Professional Practices

"The Engineering Profession"

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Profession

"A paid occupation, especially one that involves prolonged training and a formal qualification"

Profession

- A formal education is one where you would go to a college or university for an actual degree.

- An informal education is simply learning a trade from someone else. It's possible to have a formal education and an informal education.

- The formal education is what most employers would prefer to see because it is easier to prove. Having a degree in a specific field will mean that you have certain knowledge that will translate into a better paying job and the company that's employing you getting a qualified person for the job.

Profession

- An informal education is what many people end up having. You work under someone who has a degree or has been doing it for enough years to be knowledgeable about the subject.

- Many car mechanics and other "trade" skills usually have an informal education as to what they're doing.

- Informal education can also be referred to as life experience. After going through life for so many years, you'll naturally acquire some knowledge about different things that you may not even learn after going through a formal education.

Fundamental characteristics of a profession

- **Great responsibility**
  - Professionals deal in matters of vital importance to their clients and are therefore entrusted with grave responsibilities and obligations.
  - Given these essential obligations, professional work typically involves circumstances where carelessness, inadequate skill, or breach of ethics would be significantly damaging to the client and/or his fortunes.

Fundamental characteristics of a profession

- **Accountability**
  - Professionals hold themselves ultimately accountable for the quality of their work with the client.
  - The profession may or may not have mechanisms in place to reinforce and ensure adherence to this principle among its members.

Fundamental characteristics of a profession

- **Based on specialized, theoretical knowledge**
  - Professionals render specialized services based on theory, knowledge, and skills that are characteristic to their profession and generally beyond the understanding or capability of those outside of the profession.
  - Sometimes, this specialization will extend to access to the tools and technologies used in the profession (e.g. medical equipment).

Fundamental characteristics of a profession

- **Institutional preparation**
  - Professions typically require a significant period of hands-on, practical experience in the protected company of senior members before candidates are recognized as professionals.
  - After this provisional period, ongoing education toward professional development is compulsory.

Fundamental characteristics of a profession

- **Ethical constraints**
  - Due to the other characteristics on this list, there is a clear requirement for ethical constraints in the professions.
  - Professionals are bound to a code of conduct or ethics specific to the distinct profession.
  - Professionals also aim toward a general body of core values, which are centered upon the client's benefit and best interests.

Fundamental characteristics of a profession

- **Merit-based**
  - In a profession, members achieve employment and success based on merit rather than on corrupted ideals such as social principle, mandated support, or extortion.
  - Therefore, a professional is one who must attract clients and profits due to the merits of his work.
  - In the absence of this characteristic, issues of responsibility, accountability, and ethical constraints become irrelevant, negating any otherwise-professional characteristics.

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10 things that define a true professional

- Put customer satisfaction first
- Make expertise your specialty
- Do more than expected
- Do what you say and say what you can do
- Communicate effectively
- Follow exceptional guiding principles
- Praise your peers not yourself
- Share your knowledge
- Say thank you
- Keep a smile on your face and the right attitude in your heart

Structure of engineering profession

- The engineering profession has a two tier structure.

- At the first level, there are the engineering institutions, that is, the chartered professional bodies, each of which covers a single or several closely related engineering disciplines. Examples are PIEAS, NUST, UET etc.

Structure of engineering profession

- The second level body in engineering is the engineering council, a chartered body which recognizes certain engineering institutions as its nominated bodies.

- Engineering council is satisfied that their standards of membership meet its requirements.

Structure of engineering profession

- Engineering council acts as an umbrella body and represents the interests of the engineering profession as a whole.

- Pakistan Engineering Council is a professional body and constitutional federal institution for accreditation of engineering education and regulation of engineering profession in Pakistan.

- PEC is founded on January 10, 1976 and its parent organization is "Ministry of Science and Technology".

Development of engineering profession

- The term engineer was first used in the sense of a military engineer concerned with military constructions.

- The term civil engineer was first used in 18th century to distinguish engineers who were concerned with civil construction.

Development of engineering profession

- First formal groupings of engineers also began to appear in 18th century.

- First group of civil engineers was founded in Paris in 1716.

- The first computer related organization "British Computer Society" was founded in 1957.

Development of engineering profession

- Large number of engineering institutions make it difficult for the engineering profession to formulate.

- To address this issue, 13 of the largest chartered institutions began a long process of negotiation which led, in 1962, to the formation of the "Engineering institutions joint council".

Development of engineering profession

- Two recent professional engineering societies of ultimate reputation are ACM and IEEE.

- ACM stands for Association for Computing Machinery.

- IEEE stands for Institution of Electrical and Electronic Engineers.

Development of engineering profession

- Both ACM and IEEE-Computer Society publish a range of journals covering theory and practice in all aspects of IT.

- These academic and professional publications are the most prestigious and the most widely read in the field.

- IEEE Computer Society and ACM collaborate extensively on matters connected with the software engineering profession.

- Together they have produced the software engineering code of ethics, that is the main code of conduct for software engineers.

Engineering Profession in Pakistan

- Engineering is one of the best career options with the most stability for the youth in Pakistan.

- Major factor on the list of most young Pakistani graduates is having a job abroad. In that regard, engineering is a clear winner by a long shot.

- Even in Pakistan engineering field offers a relatively better standing both professionally and economically.

Engineering Profession in Pakistan

- The position of software engineering
  - SW Engineering is an engineering discipline that is concerned with all aspects of software production.
  - Pakistan is included amongst one of those countries which have highest demand for software engineers at the moment because of the advancement of IT and its applications.
  - In the passage of time ranging from the last decade Pakistan has created a wide market and growth in the software engineering department including both private and government sectors.

Engineering Profession in Pakistan

- The position of software engineering
  - In coming future it will also become one of the main branches of engineering like civil and mechanical.
  - With software pervading virtually all aspects of our work in our society, a software Engineering graduate has the option to work in many different sectors such as telecommunications, finance, health care, manufacturing, retailing, security, transport.
  - Other engineering areas like aeronautical, automotive, building, electrical, etc. also have increasing needs for software engineering.
  - The entertainment industry with video games and movie animation also has a large demand for Software Engineers.

Ethics and software engineering

- Ethics is the study of right and wrong in relation to human actions. It includes
  - *Meta-ethics:* study of general principles from which ethical systems can be built.
  - *Moral theory:* ethical systems, consisting of the criteria to decide whether individual actions are right and wrong.
  - *Practical ethics:* application of ethical systems to the analysis of particular situations.

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What is Professional Ethics

- One's conduct of behavior and practice when carrying out professional work, e.g., consulting, researching, teaching.

- The principles and standards that guide members of a particular profession in their interactions with internal & external stakeholders.

Professional Ethics

- „Professional Ethics must take into accounts:
  – Relations between professionals and clients
  – Relation between profession and society
  – Relations among professionals
  – Relations between employee and employer
  – Specialized technical details of the profession
  – „A computing professional must understand;
    - Cultural, social, legal, and ethical issues in computing
    - Responsibility and possible consequences of failure

Why professional ethics?

- Awareness of professional ethics is gaining importance with time.

- Decision making process in the work place is a complex phenomena.

- The professional ethics provide a way of simplifying that decision making process.

Ethical Issues in Software Engineering

- As software becomes pervasive in our daily lives, its values from a purely human perspective are brought to light.

- Ethical conduct is one such human value.

- By participating in a software development process, software engineers can influence the final product, namely the software itself, in different ways including those that may be contrary to public interest.

- In other words, they could engage in an unethical behavior, intentionally or un-intentionally.

Ethical Issues in Software Engineering

- This could lead to personal harm, and potentially result in loss of confidence in software and loss of trust in organizations that own them.

- This can adversely affect the acceptance of software as a useful product, question the credibility of software engineering as a profession.

- Software engineers must concern themselves primarily with the health, safety and welfare of those who are affected by their work.

Ethical Issues in Software Engineering

- A number of aspects regarding software engineering ethics are
  - The **types** of harms the public can suffer as result of this work
  - How software engineers **contribute** to the good life for others
  - **Who** exactly are the 'public' to whom the engineer is obligated
  - **Why** the software engineer is obligated to protect the public
  - What **other** ethical obligations software engineers are under
  - What are the professional **codes** of software engineering ethics

Professional code of conduct

- One of main characteristic of profession is that the professional body establishes and enforces a code of conduct on its members.

- As far as software engineering is concerned, most code of conducts established by ACM and IEEE undergo major revisions with the passage of time.

- All previous code of conducts are recently replaced by "Software Engineering Code of Ethics and Professional Practice" developed jointly by the ACM and IEEE Computer society.

Professional code of conduct

- It outlines 8 principles of software engineering ethics: The obligation of the software engineer to the
  - general public
  - the client and employer
  - the product
  - the profession
  - Colleagues
  - the engineer himself or herself
  - the ethical management of software engineering projects.

Applying codes of conduct

- This section provides some examples based on real situations regarding professional practices in software engineering.
  - Sales proposals
  - Integrity and professional status.
  - Public health and safety
  - Conflicts of interest