

Engineering Ethics - Social Experimentation

Engineering itself is based on the improvement of current life, whether in terms of technology or efficiency or availability with less financial efforts. The process of engineering lets you go through a series of different experiments when it comes to practical use. Though it is not like an experiment in laboratory under controlled conditions, which is done while learning, an engineer should be ready to do the same on a social scale involving human subjects.

Experimentation is the main aspect of designing process. An engineer who is ought to design the parts of a car, will be able to understand the result only when it is tested practically. Preliminary simulations are conducted from time to time to know how the new concept of engineering acts in its first rough design. Materials and processes are tried out, usually employing formal experimental techniques. Such tests serve as a basis, which help in developing the final product.

Engineers as Experimenters

In the process of developing a product, an engineer generally learns through experimentation. To simply put, a trial and error method is the mostly used one to obtain results, but that goes with some calculations. Hence, we can say that, primarily any experiment is carried out with partial ignorance. Even the outcomes of the experiments may not be as expected. An engineer should always be ready for the unexpected output. The improvement of current prototype will lead to some change which may or may not be fruitful.

The experiments made are mostly subjected to risks though the project is small. Many uncertainties are likely to occur depending upon the changes that might occur in the altered model or materials purchased. At times, when the materials were subjected to continued stress and strain, or some process, it might happen that the nature of the substance changes which might lead to some destruction. These are the areas of experiment where nothing is really predictable.

Responsibility in Experimentation

Although the experiments and the results are uncertain, there are few things which an engineer is ought to keep in mind. Consider the following points which are related to the moral aspects of human behavior –

- To maintain the safety of human beings.

- To procure their rights of consent.
- To keep them aware regarding the experimental nature of the project.
- To warn them about the probable safety hazards.
- Should monitor the results of the experiment continuously.
- Having autonomy in conducting experiments.
- Accepting accountability for the results of the project.
- Exhibiting their technical competence and other characteristics of professionalism.

Conscientiousness

The ethics that an engineer should follow depends upon the moral standards of the individual. Conscientiousness implies **consciousness** which means the sense of awareness. Every engineer is expected to have some moral standards irrespective of the role he is performing.

The present working environment of engineers, narrow down their moral vision fully with the obligations accompanied with the status of the employee. But this might break the moral laws. Along with satisfying the employers goals, by behaving as a responsible employee, by not doing any fraud, not breaking confidentiality and violating patent rights etc., an engineer should be conscious about the unexpected. Adverse outcome may come up as unexpected result of their experiments; for this, they are answerable to the public.

Informed Consent

As a responsible engineer, one should be informed of the facts so as to be conscious. The engineered products of the company should be in such a way that they can never be used to perform any illegal or unsocial activities, which causes destruction.

It is to be observed that if a company produces some products that are out of fashion or the items which promote wastage of energy and do not fetch in benefits, such things are to be well explained to the employer and alternative solutions should also be suggested by the engineers.

Moral Autonomy

Any person can be morally autonomous only when one is being genuine in ones commitment towards moral values. Moral beliefs and attitudes must be integrated into an individuals personality which leads to a committed action.

The responsibility to answer an unexpected result, influences an engineer to involve himself personally into the work. This leads to moral autonomy wherein, he also gains the trust of the employer, through his commitment. Such responsible actions lead to great outcomes.

Accountability

Accountability can be understood as the moral responsibility that we have towards our actions. It means a tendency to be willing to openly accept the moral examinations towards ones actions and being responsive to the assessment of others. The gap between casual responsibility and moral accountability is common in any profession, along with engineering.

Let us now consider the following instances to understand accountability –

- When a group of persons are involved in the completion of a project, then the accountability refers to the group minimizing the chances of acceptance of moral responsibility towards a specific action, where each person makes only a small contribution to something much larger.
- The accountability is diffused within the organization and one has to accept it. Both credit and failure need to be considered for accountability where the work is diffused and the areas of personal accountability are delimited within the organization.
- At times, when the engineers are pressurized to move to another project while the current is still underway, then the accountability is limited only for meeting schedules.
- There is always a moral involvement beyond the laid down institutional role, where the engineers cannot separate themselves from personal responsibilities of their work.

Codes of Ethics

The engineers who are represented as professionals, and who belong to a professional society need to have some moral responsibilities. A code of conduct is important for engineers to remain committed to their world.

The engineering societies such as **AAES, ABET, NSPE, IEEE** and **AICTE** have framed these codes of ethics which are helpful to engineers to strengthen the moral issues on their work. The codes of ethics play at least eight important roles such as the following –

- **Serving and protecting the public** – Engineers are in a responsible position where trust and trustworthiness, both are essential. A code of ethics functions as a commitment by the profession as a whole that engineers will serve the public health, safety and welfare.
- **Guidance** – Codes are written in brief yet prove effective in offering general guidance to the engineers. More specific directions may be given in supplementary statements or guidelines, which tell how to apply the code. If needed, the assistance is obtained for further specification.
- **Inspiration** – Codes of ethics, which specify a collective commitment towards a profession, help in motivating the engineers towards ethical conduct. Actually, these codes make one feel really responsible and proud to be a professional thus motivating towards the commitment one should have towards ones profession.

- **Shared Standards** – The standards established should be applicable to all individuals, in their particular professions. With the codes of ethics, the public is assured of engineers with minimum standard of excellence and the professionals are provided a fair way to compete.
- **Support for Responsible Professionals** – The professionals who act ethically have more positive support through these codes. A professional engineer who has the intention to stand by the codes of ethics, can have no harm from immoral professional obligations, as he can reject smoothly yet formally. As well, these codes can provide legal support for engineers criticized for living up to work-related professional obligations.
- **Education and Mutual understanding** – The codes which are widely circulated and officially approved by professional societies, promote a shared understanding among professionals, the public and government organizations about the moral responsibilities of engineers. These codes prompt discussion and reflection on moral issues.
- **Deterrence and Discipline** – The professionals who fail to follow the codes exhibit unethical conduct, which is evident from the disobedience towards their profession. Such an investigation generally requires paralegal proceedings designed to get at the truth about a given charge without violating the personal rights of those being investigated. This might lead to expulsion of those whose professional conduct has been proven unethical, which also leads to loss of respect from colleagues and the local community.
- **Contributing to the Professions Image** – Codes project the engineers as the professionals of ethically committed profession, which inspires them to work with great commitment and more effectively to serve the public. It can also win greater powers of self-regulation for the profession itself, while lessening the demand for more government regulation.

Advantages of Codes of Ethics

Let us now see the following advantages of codes of ethics. The codes

- Set out the ideals and responsibilities of the profession.
- Exert a **de facto** regulatory effect protecting both clients and professionals.
- Improve the profile of the profession.
- Motivate and inspire practitioners, by attempting to define their *raison d'être*.
- Provide guidance on acceptable conduct.
- Raise awareness and consciousness of issues.
- Improve quality and consistency.