

Exploring Mathematics Education Students Presentation Skills in Differential Equation Assignment Through Online Learning

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ABSTRACT

Presentation skills are one of the skills that prospective mathematics teachers must possess because they support pedagogical competence. Pedagogical competence is one aspect of teacher professional competence that is important for future teacher candidates. This study aimed to explore the presentation skills of mathematics education students on differential equation assignments through online learning. This research is a qualitative descriptive study. The research subjects were 20 students of mathematics education in the 4th semester of the Universitas PGRI Madiun. The data was collected through assignments, interviews, and video recordings. To ensure the validity of the data, the analysis was carried out through method triangulation. The results showed that the student's presentation skills included: (1) Professionalism (technical aspects), two groups distributed assignments using laptops and five groups used handphones; (2) Demonstration, each group can demonstrate the assignment according to the material that the lecturer has delivered; (3) Ingenuity and creativity, only 1 group, made a PowerPoint for the presentation of their assignment, while others uploaded a scanned copy of their written work on paper; (4) Verbal communication, there are two groups still mispronounce some mathematical symbols; (5) Visual communication, there are three groups who are wrong in visualizing formulas in their work; (6) Trust and confidence, namely there are four groups that do not yet have credence and confidence in their answers; (7) Collaborative effort, each group is still unable to involve other groups in responding to the presentation.

Keywords: Presentation skills, differential equation, assignment, online learning.

1. INTRODUCTION

Higher education should develop student skills, one of which is oral communication [1]. Forms of oral communication needed in academic activities, one of which is presentation skills, which is the ability of a person or group to present a material or work. This skill is important to have in the current era because it is the ability to present information to the public [2],[3].

In the academic field, presentation skills play a key role, for example, demonstrates material, assignment presentations, seminars, and conferences [4]. For teachers' candidates, presentation skills are one of the skills that prospective mathematics teachers must possess because they support pedagogical competence.

Presentation skills can be used by teachers to present or show how to model or illustrate a concept (can include material or diagrams) and also explain topics, concepts, or procedures, so that these skills are pedagogical competencies [5]. Pedagogical competence is one aspect of professional teacher competence that is important for future teacher candidates [6]. Thus, it is important to practice these presentation skills for mathematics education students who will become teacher candidates.

When students make presentations, they change knowledge, because they act didactically [7]. In presenting task solutions, mathematics students should adapt to the axiomatic forms of mathematics, arrange presentations that maximize the amount of knowledge

conveyed in a short time [8], because they have to share with other students in presenting.

Facts in the field show that mathematics education students are still not used to presentations on online learning. Even though they have done presentation assignments through offline learning, if it is done through online learning, of course, they still need adjustments. In addition, in the implementation of online learning, there are obstacles faced such as the limitations of writing mathematical symbols and the limitations of the basic abilities to learn management systems and multimedia software [9].

Based on these facts, it is important to reveal how the skills of mathematics education students in presenting their assignments. Mathematics education student presentation skills can be done through learning activities in one of the courses, namely differential equations. The differential equation is a subject that mathematics education students must teach. This subject requires students to be able to master the material, one of which is marked by the explanation given by the student regarding the material on differential equations.

In the differential equation subject, mathematics education students learn about equations whose terms are the derivatives of an unknown function [10]. This course provides student content skills which are part of the competencies that must be possessed as a mathematics teacher. Content knowledge is part of the content and pedagogic knowledge as well as content, pedagogic, and technology knowledge [6][11], namely knowledge that must be mastered by a teacher to convey material properly and correctly to students [12] [13].

To determine student mastery of the equation material given, assignments are given that must be presented in class through online learning. Through presentations, students can also show their communication skills, which is also very important for student teacher candidates. Students must be able to choose a presentation method to present their part of the assignment [14]. Presentation is needed to explain specifications and to justify choices made to arrive at a product to a given specification [15].

This presentation skill can be seen based on several aspects, including professionalism (technical aspects), demonstration, ingenuity and creativity, verbal communication, visual communication, trust & confidence; and collaborative effort [16]. In presenting material, students can technically demonstrate creativity using oral and visual communication to foster self-confidence. In presentation skills, collaborative efforts are also needed that are not only between group members but also the collaboration between groups.

Research on presentation skills has been researched by several previous researchers. An experiment in which students were allowed to demonstrate their technical knowledge and integrate it with oral presentation skills

[16]. Developed innovative PowerPoint presentations which still pose challenges or difficulties for students with low abilities [17]. [18] have tested whether using video recordings helps students increase their awareness of developing oral presentation skills by reviewing video recordings of their presentations [18].

From the results of these studies, it appears that research that explores student presentation skills in online learning has not been researched. Thus, it is necessary to reveal the presentation skills of mathematics education students on differential equation assignments through online learning, so that later it can be used as a basis for designing more suitable learning, especially online learning.

2. MATERIALS AND METHOD

This research is a qualitative descriptive study that explores descriptively the presentation skills of mathematics education students in Differential Equation assignment through online learning. The research subjects were 20 students of mathematics education in the 4th semester of the PGRI Madiun University who were taking the differential equality course.

The data was collected through assignments, video recordings, and interviews. The assignment in the differential equation subject given to students was carried out by dividing the class into 7 groups. Each group gets a part to work on 1 question from the assignment presented on e-learning as shown in Figure 1 below.

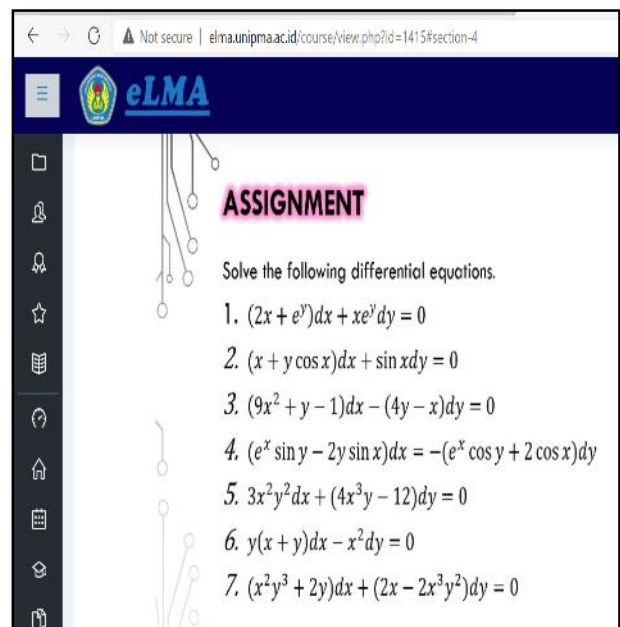


Figure 1. Assignment in Differential Equation Course

Video recording was carried out during online learning activities by giving assignments to students, namely students presenting the problem-solving in Figure 1 in groups. Video recording on online learning is

done using the recording facility at the Google Meeting. Video recordings are used to get presentation data made by students in delivering differential equations solving tasks. Interviews were also conducted to confirm the presentation of assignments that have been carried out by students.

Analysis of research data to explore the presentation skills of mathematics education students in Differential Equation assignment through online learning was carried out based on the aspect of presentation skills [16] in Table 1 below.

Table 1. Presentation Skill Aspects

Presentation Skill Aspects	Descriptions
Professionalism (Technical Aspects)	Student management of presentation technical
Demonstration	Student demonstrations were planned and carried out
Ingenuity and Creativity	Student presentation ideas show ingenuity and creativity
Verbal Communication	Student communication in conveying symbols/formulas in writing or orally
Visual Communication	Student communication in conveying information uses depiction media that can only be read by the sense of sight that combines symbols and images
Truth and Confidence	Student credence and confidence in the answers presented
Collaborative effort	Cooperation among team members in presenting assignments

Data analysis was carried out by reducing research data, presenting research data, and drawing conclusions from research results. To ensure the validity of the data, the analysis was carried out through the triangulation method derived from the data assignment, video recordings, and interviews.

3. RESULTS AND DISCUSSION

3.1 Results

The presentation skills of students in presenting solutions to differential equations in this study are described based on several aspects [15], including (1) Professionalism (technical aspects); (2) Demonstration; (3) Ingenuity and creativity; (4) Verbal communication; (5) Visual communication; (6) Trust and confidence; and (7) Collaborative effort.

3.1.1. Professionalism (technical aspects)

Professionalism (technical aspects) is the management of technical presentations by students in their groups. This technical aspect appears when students use the devices used during the presentation. Of the 7 groups that presented their assignments, it appears that two groups distributed assignments using laptops (Group 1 and 3) and five groups used handphones (Group 2, 4, 5, 6, and 7). The use of laptops and handphones during the presentation is as shown in Figures 2 and 3. Figure 2 shows the presentation of group 1 using a laptop, while Figure 3 shows the presentation of group 2 using a mobile phone.

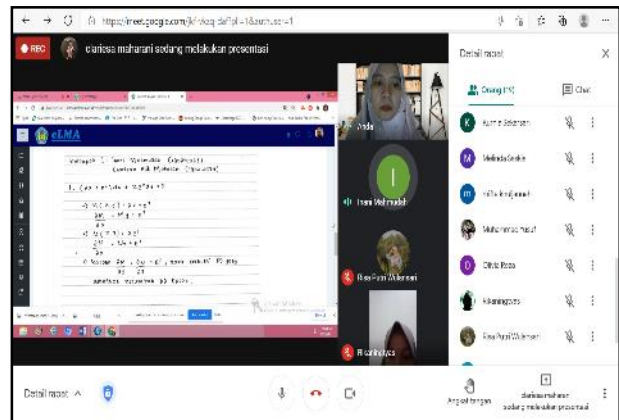


Figure 2. Using the laptop for presentations on online learning

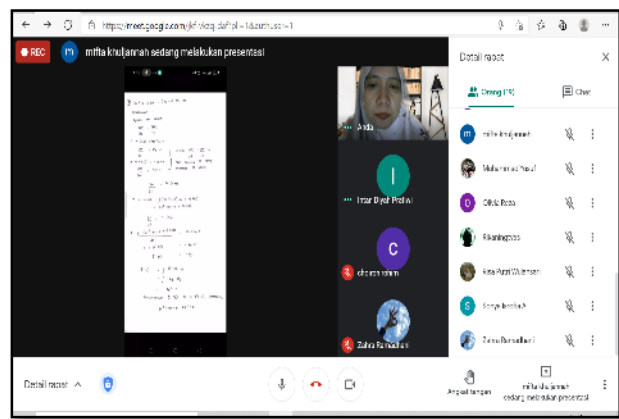


Figure 3. Using the mobile phone in presentations on online learning

Students have their reasons regarding the use of laptops and cell phones during presentations. M1 who is a member of group 1 stated that "the presentation using a laptop makes it easier for friends from other groups to see more clearly the solutions to the questions presented". Group 1 pays attention to the ease with which students from other groups understand the problem solving presented by the group. In contrast to M3, which is a member of group 3, stated that "the use of cell phones for presentations is because it is more practical, although

it makes it a bit difficult for friends from other groups to understand the solutions to the questions presented". Group 3 paid less attention to the convenience for other group students in understanding the solving of the questions it presented.

3.1.2 Demonstration

The demonstration in this study is that students can carry out a presentation on the completion of the assigned questions as planned. Each group gets an assignment according to its part and completes it by discussing it in their respective groups. The problem solving for each group is done on e-learning which looks like Figure 4.

Dikawal	Dimulai oleh	Balasan	Post terakhir
kelompok 6	Luslanaji	2	Wahidul Muzaffar Sel: 6 Apr 2021, 03:02
kelompok 7	Sonyo Istiqo Azzafre	5	Muhammad Yusuf Alifan Sab, 5 Apr 2021, 4:16
kelompok 5	Enyo Azzin	1	Evina Astri Sel: 30 Mar 2021, 15:18
kelompok 1	Clayesa NH Mahonori	1	Clayesa NH Mahonori Sel: 30 Mar 2021, 12:31
kelompok 3	Amelkhalqia Jannah	1	Muhammad Ajmanan Kam, 25 Mar 2021, 06:49
kelompok 4	Makinda Salsca Pendiarty	0	Makinda Salsca Pendiarty Rab, 24 Mar 2021, 22:23
kelompok 2	Risa Putri Wulansari	0	Risa Putri Wulansari Rab, 24 Mar 2021, 16:51

Figure 4. Problem-solving for each group in preparation for the presentation

In addition, based on the results of the video recordings, it shows that each group presents the completion of the problems that have been done previously or have been planned in the group. Each group can demonstrate the assignment according to the material that the lecturer has delivered.

3.1.3 Ingenuity and creativity

Ingenuity and creativity is a presentation idea that shows creativity. This can be seen from the way students present their results. From the video recording, it appears that only 1 group (Group 6), made a PowerPoint for the presentation of their assignment, while others uploaded a scanned copy of their written work on paper. This is shown in Figure 5 below.

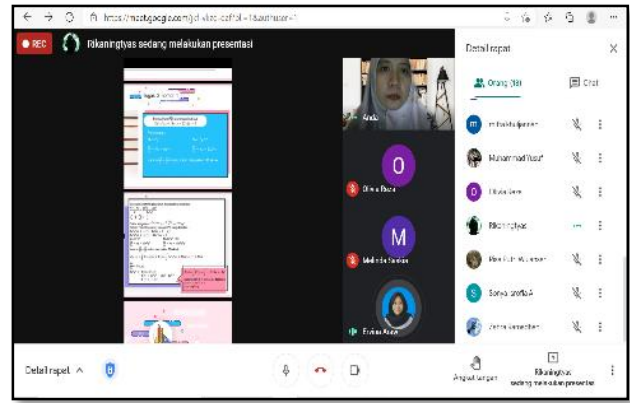


Figure 5. Presentation by using color PowerPoint

In Figure 5, it can be seen that group 6 presented the solving of their part of the problem using PowerPoint. M6 who is a member of group 6 stated that "our group presented the completion of the assignment using power points to attract and arouse the interest of other group students to pay attention to our presentation". However, when asked why the presentation was using a mobile phone, M6 stated that "actually we planned to present the completion of the task using a laptop, but when we wanted to share it suddenly constrained by a signal, so we immediately used a cell phone so that our group presentation could run". However, group 6 has fulfilled ingenuity and creativity because it already has an idea in creating its presentation through power points and color combinations on each slide.

3.1.4 Verbal communication

Verbal communication in this study is student communication in conveying symbols/formulas in writing or orally. Based on the video recording, shows that the two groups still mispronounce some mathematical symbols. The first error is shown in Figure 6 below.

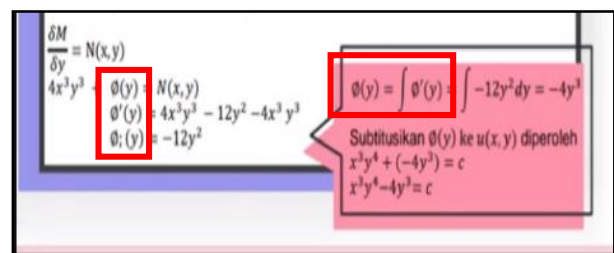


Figure 6. Error in mentioning symbol ϕ

Students in group 6 incorrectly mention the name of the symbol. The symbol ϕ which should be read "phi", is read "rho" by students. This is also supported by M6 who said that "yes ma'am, we thought it was a symbol that was read by rho because it was the same as the symbol in physics when we were in high school".

In addition, students in group 3 made the mistake of mentioning the symbols in Figure 7 below.

$$u(x,y) = \int (x + 4 \cos x) dx + \phi(y)$$

$$= \frac{x^2}{2} + 4 \sin x + \phi(y)$$

$$\frac{\partial u}{\partial y} = \phi'(y)$$

$$\frac{\partial}{\partial y} \left(\frac{x^2}{2} + 4 \sin x + \phi(y) \right) = \phi'(y)$$

$$\sin x + \phi'(y) = \sin x$$

$$\phi'(y) = 0$$

Figure 7. Error in mentioning the name of the symbol [

Students from group 3 mispronounced the name of the symbol. Symbol [which should be read "integral" read "derivative". The same thing was stated by M3 that "I didn't realize that it should be read as integral but I read derivative".

3.1.5 Visual communication

Visual communication in this research is student communication in conveying information uses depiction media that can only be read by the sense of sight that combines symbols and images. Three groups are wrong in visualizing formulas in their work. The first error was made by group 1 which is shown in Figure 8 below.

$$M(x,y) = 2x + e^y$$

$$\frac{\partial M}{\partial x} = M$$

$$N(x,y) = xe^y$$

$$\frac{\partial N}{\partial x} = Nx = e^y$$

*) karena $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x} = e^y$, maka terbukti PD jang diberikan merupakan PD eksak.

Figure 8. Error writing symbols

The visualization error by group 1 appears at $\frac{\partial M}{\partial x} = M_y$ which should be $\frac{\partial M}{\partial y} = M_y$. Another visualization error also occurs at $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ which should be $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$. This is also supported by M1 who said that "yes mam, we were not careful enough so we wrote it wrong".

Furthermore, the errors in group 4 are shown in Figure 9 below.

$$\mu = \frac{1}{xM - yN}$$

$$= \frac{1}{x(x^2y^2 + 2y) - y(2x - 2x^2y^2)}$$

$$= \frac{1}{(x^3y^2 + 2xy) - (2xy - 2x^2y^2)}$$

$$= \frac{1}{3x^2y^2}$$

alikan faktor Integrasi $\frac{1}{3x^2y^2}$ dengan PD yang dibikin

Figure 9. Error writing symbols in formulas

The visualization error by group 4 appears in the integration factor symbol which should be $\mu = \frac{1}{xM - yN}$ visualized as $N = \frac{1}{xM - yN}$. This is supported by the M4 statement that "I am not clear in writing symbols".

In addition, the errors in group 6 are shown in Figure 10 as follows.

Faktor Integrasi = $e^{-\int f(y) dy} = e^{-\int \frac{2}{y} dy} = e^{2lny} = y^2$
 Kalikan Faktor Integrasi y^2 dengan PD yang diberikan :
 $3x^2y^2 dx + (4x^3y - 12)dy = 0$ xy^2
 $3x^2y^4 dx + (4x^3y^2 - 12y^2)dy = 0$
 $M = 3x^2y^4$ $N = 4x^3y^2 - 12y^2$
 $\frac{\partial M}{\partial y} = M_y = 12x^2y^3$ $\frac{\partial N}{\partial x} = N_x = 12x^2y^2$

Figure 10. Errors in visualizing the results of multiplying operation

The visualization error by group 6 appears in the visualization of the product $(4x^3y - 12)dy = 0$ with y^2 which should be $(4x^3y^3 - 12)dy = 0$ visualized with $(4x^3y^2 - 12)dy = 0$. This is in line with M6 who said that "we are not very careful in operating it".

3.1.6 Trust and confidence

Trust and confidence in this research are the truth and confidence of students in the solutions or answers presented. When interviewed, four groups do not yet have credence and confidence in their answers. This can be seen in the interview quotes from 4 groups which show that they are not sure about the answers or solutions to the problems assigned to their groups. M1 who is a member of group 1 stated that "we are a little unsure because we made some writing errors". M4 who is a member of group 4 stated "we are not sure about our answer". M5 who is a member of group 5 stated "we are still confused about the integration factor". M6 who is a member of group 6 stated "not sure because we were wrong in multiplying it by the integration factor".

3.1.7 Collaborative effort

The collaborative effort in this research is cooperation among team members in presenting assignments. The video recording shows that each group is still unable to involve other groups in responding to the presentation. In addition, this statement is also supported by quotations from interviews for each group. M1, M2, M3, M4, M5, and M6 who are members of groups 1, 2, 3, 4, 5, and 6 stated that if they had just collaborated with their respective group members and when presenting they were still less collaborative with other groups. This is because they have difficulties with online learning, so that interaction between groups feels limited even though they have tried to provide input to each other, but they are still not maximally biased.

3.2 Discussion

The student presentation skills consist of some aspects [16]. The first aspect is professionalism (technical aspects), where students use different tools in presenting their assignments. This difference, for delivery purposes, there seems to be no problem because students can carry out activities anywhere and anytime via a computer, laptop, tablet, or smartphone as long as they have an internet connection [19]. Second, each group can demonstrate the assignment according to the material that the lecturer has delivered. Student presenters select content and decide how to deliver the content in the format assigned to them [20]. The third aspect is ingenuity and creativity. Only 1 group, made a PowerPoint for the presentation of their assignment, while others uploaded a scanned copy of their written work on paper. It is better if students' creativity needs to be trained as a provision for designing learning when they become teachers later [14]. The fourth aspect is verbal communication. Two groups still mispronounce some mathematical symbols. Verbal communication is important for prospective teachers as a provision to deliver material to students later [21]. The fifth aspect is visual communication. Three groups are wrong in visualizing formulas in their work. This visualization is important because learning must pay attention to the cognitive aspects of students and make use of a combination of visualization and explanation when designing presentation materials [22]. The next aspect is trust and confidence. Four groups do not yet have credence and confidence in their answers. A person's self-confidence is one of the things that affect decision skills, including decisions in presenting tasks [23]. The last aspect is a collaborative effort. Each group is still unable to involve other groups in responding to the presentation. This collaboration is important to train prospective mathematics teacher students because it is one of the 21st-century skills to face the challenges of the times [24].

4. CONCLUSION

From the research results, it can be concluded that the student presentation skills include: (1) Professionalism (technical aspects), two groups distributed assignments using laptops and five groups used handphones; (2) Demonstration, each group can demonstrate the assignment according to the material that the lecturer has delivered; (3) Ingenuity and creativity, only 1 group, made a PowerPoint for the presentation of their assignment, while others uploaded a scanned copy of their written work on paper; (4) Verbal communication, there are two groups still mispronounce some mathematical symbols; (5) Visual communication, there are three groups who are wrong in visualizing formulas in their work; (6) Trust and confidence, namely there are four groups that do not yet have credence and confidence in their answers; (7) Collaborative effort, each group is still unable to involve other groups in responding to the presentation. The results of this study provide recommendations that it is necessary to familiarize higher education students so that they are skilled in conveying their ideas through presentations on offline learning or online learning because they can indirectly train the communication skills that are needed in facing the progress of the times like today.

AUTHORS' CONTRIBUTIONS

All authors actively participated in the preparation of this article. The contributions made by each author include: determining ideas, reviewing the literature, collecting data, and analyzing research data, which are outlined in this article.

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