



DEVELOPMENT OF MORAL VALUES THROUGH SCIENCE EDUCATION

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Abstract

The teaching of science does not only involve the teaching of a set of facts, laws and theories, but a set of values as well. It appears as if the value product of science teaching has often been obscure. The moral decadence in the society has degenerated to the extent that the teenagers are now involved. If the value aspect of science could be intensified and made pronounced, there is possibility of reduction, if not elimination, in the social vices engaged in by the young ones right from the school. It is therefore expected that science teaching should actively inculcate noble values in its lessons. This paper is a discourse on the prevalence of social vices that attended the degraded level of morality in our contemporary society, psychological perspective of moral development, need for developing moral values through science teaching as well as the different types of moral values that science education could instill in the student. It further argues for the inclusion of moral value in the science classrooms.

Keywords: Science education, moral value, teachers, curriculum, ethical, morality, moral decadence

Introduction

The fabric of any society is held together by the standard of morality that the citizens practise and maintain. The teaching of morality starts from every home and followed by the teachings at school. Morality could be defined as a doctrine or system of beliefs, values, or principles that govern human conduct. This could be regarded as the positive aspect of behaviour. The positive behaviours are those that are beneficiary to others in the society like sharing, helping, comforting others while the negative behaviour are harmful ones like violation to others' right and welfare (Jason & Stephen, 2009). A moral code is a system of morality based on a particular philosophy, religion, culture etc. Morality may be synonymous with "goodness". Morals refer to human behavior where morality is the practical activity and, ethics describes the theoretical, systematic, and rational reflection upon that human behaviour (Churchill, 1982).

Morals, values, and ethics are strongly attached to society, spirituality and culture. While ethics describes a generally accepted set of moral principles, morals describe the goodness or badness or right or wrong of actions and values describe individual or personal standards of what is valuable or important. Mohammad (2016) [gave three](#) meanings of ethics.

"Firstly, ethics is commonly taken as a synonym for morality, the universal values and standards of conduct that every rational person wants every other to follow. Secondly, ethics is a well-established branch of philosophy that studies the sources of human values and standards, and struggle to locate them within theories of human individual and social condition. Thirdly, professional ethics, and it is not universal nor is it ethical theory; it refers to the special codes of conduct adhered to by those who are engaged in a common pursuit. Professional



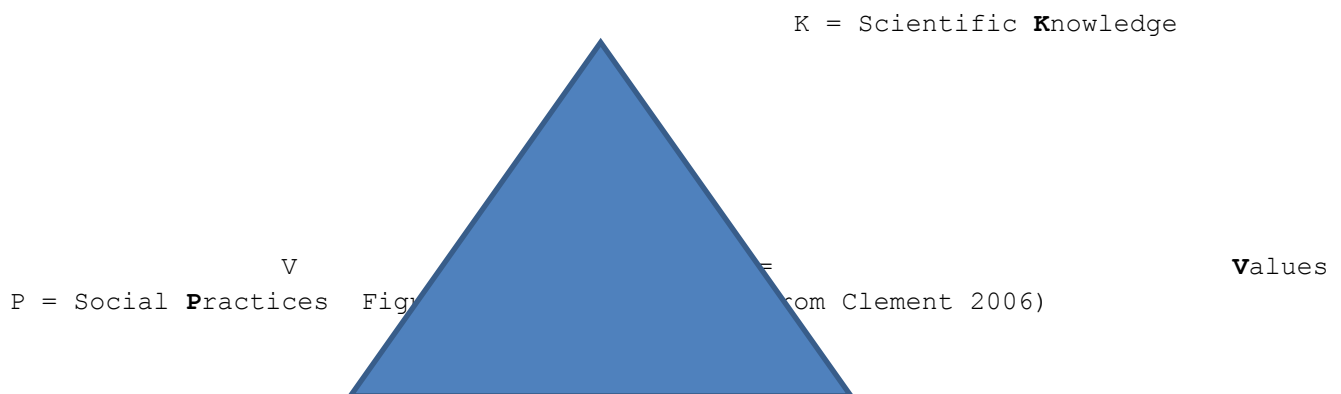
ethics is an integral part of the concept of a profession"

Values refer to our personal set of beliefs about what is important or unimportant, right or wrong, good or bad. When one is confronted with making a choice out of options of moral dilemmas, the decision taken in such a circumstance is an indicator of the value attached to such a situation. Values are merely the perception of the principle that governs the mind. Moral value therefore is the beliefs about what one would consider important or not.

Science is a branch of knowledge dealing with facts or truths that are systematically arranged revealing the relationship between them through laws and theories. Ethical requirement on the part of scientists involves reporting authentic results of observations. Implicit in teaching science has been the teaching of a set

of values. Even though, scientific values had not be popular on the common assumptions that science products are value-free (Tan, 1997). Thus, the teaching and practise of moral value through science education is a giant stride towards engendering self-reliant citizen.

The processes of science is full of values that are morally acceptable. Science seeks the truth by observing important values like been honest, modest concerning the experimental results, always critical, rejecting any dogmatism and any fraud, but also creative, imaginative and able to work collectively (Pierre, 2014). However, Clement (2006) proposed a model to identify the possible interactions between scientific Knowledge, Values and social Practices (the KVP model) to relay the interaction between science teaching and the society. This is represented diagrammatically below (fig 1).



From the pyramid, the apex of science teaching is the acquisition of scientific knowledge, which is based on the values inherent in the social practices.

Some questions were raised by on the possible impact of science on the moral values which include: could scientific facts make people rethink some of man moral stances? Could the science even determine, in some empirical way, what is right and what is wrong? (Lawrence, 2010). The answers are not far-fetched. The process of science are rich enough to develop good moral standard in individuals. Such virtues that science

education has potent to impress on the students include hard work, honesty, unconditional love/kindness, respect for others, cooperation/team spirit, logical thinking, forbearing, among others.

Psychological Perspective of Moral Development

It is the believe of psychoanalysts that morality is noted on the avoidance of guilt and shame and that its development is a product of the super-ego (Fred, 1923; Hoffman, 1982). The origin of moral value can be aligned to Skinner's (1953) postulate that the mind of the new born baby is like a clean slate, devoid of any



inherent moral emotion or inclination. Skinner (1953) placed emphasis on direct experiences and consequences which are the main sources of learning. It was the opinion of Skinner (1953) that morality has no biological or evolutionary basis, nor is it motivated by emotions, conscience or judgement; rather, it is simply those behaviours reinforced as good or bad, driven by the rewards or the punishment they beget.

According to Piaget (1932), all developments emerge from actions; that is to say, individuals construct or reconstruct their knowledge of the world based on interactions with the environment. It was therefore expedient of the school to emphasise cooperative decision-making and problem-solving, nurturing moral development by engaging students in activities geared towards bringing out common rules regarding fairness virtue. The earlier work of cognitive theorist Piaget (1932) was expanded by Kohlberg (1989) to explain the moral development of children, which he believed follows a series of stages. According to Kohlberg (1989), there are three levels of moral development, viz: pre-conventional, conventional, and post-conventional morality levels. He stressed further that each level has two distinct stages.

Level 1 - Pre-conventional Morality

This centred on values in external events. At this level, individual child does not have personal code of morality but as prescribed by the adults i.e. the societal moral ethics. Authority and moral code is outside the individual child and reasoning depends on the physical consequences of action. The stages are:

Stage 1: Avoidance of Punishment - The emphasis here is on doing good to avoid being punished. Thus, obedience plays a paramount role at this stage.

Stage 2: Trade-off for Individualism - The children at this stage are aware that every individual has different

viewpoints about an issue. Hence, there is need for exchange of ideas.

Level 2 - Conventional Morality

The adolescents and adults start to internalize the moral standards of valued adult role models. The target is performing the right roles. Still, authority of the adults is not questioned and reasoning depends on the societal norms.

Stage 3: Good Interpersonal Relationship - The child tries to be good by meeting the expectation of other members of the society. Thus, the focus is seeking the approval of others as meeting the moral standard of the society.

Stage 4: Maintaining the Social Laws - At this stage, the child is acquitted with the general rules and laws of the society. The morality here stands for obeying the rules and regulations by fulfilling expected duties and upholding the laws.

Level 3 - Post-conventional Morality

The adults have fully grown to discern the rights and wrongs of the society. Therefore, individual is judged on the basis of self-chosen principles or actions and reasoning is a function of individual's perspective of what is right or wrong.

Stage 5: Sense of Democracy and relativity of Rules - The general rules, though exist, may not work for an individual in a particular situation. In such a case, the individual has the prerogative of deciding on moral value to embrace. This implies that the generally believed norm is relative to individual in peculiar situations.

Stage 6: Self-selection of Universal Principles - The concept of good and bad is the prerogative of individuals. Individuals have developed their own set of moral guidelines or rules which may or may not align with the general norms. However, it is considered that people rarely reach this stage.



LEVEL 3	POSTCONVENTIONAL Shared standards, Rights and duties.	Stage 6: Self-selection of universal principles Stage 5: Sense of democracy and relativity of rules Rights and duties.
LEVEL 2	CONVENTIONAL Performing right roles	Stage 4: Fulfilling duties and upholding laws Stage 3: Meeting expectations of others
LEVEL 1	PRECONVENTIONAL Values in external events	Stage 2: "Getting what you want" by trade-off Stage 1: Punishment avoidance

Figure 2: Kohlberg Theory of Moral Development. Retrieved online @ <https://explorable.com/theory-of-moral-development> on 25th April, 2017

Moral Values for Students: A necessary part of the Science Curriculum

A school curriculum should have moral values as one of its parts aside Mathematics, Science, Social Studies and Language courses. Paul (2011) opined that the neglect of teaching moral values in schools is hurting the students and causing problems in the society as the students practice in the society what is taught in the school.

Suzanne (2013) submitted that:

it is a shame that society has become so tangled that moral values automatically become synonymous with religion for some. Moral values are simply common decency and courtesy as well as a sense of fair play and sportsmanship. None is taught in schools anymore.

Suzanne (2013) stressed further that students' performance decline daily because there is no means to keep them focused and organized since there are no constraints as a result of moral decadence.

For the school to impact the students towards decent morality, Ryan and Bohlin (1999) advocated for the teaching of moral values in the science teaching for the following reasons:

1. Preparation for the future roles in Society

- The primary goals of science education include enabling students to gain knowledge and moral values. Children will need the combination of the knowledge gained in school academically and morally to completely fit into the society and become fulfilled parents and citizens.

2. Parents' Neglect of Moral value teaching

- Many parents slack in their duty of infusing moral values into their children from home, otherwise called "home training". This may be due to too tight schedule of duty or *laissez faire* attitude of the parents. Children from such homes grow up to become nuisance and social complications in the society. In many cases, there are single parenting homes which offer unbalance role model for the kids raised in such home.

3. Exposure to Violence and dishonesty in society

- Students are exposed to violence, dishonesty and other social vices through the media and real life experiences on daily basis. There are avalanche cases of school shootings, examination malpractices, bullying, fighting, rape, cultism, way-laying of teachers and school mates, ganging up, burgling of offices, stealing/thefts, etc taking place in the schools on the increase. Incorporating moral values into the teaching of science would



reduce, if not eradicate these anti-social behaviours.

4. Contemporary bad influences from Society - The society is jam packed with people of indecent morals. These are the set of people that constitute role models for the young ones. There are cases of rape, sexual promiscuity, fraudulence, getting rich at all cost syndrome, etc. Inculcating moral values in science teaching would ameliorate these vices in the minds of the students.

5. Permanent nature of Moral value - If moral values are instilled into the lives of the students through science teaching, there is high tendency to grow with them and eventually become part of them. Any morality that a child imbibes and develops with will remain permanent in him/her.

Moral Values desirable in Science Curriculum

The school science curriculum must integrate moral values capable of developing in the learners expected norms and character in the society where they belong. Paul (2011) highlighted some moral values that should be taught in school for character development. However for this discourse, the following values are considered desirable to be developed in the students through science teaching:

- 1. Hard Work:** This is the ability to embark on any task with vigour and strength that it deserves.
- 2. Honesty:** This is the tendency to say the truth about something or an event devoid of any falsification or alteration.
- 3. Unconditional love and Kindness:** This deals with showing care and goodness to others.
- 4. Respect for Others:** It has to do with giving honour and values on others' view, opinions and actions.
- 5. Cooperation:** This is the tendency of a group to unit and have a common target and act accordingly.

6. Compassion: This is great love and affection towards someone.

7. Forgiveness: This is the ability to overlook wrongs and faults of others.

8. Logical Thinking: It involves tendency to systematically engaged is a reasoning and come up with tangible result.

9. Team Spirit: This is a spirit of individuals to get along or work with others.

10. Forbearing: It is an ability to endure others' uniqueness and differences.

Roles of Science Teachers in Moral Value Development

The science teachers as the facilitators of science learning have the following roles to play towards enhancing the development of moral values among the students:

1. Science Teachers as Role Models - Morality is best fostered through good example. Science teachers therefore must put up characteristics capable of engendering moral values in the students. The teachers must show good virtues in behaviour, dressing, charisma, accommodation, speech, actions, inter-personal relations, etc

2. Science Teachers as Counsellors - The science teacher is the parent of the students in the school. He/she therefore is in the best position to assist the students through guidance and counseling to take up worthwhile morality while in school. To accomplish this arduous task, the science teacher should create a warm, trusting, confidential and healthy relationship with the students. This would enable the students to open their minds and allow teachers to assist them towards self-understanding, self-acceptance, decision making and solving problems.

3. Creating a Caring Environment - The role of environment in development of skills and learning cannot be over emphasised. A caring classroom environment as put up by the science teacher would be a practical model for



the students towards creating a healthy and friendly atmosphere wherever they find themselves.

4. Developing Social and Emotional Stability - Emotional intelligence has more bearing on life and school outcomes than academic learning. Science teachers are to ensure social and emotional stability of the students. Classroom climate should encourage social and emotional bonding and promote positive inter personal experiences, providing the minimum grounding necessary for character formation.

5. Teaching for Expertise and Competence - Science teachers should exhibit expertise and competence in their teachings. This would as well instill in the students the need to be competent in their skills acquisition and become experts in their future endeavours. An expert would showcase expertise in his/her duties and pay attention to ethical aspects of his/her profession, thereby exhibiting morality devoid of laziness and deceit.

6. Teaching for Self-Esteem and Integrity - Science teachers are to ensure that their students learn to believe in themselves. They should be indoctrinated to use their skills independently. Science teachers should develop integrity in the students on the basis of their self-esteem.

Science Methods and development of Moral Values

The methods of sciencing have the potency to develop moral values in the students. These are possible as discussed below:

1. Observation: Scientific method of looking at things from many relevant perspectives helps students understand and resist egocentric thinking i.e. thinking that revolves around innate human tendency to see the world from a narrow self-serving perspective.

2. Accuracy: The accuracy of scientific measurements would develop in the youngsters the moral spirit of

truthfulness in their dealings. They would have imbibed the idea of saying or relaying events as accurate as possible devoid of unnecessary embellishment which would represent a wrong presentation of the said event.

3. Objectivity: Science study is based on objective consideration of facts, phenomena and events. This involves clarity, fairness, thoroughness, and impartial judgement. All these are valuable assets for morality.

4. Constructive Criticism: This scientific method would infuse into the students the spirit of fair consideration of others' views or opinions and respond appropriately in such a way that would not lead to disagreement. Hence, there would be peace and tranquility in the society.

5. Inquiry: Development of inquiry skill involved in scientific activities in quest for authentic fact and truth is a virile tool for acquisition of appropriate facts and information rather than believing on fallacy. This is a worthwhile asset of morality.

6. Hypothesising: Ability to fore-see the consequence of an action would have been developed in the students due to acquired scientific skill of hypothesising. Based on this, students would be pro-active in their dealings and able to avert possible danger or problem in the society.

7. Experimenting: The experimental procedure involved in science develops in the students the spirit of team work. On this basis, students would be able to collaborate with others in their environment for a productive result.

8. Sharing: Scientific method of sharing experimental results with other scientists is enough impetus for the students to be ready to share ideas and properties with others. Hence, there would be no room for stinginess but hospitality.



9. Specificity: Students are able to display clarity of issues and situations by virtue of method of specificity employed in scientific endeavour.

Conclusion

Science education equips learners to effectively participate in the society they find themselves. This is achievable through inculcation of the essential skills, traits and values requirements for good citizenship. The scientific skills are meant to make the students functional in the society while the scientific traits and values are tools that would enable the students related well in the society, thereby exhibiting expected morality as good citizens.

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