

# **STUDENTS' LEARNING OUTCOMES AND PERSISTENCE AT THE FIRST CYCLE OF IMPLEMENTATION OF PEDAGOGI IGNASIAN IN ORDINARY DIFFERENTIAL EQUATIONS COURSE**

**Febi Sanjaya**

*Department of Mathematics Education, Faculty of Teacher Training and Education, Sanata Dharma University,  
Mrican, Tromol Pos 29, Yogyakarta 55002, Indonesia*

[febi@usd.ac.id](mailto:febi@usd.ac.id)

## **Abstract**

This study aims to explore the results of the implementation of Ignatian pedagogy in Ordinary Differential Equations course in terms of learning outcomes and persistence. This research is descriptive quantitative approach. The instruments used are the persistence questionnaire sheet, and the test sheet. The subject of this research is students of Mathematics Education of Sanata Dharma University, who is taking a course of Ordinary Differential Equations on class C. The results obtained are: 1) Students' learning outcomes are in good category; 2) Students' persistence are in high category.

**Keywords:** learning outcomes, persistence, ordinary differential equations

## **Introduction**

Ordinary Differential Equations is one of the compulsory subjects for Mathematics Education 6th semester students. This course studies the forms of differential equations and how to solve them. Based on the experience of the researchers, the problem is there are many forms of differential equations. The number of forms of solving differential equations causes students to be confused in solving problems related to differential equations, making them back and forth in solving them. Yet if further examined, the characteristics of each equation is clearly written, it

just takes a lot of practice to more easily distinguish it. Talking about the need for lots of practice questions is tantamount to talking about persistence. The more diligent a student, the more training questions are tried so that it is easier to understand the subjects of Ordinary Differential Equations. However, seeing the recent phenomenon, students prefer to wait to be explained in the classroom rather than by self-study with full perseverance. Researchers' experience shows that preparing for learning before their lectures is very rare. This is indicated when in a few lectures, when they have been studied or not, most have answered yet, even though they have been told that sometimes they will be given an impromptu quiz.

## **Theory**

### ***Understanding Persistence***

According to KBBI, persistence means diligent, hard-hearted, and earnest. Persistence can show the ability to stimulate us to attention to a person, a thing or activity, or something that can have an effect on the experience which has been stimulated by the activity itself (Lester and Alice, 1984). In terms of learning to teach, persistence can be defined as a serious effort to achieve optimal results. Persistence can not be classified as innate but its nature can be cultivated and developed (Rohiat, 2008). According to Lester and Alice (1984) there are several factors that influence the growth and development of a persistence, among others:

#### a. Internal factors

- i. Motivation
- ii. Needs
- iii. Pleasure Against An Object

#### b. External Factors

- i. Family
- ii. Facilities
- iii. Friendship

### ***Ignatian Pedagogy***

Ignatian pedagogy is usually called the Reflection Pedagogy. Suparno (2015) states that the Paradigm of Reflection Pedagogy (PRP) is a pedagogy to support the needs of a whole and comprehensive education. PRP is expected to foster student development, not only to be smarter in their knowledge, but to be a sensitive person, and sensitive to the needs of others. Even expected, with the help of PRP, students can develop into human beings for others and with others. The main elements of PRP are three, namely experience, reflection, and action. The three main elements are assisted by the element before learning, which is to see the context, and assisted by the element after learning with evaluation. So in outline, PRP has the following dynamics: (1) context, (2) experience, (3) reflection, (4) action, and (5) evaluation. (Gallagher et al in Suparno, 2015). Suparno (2015) also stated that one of the approaches and methods that fit the Reflection Pedagogy Paradigm is the constructivism approach with the working methods of the group.

### ***Learning outcomes***

Learning outcomes are the abilities possessed by students after carrying out learning activities, both cognitive, affective and psychomotor aspects. In addition, learning outcomes is the change or output of the students after experiencing the experience in learning both quantitatively and qualitatively. Evaluation of learning is the way to find out whether the learning outcomes have achieved the desired goals. Likewise Sunal proposed (in Susanto, 2013: 5) that evaluation is a tool to obtain information how effective a program has met the needs of students. According to

Wasliman (in Susanto, 2013: 12), student learning outcomes are the result of continuity between factors affect, including:

- a. Internal factors are factors that originate from within the self include intelligence, interest and attention, learning motivation, attitude perseverance, study habits.
- b. External factors are factors that come from outside the self includes family, school and community.

### **Methodology**

The research used is descriptive quantitative research. To answer the problem formulation of this research, and to achieve the purpose of this research, the researcher took the subject of the subjects of Equal Differential Equation class C Mathematics Education of Sanata Dharma University, Yogyakarta, academic year 2016/2017. The instruments that will be used are the persistence questionnaire sheet and the learning ability evaluation sheet.

Data analysis is done as follows. For the evaluation sheet of the persistence questionnaire, the researcher quantifies based on the Likert scale, categorizes it, and presents it descriptive-quantitatively. The questionnaire contained 8 positive and negative statements. Data from this questionnaire was transformed based on Likert scale with score 1,2,3, and 4. Persistence score of each student is defined as the total score of students divided by 8. Furthermore the final result of the persistence score are grouped as follows:

**Table 1.** Predicate of The Persistence score

<b>Score</b>	<b>Predicate</b>
$3 \leq x \leq 4$	High
$2 \leq x < 3$	Medium
$1 \leq x < 2$	Low

The first step that researchers do is explore the context of students. The second step is to finalize the prepared lesson plan, and implement it. The learning process uses group discussion methods. For the latter the researcher will see the learning outcomes for one semester, through the evaluation result, the reflection sheet, and the final value.

## **Results and Discussion**

Suparno (2015) states that one of the approaches and methods that match the Paradigm of Reflection Pedagogy is a constructivism approach with the method of working groups. Therefore the method of learning done in one semester is the method of working group. The learning process is divided into 2 cycles. The first cycle is done from the beginning of the lecture to UTS, the second cycle is done afterwards to UAS. Cycles consisting of context, experience, reflection, action, and evaluation will be explained as follows.

### ***Context***

The course of Ordinary Differential Equations is a compulsory 6th semester course that weight 3 credits. This lecture is conducted every Thursday at 14.00 - 16.30. This course was taken by 44 students consisting of 2 students of class of 2015, 28 students of class of 2014, 13 students of class of 2013, 1 student force 2010. Another thing that also need attention is that lecturers have known most of the students who take the courses the. This ultimately makes it easier for lecturers to interact in the classroom.

In addition, in the context of the context of the lecturer asked the students to write down their learning experiences. Some things that are obtained are:

- a) The student realizes his mistake in the past and begins to make up for it by studying hard
- b) Students look for other references (books, internet, friends, lecturers)
- c) Students learn when they need (exam preparation, quiz, presentation, task)

- d) Students learn to depend on mood
- e) Students take time to learn
- f) Students study together
- g) Students do not know how to learn

Here are some examples of reflections on student learning experiences

"My learning experience is unique. In a day, I always take the time to read and write for about 3 hours outside normal college hours on campus. Whatever I read and write does not always remain in the memory but at a certain moment will appear in the memory when meeting the same experience. "

"At first fitting junior high school and senior high school, I use the method of learning to read and practice questions. Often feel like the same difficulty friend. In high school I began to feel that learning can not be alone. I need friends to help understand the material and so should we. "

"I never learned, never went to college. But now I study 26 hours during the day to make amends for me. "

### ***Experience***

After the context excavation, the lecturer asks students to write the grade of Integral Calculus and Differential Calculus courses. It serves as the basis for the division of the group because the two courses are closely related to the subject of ODE. Groups are formed by seeking cognitive abilities between groups equally. The point is that there is no dominant group. Furthermore they will be given the task of preparing the discussion for further material. The hope of the next learning process is that they prepare the next material in the group discussion outside class hours and then in the class there is a discussion. However, in reality the group discussions do not occur

in outside class. Therefore, the lecturers take the initiative to give the group task so that they study group outside the hours of the lecture.

In the process of learning in the classroom, students sit in groups that have been formed to discuss about the materials given. Furthermore, the lecturer gives an opportunity to some groups to share their learning experience according to the given material. Other groups were asked to ask or respond. Furthermore, the lecturers provide reinforcement on some concepts that are still under-understood. Although not as dynamic as expected but the processes that occur in the classroom are quite good. In that sense, discussion can occur in the process.

In this first cycle, the materials provided include the types of first order ODE and how to solve it, order reduction methods for high-order ODE, and ODE settlement constant coefficients. The material of the types of ODE I order and how to solve it is actually not difficult, it's just a lot of different forms of settlement. For the material of order reduction method tends to solve only the differential equations in accordance with the systematical way given. While the material of ODE settlement coefficient constant is a topic that tends to be easy because it is identical to the root search of the polynomial.

### ***Reflection***

In cycle I is done 2 kinds of reflections, namely large reflections and small reflections. Large reflections are done before UTS in writing on paper, whereas small reflections are done every 2 weeks through exelsa. On the big reflection, lecturers only ask students to reflect on how they feel about the lectures, whether from the learning model, the material, or anything else.

### ***Action***

After reflection on this cycle I, the lecturer asked the students to silence for a moment and make intentions to improve the next learning process. In addition, lecturers also provide strengthening. These intentions become action for the next student.

### ***Evaluation***

#### 1. Learning Outcomes (Competence)

The evaluation used in cycle I is several types shown in the following table.

**Table 2.** Type of Evaluation

No	Type of Evaluation	Form	Weight (%)
1.	Presentation	Oral	20
2.	Midterm Exam	Written	20
3.	Task I	Written	7
4.	Task II	Written	7
Amount			54

The final result is as follows.

**Table 3.** Final Result

Grade	Amount	Percentage
A	10	22,73%
B	29	65,91%
C	5	11,36%
D	0	0,00%
E	0	0,00%
F	0	0,00%

From the result, it can be concluded that 44 students (100%) minimum have C grade. So Students' learning outcomes are in good category

#### 2. Persistence

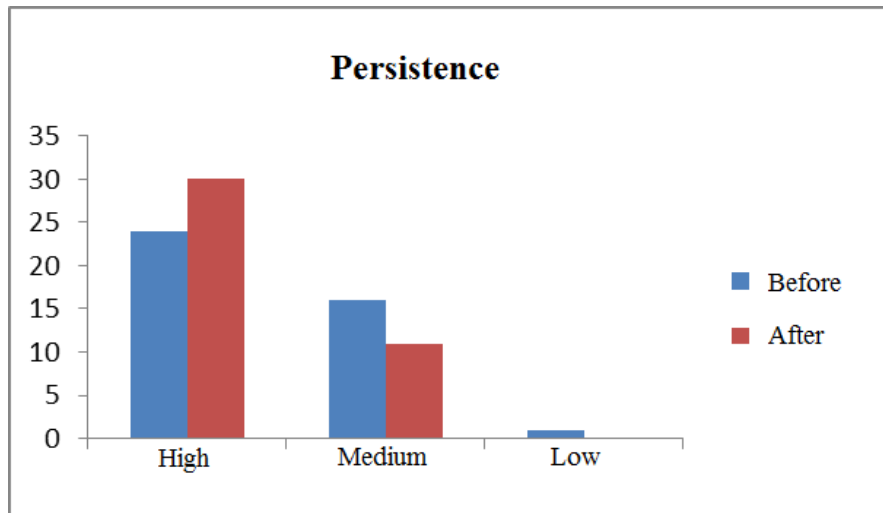
The evaluation of persistence used is to use a self-assessment questionnaire. This questionnaire is given in the middle of a semester that already contains a statement before they follow the ODE lecture and when they follow the ODE lectures. The results of the questionnaire scores are grouped into 2, i.e.



- a) average persistence score before attending ODE lectures,
- b) average persistence score when lecturing ODE,

Of the 44 data, 3 data is invalid because there are items not filled so that only 41 data remaining.

Here are the results of data processing using Excel and SPSS.



**Figure 1.** Amount of Persintence Category

The data shows that in the high category, there is increasing persistence from 24 students (59%) to 30 students (73%), in the middle category there is decreasing persistence from 16 students (39%) to 11 students (27%), low decreased persistence of 1 student (2%) to 0 students.

**Table 4.** Descriptive Statistics Result for Persistence

	N	Minimum	Maximum	Mean	Std. Deviation
Pers_Before	41	1,75	3,88	2,9421	,39637
Pers_After	41	2,25	4,00	3,1372	,37791
Valid N (listwise)	41				

From these results it can be concluded that on average there is an increase in student persistence after learning with PI from score 2.9421 to score 3.1372. This means that on average there is a change of persistence from the moderate category to the high category.

## **Conclusion**

From pengimplentasian Ignasian pedagogy in the course of Equal Differential Equations this can be obtained conclusion as follows:

- 1) Students' learning outcomes (competence) are in good category;
- 2) Students' persistence are in high category.

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