Preventing Homework Copying through Online Homework in a Math Class

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Abstract This article presents a potential solution to one of the prevailing issues of paper-and-pencil homework in mathematics–copying. We investigated the reasons why students copy homework and determined how they usually do it. Then, we used the information gathered to design an online homework using the features of *MyOpenMath*, an open source learning management system that can possibly address the limitations of traditional homework. A set of online homework that administers algorithmically generated parallel homework questions to each student, provides immediate feedback, and offers students unlimited attempts to get the problem right was developed as a result. After which, we explored how students approached the online homework and studied if it was able to prevent copying of homework among students. A class with 32 participants was observed for this endeavor. Interviews, outputs, and reflection papers from the class were analyzed to reach our aims. Two student cases were presented to demonstrate how homework copying is usually done and to further examine and comprehend the impact of online homework. Student A narrated how online homework at *MyOpenMath* prevented him from copying and forced him to engage in answering homework. Student B's experience described why some students allow others to copy their homework and how the online homework led her to

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tutor her classmates. By and large, the *MyOpenMath* online homework was able to prevent copying among students and was able to generate remarkable improvement to students' homework answering practices.

Keywords: Homework copying; math education; MyOpenMath; online homework

Introduction

Students need better mathematical skills than ever before to prepare themselves in the modern world (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2010). However, many students struggle with math and efforts are being made by different stakeholders to find more effective ways to teach and learn the subject (Silva, Ghodsi, Hassani, & Abbasirad, 2016). One of the many activities that math teachers use to promote learning is homework. Homework is typically among the first thoughts when one thinks about school (Thomas, 2014). Teachers value the use of homework and usually assign it for one of three reasons: to introduce a new topic, to revisit past materials, or to teach a lesson they do not have time for during face-to-face meetings (Sallee & Rigler, 2008).

In the Philippines, due increasing pressure placed on teachers to cover the topics enumerated in the curriculum, and the many class suspensions due to frequent inclement weather, many teachers are forced to rely heavily on activities that will be done beyond face-to-face meetings to reinforce learning. From our experience, the time allotted for the subject is barely enough to discuss the concepts and the remaining time for practice exercises is extremely limited, thus we are often left with no option but to assign exercises as homework that will be done after class hours.

Despite its long history in the educational process, homework has been a debate between experts and will continue

to be an interesting topic in the future (Thomas, 2014). Numerous researches examined the empirical relationship between homework and academic performance (Brewer & Becker, 2010; Demirci, 2010; Mathai & Olsen, 2013). Few, however, have analyzed the practices and misconduct of students in doing homework, like homework copying in math, and possible remediations. On this note, this study was conducted aiming to fill the gap in research, focusing on homework copying that occurs in a math class and its prevention using online facilities.

Homework Copying

Homework is a teacher assigned task that is meant to be carried out during non-instructional time (Bembenutty, 2011). It is an important and effective educational supplement that continues to grow and expand its educational frontiers (Dettmers, et al., 2011). It is also an integral school activity used by most teachers to enhance the learning experience of the students, which has shown positive results (Xu, 2010). However, many math teachers have experienced receiving homework submissions that are obviously copied. Unfortunately, copying of homework answer prevails within a significant number of students in a class (Palazzo, Lee, Warnakulasooriya, & Pritchard, 2010). Traditionally, homework in math are paper-and-pencil tasks where students are assigned the same items to work on, which is a practice that permits students to copy homework from others. It is quite easy for them to depend on their classmates who do the homework since they are supposed to provide solution to the same math problems. This method of assigning homework is also an added burden to teachers who has to grade it manually, and frequently results to delayed feedback.

Copying of homework, although not considered so morally wrong as cheating on exam (Palazzo, Lee, Warnakulasooriya, & Pritchard, 2010), is still a violation of academic integrity since the students who copied gained an

unjust advantage over the others (Cronan, Mullins, & Douglas, 2018). According to Felder (2011), students copy homework because they are after good grades, which will certainly have an impact to their long term goals. He added that academic accomplishments as indicated by school marks has become a high stake investment amongst students, since they are usually judged by their report cards.

A similar study done by Palazzo, Lee, Warnakulasooriya, and Pritchard (2010), identified probable causes of homework copying. They found out that students who copy homework are usually crammers who do their homework a few hours before the deadline. In their study, students reported that some of the reasons why they copy homework is the lack of time due to other requirements in other classes, difficult problems included in the homework which takes too much time to answer, and that they don't care about the learning they will gain from doing the homework. Moreover, they have also noted that homework copying increases significantly after the midterms, which is consistent with their notion that students copy homework as a result of time constraints that build over the term and aggravated by delaying the start of serious work on the homework until its due date.

Although there is a substantial amount of research indicating that doing homework leads to better learning (Palazzo, Lee, Warnakulasooriya, & Pritchard, 2010), an alarming number of students still copy homework answers. In a survey, *Bark* did reveal that 80% of Redwood students copy homework at least once a month (Sweet, 2017). In another study, 49% of science and engineering students surveyed participated in unauthorized collaboration on homework (Felder, 2011). Clearly, a significant number of students do copy homework, which is an issue that could be associated with reduced learning and consequently, failure in the course (Palazzo, Lee, Warnakulasooriya, & Pritchard, 2010).

Learning Management Systems (LMS)

The available technologies for teaching and learning, both in and out of school have expanded rapidly over the years. Together with calculators, there are laptops and web-based resources that serve different educational purposes. The advancements made by the internet clearly changed the way people live their lives and consequently reshaped the way students learn (Gonzales, 2010). Hence, educators need to investigate how to make the most of the technological environment in which students live. Math teachers need to understand how to harness and utilize to the fullest this modern atmosphere to enhance the teaching and learning of math, both in and out of school.

With the advent of Information Communication Technology (ICT), many institutions started to use various Learning Management Systems (LMS). These are web-based applications that are accessible with a web browser through an internet connection (De Smet, Bourgonjon, Schellens, & Valcke, 2012). The use of LMS can help teachers oversee student-learning process and learning-related materials (Malikowski, 2008). The typical LMS contains advanced features that allow educators to create online courses, provide access to educational materials, and administer online homework. Online homework is generally defined to be a system of homework problems that are available online. The integration of ICT in homework administration allows immediate scoring and may be accompanied by instructional support or tutorial (Brewer, 2009). It can also be configured according to the needs of the teacher and the class. Many of the LMS available can deliver randomly arranged items in varying format on specified dates.

Innovations in education like the development of LMS that can administer online homework may offer many advantages. Online homework, as a replacement for traditional paper-and-pencil may be a more efficient alternative to help

students learn math since it has features that are not available on traditional homework.

MyOpenMath

MyOpenMath is an LMS developed by David Lipman intended for math classes. It is an open source that has advanced features that allows teacher-users to program homework items according to their needs using the IMathAS platform (MyOpenMath.com, n.d.). Teachers can create homework items that require students to enter algebraic answers and graphs. It also has a very useful course management system with gradebook, file posting, and discussion fora. Instructors have the freedom to customize the homework items in terms of randomization, number of attempts, type of question, deadline and many more (Sarmiento, 2017). Since the homework items are programmed, it provides many opportunities for teachers to be creative and it opens up to many possibilities.

In this study, we used *MyOpenMath* as an online homework system to administer homework to 32 students taking the subject Engineering Probability and Statistics. The use of *MyOpenMath* created an avenue to integrate attributes to homework that aims to prevent students from copying.

Purposes of the Research

The aim of this action research is to address the issue of homework copying in a math class. Clearly, the usual manner of administering homework has limitations that bring predicaments to many teachers and one of the causes of poor class performance. In this regard, this study was conducted with the following purposes:

1. explain why and how students copy math homework; and
2. use MyOpenMath to innovate homework

administration and investigate if it was able to prevent homework copying.

Context

Our specific study was undertaken within the context of a third-year class in a private university in Cavite, Philippines. Classes in this particular university are in semestral scheme, with a 54 hour allotment, taken three hours per week. A semester is divided into three terms; prelim, midterm, and final term. In our observation, students generally perform poorly in the probability part of the subject, which is taken during the midterm and final period of the course. Students struggle with the fundamental ideas of probability and encounters weaknesses in comprehending concepts and proportional reasoning. Also, from our experience, the time allotted for the subject is barely enough to discuss the concepts and examples. Additionally, the time for practice exercises, which is an integral part of teaching and learning math, is extremely limited.

Exercises are vital in math since they allow students to participate and think about the given problems, hence letting them apply the concepts they have been taught and they have learned actively. Research and anecdotal evidences overwhelmingly support the claim that students learn best when they engage with course materials and actively participate in the learning process (Haelermans & Ghysels, 2017; Hattie, 2009). But due to time constraints brought by insufficient time allotment and class suspensions, the teacher is left with no option but to assign the exercises as homework that will be done beyond class hours.

However, to our disappointment, most students have good grades in homework, but not during actual quizzes, even if we use some of the items in the homework in the actual quizzes they took. This observation implies that students are able to obtain good marks, most probably by copying, in the homework without really having a thorough understanding of its content.

We believe that there is a need to innovate the way homework is done so that this activity, which has been part of the educational process for a very long time, actually serves its purpose.

Methods

Research Design

We were motivated by our desire to reduce if not eliminate copying of homework among students. Our investigations followed an educational action research design using the iterative process described by Bryndon-Miller, Prudente, and Aguja (2017). That is, (1) conducting initial investigation to develop a deeper understanding of the form and causes of the problem, (2) creating strategies designed to address the problem based on the teacher's own experience as well as other information, (3) implementing and observing the results of these interventions, and then (4) reflecting on the outcome and determining the next iteration of the research process which can be carried out by teachers in the classroom.

Data Collection and Analysis

We present this section using the Plan-Do-Check-Act (PDCA) cycle format, which is a four-step model for implementing change.

Plan

An action research is a process where investigators examine their own practices systematically using techniques in research (Brydon-Miller, Prudente, & Aguja, 2017). In this particular study, we aimed to address an issue encountered by most math teachers (homework copying). We hypothesized that we can utilize the power of information and communication technology (ICT) to enhance the delivery of homework in mathematics, and eventually improve the homework answering practices of students.

We reviewed various literatures on homework and learning management systems to help us plan how are we going to execute this study. After much deliberations, we decided that we will first investigate the reason why students copy homework and their practices in doing it. We thought that having first hand data about these issues would give us a better picture of the phenomenon, and would give us a better idea how to design online homework.

After our investigation on homework copying, we determined how to design the online homework that we will administer. We also searched for an appropriate LMS that has necessary features to execute our design. Aside from our initial findings, part of our consideration in the selection of a LMS is its appropriation for the type of internet connection that we have in the country, accessibility, and its cost. We advocated an LMS that will run smoothly despite the relatively slow connection that we experience in general and can be accessed using most computer devices or smart gadgets. Moreover, it has to be free to use so it would be economical and would not incur additional costs for teachers and students. Upon the completion of the online homework, we investigated how its use was able to innovate homework delivery and change students homework answering practices through observations, interviews, and document reviews.

Do and Check

We conveniently selected a homogenous class with 32 students enrolled in the course Engineering Probability and Statistics to investigate. All of them are in their 3rd year in college and taking various engineering courses and have taken the same math subjects in the previous years. They have an average age of 18.59 years old and are composed of 15 males and 17 females.

We used the midterm period of the semester to observe and determine why and how students copy homework. Then we devised a strategy in designing the online homework at *MyOpenMath* that we administered during the second half of the research, which is the final period of the semester. We also gave the participants eight paper and pencil homework during Midterm, and eight online homework during the final period. The coverage of the homework given were patterned to the syllabus of the course and were slightly modified depending on the pacing of the discussion and with the suggestions of the subject coordinator. They were given seven days to answer each homework. Several student outputs were analyzed, together with the reflection papers they submitted. Some informal and random interviews, among the participants were also done to give a better explanation of the observed practice.

Additionally, we formally and thoroughly interviewed two students (Student A and Student B) about their experiences in copying homework. The two were selected based on their observed behavior in doing and submitting homework. Student A always submit copied homework, as evident in his rushed work and unorderly handwriting. On the other hand, Student B submitted neatly written outputs and seemed to be a source of homework answers of some students in the class. We used an open-ended interview protocol as a guide during the interview proper. Their experiences are narrated in the discussion to give a better scenario and a clearer explanation of what transpired because of the online homework we developed.

We used thematic analysis to analyze the data that we have gathered. Foremost, we also analyzed the quotes from interviews within a thematic framework that we developed to focus on the different reasons why students copy homework. Then, we identified the reasons why students copy homework and why some allowed their homework to be copied by others. We also investigated their homework answering practices, homework outputs, and noted suspicious submissions.

Act

The results of our analysis was the basis of our action. If the online homework we developed did not prevent homework copying and did not improve students homework answering practices, then we will go through the cycle again with a different and a more superior plan. On the other hand, if it was successful, then we will start incorporating online homework in our teaching practices and share it to other math teachers. Further, we will use what we have learned to plan new innovations in administering homework.

Results and Discussions

Stories and Outcomes

Why students copy homework?

We analyzed interview transcriptions and reflection to give light on why and how students copy homework. Student A admitted that the homework he submitted were copied from his classmates because his priority was getting good grades in the homework rather than learning from it. He also revealed that he would rather copy from someone who is known to always get good homework scores, than to exert effort to do his own. He was not motivated to learn how to solve the problems in the homework since the grades he will obtain if he studied the process or if he copied the answers are just the same.

Researcher: *So ok lang na wala kang naintindihan basta may grade ka?*

[So it's alright even if you don't understand anything, as long as you have a grade?]

Student A: *Basta Ma'am gusto ko siyempre pasado. Tapos kasi 'pag ako lang gagawa ng assignment baka mababa yung score, kung*

*kay ***** ako kokopya, sigurado mataas 'yon.*

[I want a passing grade Ma'am. If I'm the one who will answer my homework, there's a chance that the grade will be low. If I will copy it from *****, for sure I will get a high grade.]

The assurance that he can always borrow and copy the work of others, since they are just answering the same set of items, reduces his drive to do the homework.

Researcher: *Asa na lang talaga?*

[So you will just depend on others?]

Student A: *Parang sa isip ko kasi Ma'am, kaya tinatamad din ako… kasi naiisip ko, may gagawa't gagawa ng assignment sa mga ka-classmates ko eh. Alam ko kahit hindi ako gumawa, may mahihiraman ako. Pare-parehas naman kami ng sasagutan.*

[At the back of my mind Ma'am, the reason why I don't have the motivation to do it… is because I know, someone amongst my classmates will do it. I know even if I don't answer my homework, I can always borrow from someone. Anyway, we are all answering the same items.]

He doesn't feel guilty either for copying someone else's hard work since many are doing the deed. Student A reasoned, "*madami po kasi kami na gano'n yung ginagawa. Kaya parang normal lang.*" [many students are doing it. So it feels normal.]. He added that he is not motivated to do homework since it is

not interactive and there is no way to determine if his answers are correct right away.

It was also apparent that copying homework in this class is rampant. There were several students who admitted that they copy homework answers of their classmates without even trying to understand the solution or the way it was answered. For instance, take a look at the homework submitted by two students in Figure 1. The solution and answers of the two are the same, even the format and manner of arranging the items, which implies that they are copied.

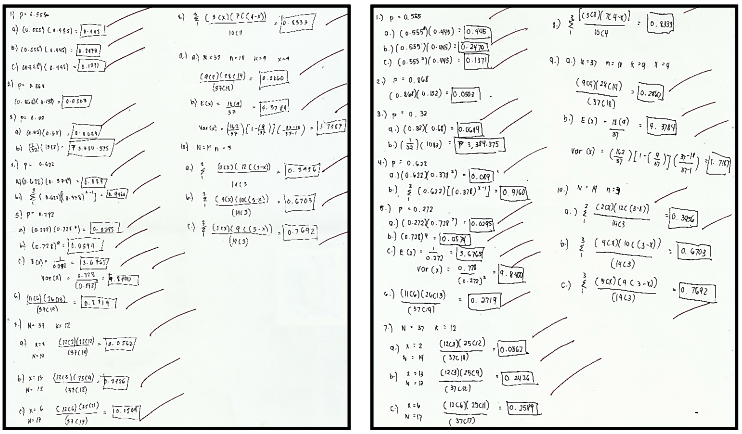

Figure 1. Homework output of two students.

Another instance is shown in Figure 2. These were answers of 11 students in a particular homework item. The solution shows $P(Y) = .227 + .486$, which when computed properly should be equal to .713. However, their answer was .763. These students are engineering students in their third year and are allowed to use scientific calculator to do mathematical computations. If they did the computation on their own, the chances that they will all commit a mistake in a simple arithmetic computation is very slim. In the computation shown in the figure, it seems like one student who copied the work of

another wrote the answer incorrectly and lent his/her work to another to copy. Those who copied his/her homework did not even check the accuracy of the answers and just replicate the error of their classmate.

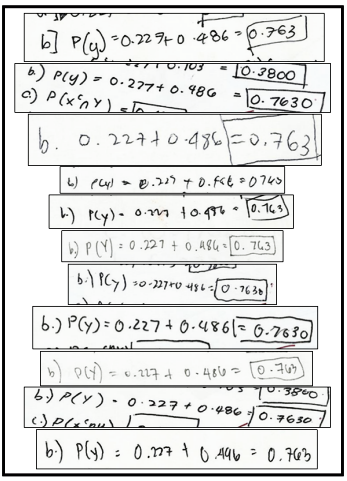

Figure 2. Miscomputed solution of 11 students in a homework item.

On a similar note, Student B confessed that she lets her classmates copy her homework. She said that since she is an officer of the class, she feels that it is her responsibility to remind her classmates to do their homework, and in the process, allows them to copy her solutions and answers.

Student B: *Saka ako po yung class president, feeling ko po responsibility ko yung mga classmate ko. Nire-remind ko po sila kapag may homework kami, tapos tatanungin ako kung meron na ko, sabay hiram na din po.*

[I am the president of the class. I believe my classmates are my responsibility. I remind them to do their homework, after which

they would ask me if I have already finished mine, then also borrow it.]

She feels that letting her classmates copy her assignment is a way to have a harmonious relationship with them, and that she might hear negative remarks if she doesn't allow them to copy her work.

Researcher: *Why do you let your classmates copy your homework?*

Student B: *Pakisama lang Ma'am. Siyempre minsan po nakaka-inis kasi pareho lang kami ng grade pero wala naman siyang ginawa. Kaya lang po kasi ayoko din may masabi sila sa 'kin.*

[For camaraderie Ma'am. I admit it's annoying sometimes since we all get the same grade, and yet they did nothing. But I don't want them to say something negative to me.]

She also mentioned that her classmates rarely asked her to teach them how to solve a homework problem, and would just directly ask for her answers. She said, "*Bihira lang po yung nagpapaturo Ma'am. Karamihan kopya lagi.*" [I am rarely asked to teach them. Most of the time they just copy my work.]. She also confirmed that copying homework is a habit of many students and she likewise affirmed that there were those who gives homework answers on Facebook.

We also observed that many submissions were poorly written and obviously rushed. Some students confessed that they only do the homework a few minutes before submission since they will just copy the answers of others. Student B believes that in their section there were only about five to

seven students who answered homework properly. According to her, most of her classmates just depended on the few that do their homework.

Online homework through MyOpenMath

The findings of the first half of our study helped us design the online homework for the second part of the study, where we used the Input-Process-Output (IPO) Model as a guide in creating algorithms for the homework sets. We used this model to convey systems fundamental in information technology and as a brainstorming, investigation tool in systems development process (Goel, 2010; Zelle, 2010). The input were the result of the initial investigation done to develop a deeper understanding of homework copying in math and the topics in probability. Then, the process involved was creating a programming algorithm on *MyOpenMath* that created the online homework with the features we have identified, which is the desired output.

We programmed each homework item to have many versions, through randomization of numerical figures. The algorithm shown in Figure 3 is an example. Note that variables *a*, *b*, *c*, and *d* in the syntax, each has 2,001 possible values. This implies that for this homework item alone, $2{,}001^4 = 16{,}032{,}024{,}008{,}001$ problems can be generated. Hence in a class of 32 students, the possibility that any two students would get the same problem to answer is very negligible.

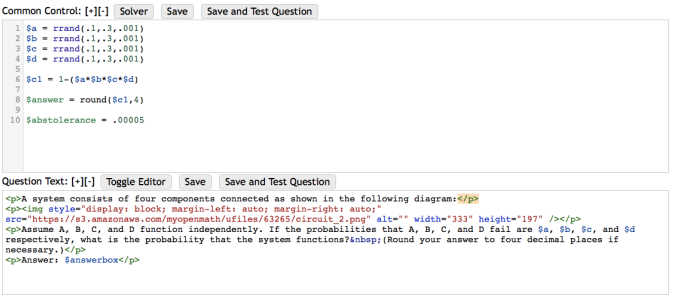

Figure 3. **S**ample algorithm of a homework item.

Furthermore, the literature we gathered for this study suggests that feedback can promote correction of errors (Butler, Karpickle, & Roediger, 2008) and increase motivation (Petre, 2017). Feedback is usually delayed in traditional homework since the teacher has to manually grade the papers. Fortunately, modern technology can automate checking of answers, which is also a feature added to our online homework, through a right or wrong indicator, immediately upon submission.

It was also evident that interactivity can boost the speed and level of students' understanding (Fan, Liu, Wang, & Wang, 2017). Accordingly, we decided to incorporate the three-way model of interactivity (3-WMI) by Evans and Khaled (2003), which involves three sequence of actions: (1) initiation; (2) response, and (3) feedback, by giving students unlimited opportunity to reattempt the problem they missed until the due date of the homework. This set-up gives the students an opportunity for victory and may motivate them to succeed (Sarmiento, 2017).

How online homework prevented copying?

Student A, who admitted that he copied his classmate's homework said in a later interview that the online homework through *MyOpenMath* made it difficult for him to copy from his classmates since they are answering different sets.

Researcher: *Sa MyOpenMath, nakaka-kopya ka pa?*

[Can you still copy with *MyOpenMath*?]

Student A: *Hindi na Ma'am, wala na ko makopyahan. Magkakaiba kami lahat ng set. Nung una akala ko parehas lang, kasi parang gano'n din yung question kay *****. 'Pag try ko mali, yun pala magkakaiba.*

[No Ma'am. There's no one I can copy from. We are all answering a different set. At first I thought they were the same, since my questions seemed similar to *****. Then when I tried his answer, it was wrong. That was when I realized that the problems were different.]

This forced him to answer the homework items on his own or ask his classmates to teach him how solve given problems.

Researcher: *Paano mo nasagutan yung mga homework mo? Ginagawa mo mag-isa?*

[How did you answer your homework? Did you answer them by yourself?]

Student A: *Yung madadali Ma'am. Yung last part calcu [calculator] lang 'yon, saka table, no match! Yung sa mga una Ma'am nakakalito pa din.*

[Only those that I find easy Ma'am. The last part just needs a calculator and table, no match! The first part is still confusing.]

Researcher: *Eh paano ginawa mo?*

[Then what did you do?]

Student A: *Nagtatanong ako sa kanila [classmates] kung paano nila sinagutan, then ginagaya ko yung process.*

[I ask my classmates to show me the process of solving, then I follow it.]

On the other hand, Student B, who lets her classmates copy her homework shared that the uniqueness of the items they received made it difficult to copy. She said that if it was paper-and-pencil, it was very easy to just copy from others since the solution and answers of one homework is the same for all, and can be rapidly duplicated. Whereas in *MyOpenMath*, students are left with no option but to solve the items they received on their own, or if they needed to consult others, they will be asking for the process of solving and not the answer.

Researcher: *Do you still let others copy your work?*

Student B: *Wala na po silang makokopya sa 'kin Ma'am. Kasi nga po magkakaiba kami. Pwede ko po bigay sa kanila lahat ng sagot ko, pero wala din po 'yon silbi para sa kanila.*

[They don't have anything to copy from me Ma'am, because our homework are not the same. I can give them my answers, but it won't really matter for them.]

Researcher: *So they're not asking for your help anymore?*

Student B: *Nagpapatulong pa din po. Pero yung process na po yung tinatanong nila. Noon po kasi, laging "Pakopya ng sagot mo." Ngayon po, tinatanong na nila "Paano mo 'to sinagutan?"*

[They still ask for my help. But they now ask me for the process of solving. Before they will say, "Let me copy your answer." Nowadays they would ask, "How did you answer this?"]

Another student agreed in her reflection,

> "*yes it greatly minimizes it [copying] since obtaining solution from others is hard and of course you need to understand the other's solution, this would be difficult if you find it a struggle trying to understand the solution of others.*"

Additionally, Student A said that his wrong answers in the homework did not frustrate or discourage him in doing homework. Contrary, it inspired him to study and determine how to get the correct answer, since he has unlimited opportunity to correct his mistakes. He was able to concentrate on answering without having to worry that he would run out of attempts. Other than the fact that each of them were answering different problems, both Students A and B believed that the immediate feedback and the many opportunity to get the correct answer are factors that minimizes homework copying and improves their study habits and learning. Burch and Kuo (2010) believed that students who did online homework performed better than students who did paper-and-pencil homework because of the option to repeat problems until they understand it. Similar results were discussed by Dillard-Eggers, Wooten, Childs, and Coker (2008); Arora, Rho, and Masson (2013); and Sarmiento, Lapinid, and Prudente (2018) in their respective studies. It appears that the advanced features of the online homework improved student practices in answering homework, which can result to better performance.

Self-reflection and Learning

As we mentioned, administering homework does not always improve students' performance in class. This made us wonder since we believe that homework is one of the strongest and most flexible activity that can be given to students. Homework is something that is done without the supervision of the

teacher, and hence, students have the freedom to choose the learning method most applicable and most effective for him/her to complete the task. However, it seems that many students take advantage to the absence of the teacher to simply copy homework answers without even trying to understand its content. It is really disappointing to know that some students are just after the grade they will get from the homework and not learning from it.

As teachers, it frustrates us when students do not take the homework we worked hard to create seriously. It upsets us when we see homework submissions that are just replication of the work of others, because we know that they learned nothing from the activity. Cheating in whatever form is a major offence, and yet cheating in homework is a frequent case. We are disappointed to learn that most students do not even feel guilty for committing the misdemeanor.

Our initial findings and the literatures we reviewed, helped us innovate homework administration. We are also grateful that learning management systems like *MyOpenMath* exists, since it has features that permitted us to deliver online homework according to our design. Even at the start of the second part of the study, we already noticed the big improvement in the practices of the students who were doing online homework. There were many times where we would just log-on to *MyOpenMath* and observe the number of attempts and the progress of our students in answering the online homework. We really noticed that they did their best to get good marks in the homework, and that the restrictions of the homework left them with no option but to work on their own or if they had to consult someone, they would ask for the process of solving and not the answer. It was also notable that through the online homework, many students strived hard and gave their best to get perfect scores in the homework since they can monitor their development,

> *"... MyOpenMath is that I have given chances or attempts to try and try to correct my answers which are wrong and this wrong answers pursue me to strive and get the correct answers because the online homework are giving me a chance to correct by giving me a number of attempts or chances so that I have given a chance to get a perfect or higher score."*

> *"Since it gives me the opportunity to re-attempt problems that I missed answering, my strive for perfection kicks in. If I know I could make a difference and do it then I would definitely do it again and again."*

while on paper-and-pencil, they just submit homework for the sake of having something to submit.

> *"When I do paper-and-pencil homework, I just do them in a manner that at least I passed something but when it comes to MyOpenMath, I make sure I get the perfect score."*

We are pleased that the online homework we developed was able to make a difference in preventing students to copy and in motivating them to do homework. Thus, we will continue to administer online homework and will conduct further studies that could further innovate homework administration in mathematics.

Conclusion and Recommendations

In this study, we examined the homework copying practices exhibited by some students and we explored how can we utilize

the features of a learning management system, *MyOpenMath*, to develop an online homework that would prevent homework copying in a math class. Our findings can provide insights to teachers about what usually transpires in answering paper-and-pencil homework in a math class and explain the reasons why students copy homework. More importantly, we were also able to come up with a remedy to homework copying in math that shows a great prospective.

Our investigation reveal that many students are only after the mark that they will receive from submitting homework and not the learning that they can possibly attain from it. We have observed that many students copy the homework of their classmates without even trying to understand how the problems included were solved. It was evident that the motivation of many students in answering homework is extrinsic (Ryan & Deci, 2017), that is, driven by rewards and benefits. The Self-Determination Theory, according to Deci and Ryan (2017), distinguishes between different types of motivation based on the different reasons or goals that give rise to an action. The data showed us that the online homework we developed was able to use the extrinsic motivation of the students, which is to get good grades, to force them to avoid homework copying and develop better homework answering practices. They were compelled to answer the problems given to them on their own, or they would consult others but not about the answer but about the process of solving. We also found out that that features we made available like immediate feedback and unlimited attempts, motivated students to answer homework and consequently, to learn.

Landers (2013) argues that as long as schools are structured in ways that privilege scores overs learning, students will copy to complete homework. Fortunately, we can take advantage of modern technology like online platforms to address the issue of homework copying. These platforms

allow us to transform and strengthen the weaknesses of traditional activities like homework.

Our findings can be used by instructors to design better online activities and to improve their homework administration practices. Although, it should be noted that our study is highly qualitative and lack random selection of participants. Moreover, our claims are supported by students' behavior and insights rather than measured attributes and statistical analysis. Therefore, other researchers should consider quantitative investigations. Moreover, we hope that future endeavors will continue to explore innovative interventions to promote healthy homework practices among students as well as better homework quality.

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