

## Case Study Discussion for Students' Comprehension of the Four Bioethics Principles

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### Abstract

In the past three years, students taking up Bioethics under the B.S. Biology curriculum of West Visayas State University, a state university located in Panay island, tend to have varied convictions regarding current bioethical issues commonly experienced in science and technology. One of the probable factors for the diversified opinions could be lack of comprehension of the four Bioethics principles, which are the basis for creating moral decisions in Bioethics. This study focuses on determining whether incorporation of a case study discussion in the existing strategy of teaching the four Bioethics principles can improve the students' comprehension of the topic. A pre-test was administered to seventy-six (76) students after a preceptorial film analysis discussion. The case-study discussion was then conducted. Administration of the post-test was done three weeks after the case study discussion. T-test for dependent samples was used to analyze the data. Results show that there was a statistically significant increase in the scores from the pre-test to the post-test. The eta squared statistic indicated a large effect size; thereby implying that an inquiry-based strategy, i.e., a case study discussion, can enhance students' comprehension of the four Bioethics principles.

*Keywords* : case study discussion, Four Bioethics Principles, student comprehension

For three years now, the subject Bioethics has been taught to B.S. Biology students of West Visayas State University (WVSU) as a free elective under the three-track B.S. Biology curriculum. Inclusion of this subject in the curriculum stemmed out from the current ethical issues arising from scientific research and progress in technology and the need to study these issues as part of the expert consultation on the Bioethics core curriculum proposal of the Division of Science and Technology of UNESCO in July 4-5, 2007 in Paris, France (Division of Science and Technology of UNESCO, 2007). The same consultative meeting drafted a recommendatory core curriculum for the teaching of Bioethics focusing on the introduction of the bioethical principles of the *Universal Declaration on Bioethics and Human Rights* to university students. Bioethics teaching has not been introduced in many universities in many countries. As a matter of fact, the B.S. Biology curriculum of WVSU is the first B.S. Biology curriculum in the Philippines to offer this course to its students.

As a teacher of this pioneer course, this researcher has come to observe that grasp of the concepts of the Bioethics principles seem to vary whenever students are asked about their opinions regarding current Bioethics issues. The four Bioethics principles which are the core of this course, are supposed to be the basis for ethical decisions regarding current issues in science and technology and medicine. Aksoy and Tenik (2002) state that the four principles of Bioethics (respect for autonomy, maleficence, beneficence, and justice), which are considered as universal and applicable to any culture and society, were originally formulated by Beauchamp and Childress and are also found in the works of Mawlana, a great figure in the Suki tradition. This indicates the universality and acceptance of these principles as a basis for ethical decisions. McCormick (2013) likewise stated that such guidelines need to be broadly acceptable among the religious and the nonreligious and for persons across many different cultures. Due to the many variables that exist in the context of clinical cases as well as the fact that in health care there are several ethical principles that seem to be applicable in many situations, these principles are not considered absolutes, but they serve as powerful action guides in clinical medicine. In the researcher's previous classes, however, it was observed that when asked questions regarding ethical decisions during the preceptorials, some students tend to lean toward emotional and practical reasoning over ethical decisions regarding bioethical issues. This brought about the premise that perhaps, the students may not have completely grasped the concepts of the Bioethics principles which are supposed to be their basis for their ethical decisions. For this reason, the researcher conducted an informal interview with some selected student to determine whether the strategies employed in teaching the course are lacking. The students suggested incorporation of

case study analysis in the strategies to enhance better comprehension of the concepts.

According to Bonwell and Eison (1991) and Sivan et al. (2000), it is now documented that students can learn more effectively when actively involved in the learning process. The case study approach is one way in which such active learning strategies can be implemented in learning institutions (Davis & Wilcock, 2003). It provides an opportunity for students to apply what they learn in the classroom to real-life experiences and proves to be an effective way of both disseminating and integrating knowledge (George Mason University [GMU], 2010). This method is an instructional strategy that engages students in active discussion about issues and problems inherent in practical application, highlights fundamental dilemmas or critical issues, and provides a format for role playing ambiguous or controversial scenarios (GMU, 2010). The usual approach in teaching Bioethics for Biology majors at West Visayas State University starts with an introductory lecture. This is followed by film showing of a feature film related to the topic (in this case, *Frankenstein*, which is an epitome of violation of all four principles of Bioethics). The book version by Mary Shelley is also given as a reading assignment. This is then followed up by a focus group discussion (preceptorial session) with the instructor; the class is usually divided to groups of five, for better management. The discussion focuses on comparison of the book and the movie how the four principles of Bioethics are violated in the story and what are the students' opinions about the violations discussed. This action research therefore focuses on determining whether incorporation of a case study discussion in addition to this approach will make a difference in the students' comprehension of the four Bioethics principles.

### **The Problem**

**The main problem.** This action research aimed to determine the effect of the introduction of a case study discussion on the comprehension of the four Bioethics principles of WVSU B.S. Biology Bioethics students.

### **The Sub-Problems**

1. What are the comprehension test scores of WVSU B.S. Biology Bioethics students before and after exposure to a case study discussion about the four Bioethics principles?
2. Are there significant differences among the comprehension test scores of WVSU B.S. Biology Bioethics students about the four Bioethics principles before and after exposure to a case study discussion about

the four Bioethics principles?

3. Is there a significant relationship between low pre-test scores and normalized high gain scores in the comprehension test?

## **Hypothesis**

1. There are no significant differences among the comprehension levels of WVSU B.S. Biology Bioethics students about the four Bioethics principles before and after exposure to a case study discussion about the four Bioethics principles.
2. There is no significant relationship between low pre-test scores and normalized high gain test scores in the comprehension test.

## **Methodology**

### **The Intervention**

**Case study discussion.** This action research incorporated the case study discussion with the regular teaching strategies (lecture, film showing and film analysis preceptorials) to determine its effect on student comprehension of the four Bioethics principles. Four case scenarios depicting situations related to the four Bioethics principles were given out to the students for discussion with their group members. A preceptorial session with the instructor was then scheduled for in-depth analysis of the opinions of each group member regarding the cases.

### **Actions**

**The participants.** The participants of the study were seventy-six (76) B.S. Biology students taking up Bioethics for the 1st semester of A.Y. 2013-2014.

**The instrument.** This study used a self-constructed validated twenty (20) item comprehensive test showing situational scenarios focusing on concepts about the four Bioethics principles.

**Data collection procedure.** After an introductory lecture of the Bioethics principles, a feature film depicting all the principles (Frankenstein) was shown to the students. This was followed up by a film analysis preceptorial with the students divided into groups. The pre-test on comprehension of the Bioethics principles was then conducted. Another preceptorial, this time, focusing on the case study discussion (the intervention) soon followed. Written reflections of

the students about the case study discussion were also collected for reference purposes. After a three-week resting period, the post-test on comprehension was administered to the students.

**Data analysis procedure.** For descriptive data, the mean test scores of the comprehension tests were converted using an interval scale, interpreted as follows:

- 17-20– Excellent comprehension
- 13-16 – Above average comprehension
- 9-12 – Average comprehension
- 5-8 – Below-average comprehension
- 0-4 – Poor comprehension

Inferential data was analyzed utilizing the t-test for dependent samples. Normalized high gain scores were computed using the formula by dividing the absolute gain by the maximum possible gain (Meltzer, 2002). The formula used is as follows:

$$g = \frac{(\text{post-test score}) - (\text{pre-test score})}{\text{Maximum possible score} - \text{pre-test score}}$$

Pearson R was used to determine the correlation among low test pre-test scores and normalized high gain scores in the comprehension test.

Reflections of the students regarding the case study discussion and the preceptorial sessions were also obtained by asking them to write down their reflections after each activity. These were used as an evaluation tool for further reference in the discussion of the results of the study.

## Results and Discussion

### Descriptive Results

**Mean and Interpretation of Over-all Pre-test and Post-test Scores.** Table 1 shows that the mean of the pre-test scores was 12.58, interpreted as “Above Average Comprehension”. The mean of the post-test scores showed an increase of 2.17, at 14.75, also interpreted as “Above Average Comprehension”. To start with, the students had an above-average comprehension of the principles; and in general, despite the increase in the post-test scores, the students maintained above average comprehension of the principles after the intervention.

Table 1

*Mean Test Scores and Interpretation of Comprehension Test*

Mean Test Score		Interpretation
Pre-test	Post-test	
12.58	14.75	Above average comprehension

**Mean and Interpretation of the Highest and the Lowest Mean Test Scores.** Table 2 shows that the highest mean pre-test and post-test scores were 15.93, interpreted as “Above Average Comprehension”. The lowest mean pre-test score is 8.2, interpreted as “Average Comprehension” and the mean post-test score is 14.25, interpreted as “Above Average Comprehension”; thus showing an increase of 6.05. This, therefore, signifies that students with lower mean test scores had gained more comprehension of the principles that those with high pre-test scores.

Table 2

*Highest and Lowest Mean Pre-test and Post-test Scores.*

	Mean Test Scores and Interpretation				
	Pre-test	Interpretation	Post-test	Interpretation	Increase
Highest	15.93	Excellent Comprehension	15.93	Excellent Comprehension	0
Lowest	8.2	Average Comprehension	14.25	Above Average Comprehension	6.05

**Inferential Data Analysis**

**Paired samples t- test of the total mean test scores.** Table 3 and Figure 1 show the paired-samples t-test and the eta squared statistics results of the total mean test scores of the pre-test and the post-test, respectively.

Table 3

*Paired-samples t-test Results of the Total Mean Scores of the Pre-test and Post-test*

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	Std. Error Mean	Standard Confidence Interval 95%				
				Lower	Upper			
Pre-test - Post-test	2.17	3.55	0.41	2.99	1.36	5.33*	75	0.000

Note: \* $p < .001$

$$\begin{aligned}
 \text{Eta squared} &= \frac{t^2}{t^2 + N - 1} \\
 &= \frac{(-5.333)^2}{(-5.333)^2 + 75 - 1} \\
 &= \frac{28.44}{28.44 + 74} \\
 \text{Eta squared} &= 0.28
 \end{aligned}$$

Figure 1. Eta Squared Statistics of the t-test

The results show that there was a statistically significant increase in the scores from the pre-test ( $M=12.58$ ,  $SD=3.20$ ) to the post-test ( $M=14.75$ ;  $SD=2.56$ ),  $t(75)=-5.333$ . The eta squared statistic (0.28) indicated a large effect size. This therefore confirms that the intervention had a great effect on the comprehension of the students about the four principles of Bioethics.

Table 4 shows that there is a strong negative correlation between low pre-test scores and high gain scores ( $r=-0.738$ ,  $n=76$ ,  $p<0.0005$ ), therefore indicating that low pre-test scores are associated with normalized high gain scores.

Table 4

*Correlation between Low Pre-test Scores and Normalized High Gain Scores*

	Pre-test			Norm Gain		
	N	Pearson Correlation	Sig. (2-tailed)	N	Pearson Correlation	Sig. (2-tailed)
Pre-test	76	1		76	-0.738**	0.000
Norm Gain	76	-0.738**	0.000	76	1	

*Note:* \*\* Correlation is significant at the 0.01 level (2-tailed)

This therefore implies that the case study discussion has a greater positive effect on students with low pre-test scores than on students with high pre-test scores. Moreover, this result also conforms to the statistical tendency of low pre-test scores to have a higher gain than high pre-test scores (Millar & Schau, 2010).

### Reflections and Implications

Results of the total mean pre-test and post-test scores showed a significant difference; therefore, implying that incorporation of the case study discussion was effective in enhancing the comprehension of the students. Moreover, the high eta squared statistic (0.29) further supports this conclusion because of the large effect size. The negative correlation between the low pre-test scores and the normalized gain scores in the post-test also suggests that students with lower pre-test scores have benefited more from the strategy the lower the pre-test score, the higher the normalized gain score. This implies that use of the case study discussion is a practical and effective strategy in enhancing students' comprehension of the four Bioethics principles.

Discussion of actual and theoretical cases have been used for many years in business, law, and medical schools; however, its use in science curriculum courses is fairly recent but with positive results for both science and non-science majors taking up science courses (Nseula, 2011). Case-based conferences provide an alternative method that is also closely linked to clinical care; clinicians, as well as students, learn well when they are actively involved in case discussions (McKneally and Singer, 2001). According to Herreid (2005), uses of cooperative learning strategies such as case studies in teaching promotes greater learning and greater retention; and the strategies have been assessed by students to be more enjoyable and to have taught them to more articulate and tolerant to others' different viewpoints.



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To determine the effect of the strategy on the students' perceptions, written reflections about how the students assess the case study discussion were also gathered. Here are some excerpts from the reflections of that reveal their views on the use of case study discussion approach

Excerpt 1: *“The case study allowed me to realize that different individuals possess varying views and morals. What may be an irreplaceable vital organ to me, maybe a \$ 200,000,000 worth organ to another? Indeed, the values of people differ from one person to another and the same is true about their morals. Nonetheless, what matters is that whatever these values and morals are, they should not be put into practice unless they follow ethics and place great value in the importance of life.” (Winnie, 2011)*

Excerpt 2: *“It was a real eye opener to the various opinions of my group mates about the different cases. It was more interesting to talk about since we can really relate it to our course and our own personal experiences. Overall- a wholesome intellectual discussion.” (Laurence, 2011)*

Excerpt 3: *“It helps me to empathize with other peoples' situations. It made me understand more my position in life and the impact that I may give to society in the future.” (Josh, 2011)*

Excerpt 4: *“It was fun in such that I was able to express my thoughts and opinions about the case studies presented. Also, some of those were confusing situations in which I have different perceptions compared to group mates. This helps us relate with some medical related bioethical issues that are happening in real life.” (Tracy, 2011)*

Based on these views and reflections, it may be inferred that the use of the case study discussion was not only an effective strategy for comprehension enhancement, but also an enjoyable learning experience for the students. It gave them a chance to voice out their own views, learn about the different perceptions of their peers, and analyse the situations from different perspectives. This also implies that students actually consider inquiry-based strategies like this case study discussion approach to provide a good and effective learning experience.

### **Recommendations**

Based on the findings and implications of this action research, it is recommended that case study discussions be incorporated into the existing teaching strategies in the course in order (a) to enhance comprehension of the four Bioethics principles; (b) to enhance the validity of the results, the Solomon four group design is recommended for similar studies on a different set of students; (c) to ensure more participants, a more effective strategy for conducting the pre-test and the post-test for enforcing. In this study, some results were not included because of participants were absent during the pre-test and the post-tests.

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