

## **Scientific misconduct and the role of value education to eradicate it**

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**Abstract-** *Scientific misconduct has been a serious threat to the authenticity of research works. In last few decades, the world has witnessed many of such cases, where a person or a group tries to manipulate the truth by violating the general terms of research ethics. The greed for publishing in high impact journals and magazines influences some researchers to use shortcut methods, which further defames the scientific rigor of a person or an institution. Modern day education system is delving into the routes of such problems and searching for their remedies. In this regard, implementation of value based education system is expected to be very beneficial. In this report, the types of scientific misconducts, their consequences and possible remedies have been discussed thoroughly. The role of value education in the eradication of scientific misconducts is the main theme of this paper.*

### **1. Introduction**

Education and research are the core factors which determine the growth of a society. Scientific research is the systematic study to build the knowledge of human, to culture the creativity and to develop a bridge between theories and applications. Implementation of scientific research can aid to human welfare as well as the economic progress of a society. Thus, scientific research aiming at the manifold development of the society is nowadays widely termed as 'Research and Development' (R&D).

Scientific advances are very important for the competitive growth of the society, therefore government has granted various funds in this area. Scientists are always in search of new and innovative ideas and their applications. However, in this journey they have to face enormous challenges. Nevertheless, they are very much committed to bring their research to the next level. Such attitude builds a healthy competition among the scientists, an urge for publishing their research findings in highly reputed journals. Thus, to join in hands with the global standard, one needs to maintain specific ethical standards in

research works. However, in the past few decades, there are some reported cases which reflect the violation of the ethical standards to maintain the integrity of a scientific research.

Incorporation of unethical means, components or violation of ethical standards in a scientific research may be broadly termed as 'Scientific misconduct'. It may be intentional or accidental. In particular, it is extremely essential to identify such misbehaviour done by the scientist; otherwise it will be a great threat to the society. There are a lot of previously reported cases (accidental or intentional) which leads to various scientific tragedies. From 1980s the US government started to monitor such cases of misconduct with particular interest. According to National Institutes of Health (NIH) and National Science Foundation (NSF), fabrication, falsification and plagiarism are the prime forms of scientific misconduct.

In this regard, various reviews, workshops and the interviews of the experts sorted out a series of scientific misconducts. Some of such behavioural misconducts are explained below,

**1.1. Core research misconduct:** The scientific misconducts which defame the core values of research are considered as core research misconducts. It category includes,

**1.1.1. Fabrication of data:** A good scientific practice insists upon the establishment of results or statements purely on the basis of repetitive and systematic experiments. However, it has been observed that some researchers use to alter their results based on some fabricated data and report them in scientific journals and magazines. This not only defames his or her personal integrity but also impose a negative impact on the publishing house.

**1.1.2. Falsification:** In scientific philosophy, contradiction of results, hypothesis or theory with the experimental or theoretical evidence is regarded as falsification. Scientific research is always based on proper experimentation or theory. However, some researchers claim some research outcome which later on shows inconsistency with the evidence. This disintegrates the scientific temperament in particular and 'scientific rigor' in general.

**1.1.3. Plagiarism:** It is an academic duplicity, where an author replicates someone's views, ideas, language, work methods and represent it as their own research without giving him proper credit. The present day scientific world is very much concerned about the protection of 'Intellectual Property Right' of a person or an institution. This directly forbids the use or duplication of one's scientific findings, comments, language, illustrations, tabulation, and description in their neat form without citing the original work.

Plagiarism insists upon the care to be taken during the drafting of a scientific manuscript so that neither the work nor the presentation resembles with some published works in their neat form. However, there is always a provision of reproducing these data with proper permission either from the author or from the publishers. Core misconducts are considered as serious offence while conducting scientific research.

Some other types of misconducts are elaborated below,

**1.2. Data-related misconduct:** Scientific findings are purely based on the data generated through in-depth analysis of theory and/or experiments. These data have very important significance in establishing the truth. Thus, falsification or mismanagement of data may lead to the suppression of the truth. Further, this may divert or misguide a person who is following these data either for implementation or for further investigation in the field.

**1.3. Personal misconduct:** Lack of leadership capacity of the research supervisor, inappropriate attitude towards the students, mental harassment can cause severe difficulties for the researchers. This personal misconduct is also considered as a source of destruction of research ethics. Personal favouritism or grudge of a supervising person generally leads to a biased working atmosphere. This is very detrimental to a person's scientific temperament, working in such a research group. It is also pertinent to mention that gender biasness in another issue which is being heard in many research institutes.

**1.4. Research practice misconduct:** The use of harmful reagents, analytical errors, lack of accuracy, abusive treatment towards laboratory animals, contravention of human subject propriety are also under scientific misconduct. This is very much unsafe as the lack of proper knowledge and carelessness can cause serious accidents (numerous examples are reported as scientific tragedy in the world history).

**1.5. Publication-related misconduct:** The order of authorship in a research publication must be on the basis of contribution of the researcher. However, sometimes it is observed that the leaders or the supervisors include undeserved authorship on the basis of favouritism and exclude actual contributor's name. This kind of practice is considered as the violation of research ethics. Further publication of data without experimental proof and reliability is a serious scientific misconduct.

**1.6. Financial, and other misconduct:** Interrupting in the publication process due to rivalry issues, cover up the publication credentials are also included as scientific misconduct. Furthermore, other cases are

observed, where the funds granted for the research are utilized in unauthorized manner. Again, creating accusation of misconduct on the basis of assumption or aversion is also under consideration.

## **2. Penalty against scientific misconducts:**

Above are the different types of scientific misconduct commonly observed during professional research practice. The standards fixed by US government must be obeyed by the researchers to carry forward a healthy research. A progressive development is impossible without scientific research. Consequently, research has a large impact on the society as well as environment. So the research frauds have to go through some punishments. The Office of Research Integrity (ORI, USA) have imposed a set of penalties which include,

**2.1. Termination of research grant:** Earlier it is mentioned that the research and development section is privileged for receiving various funding provided by the government. Unethical scientific research is treated as the wastage of public fund. So, such misconducts may cause the debarment of research fund/grant for a certain period of time. Such penalty in case of fabrication and falsification is more than plagiarism. The strictest punishment ORI can impose is the debarment of the scientist from any centrally funded research project for a certain time period.

**2.2. Banned by the journal:** On exposure of data fabrication, falsification and plagiarism, a specific journal or publisher may ban a researcher from publishing with that group for a certain period of time or for the lifetime, depending upon the severity of the misconduct.

**2.3. Action by the university or institute:** If guilt is proved, the authority of the particular institute is empowered to take disciplinary action against the person or the group. The authority may form some disciplinary committee and execute any punitive action.

## **3. Measures to combat scientific misconducts: analysis and consequences**

Bouvillev M. in his critical discussion on "*Crime and Punishment in Scientific Misconduct*" has pointed out some side effects of the punishments. In his article he put light on the honest errors or involuntary errors, that are the errors made by the researchers unintentionally, but, as dangerous as the core misconducts. In fact, the possibility of such error is more than the voluntary falsehood. It should be noted that mistakes

whether it is intentional or unintentional have the same impact on the money wastage and inhabitants. Here, he used the term '*unlucky*' instead of '*dishonesty*', as accidental errors may occur in spite of extraordinary care. According to Zuckerman, A careless person is not trustworthy at all. Ineffectiveness and deceitfulness both can break the trust with equal impact.

Another argument arises when scientific misconduct is considered as the wastage of public fund but in actual practice repetition, verification and extraordinary caution is much more costly compared to the study itself. Again, in some cases if something wrong happened, then appropriate inquiry and prosecution must be required, but, these processes can also be very expensive. Therefore, if wastage of public fund is the main concern, such consequence of misconduct is not profitable at all.

For the prevention of scientific misconduct, NIH and NSF have developed certain courses and training programs. Here, they introduced education in the responsible conduct of research (RCR), such courses are compulsory for the researchers, trainees and scholars. These courses cover 1) safe laboratory practices and guideline for the treatment of human and laboratory animals, 2) conflict of interest, 3) responsibilities of the guide towards the students, 4) research collaborations, 5) handling laboratory tools, 6) data management, 7) peer review and publications, 8) responsibility of authorship, 9) knowledge on misconduct and policies to control it and 10) give the knowledge of ethical values and obligation towards the environment and society.

An atypical way for the exclusion of such fraud behavior is the character formation. If a person is spiritually rich, it is difficult for him to encourage such immorality. According to John C. Geikie, '*Our character is but the stamp on our souls of the free choices of good and evil we have made through life*', Again, Andre Maurois the French author said that, '*If you create an act, you create a habit. If you create a habit, you create a character. If you create a character, you create a destiny*'. In this regard the knowledge of value education can play a vital role to prevent the society from such wrongdoings.

#### **4. The impact of value education on eradication of scientific misconducts**

Education is a continuous process for the development of human race. It builds the foundation of civilization. The inherent qualities of human are waking up and nurtured by education. *Education taught the human being to being human*. Value education is an integral factor of education; it drives the education towards a proper direction. Albert Einstein said, '*Try not to become a man of success, but to become a man of value*'. The knowledge of values develops the eternal ideas and shapes up human behavior. Peace,

morality, truthfulness, love, honesty, integral harmony, worship are the basic innate values present in the individual. Value education incites the inherent qualities and it reflects on one's attitude, language, choice, judgment and the vision towards life. From the vision of Mahatma Gandhi, values are the elements that bring behavioral differences that help to distinguish each human from the other. He believed that value education builds one's self identification and analyzing capacity. The ideology of such education is helpful to direct our activities and thoughts.

Swami Vivekananda described the character formation by means of correlation between value and education. He imparted some goals of value education that are; 1) the purpose of value education should be character formation and upliftment of human being, 2) amplification of the vision and a broadened mind should be the reach of value education, 3) value based education should direct towards the freedom of thoughts and expression, and 4) to understand the benefits and side effects of development, audacity to play the self role to protect the truth.

#### **4.1. Value education from ancient Indian perspective**

Ancient Indian education system was purely value based. Over the ages, it is emerged in the dharma-granthas, scriptures, heritages, culture etc. At that time, a disciple used to stay in '*Gurukul*' (Guru's place) and learn the multi folded lessons of life. Value oriented education is considered as a source of transformation of the individual. It is believed that, proper knowledge of value is the only way to refine the mind and the soul.

The Vedas and the Upanishads are highly enriched with human values. The intrinsic values help a person to understand the power of worship, honesty, truthfulness, speech, "*gyan*" (knowledge) and tolerance. In addition to this, it gives an idea of the knowledge of yoga, *sankhya* (origin, size of the universe, stars etc), logic, *Vysheshika* (concept of matter and its constituents). Surprisingly, the contents of these books can touch the modern age even in thousand years back. In Hinduism, the Sanskrit term '*Satchidananda*' means truth, consciousness and bliss. The main objective of ancient education system is to maintain integrity, peace and harmony. The concept of *purushartha* indicated the art of living. It has four elements, *dharma*, *artha*, *kama* and *moksha* which means righteousness, wealth, physical happiness and freedom of soul. According to this, man has the freedom to earn wealth and physical happiness by following the correct path. It gives the idea of *moksha*, and the way to attain it. Again, we have the well known set of blissful values '*Satyam Shivam Sundaram*' means 'Truth-Godliness-Beauty'. On the other

hand, the set of negative behaviours *Kama* (lust) – *Krodha* (anger) – *Lobha* (greed) – *Moha* (attachment) – *Mada* (pride) – *Matsarya* (jealousy) is considered as the biggest enemy of mankind.

The *Shree* Bhagavad Geeta also has large contribution on enriching the value based education of ancient India. It is a part of the epic '*Mahabharat*' written by Ved Vyas. It contains seven hundred verses which deal with *Karma yoga* (path of action), *Bhakti yoga* (path of devotion) and *Jnyana yoga* (path of knowledge). The perception of the *Shree* Bhagavad Geeta helps to inculcate the cluster of values among the students that help them in every aspect of life. The verses are believed as the '*vani*' enlightened by Lord Krishna. The principles give the direction to lead a meaningful life. It defines how to bring perfection in action, speech and thoughts. It teaches us the role of *karma* in human life and how good deeds bring happiness at the end of so many sufferings. The values are defined as *dharma*, and the one who follows that path will certainly lead a successful life in every aspect.

The educational framework of India is constructed by the ancient thinkers, was based on all round perfection. A famous American author and poet Ella Wheeler Wilcox once said, "*India- The land of Vedas, the remarkable works contain not only religious ideas for a perfect life, but also facts which science has proved true. Electricity, radium, electronics, airship, all were known to the seers who found the Vedas.*" After the Vedic era, the eight fold path of Buddhism and the *three Ratna*'s and *five vows* of Jainism also bring some revolutionary changes to the society. In a nut shell, Indian education system is ornamented with the value based education folded by spirituality, perfection, authenticity, honesty, proficiency, intellectuality, morality, self realization and social harmony.

#### **4.2. Value education in India after independence**

Value based education is also a part of modern education system. Educational institutes like schools and colleges play an important role to promote this. The whole framework of value education is made at different levels that are individual, interpersonal, community, national and global. After independence, Indian government also have introduced value education in the curriculum of elementary as well as secondary levels through different schemes like, 'National Commission of Secondary Education' (1952-53), report of the 'University Education Commission' (1962), 'Kothari Commission' (1964-66), 'The National Policy on Education' (1986), 'Programme Of Action' (POA, 1992), 'Chavan's Committee Report' (1999), 'The National Curriculum Framework for School Education' (NCERT, 2005), 'Value Education: A Handbook

for Teachers' (CBSE, 2003, 2005), 'Education for Values: A Framework' (NCERT, 2011), 'CBSE Values Education Kit' (2012) etc.

#### **4.3. A critical analysis on the need of value education**

The development of modern world is based on economic escalation, technological development, innovative research, new inventions and the development of human as well as natural resources. The rapidly developing human habits in the modern age may cause some demerits. Some of them are given below,

1. Negligence towards the sanctity of human life.
2. Disrespect towards parents, authority and other people.
3. Violation of law
4. Lack of perseverance in work.
5. Thrust of easy fame, money and success.
6. Neglect the value of punctuality, integrity and sincerity.
7. Corruption and abusive behavior.

These are some ill behaviors that can really bring threats to the society. Therefore, it is very much necessary to resolve the threats by giving the adequate knowledge of value education in the educational curriculum. Here, we can highlight the words of Martin Luther King, "*Education without morals is like a ship without a compass, merely wandering nowhere.*"

#### **4.4. An analysis on the role of value education to exterminate scientific misconduct**

Now, the question is how scientific misconduct can be solved by value based education. Here, we have discussed the types of scientific misconducts, the possibility of their occurrence, the consequences and their side effects.

Research is a continuous process; it has a great contribution to the societal development. But, it is observed that due to the lack of morality, sometimes the researchers adopt some unethical paths that can harm the people as well as society. In the words of Dr Sarvapalli Radhakrishnan, "*Civilizations are measured with the values they stand for, not the machines they invent and use*". He emphasized on the spiritual and intellectual development of the Indian Society rather than the material development.

Scientific misconducts are intentional in most of the time; there are so many reported cases, where such misconducts happened. Research is very competitive; scientists used to participate in the race for



success, money and publication in high impact journals. The tendency to reach the goal faster, may take away their perseverance of research. In some cases, they need shortcuts to earn fund and fame and so, prone to do some unethical deeds like fabrication, falsification and plagiarism (FFP). Again, apart from the core misconducts, there is a possibility of the misconducts like data mismanagement, personal and publication related misconduct and research practice misconduct. The intrinsic feelings of a person can regulate the way he adopts. These are the feelings of love, care, responsibility, honesty, morality, emotions, cooperation and brotherhood. The value based education help an individual to emerge the innate thoughts. Misconducts like fabrication and falsifications can be omitted by the education of morality and truthfulness, such values help the person to develop his or her morality so that they can easily discard the wrongness. Again, the concept of plagiarism is all about the stealing of others work without mentioning or acknowledging them. From the ancient era, the value based knowledge is inclined on honesty, gratitude and integrity. In the *Shree Bhagavad Geeta* also, there is a well explanation of *Karma*, the path of action which defines how one's own deeds determine his life. Again, in the modern education system also the impact of such values is really high. Here, the teachers try to boost up the morality of students by applying different methods. If an individual is highly enriched with such values, then there is no or little probability of negativity. In addition to this, the knowledge of value based education enlightens a person's mind and soul, so that he could understand the benefit of success as well as its consequences. Therefore, the tendency to achieve transitory success could not obstruct them. Again, personal misconduct also happens due attitude or behavioral problems. An adequate knowledge of values build the personality of an individual in such a way that he could control all his behavioral dimensions like anger, jealousy, abusive language towards others, lack of self confidence, superiority complex *etc.* by himself only. Publication related misconduct is very common in research, where the deserving one is dumped by the supervisor while publishing a work. Though the journal-editors are very much aware of such issues, still such cases are in news time to time. From the vision of value education such issues can be resolved by giving an individual proper knowledge of equality, gratitude and also the morality to give one appropriate credit for his effort. This type of thoughts restricts a person to entertain favoritism, partiality and biasness. Furthermore, the value based education is also applicable to develop the skill and thinking ability of an individual to uplift him to a better level. Also, it helps to broaden the thoughts of an individual. These are some desirable qualities that help them to get rid of carelessness and the frequent mistake performing tendency, while carrying out an experiment. So, research related misconducts can be controlled by the implementation of value based learning. Moreover,

the value based education gives the belief that a universal supreme power controls all of us. Such beliefs can motivate a person towards spirituality and keep away from all negative mentality.

We can summarize this discussion by the line of the famous American educationist Horace Mann, "Scientific truth is marvelous, but moral truth is divine and whoever breathes its air and walks by its light has found the lost paradise."

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