

Life-Based Narratives: Effects on Student Concept Understanding and Decision-Making Skills in Biology

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ABSTRACT

The study aimed at assessing the effect of students' life-based narratives in furthering concept understanding and decision-making skills among second year high school students of a public high school. The study made use of two instruments: the Concept Understanding Test (multiple choice test) and the Decision-making Skills Test (open ended questionnaire). Using analysis of covariance (ANCOVA) on the posttest scores of the experimental and control groups with the pretest scores as covariate, it was revealed that the use of students' life-based narratives as a teaching approach has a positive effect on the concept understanding of the students. However, the said approach has no significant effect on students' decision-making skills. In terms of establishing the causal relationship between concept understanding and decision-making skills, linear regression showed that concept understanding can predict the decision making skills of students.

Keywords: *life-based narratives, concept understanding, decision-making skills*

In the teaching of the sciences, one of the greatest challenges is having students appreciate the connection between academic science and the real-world problems they encounter in their daily lives. In fact, Yager & Tweed (1991) have observed that much of the concepts learned in the classroom are taught in isolation; an approach which allots more time to lecturing rather than student-centered activities. This has led them to speculate that this kind of approach may in the long run deprive students of relevance and meaning from the lessons taught in class. This may be the reason why students are often not able to make connections between theory and real-life situations (Leonard & Chandler, 2003; Solomn & Duveen, 1994).

This traditional teaching approach has been found to give rise to the impression that science is static and pre-determined (Roth & McGinn, 1996). Lock (1998) mentions that the absence of dialogue promotes the use of memorization and rote learning as productive learning approaches for students in Biology. Maybe this is the reason why despite the best efforts of the most creative teachers and most designers, the majority of students leave secondary school with a distorted view of biological objects and events (Wandersee et al., 1989; Mintzes et al., 1998; 2000).

The above circumstances partly explain why biology students perform below par in the Trends in International Mathematics and Science Study (TIMSS). According to TIMSS, the Philippines is lagging behind other Asian countries because of low quality education. In the 2000 National Secondary Achievement Test, students gave correct answers to less than 50% of the questions in science and math.

A method which could pose some potential into empowering students with their own learning is the use of stories based on life experiences or what this study labels as narratives. Basically, the events and actions of one's life are understood and experienced as fitting into narrative episodes or stories. But why propose the use of students' narratives as furthering the concepts in Biology? The idea of narratives as a learning tool is grounded on the premise that people make use of stories to create meaning out of everything around them.

In 1993, Kieran Egan (1993) proposed a theoretical framework for children's learning and for classroom teaching that is grounded in narrative. Polkinghome's (1988) book on "narrative knowing" and Bruner's (1986) work on narrative modes of thought are just two examples of the important theoretical works that have come out of explorations of the role of narratives in human cognition.

Overall, there is a need to adopt a methodology which would allow the creation of meaning and long-term understanding of biology concepts. Furthermore, this paper determined the effectiveness of narratives or storytelling as a means of engaging students in their own learning as well as furthering the concepts that are being taught in the biology classroom.

Objectives of the Study

This study investigated the effect of students' life-based narratives in their understanding of biology concepts and their ability to make decisions. Specifically, this study sought answers to these questions: (1) Is there a difference in the concept understanding of students whose lessons in Biology are reinforced

inside the classroom through narratives than those who are not? (2) Is there a difference in the decision-making skills of students whose lessons in Biology are reinforced inside the classroom through narratives than those who are not? (3) Does concept understanding predict decision-making skills?

Significance of the Study

This study derives its importance from the fact that the results can: (1) allow teachers to make some comparison on the difference narratives make on the transfer of knowledge and understanding of concepts taught in Biology compared with the traditional method of teaching. Hopefully, this would encourage teachers to make use of narratives and other similar approaches in the teaching of a content subject like Biology. (2) Likewise, the study can aid school administrators and curriculum developers in designing innovations in the teaching of Biology and other academic subjects that would address the need for creating materials that makes concepts in Biology easier to understand while being practical and relevant to real-life situations at the same time. (3) The study can also help school administrators in designing school-wide science teaching programs that address the need to increase the quality of science education among public schools.

Narratives as a Learning Tool

The relationship between narratives and learning is based on the idea of the creation of meaning on stories people hear (Bruner, 1986, 2002; Polkinghorne, 1988, 1996). Human experience in itself is a story where the person involved becomes the character and the storyteller at the same time. This notion is true in adult development (e.g., Cohler, 1982; Hermans, 1997; Rossiter,

1999) where any change is experienced through the cycle of constructing and recreating stories.

The use of stories in learning or the role it plays in the classroom goes beyond mere storytelling. The idea of using stories in education claims that learners are able to bridge concepts, whether old or new, with real life experiences that come up as stories.

Gudmundsdottir (1995) observes that concepts taught in the classroom can be taught in the form of narratives. In this sense, teachers not only play the role of a storyteller, but they also relate this with the concept or body of knowledge itself. This then allows an avenue for learners to relate with the concept (Leitch, 1986).

When one tells a story or hears one, the story or narrative bridges the gap between the thoughts and feelings of the author with that of what is true and observable in real-life (J. Bruner, 1986; Carrithers, 1992; Mattingly and Garro, 1994; Mattingly, 1998a). It is because of the interactive nature of stories that learning and understanding of the world happens. As Iser (1978) noted, countless possible meanings are created by the listener whenever they hear stories.

The use of stories as a tool in teaching is a common practice. The reason why this is forwarded is because people are beings with lives that are worth calling stories. Therefore, the study of narratives is also a study of human experiences. This idea relates to the notion that education is a cycle of creating and recreating stories wherein teachers and learners can be both storytellers and characters of their own stories.

Studies on stories revolve mostly on its role in literacy (Taylor, Marienau, &

Fiddler, 2000). Weissner's (2001) study on the use of narrative-related activities in adult education discusses the popular use and the difficulties of conducting such activities. In addition, such studies have shown how effective stories are as a teaching and learning tool.

The process of learning in storytelling starts with language fluency and development. This happens as the cycle of speaking and listening happens in the storytelling process. This then becomes an experience shared not only by the teacher and learner involved, but by the whole class as well. As children hear these stories, they develop the ability of putting events together until they can come up with the whole story itself, either in written or in spoken form. This then allows them to read even complicated stories with deeper understanding (Moss & Stott, 1986). Aside from harnessing their skills of listening, their memory tends to improve as well.

It is because of these characteristics of stories that they tend to be effective teaching and learning tools (Neuhauser, 1993). Another characteristic of stories is their ability to make meaning out of ordinary, everyday experiences. In 1986, Bruner made mention of how stories enable both storyteller and listener to fully involve themselves in the stories they share as they remember parts of the story as vivid images based on real-life experience.

Another characteristic of stories that makes them a useful teaching tool is their ability to bridge the known from the unknown. Clark (2001) seems to echo this when he said that when listeners identify with the characters involved, there is the possibility that this can have an impact to the point of creating change in the listener. Inspirational stories are examples

of this, since listeners may find themselves in the same predicament as the character involved and relate to this and so may find himself/herself believing that whatever good came out of the circumstance the character faced, he/she can make it happen to his/her life as well.

One can clearly see that there is a relationship that exists between stories and the changes it can have over one's life. In fact, Randall (1996) saw stories as enabling changes in learning. The idea is that whenever a people share with the world their own life stories, they increase their capacity to evaluate their stories within other contexts. This then allows learners to choose from various narratives. Kenyon and Randall (1997) came up with a model for the restorying process as a means of helping people develop positive changes among learners.

Theories Behind Decision-making Skills

In 1978 Dewey (pp. 234-241) proposed that problem solving involves: a) a sense of difficulty, b) a definable characteristic of that difficulty, c) suggested solutions, d) an evaluation of the suggested solutions, and e) additional observation and experiment that would lead to the acceptance or rejection of the suggestions. In 1960, Simon modified this list to make it appropriate for the context of the decision. To Simon, there are three phases to decision making: 1) intelligence, 2) design, and 3) choice. In 1962, Brim et al. proposed an influential subdivision to the decision-making process: 1) identification of the problem, 2) gathering of information, 3) possible solutions, 4) assessment or evaluation of the solutions, and 5) selection of a strategy (p.9).

Such proposals did have their own share of criticism along the way. White (1972) did not agree with the idea that the

decision-making process is divisible into stages. According to him, the stages should not be fashioned as consecutive stages but rather as being parallel to one another. Furthermore, White (1972) makes mention of how people do not just gather information without having alternatives in mind. This is the recursive or complementary process that exists in the decision-making process (p. 180).

A model that has been proposed to address this was made by Mintzberg, Raisinghani, and Théorêt (1976). Although these phases resemble what Simon did, they gave them new labels: identification, development, and selection. The identification phase consists of two sub-phases. The first one is called decision-recognition wherein “problems and opportunities” are identified along a vast number of data decision-makers receive. The second one, diagnosis, involves the “tapping of present information channels and realizing new ones to clarify and define issues” (p.254). The development phase serves to define and clarify the options. The development phase also involves two subphases.

The search routine is where ready-made solutions are sought, while the design routine is responsible for modifying ready-made ones. The last phase which is the selection phase consists of three routines. The screen routine, is only tapped when a search is expected to come up with several ready-made alternatives which can be evaluated. It is in this stage that optional alternatives are eliminated. The second routine which is called evaluation-choice routine is the subphase where a choice is made among existing alternatives. The last routine which is the authorization routine is

where the accepted solution is given approval and finality.

Despite the presence of subphases or routines in the decision-making process, the relationship among these phases can be described as being circular.

Critical Thinking and Decision-Making

Because of the complex process involving the skill of making decisions, it has been identified as a critical thinking skill. This is so since the process involves more than just memorization or recall. The act of seeking further information and recognizing inconsistencies in identifying problems are proof of this (Gregory, 1991).

The Need to Improve Students’ Decision-making Skills

It is important to develop students’ ability to make decisions since their choices will determine their future. The only difficulty teachers and researchers have observed is that students have a hard time thinking critically. Through time, students are becoming poor thinkers. Poor thinkers have been described by Glathorn and Baron (1991) as: 1) having a need for certainty in order to avoid thinking, 2) a tendency to seek closure quickly, 3) reliance on hunch without evaluating outcomes or other alternatives.

Conceptual Framework of the Study

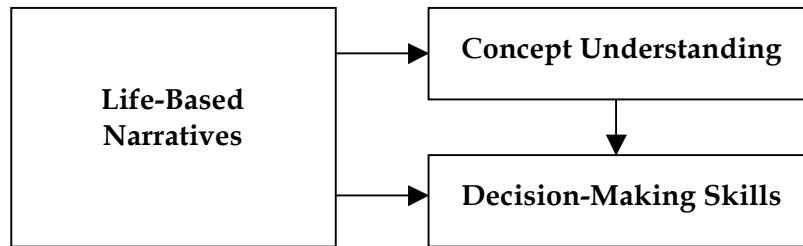


Figure 1. Student Narratives and Concept Understanding Model

In this study, students are viewed as people with life experiences and prior knowledge on certain concepts and ideas when they enter the classroom. This body of knowledge is usually based on one's past and present life experiences. This knowledge comes into play when a concept is taught or introduced into class. Students tap into this knowledge to construct meaning that is accessible to them. In this way learners understand what they already know in relation to what is presented to them in class.

Theories about narrative as a way of constructing knowing, the known, and the knower depict narrative discourse between teachers and students as an important mode through which academic knowing is tied to student identity (Bruner, 1986; White, 1981). Storytelling interactants, from the cultural perspectives of Geertz (1973) and Goodenough (1981), build knowing and being within individual classroom cultures. Through their narrative interactions, they construct ways of acting, believing, perceiving, and evaluating as classroom members. Stories, from this perspective, are symbolic conversational texts that embody sociocultural membership; they represent and construct understanding among tellers and hearers. As argued by Rorty (1979), understanding is central to knowing and being within social

relationships. Through self-reflexive classroom conversations, of which storytelling is one genre, members attempt to find and build as much agreement as is needed to understand what they know and need to know, how they are being viewed, and who they need to be in their current situation.

Furthermore, through the process of talking in groups or sharing narratives, participants not only reflect on their learning experiences, but are able to enhance their critical thinking, collaborate in their own learning, thus furthering their concept understanding.

It is believed that when concepts are learned by bringing life-based situations into the classroom, students are able to actively engage in the learning process by utilizing critical thinking skills such as reflecting (how the story relates to their own life-experience), analyzing (how they acted or would have acted in the same situation) and questioning (What matters to me? What options do I have? How will my choice impact what happens to me and others?). By going through the process, students grow more aware of their personal values and how their decisions impact on themselves as well as friends, neighbors, the community, or society as a whole.

Research Design

The study used the quasi-experimental design. The gathered data were interpreted using t-test, analysis of covariance (ANCOVA), and linear regression.

The chosen research approach was the pretest-posttest control group design since it involved two groups. A pretest and posttest were given to the two groups. Only one was given the treatment, in this case teaching approach using narratives or stories of everyday experiences.

Research participants

The subjects involved in the study were the top two sections in the second year level of a public high school. The first section (II-1) was assigned as the control group since it was a given that they would perform better than the experimental group (II-2) regardless if there was any treatment or not. So it was II-2 that utilized student life-based narratives in their class while section II-1 went through the conventional teaching approach. The study was conducted from the 1st week of December to the 3rd week of February.

Instruments

The study used the following tests:

1. Concept Understanding Test (CUT) is a multiple choice test consisting of 70 questions revolving around the topics organ systems and genetics, all of which were discussed from December 2008 to February 2009. It was used to measure the students' degree of understanding of the lessons.
2. Decision-making Skills Test, unlike the CUT whose questions deal more on theories, this one has questions revolving around everyday experiences. It required students to present various solutions to a problem which they narrowed down to what they thought was the best choice. Unlike the concept understanding test, which relied on raw scores for the analysis, each item was evaluated using a prescribed rubric.

Data Collection

During the data gathering period, the students in the experimental group were taught by the researcher/teacher using narratives or students' life-stories as part of the intervention program. The same teacher taught the students in the control group. The topics taught in both classes covered diseases involving organ systems and genetics.

Figure 1 on the next page shows how the lessons were implemented for both experimental and control groups.

Comparing both diagrams, it is apparent that there were more student-led activities in the experimental group. On the other hand, most of the discussions in the control group were done by the teacher. This gave the experimental group more time hearing the stories of their classmates, stories that were related to the lesson at hand.

During the treatment, the students in the experimental group were asked to assemble themselves into groups of five members. Each member was given a task (student 1 reports findings in class, student 2 gathers the information about the probable cause of the ailment, student 3 records the decision done by the group

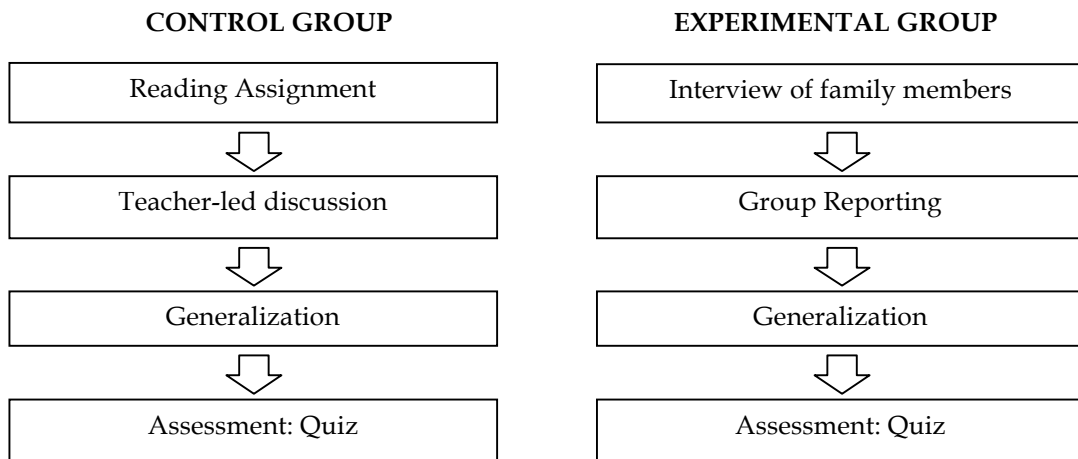


Figure 1. Differentiated lesson sequence for the control group and experimental group

and student 5 keeps the record on what they've learned). Prior to the activity, the students were given a set of questions that served as guide in interviewing a family member. During the discussion, the students were asked to share the information gathered within the group. The group leader/student 1 was asked to report the findings in class.

Results and discussion

On students' concept understanding

The primary question in this study is if narratives improve students' understanding of concepts in Biology. Before this question can be answered, a comparison of mean scores on the pretest of both the experimental and control groups had to be established to check if there was any initial significant difference between the two groups.

A close examination of Table 1 indicates that the mean pretest score of

the control group is higher than that of the experimental group. With a t-ratio of -3.4598, the difference between the pretest scores is significant at .001 level. The result suggests that at the start, the two groups are significantly different in terms of concept understanding of organ system and genetics. An explanation for this is that the control group was assigned to Section 1, which happens to be the lead or star section. So if the control group is comprised of the top students of the whole year level, then it is expected that they would perform much better than the section below them.

In order to see if the difference between the means is statistically significant enough to account for the change in means in the application of narratives in the lesson, and based on the results shown in Table 1, ANCOVA was done on the posttest scores of the experimental group and control group with pretest scores as the covariate.

Table 1. t-test of pretest scores in concept understanding of the experimental and control groups

Test	N	Mean	SD	Mean Diff.	t-ratio	Df	Sig.
Experimental	38	38.1579	4.7050	-3.4598	-3.503	70	.001
Control	34	41.61764	3.5077				

Table 2. ANCOVA of posttest scores in concept understanding of the experimental and control groups with pretest scores as the covariate

		Sum of Squares	df	Mean Square	F	Sig.
Covariates	CUPRE	1385.051	1	1385.051		
Main Effects	Grouping	421.296	1	421.296	756.377	.000
Model		1429.525	2	714.762	230.070	.000
Residual		126.350	69	1.831	390.332	.000
Total		1555.875	71	21.914		

As shown in Table 2, there is a significant difference between the posttest scores of the experimental group (M=49.1250) and the control group (M=48.29412), with significance at .000 level. So it can be said that the use of narratives in furthering concepts in Biology has a significant effect on the experimental group. The results support Iser's (1978) idea that storytelling, which in this study takes the form of narratives, can serve as a good teaching tool for learning and improving understanding as seen in one's personal experience or in the lives of others. Hopkins (1994) seems to echo this when he said that the most effective way to reach learners with educational concepts is through narrative constructions. By doing this, learners connect new knowledge with life experience and weave it into existing narratives of meaning.

Pieces of evidence that support understanding of concepts taught in class are shown in the unedited narratives of students below.

Student 1

One of our groupmate have high blood (his family has a history of hypertensive, that's why at an early age, he had the disease). He always eat oily, fatty and cholesterol foods. He is not eating the right kind of food like vegetables and some fruits. A month ago, our teacher noticed that he was trembling and was brought to the school clinic. With his blood pressure above normal, the school nurse asked that he should be excused from his classes. Before that incident, he always feel ache from his back neck and was easily irritated. His parents brought him to a doctor and the doctor told him that he has high blood. Doctor said, he should lessen the intake of cholesterol because when cholesterol builds up or clogged in the arteries, it would lead to stroke.

Student 2

This is a story about a family member of one of my group members. Let's just call him Mark. Mark used to eat fatty

foods which are high in cholesterol. He doesn't listen to his parents when they tell him to change his lifestyle because it will do him bad. When it came to a point that he need to go to the doctor, he realized that his parents are right. The doctor told him that his cholesterol level is very high. The doctor gave him medicines and told him to have a balanced diet. From now then, he avoids eating fatty foods and is now having a balanced diet. He is now in a good and healthy lifestyle.

Student 3

My uncle Joseph is suffering from a disease called stroke. He told me that before he got this sickness he always eat fatty foods and he doesn't even try a daily exercise in the morning. He always drink liquor and also smoking. Suddenly, he felt dizziness and back pain. Difficulty in breathing is also one of the symptoms, he went to the doctor an asked about it. The doctor said he is suffering stroke. After knowing his sickness, he followed the doctor's advise and take all the medicines. He avoid eating fatty foods, not drinking liquor, stop smoking and he has a daily exercise. He fully recovered in his disease and he maintain a balance blood pressure.

In the previous narratives, students have enumerated the causes of the cardiovascular disease and explained the significance of cholesterol in the blood vessel. It also appears that they understood how blood pressure plays an important role in knowing one's condition. The narratives seem to support the fact that real-life situation gives students the opportunity to build a connection between the school-based perceptual knowledge and events in daily life. By interrelating and applying concepts, students build familiarity with the terms and are able to utilize these concepts more effectively (Allen, 1993).

The narratives below show that as students share their stories, their language becomes more precise. They can speak in complete sentences and are able to elaborate more on their ideas.

Student 4

We have a heredity and its started form my grandmother. This heredity is the scale skin. My mother is 12 years old when she got this scale skin. Until now, she have this scale skin. This scaly skin was pass to me. When I was 11 years old, I see a scale and I thought I have a skin disease. I ask my mother about it and she said that she has the same skin and it is in my genes. Now I know where my scaly skin came from and I always put lotion to my skin. And now I will not worry anymore.

Student 5

My father always drink beer. Doctors have always said that alcohol causes a person to experience several disorders. He also diminishes the quality to sleep well and often experience more severe apneic episodes and hypoxia (oxygen deprivation) after drinking alcohol. Doctor said that if he will stop drinking sedative substances he could have a chance to feel better and get well.

During the group discussion, the researcher listened to students' experiences while conducting the interview. Most of them were excited to share their narratives. One of them mentioned,

Natuwa si nanay kasi may natutunan ako sa school tungkol sa masamang epekto ng alcohol sa circulatory system. Kumbinsihin namin si tatay na wag na uminom gabi-gabi kasi baka ma-stroke siya.

(Mom was happy about what I've learned in school regarding the effects of alcohol on the circulatory system. We will try to convince Dad to stop drinking alcohol every night because he might suffer from stroke.)

However, some students had apprehensions in sharing their family experiences. According to Doris Walker (www.ksre.ksu.edu), "knowing family values helps the members of a family establish goals, make necessary decisions and take the needed actions to meet their goals."

On students' decision-making skills

This section tries to compare the mean scores of the two groups on the Decision-making Skills Test. In this test, all students got mostly an evaluation grade of 2 based on a scoring rubric ranging from 1 to 4 where 1 is the lowest and 4 is the highest. A t-test of

independent means was carried out on the pretest score to see if the initial mean difference between the two groups was significant. The results are shown in Table 3.

The data show that in terms of the pretest scores on decision-making skills, there is no significant difference between the experimental and control groups. This just proves that before the treatment, both experimental and control groups had comparable levels of decision-making skills.

To determine if the use of narratives has enhanced the decision-making skills of the students, a t-test for independent samples was done on the decision-making posttest scores with results shown in Table 4.

The t-test for independent samples reveals that there is no significant difference between the posttest scores of

Table 3. Independent sample t-test for decision-making pretest scores

<i>Grouping</i>	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference	t	df	Sig. (2-tailed)
<i>Experimental</i>	33	2.3533	.4083	7.1E-02	.1083	.993	65	.325
<i>Control</i>	34	2.2450	.4807	8.2E-02				

Table 4. Independent sample t-test for decision-making posttest scores

<i>Grouping</i>	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference	t	df	Sig. (2-tailed)
<i>Experimental</i>	29	2.4021	.3144	5.8E-02	.1662	1.293	61	.201
<i>Control</i>	34	2.2359	.6278	.1077				

both experimental and control groups. A plausible explanation for this could be that the length of exposure to the treatment was not sufficient enough to have produced any significant difference in the performance of the experimental and control groups. Furthermore, the teacher did not conduct any discussion after the report of each group on the life-based narratives they shared in class. Any generalization made by the teacher should have been done as soon as the opportunity presented itself while the lesson was still on the sharing of life-based narratives.

In measuring the decision-making skills of the students, an open-ended type of test was given. The test consisted of four questions, each relating to a topic discussed in class.

Below is a comparison of the responses in the Decision-making Skills Test for both control and experimental groups.

Unedited student responses follow the first problem situation.

Problem 1. One day, your friend came up to you crying. Your friend's mother had suffered a heart attack and is now in a coma. Being an only child, she is the only one in the family who is left to take care of her mother since her father is working abroad.

In Part a, the students were asked to enumerate the possible solutions to the problem situation.

- a. If you were to give her any advice, what five actions would you tell her to do?

Experimental

Response 1: *Take presence of mind, seek help to other relatives, just take care and watch over her mother, pray to God, call her father to know what happened.*

Response 2: *Be strong to that problem, have faith in God, Just think positive, accept what is going to happen, be ready of what are going to happy.*

Response 3: *Never give up, take a deep breath, pray to God, don't lose hope, take care of her mother.*

Control

Response 1: *If I were to give advice, i shall tell her to be tough enough and have presence of mind, asks for God's guidance and help never hesitate to ask for help form the relatives and be responsible enough of taking good care of her mother and father than to escape from it.*

Response 2: *I would stay on her side and help her move on. I would help her take care of her mother. I would tell her to be strong and have faith in God*

Response 3: *I will enhances his/her faith in God and will support her/his decision if he wants to call his father or not.*

Looking at the two sets of responses, five students gave pieces of advice which are remarkably similar to one another. The pieces of advice seem to evolve from taking care of one's self first, seeking help from relatives, taking care of the parent(s), and seeking help from God. Another thing worth noticing is that the sequencing of these responses was almost the same for all the respondents. After giving advice pertaining to taking care of oneself, the advice moves to not losing faith in God.

Part b of number 1 question gives the students the chance to choose the best alternative.

- b. Of all the actions you have mentioned, which one do you think is the best?

Experimental

Response 1: *Take care and watch over to her mother and asked the doctor about her condition.*

Response 2: *I think it is the strength that you must have.*

Response 3: *Don't lose hope.*

The responses given above have been rated 3, 2, and 1 respectively. One common characteristic that these three answers share is that among the choices given in the previous question, the two pertain to strengthening oneself while the other one is about watching over one's mother instead and being knowledgeable about the condition of one's mother by seeking information from the doctor. Hence, it seems that what is important for the respondents is taking care of oneself first before taking care of the mother or seeking the help of other people, even that of God.

Control

Response 1: *I think its the last one where she has to be responsible enough of taking good care of her mother rather that to escape from it.*

Response 2: *Be strong and have faith in God.*

Response 3: *To trust God and great strength to carry his/her problem.*

All the responses from both the experimental and control groups gave importance to the need to take care of oneself first before choosing other alternative solutions to the problem.

In Part c of question 1, the students were asked to justify their choice.

- c. Why do you think this is the best action for her to take?

Experimental

Response 1: *To know what to do if something happen and to know take care of her mother.*

Response 2: *I think it is because when you have that strength you can now face that kind of problem, you can accept.*

Response 3: *Take care of her mother.*

In this question, the students are asked to justify why they believe their chosen course of action is the best. Judging from the responses, response number 2 seems to be the most logical of them all. It justifies the course of action appropriately by saying that when one is strong, all problems can be addressed. There is no obvious logical justification for responses 1 and 3. The last response looks more like a directive or instruction rather than a justification to the answer.

Control

Response 1: *Because there is nobody where she can truly rely on regarding her problem rather than herself.*

Response 2: *Bec God can help us overcome our fears and problems.*

Response 3: *Support her.*

The responses of the control group vary from one another in a sense that the first response values oneself as a key solution to the problem. The second one values the power or help given by God, while the third one fails to give a justification of the choice made.

On students' concept understanding and decision-making skills

Another area that this study explored was if students' concept understanding predicts decision-making skills. Linear regression was applied to the test results on concept understanding and decision-making skills, with the latter as the dependent variable.

The linear regression technique gave an R value of .240 and the regression model is significant at .041 level. These results suggest that concept understanding can predict decision-making skills of students with a B coefficient of 0.025 which is significant at .041 level.

The interrelatedness between these two variables can be seen in the students' answer on the Concept Understanding Test and Decision-making Skills Test. In the responses given below, it can be seen how having knowledge on concepts taught in class has influenced the way students make decisions.

For the purpose of establishing the relationship between concept understanding and decision-making skills, students' responses to questions 3, 4, and 5 of the Concept Understanding Test is given below.

Question 3. *What is affected if the cholesterol level is above normal?*

Questions 4. *What was their decision after knowing that they had such ailment?*

Question 5. *If you were in their shoes, would you do the same thing? Why?*

For Question 3, most the responses were blood vessels and arteries. Apparently, the scores on the Concept Understanding Test, of numbers 31 and 39, show that students were able to identify the types of blood vessel and the best treatment for arteriosclerosis. Therefore, an application of the concepts was seen in their answers.

For Question 4, the responses were:

Response 1: *He decided to have a healthy lifestyle. He avoid also do something that cause their ailment.*

Response 2: *Have a regular exercise and eat nutritious foods.*

Response 3: *They decided not to eat to much fatty foods and have a regular exercise.*

Most of the responses above concentrate on doing away with sedentary lifestyle. Decisions made had an impact on the personal values of the students. It was clearly seen in their answers below.

Response 1: *Yes, because if you did not do the same thing, you might die.*

Response 2: *Yes, because we know that it is good for our health. And to avoid and diseases that can give a bad effect to our health.*

Response 3: *If I where in the same situation, I will do also what they did, so that I will not suffer in this ailment.*

By letting the students involved in the process, they are developing their sense of reasoning and awareness. They can make judgments on the basis of what is important, sensible, and something worthwhile.

To further establish the relationship between concept understanding and decision-making skills, social issues like family planning was also tackled.

Scores on numbers 55, 56, and 66 of the Concept Understanding Test showed that students were able to perform well and applied the concepts based on the responses given. Notice that the spiritual aspect was considered in making the decision against abortion.

It is also important for the students to be aware of their personal values and how these affect their decisions. Seemingly, there's also a need to reflect on other's view in order to minimize subjectivity. As Millar and Osborne (1998) stated:

Young people should be helped to acquire conceptual and procedural understanding of science so that they can appreciate the underlying rationale for decisions (for example about diet, medical treatment, or energy use) which they (students) may wish to take in everyday contexts, both now and in later life, be able to understand and respond critically to media reports of issues with a science component, and feel empowered to hold and express a personal point of view on issues with a science component which enter the arena of public debate, and perhaps to become actively involved in some of these (p.2012).

Based on what has been shown, it can be said that an enhanced

understanding of concepts taught in the experimental class (based on the posttest scores on concept understanding) has helped the students make sound decisions that reflect the concepts they have learned in Biology. It can be said that this somehow supports the study's findings of a causal relationship between concept understanding and decision-making skills. Furthermore, this has enabled the experimental group to perform at par with the control group which happens to be the star section.

Conclusion

The following results were drawn based on the study: (1) The use of life-based narratives as a teaching approach improves the students' concept understanding in Biology; (2) The use of life-based narratives as a teaching approach and the conventional teaching approach produce similar results in the Decision-Making Skills Test; (3) Concept understanding can predict decision-making skills.

Recommendations

Considering that the life-based narrative approach significantly enhances the students' concept understanding, it is therefore recommended that teachers use life-based narratives in teaching concepts in Biology. It also encourages teachers in other fields of science to also try out the same approach in enhancing the concept understanding of their students.

Future research can investigate the effect of narratives in the classroom after two or even three grading periods. This is to ensure that ample time will be devoted to the application of the treatment for it to produce any significant effect especially on the decision-making skills of the students.

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