experts in the field of the subject at hand reveal that aforesaid instruments used were very highly valid.

Description and correlation of variables were undertaken in this study. Tracking of the content-based quizzes throughout the implementation was undertaken. Averages were computed and compared from unit to unit.

The Pearson Product Moment of Correlation was employed in determining the relationship between Cornell Note-Taking and the learners' performance. To facilitate this, the Cornell notes were given points using an Assessment Rubric developed by the researcher.

On the other hand, the Dependent T-test for Paired Samples or Paired T-test is the appropriate statistic used to determine the significance of differences between the averages garnered by the learners in the consecutive content-based quizzes. A dependent t-test is an example of a "within-subjects" or "repeated-measures" statistical test. This indicates that the same subjects are tested more than once (Laerd Statistics, 2013). The qualitative data gathered were analyzed reflectively by the researcher founding his interpretation on the remarkable features of the learners' Cornell notes including the researcher's own written reflections. This included, as well, a thematic interpretation of the reflection papers. Thus, the data were treated phenomenologically since the reflection papers of the students contain their experiences. For the perception surveys, frequencies, percentages, and ranks were used.

Results and Discussion

Impact on Learner's Performance of Cornell Note-Taking

The tables that follow present the data pertinent to the research question: How does the use of the Cornell Note-Taking method impact learners' performance in Senior High School classes?

The data were gathered through content-based quizzes and a survey about the use of Cornell Note-Taking to elicit information about its impact or effect on learners' performance in Senior High School classes in the school involved in this study.

Table 1 specifies the scores obtained by the students, averaged into the three sections of Grade 11, on content-based quizzes, which are the primary sources of quantitative data to satisfy the aforesaid research question. The resulting means for each of the Senior High School classes across the administered successive content-based quizzes are considered to facilitate the succeeding interpretation of findings.

Table 1. Scores of the students on the content-based quizzes

SHS Grade 11 Classes	**Content-Based Quizzes Mean Scores**				**Mean**
	1	**2**	**3**	**4**	
A	9.15	11.94	13.38	14.09	12.14
B	8.15	11.21	12.44	13.09	11.22
C	10.57	11.50	11.70	12.23	11.50
Mean	9.29	11.55	12.51	13.14	11.62

It could be gleaned from the table that the mean scores in content–based quizzes show increasing trends in each of the sections of the Senior High School Grade 11 class and as a whole. There is no single point of downturn of mean scores in any section which plausibly supports the certainty of the stipulations of this study that Cornell Note-Taking impacted students learning positively.

The mean scores of the three sections from content-based quizzes 1 to 4 are increasing (9.29, 11.55, 12.51, 13.14) despite the fact of course that the lessons are designed to increase in difficulty. This implies the students have grown responsibly to take focus on their studies progressively and this is heralded feasibly by the use of the Cornell Note-Taking Method.

Additionally, the overall mean scores for the four content-based quizzes for the three sections (12.14, 11.22, and 11.50) and the overall mean score of 11.62 for the three sections, as one, prove that the scores of the students are over the average score of 10 points. Each content-based quiz has 20 points. This can be understood that the learners' performance, in general, is swayed positively by the use of Cornell Note-Taking, which served as a learning strategy or intervention for the students in the implementation of this action research.

This finding significantly agrees with reviewed research because apparently, the note-taking served for the storage of knowledge for later review (Boye, 2012) which supported student performance in the tests (Piolat, et.al, 2005) and made the students increase their academic achievement (Boyle, 2007 & 2010) overtime. Their note-taking had a positive impact on their learning as De Zure, et.al. (2001) pointed out as well in their study.

The students in their reflections have pointed out that learning is a "…process…" which denotes that a system has to be followed even with note-taking that observably in the past is just a run-off-the-mill activity.

Further, it was noted by almost every student that has the Cornell notes prepared them for quizzes and tests since these were clear tools for review. Cornell's notes made them have "…flashback or throwback…" as they echoed. This is indicative of how Cornell notes made students realize the importance of Cornell notes, for the first time for them, in pursuit of their learning goals.

Further, the said findings are reinforced by the result of the perception survey of the Senior High School students themselves as disclosed in Table 2 below. The table shows six (6) statements that indicate the impact of the use of the Cornell Note-Taking Method. Shown are ranked frequencies denoting the responses of the Senior High School students.

Table 2. Impact of the Use of Cornell Notes

Impact	Frequency	Rank
I was better able to pay attention to the presentation/discussion while using Cornell notes. *(Ako ay higit na nakakasunod sa talakayan habang ginagamit ang Cornell notes.)*	81	3
Cornell notes helped me prepare for exams. *(Nakatulong sa aking paghahanda para sa pagsusulit ang mga Cornell notes.)*	95	1
Cornell notes helped me retain more information than if I had not used them. *(Nakatulong ang Cornell notes upang mapanatili ang mas maraming impormasyon sa halip na kung hindi koi to ginamit.)*	82	2
I preferred using Cornell notes over taking my own notes. *(Mas gusto ko na gamitin ang Cornell-notes kaysa ang sarili kong pamamaraan.)*	60	6
I recommend the continued use of Cornell notes in future classes. *(Iminumungkahi ko ang patuloy na paggamit ng Cornell notes as mga susunod na klase.)*	72	5
I would recommend the use of Cornell notes to a friend who is not using it. *(Imumungkahi ko ang paggamit ng Cornell notes sa aking kaibigan na hindi gumagamit nito.)*	79	4

Table 2 ostensibly supports the finding specified under Table 1 that students gained increasing scores in content-based quizzes. Students perceive Cornell notes helped them prepare for exams/quizzes, retain more information, and pay attention to the presentation/discussion better which among the indicators of the impact of the Use of Cornell notes ranked number 1, 2, and 3 respectively. These indicate the effect of Cornell Note-Taking on the cognitive effort of students in the process of learning which according to Piolat, et.al. (2004) enhances learning itself.

Relatedly, this finding bolsters the finding of the study of Katayama (2005) that people considered better retain learning when notes are generated themselves than when these are generated by others. As proffered by the studies of Piolat, et.al. (2005) and Williams

& Eggert (2002), it is because students begin to remember during note-taking particularly when they are engaged in deep comprehension.

Nevertheless, though students recognize the positive impact of Cornell Note-Taking in their learning, fewer students would recommend it to a friend (rank 4) or its continued use in future classes (rank 5) and prefer using the Cornell system to take their notes (rank 6). This could be attributed to students' unfamiliarity with this note-taking which has posed difficulty for them to adjust as this is their first time using it and as it required some standards and rules to follow. Students expressed unfamiliarity and consequent difficulty in handling Cornell notes in their reflection.

> *"Mahirap ang paggawa ng Cornell note dahil nasanay ako sa dati."* (It is difficult to write Cornell notes because I was accustomed to the old way.)

Seemingly, their predisposition is to their previous note-taking practices which hardly provide formal guidelines. But, as signified by their declaration (…dahil nasanay ako sa dati), such could be transformed when the use of Cornell Note-Taking becomes their daily routine in classes. It is like learning a new trick and being able to accept it as integral to the learning process and never depart from it in the long run because of its positive influences. As some students pointed out in their reflections:

> *"Napapaisip ako nang malalim kasi kami iyong gumagawa ng mga cues o tanong na nagiging dahilan para mas maalala at maintindihan ang topic namin."* (We are engaged in deep thinking because we are the ones creating cues or questions which cause us to remember and comprehend easily our topic.)

The Cornell Note-Taking of the students is no ordinary note-taking because students put their thoughts in it rather than just writing information as they come out from their teachers' mouths. Such activity, really immersed students in the teaching-learning process which is why undoubtedly, they performed well in the content-based quizzes and even acknowledged it impacted their learning positively in the survey.

Problems considered in using Cornell Note-Taking

The problems considered by students in the use of Cornell Note-Taking is worthy of assessment for it could give insights to teachers; thus, giving them ideas to plan for improvement of its utilization.

Table 3 displays six (6) situations indicating problems challenging the effective use of the Cornell Note-Taking Method. These were analyzed thru frequency and ranks. It shows, relatedly, the results of the survey conducted to satisfy the research question: What are the problems considered by the learners in using the Cornell Note-Taking Method?

Table 3. Problems with the use of Cornell notes

Problems	Frequency	Rank
It is hard to write and listen simultaneously. *(Mahirap ang magsulat habang nakikinig.)*	48	2
The presentation is disorganized. *(Ang talakayan ay hindi maayos.)*	15	5.5
The teacher lectures too fast. *(Masyadong mabilis ang pagtalakay ng guro.)*	23	4
Noise hinders listening to the lecture. *(Ang ingay ay nakasasagabal sa talakayan.)*	86	1
The language (English) used in the Cornell-note is a hindrance. *(Ang wika (English) na ginagamit sa Cornell note ay nakasasagabal.)*	29	3
The teacher fails to return Cornell notes timely for review. *(Nabibigo ang guro na ibalik agad ang mga Cornell note para sa pagbabalik-aral.)*	15	5.5

It is very ostensible in the table that the students consider "noise" (rank 1) as the most pressing problem they encounter in the use of the Cornell Note-Taking Method as it "…hinders listening to the lecture". Noise is undoubtedly a deterrent to learning because of its obvious attention-grabbing

characteristic especially when students listen to lectures.

The researcher himself had noted the negative impact of surrounding noise had done in his classes which observably almost put his classes under failure. Noise is a problem because of the apparent reason that students need to hear the discussion for them to take note of the important concepts especially since "it is hard to write and listen simultaneously" (rank 2) and the medium of instruction is primarily "English" (rank 3).

Fewer students consider teacher-related problems such as fast lecturing (rank 4), disorganized presentation (rank 5.5.), and failure to return Cornell notes timely for review (rank 5.5). However, on the part of the teacher, these need immediate attention to patch up things immediately so that these would not worsen in the long run.

Relationship between Cornell Note-Taking and Learners' Performance

The relationship between Cornell Note-Taking and learners' performance is looked at in this research to give light on whether Cornell Note-Taking can be considered a factor in students learning.

Table 4. Relationship between Cornell Note-Taking and Learners' Performance

Content-Based Quiz / Cornell Note-Taking	1		2		3		4	
	r	Sig.	r	Sig.	r	Sig.	r	Sig.
1	.356	.000	.453	.000	.475	.000	.433	.000
2	.388	.000	.422	.000	.488	.000	.473	.000
3	.380	.000	.449	.000	.512	.000	.491	.000
4	.428	.000	.495	.000	.597	.000	.561	.000

**Significant at 0.05*

Table 4 satisfies the research question: Is there a significant relationship between the Cornell Note-Taking skills as measured by a 10-point rubric covering the three general skills of Recording, Recalling, and Reducing and the learners' performance as measured by four 20-point content-based quizzes in Senior High School classes?

A significant relationship is clear between Cornell Note-taking and learners' performance as revealed by the significance values of .000, interpreted as highly significant, for every r-value indicated between the Pearson correlation of the four content-based quizzes and the corresponding Cornell Note-Taking. This means that students' Cornell Note-Taking complements the senior high school students learning. As the students put in their reflections, the "deep thinking" process they're going through with Cornell Note-Taking, which involves "…writing important details…" and pondering over or rereading these ("…para basahin ulit…") to formulate cues or corresponding cues or questions has made them, "…understand the subject easily".

The Cornell Note-Taking method perceptibly improved the quality of learners' notes. Their notes were observed to be more organized and more useful, thus it positively swayed their performance as evidenced by the results of the content-based quizzes and their perceptions.

The above results, which relate to the findings of Chang and Ku (2014) in a study about the effects of note-taking skills instruction, corroborate further the data contained in Table 1 previously discussed on the increasing fashion of the students' mean scores in the content-based quizzes.

Differences in Learners' Performance

The differences in learners' performance are calculated to establish the effect of Cornell Note-Taking. These calculations set a resolution to the following research question: Are there significant differences in the performance of the learners in Senior High School classes as denoted by their scores in the content-based quizzes in the duration of the intervention?

It is patent that from the significance values, which are all within the limits of the alpha level of 0.05 set for this study, shown by

Table 5 Cornell Note-Taking has improved the performance of learners in Senior High School classes.

The negative mean differences between paired consecutive content-based quizzes (CBQ) indicate an increase in the mean scores of students. These signify an improvement in the learning performance of students as impacted by Cornell Note-Taking which served as the intervention in the duration of the lessons.

The enhancement of learning happens when students generate notes themselves rather than having materials given to them because they exert a lot of effort in note-taking which in turn proves more meaningful to their understanding of the concepts discussed (Piolat, et.al., 2005, as cited in Schmidt, 2019).

Cornell Note-Taking significantly changed Senior High School students' performance as in the findings of Evans and Shively (2019) in a recent study that Cornell note-taking students are not just more focused on their tasks but are also more prepared for tests. This, therefore, points out that Cornell Note-Taking is an effective strategy or tool in the teaching-learning process.

Table 5. Differences in Learners' Performance

Pair	Mean Difference	T	Sig. (2-tailed)
CBQ 1 vs. CBQ 2	-2.31633	-7.777	.000
CBQ 2 vs. CBQ 3	-.98980	-4.364	.000
CBQ 3 vs. CBQ 4	-.63265	-3.036	.003

**Significant at 0.05*

Conclusion and recommendations

The foregoing findings manifest the following conclusions: Cornell Note-Taking impacts positively the learners' performance in Senior High School classes. Students consider noise, the lack of English comprehension skills, and multitasking as their top 3 problems in using Cornell note-taking. Cornell Note-Taking skills as measured by a 10-point rubric covering the three general skills of Recording, Recalling, and Reducing, and the learners' performance as measured by four 20-point content-based quizzes in Senior High School classes are significantly related. Significant differences in the performance of the learners in Senior High School classes as denoted by their scores in the content-based quizzes in the duration of the intervention are noted.

Anchored in the foregoing conclusions, it is recommended that Cornell Note-Taking must be continuously used because of its obvious positive impact on students' learning performance. Next, students' problems in the use of Cornell Note-taking must be addressed at once, and make necessary adjustments in its use to iron out problematical aspects of Cornell Note-Taking. Finally, future research should be undertaken about the use of other note-taking approaches to explore more possibilities for supporting or improving learners' performance.

Declaration of conflict of interest

The author declares that there is no conflict of interest.

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