

Cultivating characters (moral value) through internalization strategy in science classroom

M Ibrahim¹, Abadi²

¹Science Education of Postgraduate Program, Universitas Negeri Surabaya, Indonesia

²Mathematics Education of Postgraduate Program, Universitas Negeri Surabaya, Indonesia.

musliminibrahim@unesa.ac.id

Abstract. It is still in a crucial debate that characters play an important learning outcome to be realized by design. So far, most people think that characters were reached as nurturance effect with the assumption that students who are knowledgeable and skillful will have good characters automatically. Lately, obtained evidence that this assumption is not true. Characters should be taught deliberately or by design. This study was designed to culture elementary school students' characters through science classroom. The teaching-learning process was conducted to facilitate and bridge the students from the known (concrete images: Science phenomena) to the unknown (abstract ideas: characters: care, and tolerance. Characters were observed five weeks before and after the intervention. Data were analyzed from observation of 24 students in internalization strategy-based courses. Qualitative and quantitative data suggested that the internalization strategy that use of science phenomena to represent abstract ideas (characters) in science classroom positively cultivating characters.

1. Introduction

The main important goal of science education is to empower students in all level of education comprehensively in building a good character: such as spiritual and social attitudes, knowledge and skills [1], so they will be prepared for their future life. While most of the science classes focused on science concepts only [2], less attention has been paid to the characters. The reasons of this conditions: (a) we need more times, efforts, patience, and commitment to developing characters; (b) there is no complete information that can be used as a guide in order to develop characters; (c) there is no certain strategy of teaching that can be used to teach characters as well as cognitive domain.

This present study built upon past research on the use of internalization strategy of teaching in the science classroom [3]. In this strategy of teaching, students are encouraged "to learn" characters through modelling. The model of attitudes is not a human being but the scientific phenomena. In this kind of strategy, the lesson consist of two steps. Firstly, the teacher encourages the student to learn science content and make discoveries using a scientific approach to the first step of their lesson. Secondly, teacher use science phenomena that student already studied in the first step of their lesson as a model or prototype of a certain character [4] and then guides student "to learn" character.

The internalization strategy is a teaching strategy using science phenomena to represent the character and facilitate students to compares the similarities of the scientific phenomena within the character. The students were facilitated between two concepts "that are neither completely similar nor completely different" [5]. An internalization strategy has two domains: a base domain and a target domain. The base



domain (model) is usually a familiar object that students possess from previous experiences, and the target domain is usually an unfamiliar object or new information. In this kind of process, students make an image transformation of the model/analog and transfer it into the target [6].

In the science classroom, for example, the model can be represented by the picture of a rice plant, and the target is characters (attitudes: good behavior). This relationship is analogous because both have similarities. People is symbolized by the rice plant with straight upward at the first time when it's fruit appear. Slowly, as long as the seed become content fully and fruit become go down. These processes are similar to the process in human attitudes development.

When models are used for instructional purposes, such as those which were examined in this study, the base domain is a common object that is well-known to students, and the target domain is a new object or concept that is to be learned by students. By associating attributes between the known (old) and the unknown (new), instructional model aims to help students gain a better understanding of the target concept.

Modeling supports the instruction by relating "new information to knowledge and experience that students already possess, particularly if the new information is abstract and difficult to grasp" [7]. According to Orgill and Bodner [8], there are at least three classes of instructional modeling based on relationship, presentation, and level of enrichment. With respect to the relationship, modeling between known and unknown objects can be either *structural* or *functional*. The modeling relationship is structural when both objects share similar physical structures such as their external features. It is functional when both objects function or behave in similar ways. An instructional modeling can also represent a relationship that is both structural and functional.

Based on their presentation, modeling can be either visual or verbal [9]. In visual presentations, the instruction is enhanced by using the picture of a known object (concrete picture) that is analogous to an unknown object (target concept). These presentations have been called visual internalization strategy or *visual analogies* [10,11], *pictorial analogies* [12,6], *graphic analogies* [13], *Big Picture diagrams* [14], and '*new-look*' *representations* [15]. In verbal presentations, analogous relationships are expressed in writing. These written presentations have been called *verbal Internalization Strategy or Verbal analogies* [9] and *text analogies* [16]. An internalization modeling can also be both visual and verbal. Regarding the level of enrichment, verbal internalization modeling can be simple, enriched, or extended [8].

This study was guided by the following research questions: How did visual internalization strategy of teaching affect positive attitude: Care and Tolerance of the elementary students?

2. Purpose

This study aims to determine the effectiveness of internalization strategy usage in a science classroom in cultivating positive attitudes: care and tolerance of elementary school students.

3. Method

3.1. Research design

To examine the effects of the internalization strategy through science lesson, we conducted a study using a time series design (Frankael, 2012).

O₁ O₂ O₃ O₄ O₅ X O₆ O₇ O₈ O₉ O₁₀

O₁-O₅: observation before intervention

O₆-O₁₂: observation after intervention

X: intervention using Visual Internalization Strategy (Figure 1)

Along five weeks period before the intervention, the observation was conducted to make sure that character: care and tolerance already exists on the subject or not. The intervention was conducted in three meeting time, using internalization strategy and visual modelling with @ 3 x 35 minutes time allocation for each meeting. Along teaching-learning period we make an observation concerning:

- Constraints

- Feasibility of the teaching materials
After intervention, for five weeks, observation was conducted

3.2. Subject

This study is undertaken by the fourth-grade students at North Sangatta 1 Elementary School Student in the city of Sangatta, East Kalimantan Indonesia in 2013-2014 academic years. One class is treated as a group that consists of 24 students.

3.3. Instructional Intervention: Visual Internalization strategi

Five weeks before and after the intervention, the researcher makes a daily observation of characters (care and tolerance). The number of students that show their characters is recorded. The study consist of two phases: the first phase of the lesson, teacher facilitate students to learn in the area of science concept. Students learn about many things such as concept, procedures, principles, information, theory etc. They also observe several kinds of scientific phenomena, conduct an experiment and so on. At the second phase of the lesson, the teacher asks their students to observe widely and deeply about the certain science phenomenon and leads students to see the similarities about science phenomenon (base domain) with certain good characters of a human being (target domain) (Fig. 1). Frameworks of internalization strategy of teaching:

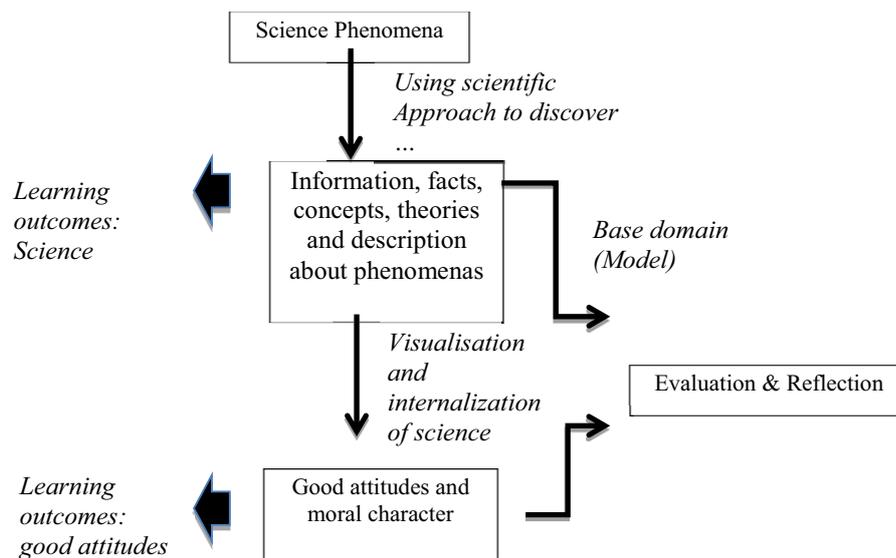


Figure 1. The framework of internalization strategy of teaching [5].

Here are the examples of positive attitudes toward scientific phenomenon as its model.

Example 1: Science topic and phenomena: Our body part

1. Hands (*fact, concept, procedures, etc.*)
 - a. The name
 - b. The function
 - c. How to take care our body parts
 - d. How our hands work, etc
2. Our hands as a model of attitudes

Table 1. The model of attitude and its target

Model	Target (Good attitudes)
We have two hands: right and left	Boys or girl (student with his/her friend)
Right hand and left hands have Different function	All of us have certain role in our community
In conducting our activity, right and Left hands usually work together (synergetics)	Student dan their mate usually working collaboratively to reach their goal(s)

In this modeling processes (Table 1), students are encouraged to internalize the phenomena as a model of good attitude (left column) and the relevance good attitudes (right column).

Example 2: Science topic and phenomena: The Life Cycle of Butterfly

1. Life cycle of Butterfly (Fact, concept, procedures, etc.)
 - a. The name of each step of life cycle
 - b. The characteristics of each step.
 - c. Comparison between caterpillar’s behavior and the behavior of butterfly
 - d. Explore what the caterpillar do along the phase of cocoon



A. Eggs



B. Caterpillar



C. Cocoon



D. Imago

Figure 2. The steps of butterfly’s life cycle (Amini, Siti: 2016)

Table 2. Life cycle of butterfly as a model of characters

Model	Target (Characters)
Caterpillar (Fig.2B), usually feeding on every Parts of plant, so they make farmer Upset---bad behavior	The student understands and have knowledge about bad behavior and make them try to avoid
Cocoon: stop feeding and start to Control their behavior	Students are experienced through visualization how to control bad Behavior---self-regulated
Butterfly: beautifully, feeding on food resources (nectar)	Visualization the model of good behavior beautiful: make anyone happy and usually use good food resources

Based on the processes, the students learn about characters bad and good behavior and how to change the bad behavior into good ones. Finally, observation has been done after the intervention for five weeks.

3.4. Instrument

In this study, an observation test with several indicators of positive attitudes: care & tolerance was developed and used. The observation sheets were piloted with 15 students. Inter-rater reliability of the test was to be 0.81. In the study, data were collected by classroom observation as long as teaching-learning process and school daily life observation before and after the intervention. The observation was conducted by two well-trained observers from postgraduate students.

4. Results and discussion

Teaching learning process using this internalization strategy can take place in accordance with the scenarios that have been developed in the lesson plan. The main obstacle was that the teacher facing the difficulty of making a positive attitudes model and how to internalize it to the students. To overcome this constraint, researcher designed lesson plans model of positive attitudes that relevance with the content, train teacher to operate the lesson plan in peer teaching forum.

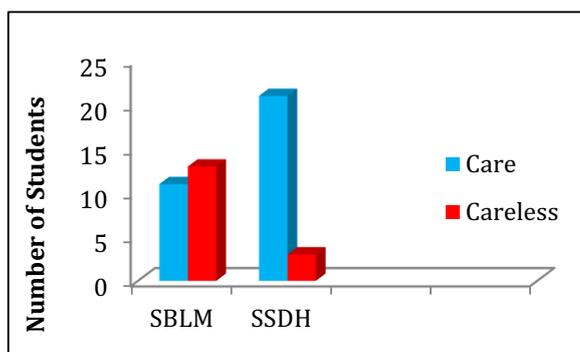


Figure 3. The distribution of student based on care and care before (SBLM) and after (SSDH) teaching-learning process.

Characters (care and tolerance) were observed as follow: Both the characters were observed five weeks before and five weeks after intervention. The growth of these characters develop from care and intolerance (unfavorable) as shown in Figure 3 and Figure 4.

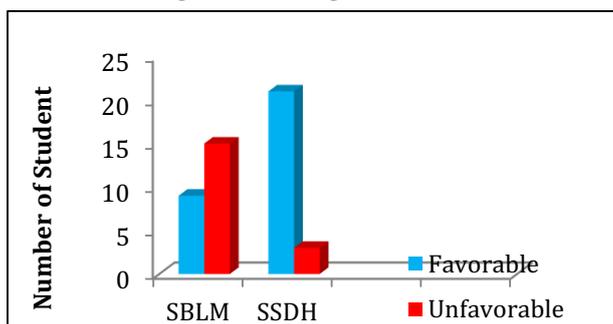


Figure 4. The distribution of student base on unfavorable and favorable before (SBLM) and after (SSDH) teaching-learning process.

In graphs 3 and 4, there were the differences in orientation of students towards tolerance and caring. This condition can be explained as follows. As shown in Figure 1 above, the internalization strategy had two phases. In the second phase, i.e. after students learned science content, students learned positive attitudes through a variety of intervention strategies. In this phase, the teacher used a phenomenon of science as a model (prototype) positive attitude. The teacher influence students through *knowing, feeling, and acting*. Teachers try to give insight to students about the positive attitude that will cultivate through model, come up with the feeling about those, subsequently affect student orientation towards positive attitudes.

This result, which states that the internalization strategy can cultivate a character: especially care and tolerance. This result supported by another finding [3–5,17] on the moral sensitivity of biology class of Senior High School.

Learning something with complex characters can be easier when it is done through modelling [10]. Through such direct comparisons, visual and graphic analogies provide a shortcut to learning and help learners retain complex ideas [13].

Visual analogies that are used in the internalization strategy have been studied extensively for teaching

science, from elementary through college [18]. One research focus has examined science analogies on the computer [15].

5. Conclusion

Characters especially care and tolerance can be cultivating through science classroom. We call it as Visual Internalization Strategy. Visual Internalization strategy is a teaching strategy that using scientific phenomena that represent characters and facilitate students to compare the similarities of the scientific phenomena with the characters. The students were facilitated between two concepts “that are neither completely similar nor completely different”.

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