IIT KHARAGPUR

NPTEL ONLINE
CERTIFICATION COURSES

Ethics in Engineering Practice

Lecture No 26: Responsible Authorship and Credit in Engineering Research

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Outline of the module

- Introduction
- Conditions for crediting as citation
- Acknowledgement
- Qualifications for authorship
- IEEE norms for qualification for authorship
- Responsibilities of an author
- Categories of Author
- Issues of Plagiarism

Outline of the module

- **Sharing of Credit among authors**

Source: Ethics in Engineering practice, Caroline Whitback, Cambridge University Press

Introduction

Credit for research contribution can be assigned in three principle ways:

By Authorship (by making someone a part of the authors depending upon the contribution made)

By Citation (for using someone's previously published work)

Via a written acknowledgement (for some contribution in present research that neither qualifies for citation or authorship)

Conditions for crediting as a citation

Widely accepted criteria for citations in research publications:

In case you drew results or ideas that already appeared in previously published or formally presented in work

Citations should also be made in case references are drawn from any work presented by others at conferences or disciplinary meetings

List of works cited should be sufficiently complete to allow readers to understand where the reported research fits in

Continued

All foundational research contributions that are not a part of common knowledge for the readership of the publication should also be cited

Unpublished work, such as private correspondence , is only cited when no readily obtainable written sources are available. Credit sourcing for such courses can be better handled with acknowledgements

Sometimes in case of published work, permission needs to be sought from the concerned person

Continued

Citation of a person's work does not make the person cited accountable for the works in which he/she is cited and thus, it most of the times does not requires permission of parties whose work is cited

Acknowledgement

Contributions to the reported research that are sufficiently significant to qualify a person to join the authors in writing up the research nor contained in citable source should be recognized in the ***acknowledgements***

A person whose research contribution is acknowledged in the report is only accountable for specific contribution for which person is acknowledged, not for the whole report

Qualifications for Authorship

A person is eligible for authorship of report when at least both of these conditions are met;

Person has made a significant contribution with respect to research design, theory development, development of prototype, analysis and interpretation etc to the research reported.

The person has reviewed or approved the final manuscript

Authorship makes a person accountable for report

As per IEEE authorship should be only be credited when

- A person has made a significant intellectual contribution with respect to theoretical development, system or experiment design, prototype development, or analysis of associated work of what is contained in the manuscript

- Contributed to drafting or reviewing or revising of the manuscript

- Approved the final version of the manuscript

Responsibilities of an Author of a Research article

Each author is accountable for entire report.

Until and unless specific statements are made with respect to the contribution made by each author,

In absence of any such statements, all are equally accountable for the integrity and competence of research reported.

Categories of Authors

- Lead author
- Submitting Author
- Corresponding Author
- Senior Author

Lead Author

Holds principle responsibility for work

Is the one who has made greatest intellectual contribution to work

Bears responsibility for whole report, even if others specified contributions are specified

Submitting Author

One who submits the manuscript

Deals with journal editors

Only point of correspondence

Owns a special responsibility to see that all authors have fulfilled the criteria for authorship

Make sure that special journal requirements are met

Continued

Submitting author is often the lead author

Corresponding Author

The one whom interested people can contact for the work published for any clarifications or queries or doubts

Receives typically the most of the reprints of the authored article

Often an asterisk indicates the corresponding author by his/her name in the author list

A co-author is usually the corresponding author

Senior Author

The term is ambiguous and most of the time indicates the lead author or the senior most author

Usually the one of highest academic rank

Or

Of the greatest reputation in the field

Plagiarism – A major issue

It is generally understood to be the appropriation of another person's ideas, processes, results or words without giving any proper credit

It is considered as a serious research misconduct

It just doesn't apply to text but also graphics representations such as photographs, tables and charts as well

Technical qualifications for plagiarism

Uncredited verbatim copying of a full paper

Uncredited verbatim copying of a large portion (greater than 20% - up to 50%)

Uncredited verbatim copying of individual elements like paragraphs, sentences or illustrations

Continued

Uncredited improper paraphrasing of pages or paragraphs

It occurs when only a few words or phrases have been changed or the order of the original sentence has been rearranged and no credit note or reference appears in the text

Credited verbatim copying of a major portion of paper without clear delineation. It occurs when sections of an original paper are copied from another paper, credit source is used but there is an absence of quotation marks

Sharing of Credit among co-authors

As collaborations are becoming very common, it becomes essential that early discussion are held and issues regarding sharing of co-authorship are resolved

It will help in avoiding misunderstandings as well as conflict of interest at a later stage when work is in the final stages of submission or print

Determination of order of authors

First author - usually used for the lead author

A lead author is usually indicated by keeping his name as the first author

Last Author – whose name appears as last in the manuscript

Usually implies the author who has made the least contribution

Continued

The head of the laboratory where the research is carried is most often but not always provides the leadership to the research team.

Inclusion of his/her name as the first or last or middle authors depends upon the contribution made by him

Avoiding Conflict and Misunderstandings

Conflicts and interests may arise in engineering laboratories.

These can be reduced if trainees and supervisors have a dialogue about credit in advance and supervisor's crediting early in relationship

Engineering research supervisors typically have many competing responsibilities which include;

For the advance of knowledge in their field of engineering

Continued

For the education of their trainees

For the wise and appropriate use of grant funding

To their institutions and for various works assigned to them

All these issues must be well resolved in advance to avoid any conflict of interest

Thank You!!

Ethics in Engineering Practice

Lecture No (27,28,29) :Engineers as Managers, Consultants and Leaders

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Outline of the module

- Engineers as managers
- Managers as professionals
- Promoting an ethical climate
- Managing Conflicts
- Principles for conflict resolution
- Consulting engineers
- Advertising, competitive bidding, safety and client needs
- Engineers as expert witnesses and advisors

Outline of the module

- Expert witnesses in courts
- Abuses in courts
- Advisors in Planning and policy making
- Moral leadership
- Habits of highly effective moral leaders
- Engineering functions as managers and situations they must tackle

Source: Ethics in Engineering, Martin and Schinzinger, Mc-Graw Hill publications

Engineers as Managers

Engineers undergo a full-fledged technical training as professionals, still in their early careers many of these engineers move into managerial roles, for which they do not actually have been through any professional training.

What does this transition happen?

Primarily because of two reasons;

Preference of companies for the dual role
An array of corporate incentives

Continued

Many companies today prefer engineers who can also play the dual role of managers because sometimes their technical understanding complements managing technological corporations and it is easier to teach engineers the business side of corporate work because of their high aptitude levels

Engineers general strengths in quantitative analysis and their confidence in problem solving also makes them an apt choice for certain roles like managing supply chains for reducing costs which requires a great deal of computational skills

It helps companies to save the costs of an additional manpower as well.

Continued

And another reason is, management field is quite inviting considering the salaries and perks involved.

These incentives include higher salary, greater authorities, prestige and recognition.

Dual ladder career options in large organizations also allow mangers to climb the ladder of success easily by taking admnistrative or managerial roles

Managers as professionals

The transition from being technically core engineers to managers requires expanded skills in scheduling and finances, marketing as well as in managing wide base of human resources, strengthened skills in coordinating and motivating people, abilities to make risk making decisions with high precision

Engineers as managers are required to heavily work on their interpersonal skills to manage a lot of people in the organization

Continued

The primary responsibility of engineers as manager is to produce a valuable product while maintaining respect for persons including customers, employees and general public

Persons and safe products should come first not profits

There are two main responsibilities of engineer managers;

Promoting an ethical climate
Resolving conflicts

Promoting an Ethical Climate

An ethical climate is a working environment which complements morally responsible conduct while taking both short term and long term decisions in the organizations

It is created via combination of formal procedures and policies as well as informal practices and traditions, job attitudes and commitments .

Engineers as managers assume greater responsibility in creation of such ethical climates.

Continued

Ethical climate of organizations differ greatly.

At one extreme, there are organizations that are indifferent to ethics. Such organizations reduce ethics within just the talks that are held in meetings of the organization.

At other extreme are the organizations that not just imbibe ethical conduct in mission and vision of the organization but make it a part of daily functions and procedures in the organization.

Managing Conflicts

Effectively dealing with conflicts, specially value disagreements , is very much essential part of a managers job

Managers have the authority and responsibility to resolve or prevent conflicts that threaten corporate efficiency

Managers should never at all use their designated authority to guide others and just force their decisions on others

Continued

The job of a manager is to create climates in which conflicts can be resolved constructively.

In one of the studies, these seven conflicts were identified as the most common confronted conflicts by engineering project managers.

a. Conflicts over schedules, more specially when support was needed from other departments

b. Conflicts over projects and departments which are most important to organization

Continued

c. Conflicts over personnel resources

d. Conflicts over technical issues, in particular over alternative ways of solving problems within cost, schedules and performance objectives

e. Conflicts over administrative procedures

f. Personality conflicts

g. Conflict over costs

Four widely accepted principles for conflict resolution

a. People : Separate the people from the problem

a. Interests : Focus on interests not positions

b. Options : Generate a variety of possibilities

c. Criteria : Insist that results be based on some standard criteria

People : Separate the people from the problem

This is no way indicates that only problem is important, people are not important

It is important to do so as to avoid the personality clashes between people

The focus should be on solving the problems rather than blaming the people

Every party should be given a equal chance to present their point of view before the final solution is reached

Interests : focus on interests not positions

Positions here refers to stated views , not only those who are a party to the bargaining ploys but those who can think correctly

The focus while resolving issues should be on meeting the interests of those who are in positions of authority

But the focus should be on coming up with solutions that are in the interests of all the parties concerned

Options : Generate a variety of options before deciding what to do

Often the best solutions are not compromises that split the differences between the stated positions but the creative options that have not been brought into focus

Especially in case of ethical issues, it is important to consider a variety of options and select the one that seems best in meeting the needs of all the parties involved not only financially but ethically as well

Criteria : Result should be based on some objective standard

Often in corporate, criteria that should be followed while solving problems are clearly defined

It is important to develop a sense of fairness before these criteria are met

Otherwise, disagreements may easily develop into contests of will

Express your views

You are the production engineer and technical manager for a corporation that manufactures medical equipment. Injuries involving cuts and lacerations are rare, but they do occur. Coworkers learn that one of the production specialist under you supervision is HIV positive and may have developed aids. The workers come to you asking either he or they should be transferred. You indicate that no transfers to comparable positions are available but the workers insist.

How might you best resolve or help resolve this conflict.

Consulting Engineers

Consulting engineers are those who work in private practice.

They are compensated by fees for the services they render , not in the form of salaries.

They have greater freedom to make decisions as they are not salaried employees.

Areas in which consultancies are common

1. Advertising
2. Competitive bidding
3. Contingencies
4. Resolution of disputes

Advertising

Some corporate engineers are involved in advertising because of their work experience in corporate sales.

Engineers have a responsibility to make sure that all the technical details mentioned on products or communicated via ad campaigns should be a true.

A lay man may not be in a position to judge the accuracy of these details. Hence it is the moral and ethical responsibility of the engineers to be sure that communication is made in an easy way for understanding of consumers.

Continued

It should be made sure that deceptive advertising is not done . This can be done in many ways like;

By outright lies
By half-truths
By making false suggestions
Hiding implications
By creating ambiguity
Through subliminal manipulation of the conscious

Continued

Marketers many times try hard to hide the negative impact of the products, engineers as managers and advertising consultants should make sure that right information reaches the consumers on time

Competitive bidding

For many years code of ethics prohibited engineers from competitive bidding, which relates to competing for jobs by submitting functional, technical as well as financial bids

They were [prohibited as they were in better position to make right estimates and many times being insiders it was easy for them to make lowest bids

Engineers are now allowed to work as consultants in helping others to make competitive bids

Safety and Client needs

Consultant engineers are under an obligation to take care of the safety needs of the clients

This issue is more specific with respect to design only projects

In design only projects, consultant engineer contracts to design something but do not have any supervisory role in its construction

Design only projects are sometimes problematic because of difficulties in implementing the design provides by someone else and who is not available for supervision

Continued

It is important to have a designer for on site inspection while the projects are being implemented

As this majorly could lead to loop holes in safety and other needs of the client

Engineers as Expert Witnesses and Advisers

Engineers many times also serve as consultants who provide testimony in adversarial and potential adversarial contests

The focus could be on explaining the causes of accidents, malfunctions or other things that involve the usage of technology

The focus can also be on designing policies for public planning, like preparing a draft for patents in technology

Expert witness in courts

Engineers may be hired by either the plaintiff or the deference in both civil law suits or criminal proceedings

Like forensic engineers play an important role in such cases

In other cases also engineers could be asked to give testimony for a bad product, injuries caused to the consumers on using the product, or in case of why the accident happened which could be done by automobile engineers

Continued

The legal system distinguishes between eye witnesses and expert witnesses

Eye witnesses testify in matters of perceived facts

And

Expert witnesses are permitted a wider latitude in testifying on facts in their area of expertise, in commenting on the views of opposite side expert witness

Role of expert witness is to identify the truth about the causes of accidents

Abuses in courts

Hired guns:

This relates to helping the party at fault by giving wrong testimony

For eg. A person who fell from the ladder sued the manufacturer for its bad quality

But the hired structural engineer wrote a report favoring the manufacturer for the money that was paid to him

Continued

Financial Bias:

Engineers who are paid by the party at fault to move the investigations in a different direction

Ego biases:

Influencing engineers to identify their own side of the dispute

Continued

Sympathy bias:

The courts are filled with drama where people suffering is too moving.

If engineers get identified with the plight of the people, investigations may be influenced.

Advisers in Planning and policy making

Technology is always involved in decisions about policies that affect people at large

For eg. in framing policies for creating online services for the poor

Large amounts of money is involved in such projects

Sometimes millions of dollars are paid to engineers who ensure the designing of technical systems which in turn guarantee the smooth execution of such projects by simplifying the technology for the poor

Continued

The job of engineers lies in overcoming the technical complexities

Moral Leadership

Moral leaders aim at serving

Such leaders aim at developing the skills of others

Point of Discussion

Do you think that we need moral engineers today??

If yes.. Why?

7 habits of highly moral leaders

Moral leaders have strong ethical character

Moral Leaders have a Passion to “do right

Moral Leaders are Morally Proactive

Moral Leaders are Stakeholder Inclusive

Continued

Moral Leaders have an Obsession with Fairness

Moral Leaders are Principled Decision Makers

Moral Leaders Integrate Ethics Wisdom with Management Wisdom

(Archie B. Carroll, “Ethical Leadership: From Moral Manager to Moral Leader,” in Rights, Relationships & Responsibilities: Business Ethics and Social Impact Management, Vol. 1, 2003. O. C. Ferrell, Sheb L. True, and Lou E. Pelton (eds.), pp. 7-17)

Functions and questions that engineers must deal with as managers

Function: **Conceptual Design**

Engineers as managers must tackle-

Will the product be useful? Will its design be safe for the thiose who are going to use it?

Functions and questions that engineers must deal with as managers

Function: **Market study**

Engineers as managers must tackle-

Is the study unbiased or is it just going to be implemented to attract investors?

Functions and questions that engineers must deal with as managers

Function: **Specifications**

Engineers as managers must tackle-

Do they meet established standards and codes? Are they physically realizable?

Functions and questions that engineers must deal with as managers

Function: **Contract**

Engineers as managers must tackle-

Are cost figures and time schedules realistic? Is a bid made low to get the job, with the hope of renegotiating ?

Functions and questions that engineers must deal with as managers

Function: **Analysis**

Engineers as managers must tackle-

Is there an experienced engineer who can judge if a computer program gives reliable results?

Functions and questions that engineers must deal with as managers

Function: ***Design***

Engineers as managers must tackle-

Have all alternatives been explored? Safe exit provided? User friendliness stressed? No patents violated?

Functions and questions that engineers must deal with as managers

Function: **Purchasing**

Engineers as managers must tackle-

Whether the parts and materials received for manufacturing of the products have been tested for quality or not?

Functions and questions that engineers must deal with as managers

Function: ***Manufacturing parts***

Engineers as managers must tackle-

Is the workplace safe, free of noise and free from emission of any toxic fumes? Is time allowed for quality workmanship?

Functions and questions that engineers must deal with as managers

Function: **Assembly, Construction**

Engineers as managers must tackle-

Are workers familiar with the purpose and basic functions of the product? Who supervises safety?

Functions and questions that engineers must deal with as managers

Function: **Final test of the product**

Engineers as managers must tackle-

Are testers sufficiently independent of the manufacturer or construction management teams?

Functions and questions that engineers must deal with as managers

Function: ***Sale of Product***

Engineers as managers must tackle-

Any bribes? Is advertising honest? Are customers given good advice? Is informed consent required?

Functions and questions that engineers must deal with as managers

Function: **Installation, Commissioning**

Engineers as managers must tackle-

Do users get training? Is the safe exit tested? Are neighbors informed of possible toxic emissions?

Functions and questions that engineers must deal with as managers

Function: **Use of the Product**

Engineers as managers must tackle-

Are users protected from harm? Are users informed of the risks? Are users misguided while passing on information to them about the products?

Functions and questions that engineers must deal with as managers

Function: **Maintenance and Repair**

Engineers as managers must tackle-

Is maintenance regularly carried out by the competent staff? Does the manufacturer still carry spare parts?

Functions and questions that engineers must deal with as managers

Function: **Product Recall**

Engineers as managers must tackle-

Is there any commitment to monitor the experiment and if necessary, is there any need to recall the product?

Functions and questions that engineers must deal with as managers

Function: **Decommissioning**

Engineers as managers must tackle-

How are recycling of valuable materials and disposal of toxic wastes handled at the end of useful life?

Functions and questions that engineers must deal with as managers

Function: **Maintenance and Repair**

Engineers as managers must tackle-

Is maintenance regularly carried out by the competent staff? Does the manufacturer still carry spare parts?

Thank You!!

Ethics in Engineering Practice

Lecture No 30 : Key Questions pertaining to Ethical conduct for Engineers

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Key questions answered in the module

❖ What makes a good engineer and good engineering? What values underlie engineering practice today? Which of those values are specifically ethical values? What is the experience of living by those values and working in a society and in organizations that trust you to practice those values? How do these values reflect and affect the person you are and the person you become by practicing them?

❖What are the two key values that lie Engineering practices today?

❖ How, if at all, do you understand religious and ethical values to be related?

❖How can we tackle ethical subjectivism?

Continued

❖What kinds of considerations are relevant to judging an act or course of action morally justified or unjustified?

❖Understanding Justification and examples of lying

Source: These questions and answers have been drawn from Ethics in Engineering Practice and Resercah, Caroline Whitback, Cambridge University.

Key Question 1

What makes a good engineer and good engineering? What values underlie engineering practice today? Which of those values are specifically ethical values? What is the experience of living by those values and working in a society and in organizations that trust you to practice those values? How do these values reflect and affect the person you are and the person you become by practicing them?

Introduction

The developing economies today place special interest in professions like engineers as they make an enormous contribution in the development of an economy.

Because of the trust placed by these economies in engineers, their ethical conduct assume huge relevance, as the acts of the engineers are not just a matter of professional conduct, but lay huge impact on society.

The point of discussion is;

“What makes a good engineer?”

Continued

Is the ground for deciding their good conduct is their Ethical conduct?

Overall, we can conclude a good engineer to be the one:

- Who holds the health, safety and welfare of the public to be of paramount importance

"Does it lead to a friction between engineers' desire to earn and pass designs that carry low quality but higher returns?

-Does not compromises in delivering the best of services

- To be honest and objective in communicating with the public at large with respect to engineering outputs

Continued

-Act as faithful agents for their employer

- Avoid deceptive acts

- Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession

Ethical Values for Engineering Profession

Honesty – Being honest to your employer as well as society at large

Specifically for engineering profession, honesty in communications is of utmost value in sharing information with employer as well as other stake holders. The engineers should not mislead or deceit others for their own benefit. It is not at all acceptable for an engineer, who evaluates the feasibility of a say dam and approves lower quality materials for his own benefit and his employer.

All lies may not be unethical but are definitely dishonest. It can be sometimes justifiable for example an undercover CBI agent hiding his identity to criminals or terrorists to save lives. But occasions for ethically sanctioned lying are rare - eg saving a life.

Continued

Integrity - Technically there isn't much of a difference in the way a person of integrity makes decisions in different situations. There is no difference in the way they handle situations at home or at work.

The things that cannot be considered as traits of a person with integrity relate to ; thinking about self-interest always, refusing to see situations clearly and always believing yourself to be right.

An engineer with integrity would not accept corruption and return in terms of money to approve designs that might decrease the cost of a product but would affect the health of those who will use it in future.

Continued

Reliability - The ethical responsibilities of a person go much beyond than what is written in a legal contract.

It is an individual's desire to fulfill promises which makes them responsible to make all reasonable efforts to fulfill those promises and thus enhances reliability.

Continued

Loyalty - For an engineer who undertakes projects that affect people at large, promoting and protecting the interests of organizations or affiliations and majorly people at large is what defines their loyalty.

It also includes the aspects of safe-guarding the confidential information of the employers as well, which relates to not at all disclosing trade secrets and other relevant information which might give an advantage to the competitors and affect company severely.

The Engineers are required to take all professional decisions on merit, not on personal interests. Their goal is to maintain the trust of the public.

Continued

Responsibility - It simply means being accountable for the choices you make. It becomes relevant in case of engineers as others people rely on their knowledge, ability or willingness to perform tasks safely and effectively, which in a way affect a lot of people.

Engineers should support projects are sustainable, and ensure the protection to the environment as well.

Continued

Fairness - Fairness refers to a range of morally justifiable outcomes rather than arriving at one fair answer. Engineers as professionals shall make choices that carry an element of fairness and are in inertest of all the stake holders, provided their interests are not self-dominated.

Ethical Principles for Engineers at Personal level

Ethical Principles for Engineers at Professional level

Ethical Principles for Engineers at Macro level

Saluting an ethical and honest ethical engineer Satyendra Dubey

Satyendra Dubey: A project engineer of the National Highway Authority of India (NHAI) Satyendra Dubey, had exposed several cases of large-scale flouting of rules and corrupt practices in the construction project. He was gunned down in the early hours of November 27, 2003 in front of the Circuit House in Gaya when he was going to his residence after alighting from a train from Varanasi. Dubey had even written directly to the then Prime Minister Atal Bihari Vajpayee detailing the financial and contractual irregularities in the construction project. Dubey had requested his name be kept secret but at the same time. On November 11, 2002 the PMO received his letter and just a year later, he was shot dead on November 27, 2003.

(source : News18 article (https://www.news18.com/news/india/indian-officers-who-paid-a-heavy-price-for-their-honesty-and-hard-work-974587.html)

Key Question 2

What are the two key values that lie Engineering practices today?

Two key values that lie Engineering practices today

Knowledge values of truth and Accuracy often have a place in ethical codes and guidelines for engineering.

Knowledge values of truth in a simple way relate to –

Not being deceptive to self and others

Using your knowledge to make truthful disclosures to others

Being accurate in judgments that you make, they must be supported by facts and result than just being mere statements made by you.

Continued

Engineering societies emphasize the importance of honesty for engineers. The American Council of Engineering Companies' Ethical Guidelines, and the ethical codes of the American Society of Civil Engineers (ASCE), the National Society of Professional Engineers (NSPE), and the American Society of Mechanical Engineers (ASME) all agree in saying that

Engineers should "issue public statements only in an objective and truthful manner."

Continued

For eg. The Code of Ethics and Professional Conduct of the Association for Computing Machinery (ACM) says:

The honest computing professional will not make deliberately false or deceptive claims about a system or system design but will instead provide full disclosure of all pertinent system limitations and problems

Engineers shall be objective and truthful in professional reports, statements, or testimony. They shall include all relevant and pertinent information in such reports, statements, or testimony, which should bear the date indicating when it was current.

Continued

Engineers may express publicly technical opinions that are founded upon knowledge of the facts and competence in the subject matter.

Engineers shall issue no statements, criticisms or arguments on technical matters which are inspired or paid for by interested parties, unless they have prefaced their comments by explicitly identifying the interested parties on whose behalf they are speaking and by revealing the existence of any interest the engineers may have in the matters.

Thank You!!