

Promoting Reflective Thinking: Pre-service Teachers' Experience in a Web-based Learning Platform

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Abstract The presence of web-based learning platforms advances instructional strategies that support the development of students' thinking skills. The study was conducted to stimulate the reflective thinking skills of the students with the aid of web-based learning platform particularly Edmodo. This study aims to cultivate the instructor's own abilities to develop and implement activities promoting reflective thinking among pre-service teachers and describe the experience of reflection-integrated activities in a web-based learning platform among students. The research employed an action research design. The 24 pre-service teachers (PSTs) who were taking a course handled by the researcher were the respondents of the study. Course materials were given to the students who were required to submit their answers to questions posted in Edmodo. Quantitative data shows that the reflective thinking skills of the PSTs were described as 'Reflective.' Qualitative data validated the quantitative results that the activities given to the respondents fostered the reflective thinking of the PSTs. Constant follow-up, considerable time and immediate feedback are essential in tasks using web-based learning platform. The use of a web-based learning platform can be an avenue to promote reflective thinking among students through proper planning, implementation and evaluation of course.

Keywords Reflective Thinking, Web-based Learning Platform, Action Research, Preservice Teachers, Philippines

1. Introduction

As technology creates significant changes in the landscape of education, web-based learning platforms advance instructional strategies that support the development of students thinking skills. This advancement has advanced the development of web-based instruction for learners to engage in interaction, learning, discussion, and access without time and geographic constraints [1]. Certainly, educational technology plays a vital role in education where the question is no longer whether teachers should use educational technology or not, but on how best to integrate these education technology applications in the classroom settings [2].

In the field of education, reflection is said to be a problematic area for pre-service teachers (PST) [3]. This is because they often lack required involvement and program and instructional knowledge on which to anchor their teaching reflection. Hence, teacher education institution should provide venue and opportunities for PSTs to reflect. These supported the call for teacher education institutions (TEIs) to emphasize reflective thinking and its development should commence even at the early phase of the PSTs' training. The development of PSTs' reflective thinking may be influenced by more interactive learning environment [4] which happens when people are invited to think [5]. It was suggested that the use of reflective thinking tools is essential means to support reflective thinking skills [6]. Further, [7] underscored the importance of forming various chances and conditions where reflective thinking can be nurtured

rather than limit PSTs to a specific approach. It was highlighted the need for PSTs and in-service teachers trainings on the implementation of reflective thinking activities in the classroom [8]. Similarly, it was suggested that teacher educators develop ongoing activities for their PSTs to encourage them to reflect; that will challenge them to examine experiences from various viewpoints [9]. Thus, it was stressed that reflection should be vital in all aspects of teacher preparation from content analysis to interactions with children.

Poyraz and Usta [10] averred that the act of reflection forms the base of reflective thinking and is both active and controllable. They added that reflection appears as one of the doctrines which aim at learning in class environment with constructivist learning approach.

Reflective thinking practices have been traced back to John Dewey. Dewey [11] defined that “reflective thinking is an active, persistent, and careful consideration of a belief or supposed form of knowledge, of the grounds that support that knowledge, and the further conclusions to which that knowledge leads.” Also, it was suggested that there may be an increase of critical-reflective thinking by setting up material conditions that are conducive to privacy and leisure, and by consistently practicing activities that require the adoption of an open attitude and wakeful concentration.

Kim [4] claimed that providing reflective thinking support helps students to further their learning experiences and that external tools for reflections guide them to reflect on their own learning, effort and actions.

The development of students’ reflective thinking tendencies is not a coincidence since there are lots of natural resources for developing students’ reflective thinking [10]. Furthermore, it was suggested that it is important to embrace activities that develop reflective thinking in the training of pre-service teachers and thus, reflective thinking should take parts more in the curriculums of the faculties of education. Previous studies also supported the call for teacher education institutions to emphasize reflective thinking. It is the goal of all teacher education programs to produce future teachers who will be engaged in critical reflection on the practice and become agents of change in education [12].

United Nations Educational, Scientific and Cultural Organization (UNESCO) [13] recognized that the quality of education today cannot be achieved without taking technological factors into account. These technological innovations are placed in the position of new approaches and tools that contribute to the development of PSTs’ reflective thinking skills. While technology trains the brain to process new ideas quickly and become open to new ideas and communicate freely and frequently, students experience information overload and have no time for reflection or problem solving [14].

The use of web-based learning platforms in education became popular. The capabilities of these platforms are

broad and thus requires proper selection of activities for the students. These platforms offer a range of reflective tools for students and teachers such as blogs, and discussion forum. The article, *The 12 Key Benefits of Learning Platforms*, stated that these platforms can help teachers link all activities to the curriculum and integrate reporting tools for students assessment [15]. Mokhtar [16] identified three significant features of Edmodo that may enhance students learning experience namely novelty of tasks, favorable learning environment, and mobility. The wide range of applications of this platform allow teachers to design tasks that is suitable for the learning needs and goals. It was also mentioned that Edmodo provides an informal environment and extended lessons after school hours, which can be a haven for learning. With such potentials, I believed that the challenge is left to the teacher to design her instruction to achieve the aimed learning outcomes among his/her students.

Moreover, this study aimed to cultivate the instructor’s own abilities to develop and implement activities promoting reflective thinking among pre-service teachers and describe the experience of reflection-integrated activities in a web –based learning platform among students.

2. Method

This study utilized the mixed-method action research design. It aimed to gather information on the process of the teaching employed by the researcher to further improve the ways she conducts her instruction [17] and also how well her students learn [18]. It utilized the Plan-Do-Study-Act (PDSA) process [19] which is a systematic series of steps for gaining valuable learning knowledge for the continual improvement of a product or process. It is an iterative approach that enables the practitioner to test out solutions to the problems and build learning from these cycles in a structured way to verify the solutions and further improve the practice. Action research is the appropriate method in the study based on the major goal of the researcher of improving her practice in the use of web-based learning platform as means in developing pre-service teachers’ reflective thinking skills.

This research placed its effort to focus the study on reflective skills of students with the use of web-based learning platform, the Edmodo. Data was collected, analyzed, interpreted for the purpose of devising action plans. to improve designed teacher activities, and the learning process as a whole.

The participants of the study were 24 first year pre-service teachers who were enrolled in the researcher's class during the second semester of the academic year 2018-2019. Out of 24 PSTs, sixteen (17) are females (70.73 %) and seven (7) are males (29.17%). Seventeen (15) of the PSTs graduated in a public high school

(70.73 %) while seven (7) were from private high schools (29.17%). Most of the participants are the first batch of the senior high school (SHS) graduates under the K-12 curriculum, hence most of them aged 18 years old which comprised of 75 % of the participants. Interestingly, among the 24 PSTs, only two (2) students had taken Science, Technology, Engineering and Mathematics (STEM) strand (8.33%) in their SHS, four (4) had Humanities and Social Sciences (16.67%) strand, eight (8) had Accountancy and Business and Management (ABM) (33.33%) strand, two (2) had technology-Vocational (8.7%) strand, and one (1) was from the old curriculum (4.17%). All of them have either a computer or a mobile phone however, only nine (9) of them only have an internet connection at home (39.1 %).

This study presented the first stage of the research cycle. In this phase the researcher designed her instruction based on the course goals, characteristics of the students and current trends in educational technology that will support students learning. One of the major goals of the course was to gain practical experience on the use of new tools in educational technology and introduce new concepts in the course.

'Edmodo' is the learning platform where students can submit assignments, communicate, and other tasks supported by this platform. The concept of Garbage In, Garbage Out (GIGO), was considered in using this platform. It is necessary to provide students with thoughtful, meaningful, and goal-oriented tasks to be able to maximize the capabilities of this platform. The teacher became critical in terms of the instructions and tasks given to the PSTs. It was made sure that the questions given to them were thought-provoking and lead them towards reflection. The activities given to the students were content validated by experts to ensure that these activities will lead students toward reflection.

The teacher set up a two-week timeline for the students to post their activities in Edmodo. This much time was allotted considering that not everyone has immediate access to the internet, to give them enough time to find ways to comply with the activities. Once the students submitted their assignment/reflection, the teacher was notified through Edmodo notification prompt and email. The teacher then graded the students' reflection based on the criteria provided to them and posted feedback on the comment box, when necessary. The students received a notification after their assignment was graded.

To support the reflections of the researcher/ instructor, a questionnaire and structured interviews were used to measure the reflective thinking skills of the students. The Reflective Thinking Questionnaire intended for Filipino Senior High School was taken from De Leon and Prudente [20] was reduced to three factors after it was administered to preservice teachers. The KMO measure of sampling adequacy is 0.836 showed that the data is fit for factor analysis and Bartlett's Test of Sphericity is

1597.149 ($p = 0.000$) determines homogeneity of the data. The first subscale is labelled feedback which described how students use feedbacks in the process of reflective thinking. Items in this subscale demonstrated that taking feedback into consideration allows student to understand and improve what they do. The second subscale describes how students make reflection based on their mistakes and what have previously done, thus is labelled 'Realization'. This factor provided for describing how students make judgment of their actions. The five (5) items in this factor demonstrate students making judgements on their actions. Reflection on own mistakes can be more elaborate than reflection on others' or hypothetic mistakes due to a stronger emotional and cognitive involvement in the incidents (Kipfmuller, Gartmeier, Gruber, & Heid, n.d.). The third subscale was named 'Mastery' as it collected three items which pertain to doing things without dwelling on deeper thoughts. It is that which has been learnt before and through frequent use becomes an activity that is performed automatically or with little conscious thought. calculated Cronbach's alpha is 0.768 which tells that the items are internally consistent. The Cronbach's alpha of the subscales are as follows, 0.791 for Feedback; 0.753 for Realization; and 0.70 for Mastery. The quantitative data gathered in this study were analyzed using descriptive statistics particularly mean and standard deviation. The 4-point likert scale used in the study which were rated '4-strongly agree', '3- agree', '2-Disagree', and 1-strongly disagree were equivalent to the descriptive interpretation of '3.56-4.0- Very Reflective'; '2.56-3.50- Reflective'; '1.56-2.50- Moderately reflective, 1.0-1.50- Not Reflective.

On the other hand, the structured interview was used to gather the qualitative data that will support the responses of the participants. The interview questions were validated by three (3) experts and were pilot tested to five (5) preservice teachers. Each student was interviewed on their experience in the use of the web-based learning platform and whether the tool fostered their reflection thinking. The qualitative data were content analyzed through coding technique.

The researcher observed ethical considerations in the conduct of the study. The researcher asked permission to the university where the researcher is teaching to conduct the study. Also, informed consents were given to the participants to be a part of the study. The PSTs were informed about the research process and were assured that any incidents or quotes that were anonymous to protect their identities. The PSTs were cooperative and willing to give their insights about their experience on the designed activities.

3. Results and Discussion

This section provides an in-depth analysis of PMT's

reflective thinking skills based on the quantitative and qualitative data collected.

3.1. Preservice Teacher's Reflective Thinking Skills

Shown in Table 1, all the constructs in the reflective thinking skills, namely feedback (\bar{x} = 3.50, s = 0.28), realization (\bar{x} = 3.44, s = 0.29), and mastery (\bar{x} = 3.43, s = 0.56), were described as 'reflective.' Overall, the PMTs are reflective (\bar{x} = 3.48, s = 0.24). Under 'Feedback', PMTs 'strongly agreed' that they considered feedback because it will help them improve what they are doing (\bar{x} = 3.88, s = 0.34). Generally, PMTs recognized the role of 'feedback' to understand further and improve their work. On 'Realization,' the items 'I like to know how I do things' (\bar{x} = 3.54, s = 0.51) and 'I reflect on my actions to see whether I can improve on what I did' (\bar{x} = 3.54, s = 0.51)

were strongly agreed by the PMTs. On 'Mastery,' high disagreement was rated on items, 'I do not consider other's feedback because I know what I am doing' (\bar{x} = 1.38, s = 0.50) and 'I can work on things without thinking about what I am doing' (\bar{x} = 1.50, s = 0.78).'

Though in general, PSTs were described as 'reflective,' the research analyzed the reflective thinking skills of each student and compared it from the pre- assessment to the post- assessment, as seen in Table 2 and Figure 1. During the pre-assessment there were 18 (75%) PSTs who rated themselves as 'reflective,' while only 6 (25%) perceived that they were already 'very reflective.' The post-assessment showed an increase of 10 PSTs who are 'very reflective' and only 8 among the 18 PSTs remained to be 'reflective.' Thus, there are already 16 (67%) 'very reflective' PSTs after the execution of the intervention.

Table 1. Descriptive rating of preservice math teachers' reflective thinking skills

	Statements	Mean	Standard Deviation	Verbal Description
Feedback				
1	I consider feedback because it will help me improve on what I am doing.	3.88	.338	Strongly Agree
2	I seek feedback from others to enhance my tasks.	3.50	.511	Strongly Agree
3	I think other feedbacks are important as they will help me understand better.	3.67	.482	Strongly Agree
4	I think of what I have done so that I can improve on it further	3.54	.509	Strongly Agree
5	I review my past performance and integrate it in what I am doing.	3.25	.442	Agree
6	I reflect on what others have said.	3.38	.495	Agree
	Mean	3.500	.278	Reflective
Realization				
7	I like to know how I do things.	3.542	.5090	Strongly Agree
8	I immediately realize my mistakes when I reflect on what I have done.	3.33	.482	Agree
9	I correct my mistakes upon reflection.	3.38	.495	Agree
10	I reflect on my actions to see whether I can improve on what I did.	3.54	.509	Strongly Agree
11	I reflect on what I think .	3.42	.504	Agree
	Mean	3.442	.2948	Reflective
Mastery				
12	I do not consider other's feedback because I know what I am doing.	1.38	.495	Strongly Disagree
13	I can work on things without thinking about what I am doing	1.50	.780	Strongly Disagree
14	When I repeatedly do things, I start to do them without thinking about it.	1.83	.816	Disagree
	Mean	3.431	.560	
	Overall Perceived Reflective Thinking Skills	3.484	.242	Reflective

Table 2. Detailed Descriptive Analysis on the Pre-assessment and Post-assessment on PSTs Reflective Thinking Skills

Students	Preassessment	Remarks	Post assessment	Remarks
PMT 1	3.357143	Reflective	3.54	Very Reflective
PMT 2	3.642857	Very Reflective	3.62	Very Reflective
PMT 3	3.5	Reflective	3.38	Very Reflective
PMT 4	3.285714	Reflective	3.69	Very Reflective
PMT 5	3.285714	Reflective	3.85	Very Reflective
PMT 6	3.5	Reflective	3.38	Reflective
PMT 7	3.357143	Reflective	3.54	Very Reflective
PMT 8	3	Reflective	3.08	Reflective
PMT 9	3.214286	Reflective	3.08	Reflective
PMT 10	3.285714	Reflective	3.69	Very Reflective
PMT 11	3.214286	Reflective	3.15	Reflective
PMT 12	3.071429	Reflective	3.46	Very Reflective
PMT 13	3.571429	Very Reflective	3.46	Very Reflective
PMT 14	3.571429	Very Reflective	3.69	Very Reflective
PMT 15	3.5	Reflective	3.62	Very Reflective
PMT 16	3.071429	Reflective	3.38	Reflective
PMT 17	3.642857	Very Reflective	3.85	Very Reflective
PMT 18	3.142857	Reflective	3.23	Reflective
PMT 19	3.714286	Very Reflective	3.62	Very Reflective
PMT 20	3.5	Reflective	3.54	Very Reflective
PMT 21	3.357143	Reflective	3.08	Reflective
PMT 22	3.5	Reflective	3.23	Reflective
PMT 23	3.428571	Reflective	3.77	Very Reflective
PMT 24	3.571429	Very Reflective	3.69	Very Reflective

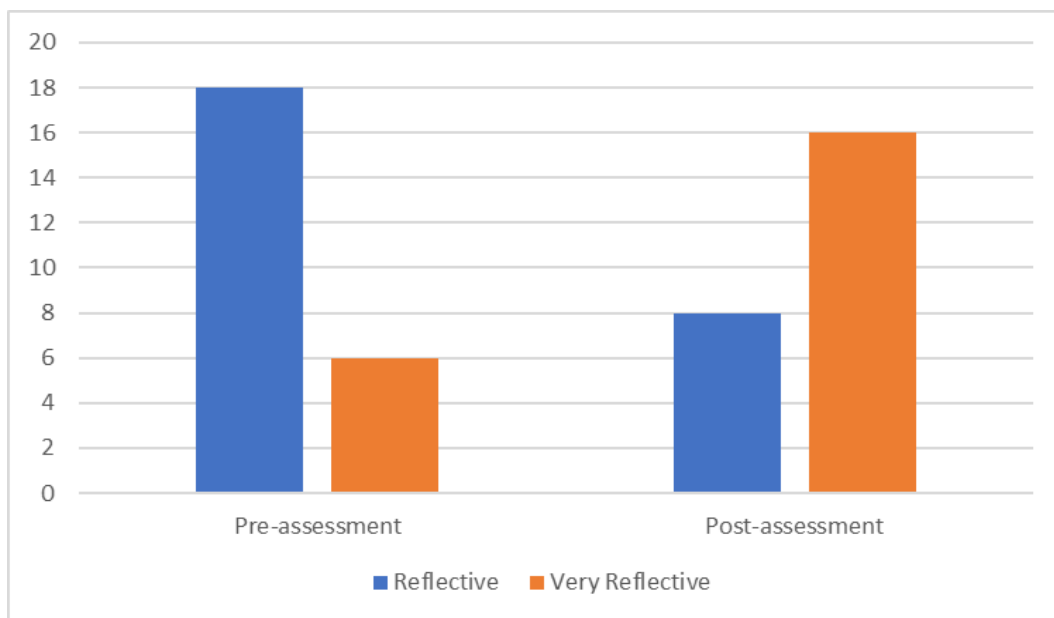


Figure 1. Visual Presentation of the PSTs Rective Thinking Skills in during the Pre-assessment and Post-assessment

To support the quantitative claims on this study, the researcher validated the result through the qualitative data gathered from the participants. The PSTs were positive that these tools helped them to think deeper, analyze further, and reflect more. One student said,

“The activities prepared by our teacher have helped us see and realize the real-life application of the topics we have discuss(sic).”-PST 1

Another student mentioned that the activities helped them learn how to reflect on the lessons while developing their creativity and enhancing their learning.

“The activities that were prepared by our teacher gave us insight on how to properly reflect on the lessons as well as on our experiences while doing such activities that will help us develop our creativity and determine what is needed to improve our knowledge about the lessons.”-PST 15

The output of the PSTs on the activities corroborate the claims of PSTs that these activities indeed lead them towards the reflection.

“The activities were very helpful for me to learn the concepts and applications of the lessons effectively because I was able to see and know where concept is more applicable and how does(sic) the concepts was being used in real life situation.” -PST 7

Providing PSTs with tools and opportunities to do reflection, they also become mentally and socially engaged. Students were provided with a venue for intellectual discussion and collaboration.

“The activities allowed us to reflect by means of helping us to think critically to find and gather more knowledge and share our opinions.”-PST 20

Notably, when PSTs are constantly immersed in these reflection tasks in Edmodo, they become more reflective in what they say and do even outside the tasks given to them. It may become a part of the thinking routine.

“There is a change on how I reflect on something. It is important that whenever I say something or share information to others, I have a basis and I am sure on(sic) what I am saying.”-PST 11

They recognized that Edmodo provides an extended classroom and is appropriate for the classroom set-up that they have- that is, meeting once a week.

“Edmodo is a great app especially in the discussion of large number of people or class.”

“Ang cool nga po ng Edmodo hehe; first time ko lang po mag-online class at napaganda po kasi, even wala ka po sa classroom parang nasa classroom setting ka pa rin. Two thumbs-up!”

[Edmodo is really cool, hehe; It was my first time to have an online class and it was nice. Even when you are not in the classroom setting you are like in the classroom like setting. Two thumbs up!]

In summary, the qualitative data supports the quantitative result in relation to the reflective thinking skills of the PSTs. It is notable that the activities done through the web-based learning platform (Edmodo) helped them develop their reflective thinking.

3.2. Preservice Teacher’s Experiences in the Use of Edmodo

This section describes the PSTs experiences in the use of Edmodo. This section is essential part in determining the challenges and other factors that contributes in the success of the instructional activities done by the teacher-researcher.

The success of Edmodo in achieving the course goals is highly dependent on what the teacher provided the students with. It only served as a platform; thus, the researcher inquired the PSTs on effect of the activities and whether the questions posed by the teacher contributed in their reflection. Activities set for Edmodo were also received positively because of the opportunities for learning and engagement in higher thinking skills, especially reflective thinking. For them it helped them to know, learn, and share more; provided better understanding, reflection, and critical thinking of the content and application of geometry; and

“I get to know, learn, and share knowledge about the subject.”-PST 12

“Yung Edmodo, tinulungan nya ako na magisip pa to think deeper.”

[Edmodo helped me to think more, to think deeper.]
– PST 14

In order to stimulate reflection, the teacher provided the students with guide questions. These questions are intended to facilitate understanding of the article and reflection towards real- world task applications. These questions as learning strategies have been used to guide students to generate effective questions that elicit meaningful interaction between students or between students and teachers [4]

They were asked whether the guide questions are helpful or not. Positive comments were gathered in terms of the guide questions provided by their teacher. During the interview, the students said;

“The questions posted by the teacher summarized the whole topic and helps me think critically.” – PST 8

“The questions posted were probing for me to think deeper and to think beyond what was taught or what has been discussed.”- PST 9

Feedback and follow-ups also brought excitement to students especially when they receive their grades and remarks from every activity. On the part of the teacher, she gave feedback immediately to the students who submitted their assignment earlier compared to those who

submitted on the due date, where bulk of the submissions were forwarded. During the classroom follow-up, some students said that they get excited to see the feedback of their teacher, and because of that, they submitted their project as soon as they can. Also, constant follow-up made the students feel connected.

Furthermore, the researcher also gathered disapproval among students particularly those who are still struggling with the use of computers and other devices.

“Doing online activities are a bit challenging especially for those who do not have an internet connection. That is the part where I was challenged the most.”- PST 10

“Upon passing my assignment, I did have a hard time sending it because of the poor internet connection.”- PST 11

Similar to the suggestion of Poyraz and Usta[10] education environment should be organized with various scenarios regarding to the events that pre-service teachers might encounter in their career in order to show tendencies in reflective thinking, making reflection and developing positive attitude towards this type of thinking. The need to emphasize the role of environment in which teaching and learning happens is inescapable priority for any educational institution due to the interdisciplinary nature and complexity of education in the new millennium [21].

4. Conclusions

This action research aimed to promote the reflective thinking of the preservice math teachers. Based on the gathered quantitative and qualitative data, the designed instruction in the use of Edmodo promotes reflective thinking. Though this study does not claim that the use of Edmodo primarily contributed to development of PSTs reflective thinking skills, the data provided in this study showed that the instruction designed by the teacher-researcher fostered reflection. The Edmodo tasks given to them allowed them to think deeper, analyze further, and reflect more. Carefully thought reflection activities, guide questions, and feedbacks and follow-up are essential in conducting reflection-embedded tasks.

This study allows the teacher-researcher to reflect and improve her practice where the process was seen to be effective. It can be adopted or adapted by other teachers who aim to integrate technology into their teaching and promote students reflective thinking. This study recognizes that even though the action implemented on this course was successful in its goal, it cannot guarantee that it will also be successful to others. Since there are no classrooms alike, the teacher should be cautious and should be constantly tailoring the activities based on the needs and interest of the students.

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