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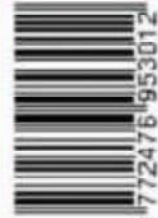


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(TPACK) in Science Education for Supporting  
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## Development Model of Students' Inert-Depend Strategies to Face Disruption Era Through Best Practice Film of Android Based Learning of Pancasila Character Value

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**Abstract.** The world of education is currently facing new challenges since it enters the industrial revolution era 4.0 in which the digital industry has become a paradigm and reference in the recent order of life. The Industrial Revolution 4.0 comes together with the disruption era of which new literacy incorporating data, technology literacy and human literacy. Data literacy is related to the ability to read, to analyze and to make conclusions based on obtained data and information (big data). Technology literacy emphasizes on the ability to understand the way of the working machine. It also includes technology applications and technology based work to produce maximum results. Human literacy focuses on communication, collaboration, critical thinking, creative and innovative abilities. In case of human literacy, it is necessary to develop positive characters to equip Indonesian people with Pancasila character. The efforts to produce a generation that can compete in disruption era must be done in some integrated way with Inert-depend strategies to foster a holistic culture and community morality with the potential basis of the community including Pancasila character. This study aims at producing Inert-depend strategies development model through making best practice film of Android based learning of Pancasila characters. The research method was using Research and Development [1] with the 4-D (Four-D Models) modified by R & D form of [2]. Research procedure include Define phase; Design phase; Develop phase and Disseminate phase. The first stage was to produce film packages best practice of Android-based Pancasila character, the second stage was to produce students' Inert-dependent strategies development model to face disruption era, and the third stage, the model has been disseminated in the student environment through intra-curricular and extracurricular. The results showed that there was an increase in Inert-depend strategies during the experimental class students and the standard gain average in the experimental class was in the "high" category which was significantly different from the control class with "medium" category. Based on these results, it can be concluded that the average inert-depend strategies test results and understanding of the experimental class concept were higher, both from the average score and the standard gain mean.

**Keywords:** *inert-depend strategies, best practice film, Pancasila character*

### 1. Introduction

The present education world challenging disruption phenomenon where the movement of industrial world or labour competition is no longer linear. The change is very fast and fundamental by ruffling the old patterns to create a new order [3]. There is a radical change that penetrate any challenges and obstacles. It overturns the systems that already existed since tens or even hundreds of years and those replaced with a new system driven by innovative and creative young generations.





Disruption era is like a double-edged sword which has positive and negative impact. This era also changes the international world that directly influence to most of countries. It gives effect to the social, political, even mental of nation. The young generation is prone to be lured by the negative influence of the disruption era. For example, the digital era tend to allow illegal transactions of illicit goods such as drugs, pornography, even new ideologies that are negative and contrary to the values of Pancasila as national ideology. Disruption in the digital domain covers themes in all industrial sectors; healthcare, logistics, retail, service and information, production, and entertainment industries etc. In addition to this; governmental, political, economic, social, and cultural areas were subjects discussed in relation to disruption in the digital domain [4, 5]. The results from the study pointed to USA as the main contributor of disruption literature and to Asia as the least contributing continent [6]. Therefore, a real action should be taken in the form of best practices to develop the Pancasila character within the nation life and among the young people. The last stronghold of the effort to counteract the negative effects of the disruption era is belief of Pancasila as national identity towards global challenges at this time.

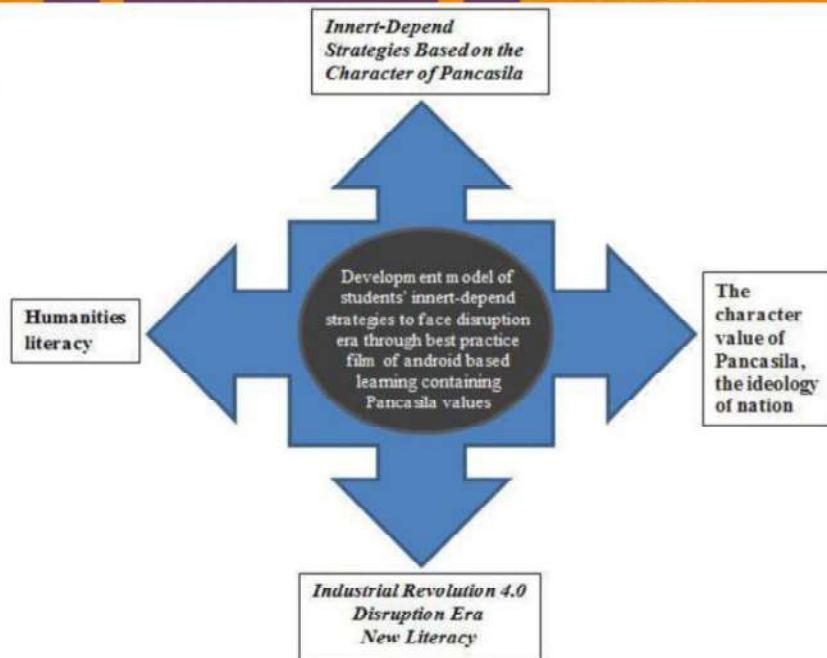
Digital disruption is often defined along the mainlines of disruptive innovation theory combined with subjects like digital transformation, industry 4.0, or digital technologies with potency to cause disruption [7-12]. In academia no theory exists, nor a common consensus as to what digital disruption is and what it entails; except, perhaps the unclear definition: "Disruption in the digital domain" [13]. The survival of the Indonesian state in the era of disruption requires us to strive for the implementation of Pancasila character to make sure the future generations can live with it and practice it as well as to maintain its noble values to be main guidance of all time. As the state philosophy, Pancasila is a value system meaning the principles of Pancasila are fundamentally a unity [14]. Pancasila has a set of values, namely divinity, humanity, unity, democracy and justice. Those basic values of Pancasila are universal and objective in which these values can be used and admitted by all people of all over the world.

One of issues for educational during the industry revolution 4.0 era is the digital world becoming paradigm and reference in the recent order of life. The Industrial Revolution 4.0 comes together with the disruption era of which new literacy incorporating data, technology literacy and human literacy. Data literacy is related to the ability to read, to analyze and to make conclusions based on obtained data and information (big data). Technology literacy emphasizes on the ability to understand the way of the working machine. It also includes technology applications and technology based work to produce maximum results. Human literacy focuses on communication, collaboration, critical thinking, creative and innovative abilities. In case of human literacy, it is necessary to develop positive characters to equip Indonesian people with Pancasila character.

The efforts to produce a generation that can compete in disruption era must be done in some integrated way with inert-depend strategies to foster a holistic culture and community morality with the potential basis of the community, i.e Pancasila character. This study aims at producing inert-depend strategies development model by making best practice film of Android based learning containing Pancasila characters. Pancasila is subjective meaning that its values are attached to its conveyors and followers, i.e. the people, the nation and the state of Indonesia. As the identity and personality of the Indonesian nation, Pancasila is a source of inspiration, behavior guidelines and standards of justification. Thus, the ideas movement, activity patterns, attitude, and results of behaviour of Indonesian people must reflect on Pancasila [15]. It means that Pancasila should be prioritized to filter globalization effects in disruption era may bring changes to the world order, especially for Indonesia people.

By leaning to Pancasila, the Indonesian people can maintain their nationalism. The challenge for Pancasila towards disruption era is the threat to the nation's personality because, inevitably, the Indonesian people are in the vortex of the globalization syndrome. However, Indonesia people should maintain their identity among global world. In order to give clear picture of this research, the conceptual framework is presented in Figure 1 below.





**Figure 1.** Conceptual framework of development model of students' inert-depend strategies to face disruption era through best practice film of android based learning containing Pancasila character

The research focusing on development model of students' inert-depend strategies to face disruption era through best practice film of android based learning of Pancasila has a very significant benefit to strengthen a nationalism among the young generation towards the disruption era. As the identity and personality of the Indonesian nation, Pancasila is a source of inspiration, behavior guidelines and standards of justification. Thus, the ideas movement, activity patterns, attitude, and results of behaviour of Indonesian people must reflect on Pancasila [15]. Pancasila should be prioritized to filter globalization effects in disruption era may bring changes to the world order, especially for Indonesia people. By leaning to Pancasila, the Indonesian people can maintain their nationalism. The urgency of this research is related to the solution that can not be bargained with. It is to grow "sense of belongin" within the society towards with the noble values of Pancasila which begin to fade due to globalization syndrome in this of disruption era.

## 2. Research Method

The research design used the Research and Development approach with the procedure as presented in Figure 2. The define phase or research and information collection [2] was the initial research and data collection phase in the form of literature studies, needs analysis and field studies. The design or planning phase [2] was the product design including the purpose of product use, product users and description of product components. The product result is development model of students' inert-depend strategies to face disruption era through best practice film of android based learning of Pancasila.

The experimental design carried out on the limited trial activities was using the Pretest-Posttest Design of Control Group are presented in Table 1.



Table 1. Preliminary field testing of experimental design (Pretest- Posttest Control Group Design)

Group	Pre-test	Experiment	Post-test
EG	O <sub>1</sub>	X <sub>1</sub>	O <sub>2</sub>
CG	O <sub>3</sub>	X <sub>2</sub>	O <sub>4</sub>

**Explanation of symbols**

EG:	Experimen Group	O <sub>1</sub> :	Pre-test EG
CG:	Control Group	O <sub>2</sub> :	Post-Test EG
X <sub>1</sub> :	Class Model	O <sub>3</sub> :	Pre-test CG
X <sub>2</sub> :	Non Class Model	O <sub>4</sub> :	Post-Test CG

In the disseminate phase, there were four steps of development, namely preliminary field testing consisting of the initial field trial, main product revision or revised test results, main field testing or main field trial and operational product revision [2] or refinement of the field trials results.

The research procedure was carried out through research and development (R & D) stages. The main objective of R & D is to develop and validate the humanities literacy learning model through the development of science film media containing Pancasila character for pre-service teacher of natural science teacher which is effective and ready to be implemented. This reserach stages were fomulated into 4-D (Four-D Models) models [1] and adjusted to Borg and Gall [2], namely:

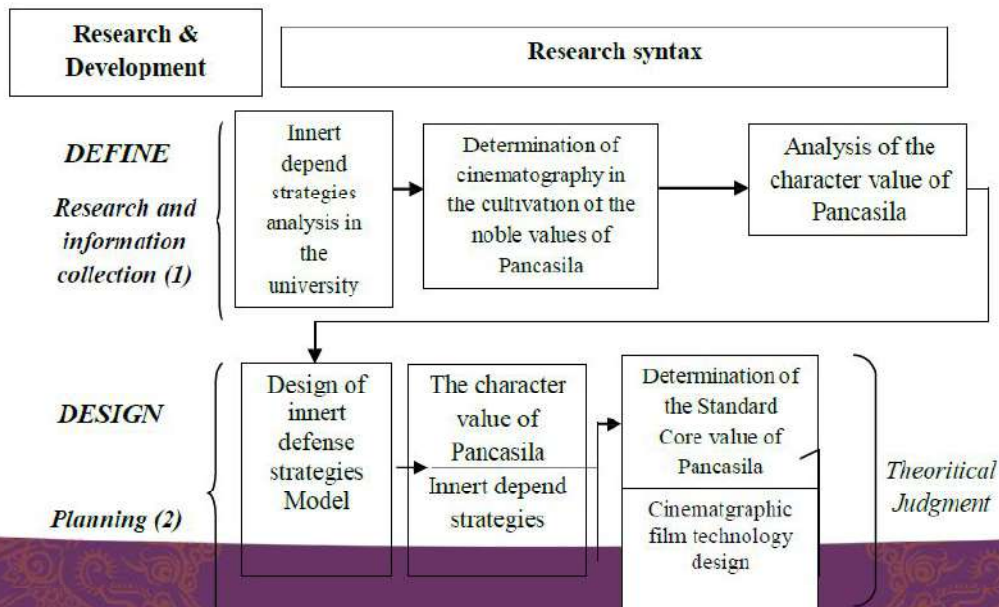
2.1. *Define (D-1)/Research and Information Collection*

2.1.1. *Theoretical analysis or literature review*

This phase analyzed theoretically about the development of soft security, learning of educational institutions, and technological literacy about the use of film for Pancasila values.

2.1.2. *Needs Assessment*

This stage identified the main process skills and classified them in the required sub-skills sets. This analysis guaranteed the comprehensiveness of the tasks in developing the inert-dependent strategies model through the creation of the best practice film of the Android-based learning for Pancasila character since the analysis covered the improvement of inert-dependent strategies of pre-service teacher of sciences and the evaluation design. The learning activities included information discussion, modelling, assignment, group work, and





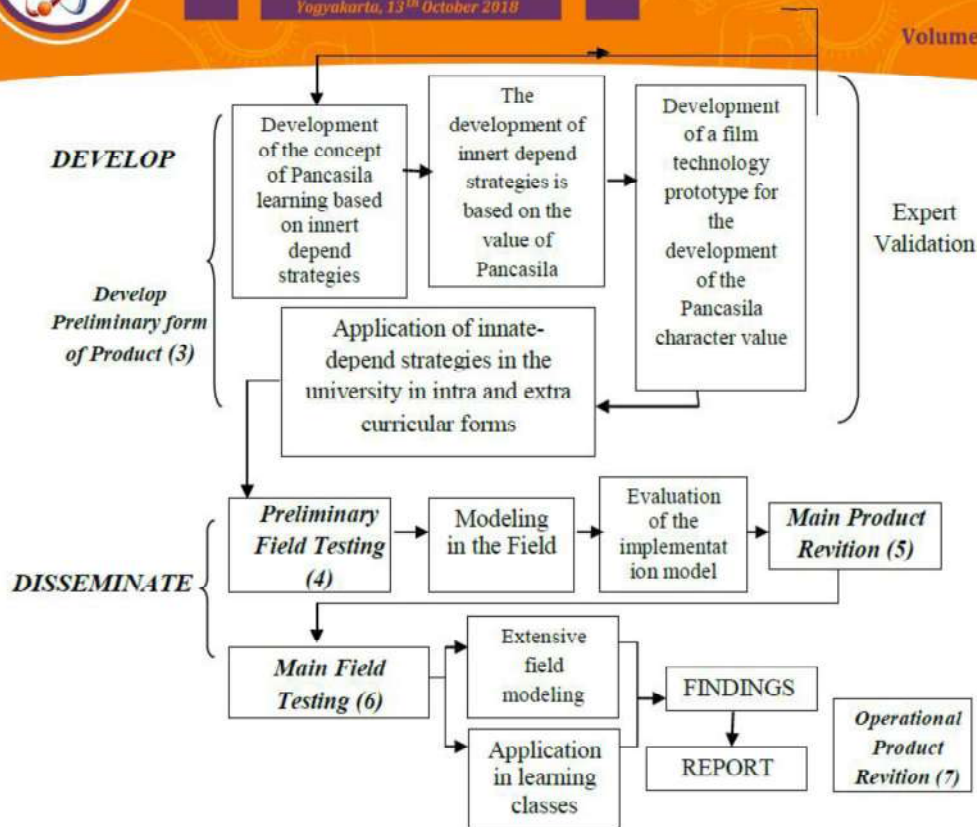


Figure 2. Reserch Design

### 2.1.3. Needs Assesment

This stage identified the main concepts in developing inert-dependent strategies through the creation of best practice film in the character of Android-based learning of Pancasila character value. It arranged the hierarchy and describing into main activities. The activities of learning model development to improve inert-depend strategies among pre-sevice teacher included all efforts to utilize the existing Pancasila values film by referring to its implementation in learning process.

### 2.2. Design (D-2)/Planning

It started by identifying cultural diversity that forms the basis of Pancasila to see its potential to be developed into teaching materials. It also observed instructional activities of inert-dependent strategies to develop the model through the creation of best practice film of the Android-based learning of Pancasila character.

### 2.3. Develop (D-3)/Develop Preliminary form of Product

Producing development models of inert-dependent strategies through making best practice film of Android-based leaning for Pancasila character to improve inert-dependent strategies among pre-service teacher. It was tested empirically in terms of its practicality and effectiveness through trials in educational institutions.



The model had been widely disseminated, especially in the Science Education Program of Faculty of Mathematics and Science, Yogyakarta State University. The film learning model of the of Pancasila character value for the improvement of inert-dependent strategies among students of pre-service teacher (Main Field Testing). It was then observed all the variables as the focus or development purpose.

### 3. Result and Discussion

The development of inert-depend strategies model through the making of best practice film of the Android-based Pancasila character learning was carried out in the Science Education Program of Faculty of Mathematics and Science, Yogyakarta State University. The research and development procedure was divided into four stages, namely (1) define, (2) design, (3) develop, and (4) disseminate.

In the development stage, a model feasibility test was carried out through expert judgment and practicality testing by the lecturer in the sciences education program. The feasibility test aimed at obtaining the results of evaluation and reflection as improvement material for the model and the tools so that it can be used to enhance inert-dependent strategies and nationalism of pre-service teacher of sciences. Then, the model and tools were tested in a limited and broad scope. The produced model tools included: (1) science learning film packages based on Pancasila values, (2) lessons plan of science learning media based on Pancasila values, (3) learning activity worksheets, and (4) evaluation assessments of inert-dependent strategies among students of pre-service teacher for sciences.

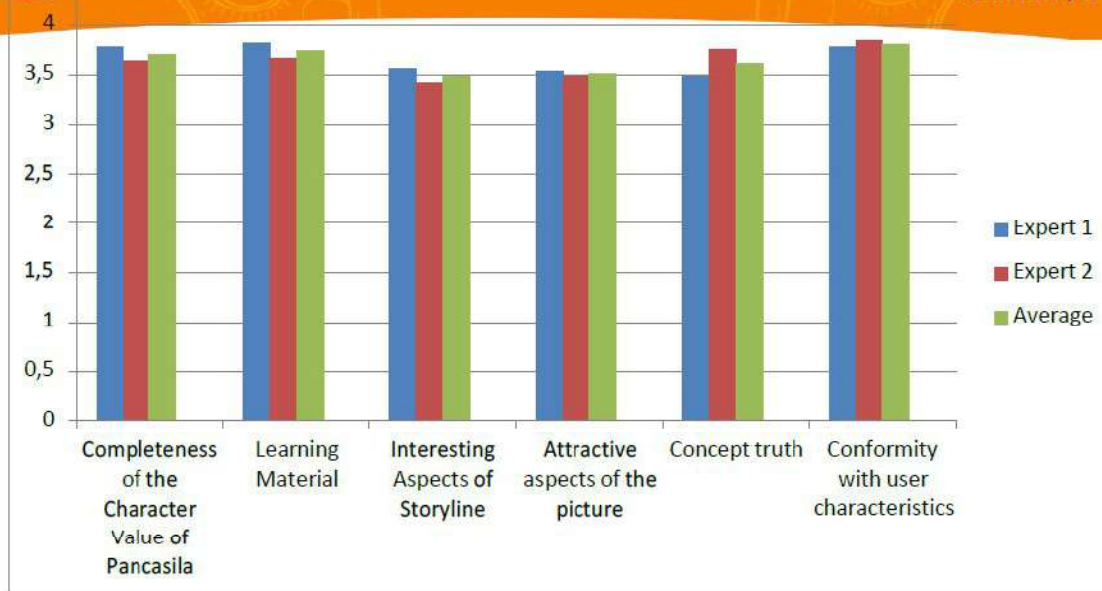
#### 3.1. Validation of Science Learning Film Based on Pancasila Character Values

The development results of science learning film for inert-depend strategies were validated through expert judgment according to six assessment components, namely; (1) completeness of the character value of Pancasila, (2) learning objectives, (3) interesting aspects of storyline, (4) attractive aspects of the picture, (5) concept truth, and (6) Conformity with user characteristics. Each component had its own assessment aspects. The results of the validation of each component in the form of average converted into mean scores. The validation results of are presented in table 3 and figure 3 below.

**Table 3.** Validation of Science Learning Film Based on the Pancasila Character Values

	Completeness of the Character Values of Pancasila	Learning Material	Interesting Aspects of Storyline	Attractive aspects of the picture	Concept truth	Conformity with user characteristics
Expert 1	3,78	3,82	3,56	3,54	3,48	3,78
Expert 2	3,64	3,66	3,42	3,48	3,76	3,84
Average	3,71	3,74	3,49	3,51	3,62	3,81
Category	Very Good	Very Good	Good	Good	Good	Very Good





**Figure 3.** Graph of validation result of science learning film based on the Pancasila character values

The results of learning film validation indicated that the two learning experts gave assessment with a “Very Good” category for three components (completeness of the character value of Pancasila, learning objectives, and conformity with user characteristics) as well as “Good” category for the other three components (interesting aspects of storyline, attractive the aspects of the picture, and the concept of truth). The results of this validation showed that inert-depend strategies based on science learning films was suitable for learning.

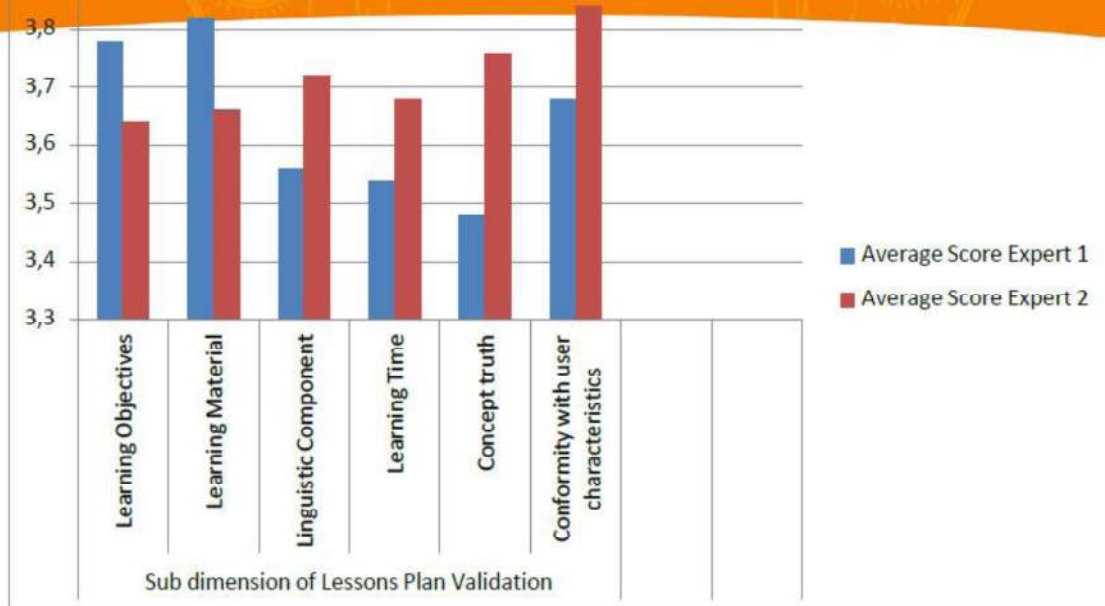
### 3.2. Lessons Plan Feasibility

The results of the lesson plan development were validated through expert judgment which was divided into six assessment components, namely: (1) Learning objectives, (2) Learning materials, (3) linguistic components and, (4) Learning time, (5) Concept Truth, and (6) Conformity with user characteristics. The results of the validation of each lesson plan component in the form of average were also converted into mean scores. The results of the validation of the lessons plan component presented in Table 4 and Figure 4 below.

**Table 4.** Sub dimension of Lessons Plan Validation

	Learning Objectives	Learning Material	Linguistic Component	Learning Time	Concept truth	Conformity with user characteristics
Expert 1	3,78	3,82	3,56	3,54	3,48	3,68
Expert 2	3,64	3,68	3,72	3,68	3,76	3,84
Average	3,71	3,75	3,64	3,61	3,62	3,76
Category	Good	Very Good	Good	Good	Good	Very Good





**Figure 4.** Results of the Lessons Plan Validation

The results of learning film validation indicated that the two learning experts gave an assessment with “Very Good” category for two components (learning material and Conformity with user characteristics) and “Good” category for the other four components (learning objectives, component linguistics, learning time, and conception truth). The results of this validation showed that inert-depend strategies based on lesson plan science were feasible to be used in learning process.

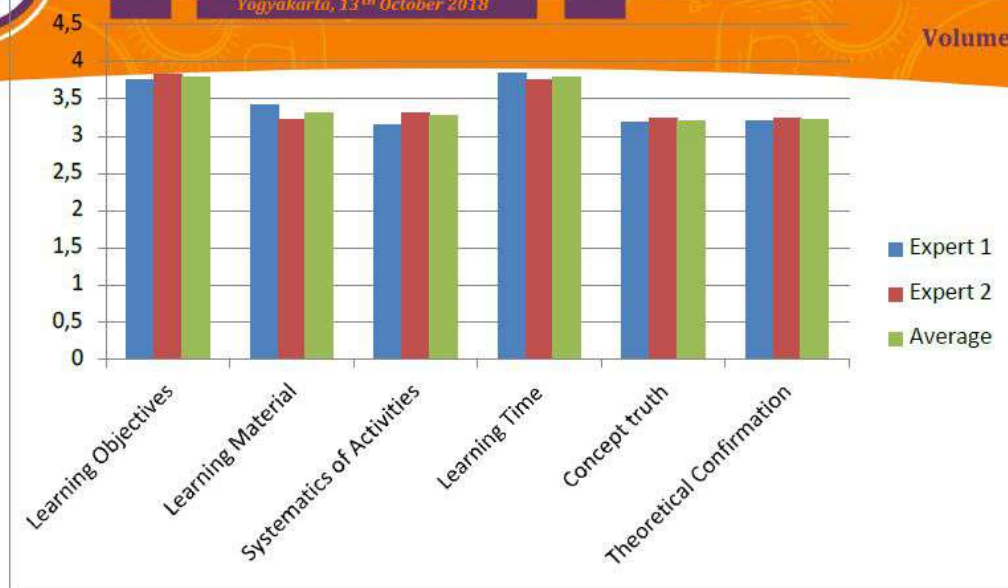
### 3.3. Worksheet Feasibility

Worksheet development results were validated through expert judgment based on six assessment components, namely: (1) learning objectives, (2) learning materials, (3) systematics of activities and, (4) learning time, (5) concept truth, and (6) theoretical confirmation. Each component had its own assessment aspects. The results of the validation of each lesson plan component in the form of were average converted into mean scores. The following is the validation results of the Lessons Plan component in table 5 and figure 5.

**Tabel 5.** Sub dimension of worksheet validation

	Learning Objectives	Learning Material	Systematics of Activities	Learning Time	Concept truth	Theoretical Confirmation
Expert 1	3.75	3.42	3.16	3.84	3.18	3.20
Expert 2	3.82	3.22	3.32	3.75	3.24	3.24
Average	3.79	3.32	3.28	3.79	3.21	3.22
Category	Very Good	Good	Good	Very Good	Good	Good





**Figure 5.** Graph of sub dimension of worksheet validation

Based on results of the worksheet validation, it can be concluded that the two learning experts provided “Very Good” categories for two components (learning objective and learning time) and “Good” category for the other four components (learning materials, systematics of activities, concept truth, and theoretical confirmation). The results of this validation indicated that the worksheet of on inert-depend strategies was feasible to be used in learning process.

### 3.4. Results Discussion of Limited Field Test

#### 3.4.1. Assessment results of Pancasila character

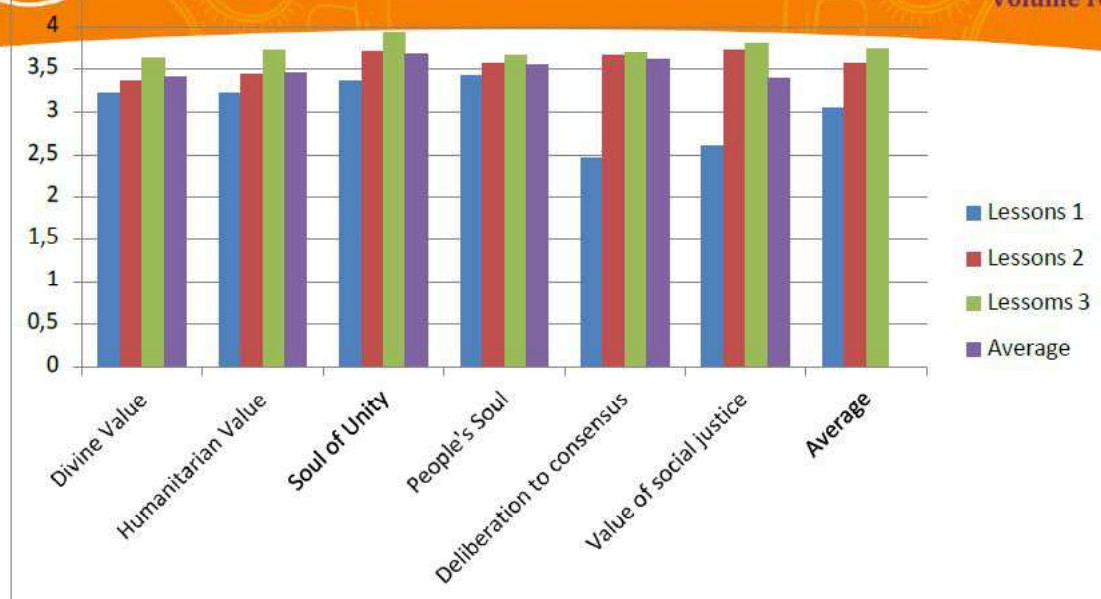
The limited field trials were carried out among the students of Natural Sciences Study Program with the year of 2016, Faculty of Mathematics and Science, Yogyakarta State University who attended the Learning Evaluation course. The research sample consisted of two classes, namely Class I as a control group, and class C as an experimental class. The assessment results of inert-depend strategies were carried out at each stage of learning in the experimental class using questionnaires and observation sheets. The indicator of inert-depend strategies according to six assessment components, namely; (1) divine, (2) humanity, (3) unity, (4) democracy, (5) deliberation to consensus, and (6) social justice. Each component had its own assessment indicator. The results of the validation of each lesson plan component in the form of average converted into mean scores. The results of the validation of the Lessons Plan component presented in table 5 and figure 5 below.

**Table 5.** Development of inert-depend strategies in each cycle in experimental class

	Divine Value	Humanitarian Value	Soul of Unity	People's Soul	Deliberation to consensus	Value of social justice	A	C
L 1	3,21	3,22	3,36	3,42	2,47	2,61	3,04	G
L 2	3,36	3,43	3,72	3,56	3,66	3,74	3,57	G
L 3	3,63	3,74	3,94	3,66	3,69	3,82	3,75	V
A	3,40	3,46	3,67	3,55	3,61	3,39		
C	G	G	VG	G	G	G		

Explanation: L = Lessons, A = Average, C = Category, G = Good, V = Very Good





**Figure 5.** Graph of Development of inert-depend strategies in each cycle in experimental class

Based on the assessment results of inert-depend strategies carried out through observation during learning and questionnaires, it indicated that there was an increase of the average value for students' attitudes from the first to the third meeting according to the average scores. It mean that the science learning film based on the Pancasila character values had succeeded in enhancing students inert-dependent strategies. The inert-depend strategies that can be measured in this study were; Divine Value (good category), Humanity Value (good category), Unity Soul (very good category), Democracy (good category), Deliberation to consensus (good category), and Social Justice Value (good category). Indonesia's version of exceptionalism might best be described in an unabated conviction about the inviolable nature of *Pancasila* in national political life and beyond. This *Pancasila* delusion has gone further with the introduction of some legal efforts to prosecute any sacrileges against it [16].

#### 3.4.1. The the assessment results of concepts understanding

In case of Science Education Study Program, indeed, the direct impact of the application of this model was the enhancement of concepts understanding related to the Science Learning Evaluation material. The data of concept understanding consisted of pre-test and post-test results. The purpose of these two types of tests was to find out the differences in the results of treatment for each class between the two classes, the experimental class and the control class. The type of test given in the pre-test and post-test was a description test related to the Evaluation of Science Learning material. The description test contained eight items that were used as indicators in measuring the knowledge of science concepts containing inert-dependent strategies in the control class (30 students) and the experimental class (31 students). The concept comprehension test results were summarized in Table 6.





Explanation	Test result of concepts understanding			
	Control class		Experimental class	
	Pre-test	Post-test	Pre-test	Post-test
Highest score	58	80	59	93
Lowest score	35	55	36	71
Average score	48,5	63,5	47,5	84,5
Total of PD above KKM (>75)	4	8	5	29
Total PD below KKM (<75)	26	22	26	2
Gain Mean	0.49		0.84	

Based on table 6 showed, there were differences in the test results between two classes. For the control class, the highest score in the pre-test was 58 and the lowest was 35. The average acquisition value of the control class on the pre-test was 48.5 with the number of students with the grade above passing grade (> 75) was 4 people and students with scores below the passing grade was 26 people. In the post-test control class, the highest score was 80 and 55 for lowest score. The average value of the control class at post-test was 63.5 with the number of students above the passing grade (> 75) was 8 people and below the passing grade as many as 22 people. The score pre-test and the post-test, the control class gain mean was 0.49. It indicated that the standard gain of control class was in the "moderate" category.

It also revealed that in the experimental class, the highest pre-test score was 59 while the highest post-test score was 93. The experimental pre-test mean score was 47.5 with the number of students with the score of (> 75) was 5 people. Meanwhile, the post-test mean score of the experimental class was 84.5 with the number of students above the passing grade was 29 people. The standard gain mean in the experimental class was 0.84 or categorized "high". Based on these results, it can be concluded that the average test results of concept understanding for the experimental class was higher, both for the average score and the standard gain mean. The results of this study are in accordance with the opinion [17], the theory of conceptual change is the process of shifting concepts across ontological boundaries (re-assignment or conceptual shifting process), and the re-conceptualisation (within ontological shifts categories), is better described as conceptual reorganization but not ontology shifts.

#### 4. Conclusion

Based on the research result on the development model of students' inert-dependent strategies with best practice film of android based learning containing Pancasila character values, some conclusions can be drawn as follow: (1) Inert-dependent strategies have been developed through the creation of best practice film of Android-based learning with Pancasila character that is feasible to be applied in learning process in universities level, (2) The application of learning models and tools in the form of best practice film of Android-based learning with Pancasila character has proven effective to improve inert-dependent strategies, (3) The application of learning models and tools in the form of best practice film containing Pancasila character was effective in improving the concepts understanding in Science Learning Evaluation courses, according to the scores difference and gain score.

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