Ethics in Engineering Practice
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Lecture - 25
Research Ethics

Welcome to today's session. Today we are going to discuss about a very important topic which is about ethics in changing domain of research. So, in this module we are going to discuss about the ethical issues related to like if any research collaboration is happening in the field of engineering research, then what are the ethical issues that maybe related to it and like in the subsequent module, we are going to discuss about like if we where authoring a paper, your sighting in somebody's references, then how do you do it, so that you do not fall into like any trap of any unethical practices.

So, today's discussion is about research and engineering research and ethical aspects related to it. So, let us see what is there in these modules for today's discussion.

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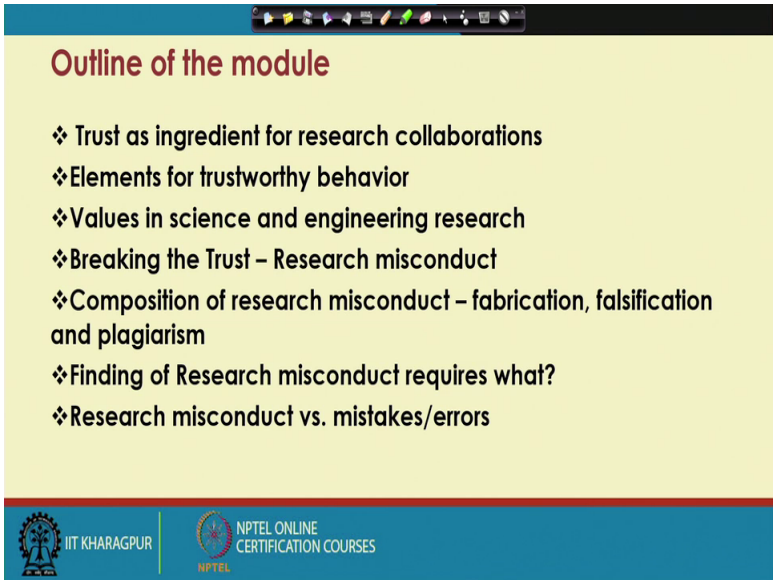

So, the outline of the module will be trust as an ingredient to research collaboration, elements for trustworthy behaviour, values in science and engineering research, breaking the trust, search misconduct, composition of research misconduct fabrication falsification and plagiarism, finding of research misconduct requires what research misconduct versus mistakes and errors.

When does a research misconduct qualifies as a fraud falsification versus legitimate data selection deterrents to ethical engineering research. Self-deception versus observer bias keys to research integrity factors that undermine research integrity advantages of fostering responsible research conduct and responsibilities of an author of a research article.

So, you see this is an extensive discussion about the research and this final things connected to how to collect data like where do you get data from, how do you give references and like what you do with that data, how do you report about that data, these are very important aspects where you are doing any research with respect to your product design and also like you are collecting data for at our your reporting your results. So, today's module we are going to discuss about that.

Let us start like in the what you have discussed at the first instant is of course like the importance of trust.

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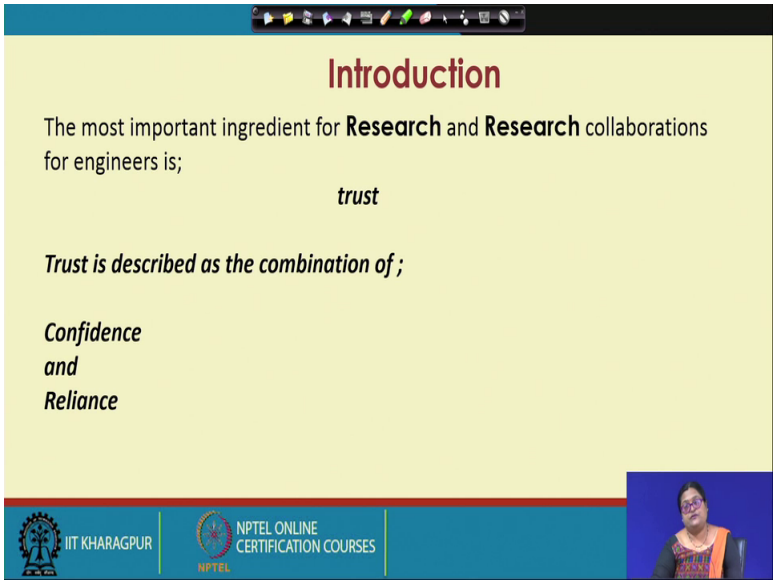

What it means to be trust worthiness because in nowadays many research are in collaboration with the other like counter parts, either in industry or in academics or in a like different university. So, there are lots of research collaboration going on.

So, one of the primary factor for trust is of all this thing is trust and if we define trust, trust is a combination of confidence and reliance. Now, what is confidence?

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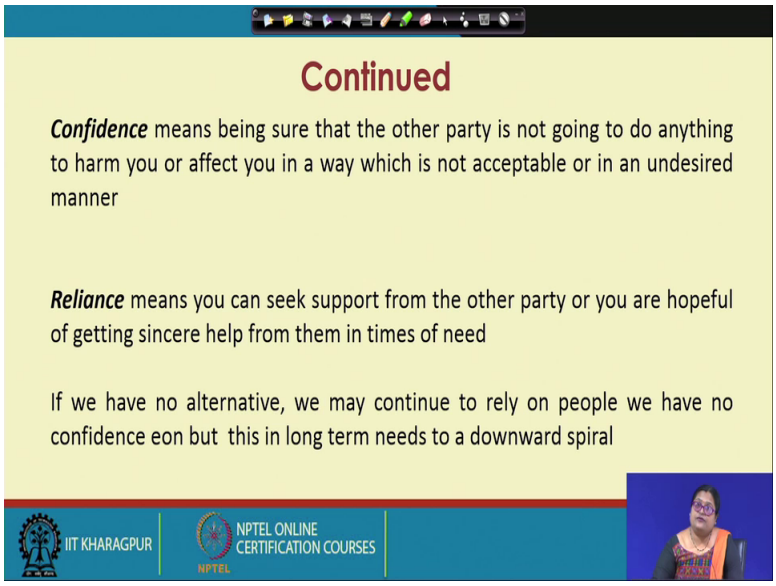

Confidence means being sure that the other party is not going to do anything to harm you or affect you in a way that is not acceptable or in an undesired manner. So, you have confidence in the other person that person is not going to harm you and in a way which is not acceptable by you.

Reliance means you can seek support from the other party or you hope full of getting sincere help from them in times of need. So, you know like if you are extending like your search for someone who can help you, so you can rely that the other party is there to help you, but there is a small difference like you can rely upon someone, but you may or may not have total confidence in the other that party like they are not going to harm you.

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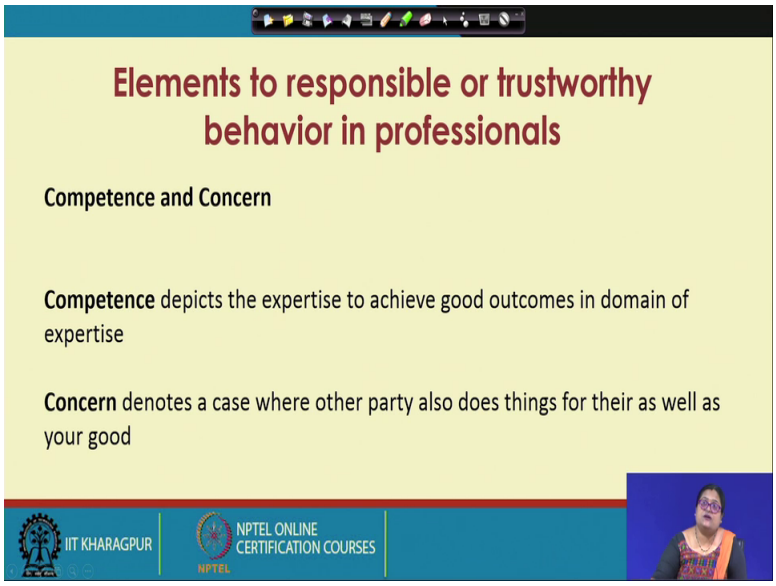

So, you can always extend secure help you know like they will help you, but you may not be confident in understanding whether in the long run they are going to harm you or not in a undesirable way. So, these two are finer aspects. When two of them comes together, it is trust mainly.

So, next we are going to discuss about elements to responsible or trustworthy behaviour in professionals.

So, competence and concern. Competence depicts the expertise to achieve good outcomes in domain of expertise. Concern denotes a case where other party also does things for their as well as your good. So, when both the things are their competence means they have their competent and they have a concern for you, so in the sense like they are doing not only for their own good, but also for your good. They are concerned about you.

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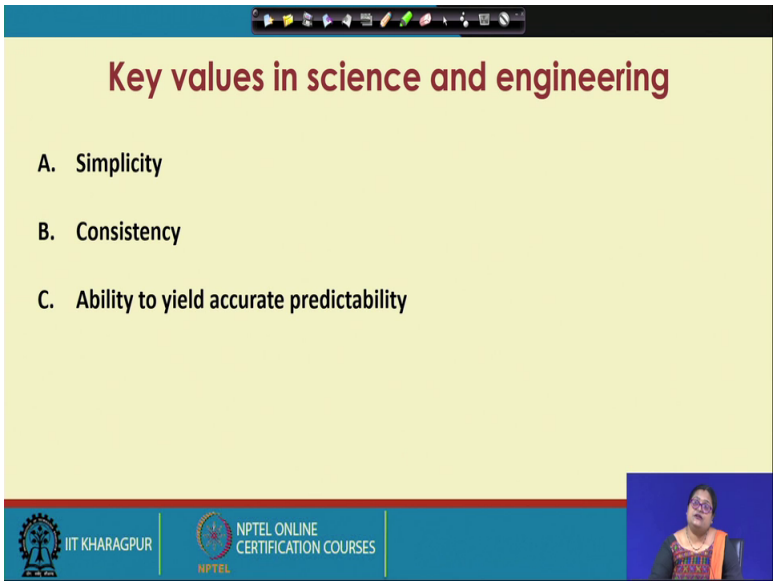

The key values in science and engineering are simplicity, consistency in behaviour and ability to yield accurate predictability. So, the more closer you are to your predicting things, the more consistent you are in the reported results and your behaviour and ways of doing things. How? In a simple way you can explain things. These are the key values in engineering and science.

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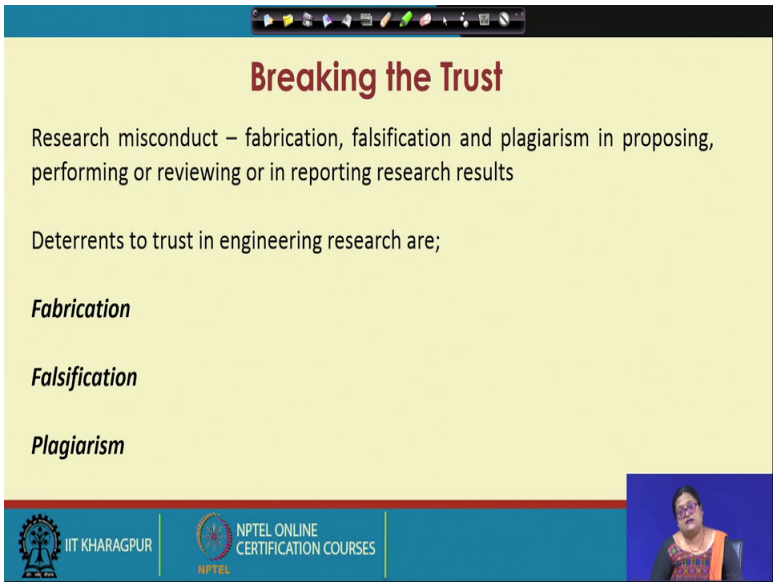

Now, what happens when the breaking of trust happens and how it happens is like, it happens through research misconduct. So, research misconduct in terms of fabrication,

falsification and plagiarism in proposing performing or reviewing or in reporting research results. So, it can appear it can happen in 4 things; proposing, performing, reviewing or in reporting research results. So, the deterrents of trust are fabrication, falsification and plagiarism. We will visit each of these concepts separately.

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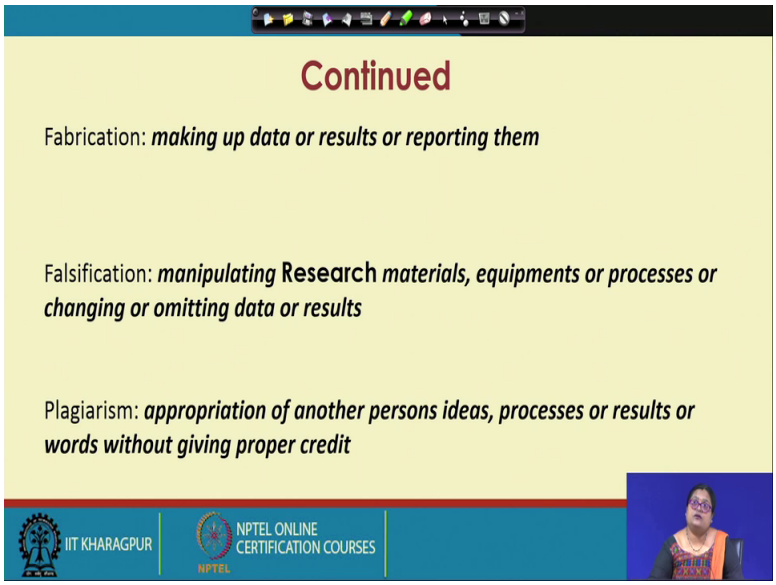

Fabrication is making up data or results or reporting them. So, you fabricate your data or results or report them. Falsification is manipulating research materials equipments or processes or changing or omitting data or results. So, you are in the fabrication you are like making up data which does not exist or results or reporting them.

In falsification, you have some data, you have some research materials, but you are trying to make some changes in that and report accordingly. You are omitting certain data or results, so that a favourable result which favours your purpose is come.

Plagiarism is you know appropriation of other persons ideas, processes. Our results or words without giving proper credit in plagiarism, you are just copying somebody's ideas processes or results, but you are not giving credit to that person.

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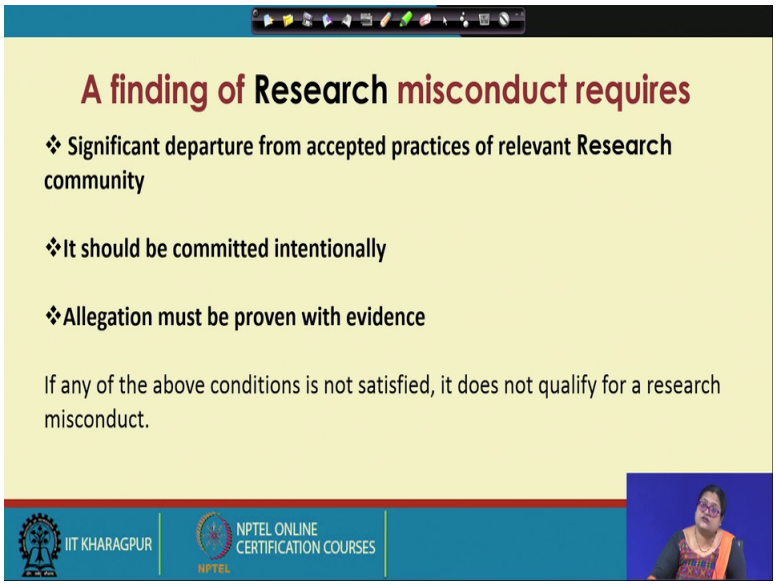

So, if something is to being described as a research misconduct, then what are the required things?

The required points are it should have a significant departure from accepted practices of relevant research community, it should be committed intentionally. This part is important that it should be committed intentionally.

Allegation must be proven with evidence. So, if somebody is bringing allegation against a person telling that he or she has done a research misconduct, then it must be proven with evidence.

If any of the above conditions is not satisfied, it does not qualify for a research misconduct. So, it needs to be you need to prove like with evidence your allegation. You have to prove like it was done intentionally and you have to also prove like it is a significant departure from the accepted practices of the research community.

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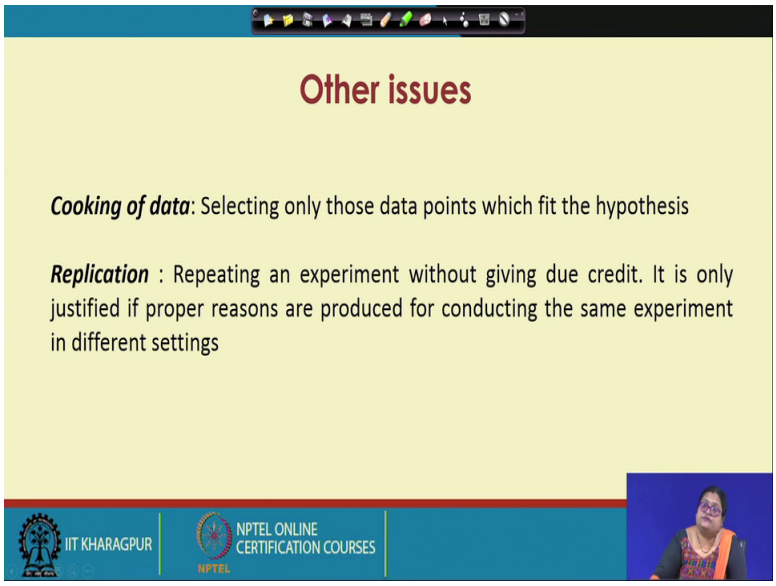

So, other issues are like cooking of data. This is what selecting only those data points which will fit the hypothesis and not selecting other data points.

Replication, repeating an experiment without giving due credit; this part is important. It is a part of a duty to acknowledge the person who has original given the idea or who has contributed as a part of a research program. So, it is a part of a duty to acknowledge the contribution.

It is only justified if proper reasons are produced for conducting the same experiment in a different way. It is only justified if proper reasons are produced for conducting the same experiment in a different settings.

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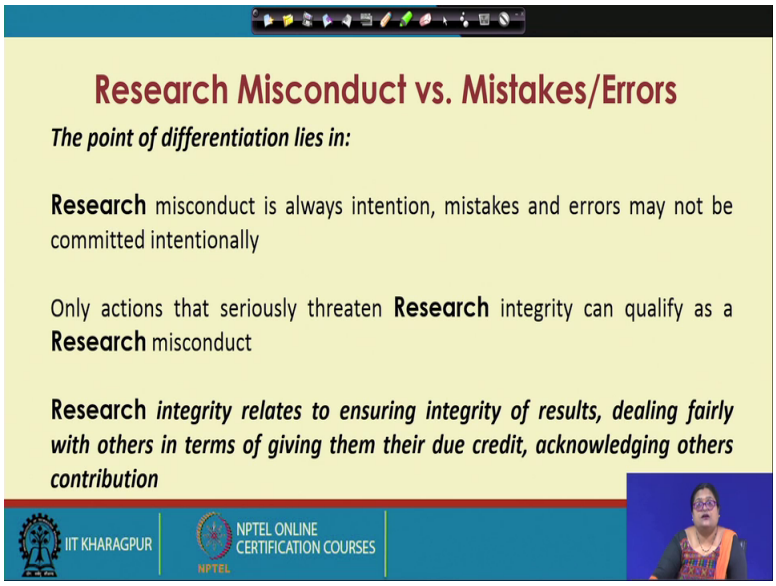

So, when we are discussing in light of the ethics theories, it talks of more of the duty of the person to acknowledge the work of the original contributor where we are discussing research misconduct, research mistakes or errors. These are terms which appears to be very closely related to each other in terms of meanings and maybe confusing to us. So, let us discuss like how it is different from one another.

The point of differentiation lies in research. Misconduct is always intention mistakes and errors may not be committed intentionally. Only research that seriously threatens research integrity can qualify as a research misconduct research. Integrity relates to ensuring integrity of results dealing fairly with others in terms of giving them their due credit, acknowledging others contribution.

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So, it talks of few virtual character of integrity like consistency integrity in your words and your dates.

We have to also understand what does not include, get included under research misconduct. It is honest errors. If sometimes errors get committed and some it becomes unavoidable, so that is honest errors and some new differents of opinion has happened with the original research error some other contemporary people doing research on the same thing, then those are not included under research misconduct.

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So, we are also discussing over here when does a research misconduct qualifies as a fraud. When false representation is made, the perpetrator knows that misrepresentation is false and recklessly disregards it to be true or false. It is done with the intention to deceive others. So, what we have find over here the nature of the person, the virtues of the person, the person's understanding of the rights and duties, obligation to the research community as a whole, obligation to the other collaborators as a whole is very important as a part of maintaining research ethics and being just to oneself and doing justice to others also.

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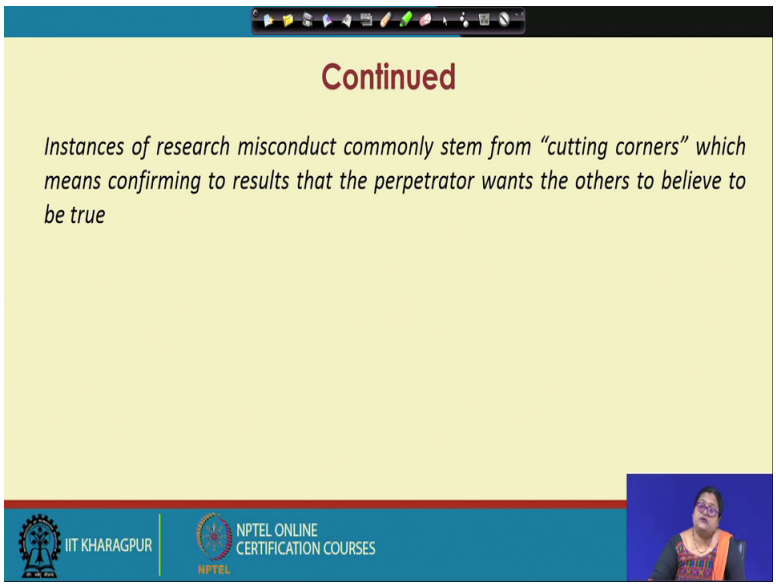

Instances of research misconduct, commonly stem from cutting corners which means conforming to results that the perpetrator wants the others to believe to be true.

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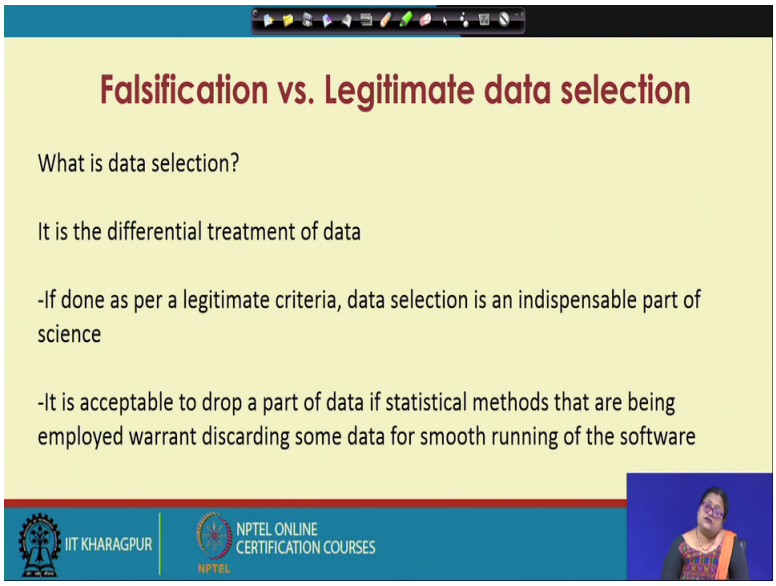

So, there are certain ideas which there are certain ideas maybe which the researcher believes in and what he or she feels like wants to be propagated and wants others to believe in that way. So, certain datas are omitted or only those data are chosen which will represent this idea. These practices are called cutting corners.

Falsification versus legitimate data selection. So, what is data selection? It is a differential treatment of data. So, what we get in a like raw data form and when we transform it into an analyzable form, certain transformation happens. So, as per the legitimate criteria, data of selection is an indispensable part of science. So, it is acceptable to drop a part of data if statistical methods that are used warrants that some part of the data be dropped for a smooth running of the software. So, if from the statistical analysis only this field work are going to come, then what is not acceptable?

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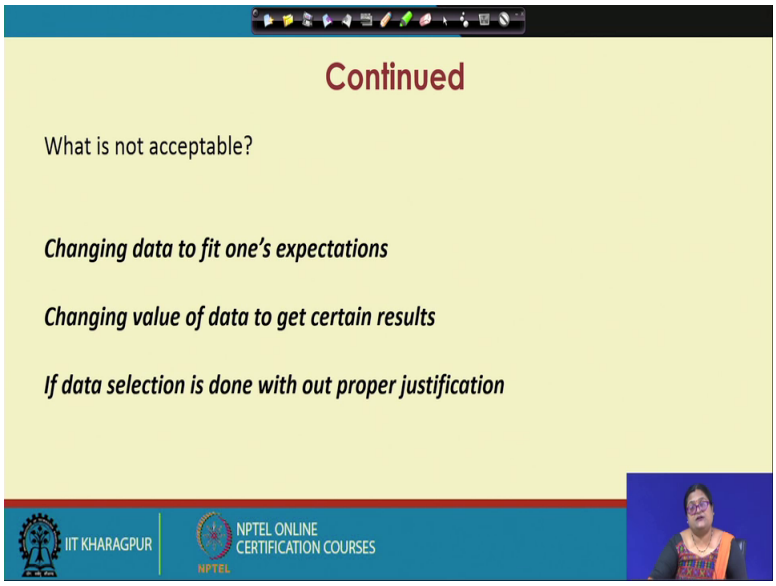

So, changing data to fit ones expectations, changing value of data to get certain results if data selection is done without proper justification, when we are changing data to fit one's own expectation, we may have propose certain hypothesis that we wanted to fit our results. We want to fit into it, then we want to change the value of the results to data to get certain results that we expected, but we find that the data is not showing and datas we are just focusing on one part of the data because it is more close to proving our hypothesis. So, these are not acceptable part of data selection and this needs to be avoided.

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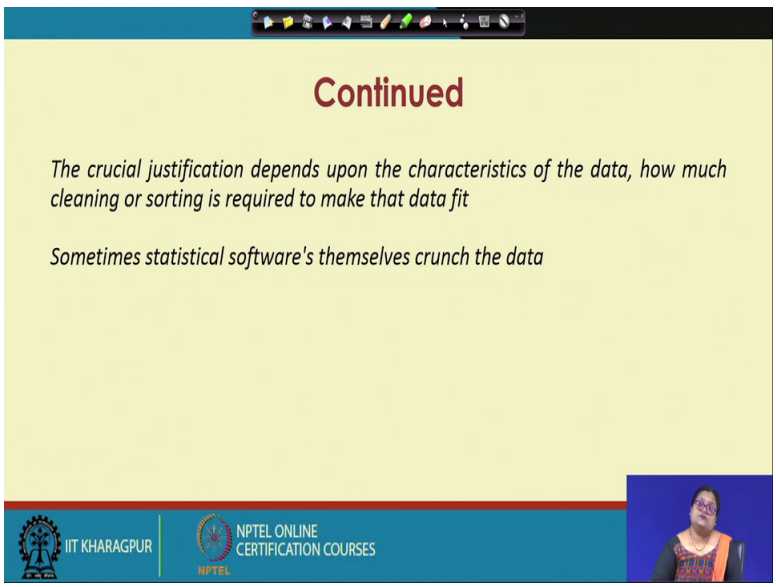

So, the crucial justification depends upon the characteristics of the data how much cleaning or sorting is required to make the data fit. So, sometimes the statistical softwares themselves they are doing the process for themselves.

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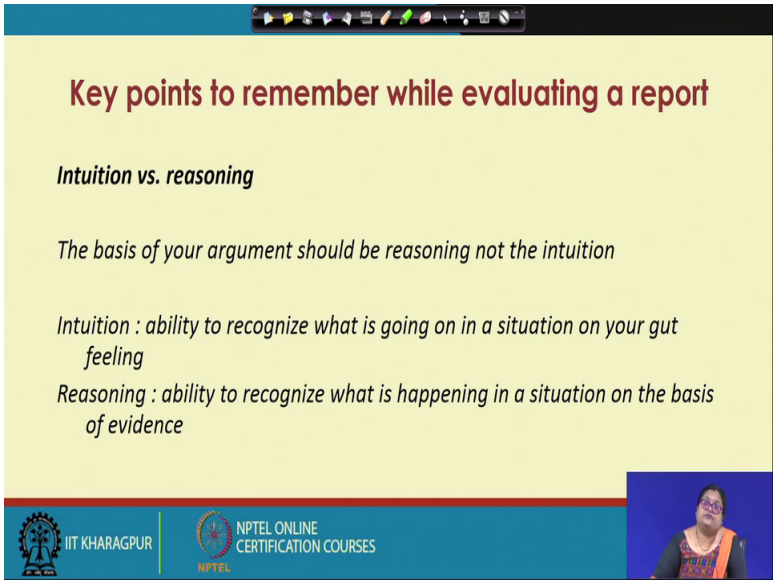

This was about like the data selection and maybe running the data. There are certain key points, which needs to be remembered while evaluating a report. So, there are two basic points which are for intuition versus reasoning. The basis for any argument should be reasoning and not intuition.

Intuition is the ability to recognise what is going on in a situation on your gut feeling. Reasoning is the ability to recognise what is happening in a situation on the basis of evidence. So, while evaluating a report, you should always be moving by reasoning and not by intuition.

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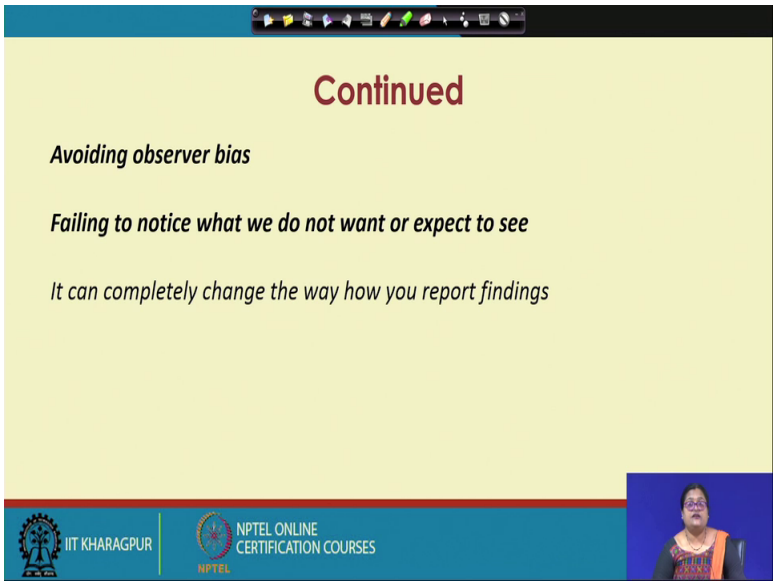

We need to avoid observer bias and next is like we sometimes felt to notice what we do not want to see or expect to hear. So, those things are generally not noticed by us, but also if it take care of those things, it can completely change how we are reporting things.

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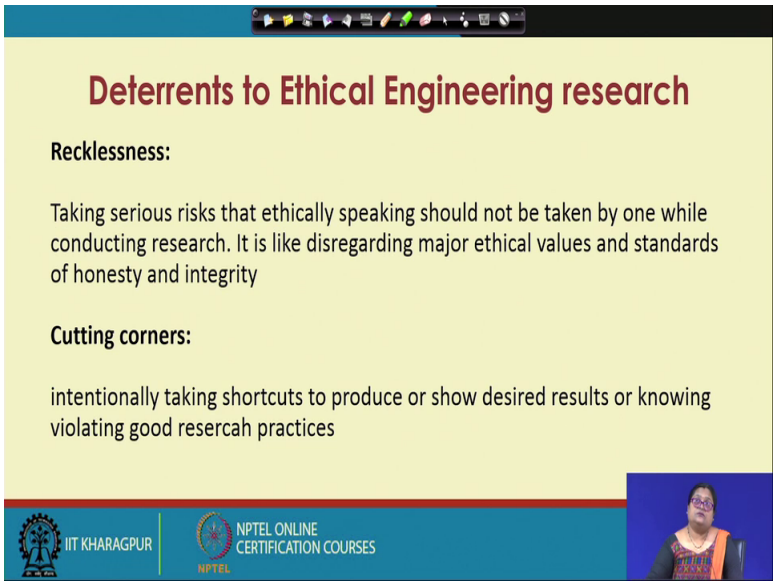

So, sometimes that blindedness happens like we are only focusing on one part of the data, but we are not having a holistic perspective, but if you look into it or maybe we discuss about it and we get another perspective from other person, it may take a different like all total different mode of doing things.

There at certain deterrents to ethical engineering research. First is recklessness, taking risk, serious risks that ethically speaking should not be taken by one while conducting a research. It is like disregarding the major ethical values in standards of honesty and integrity. So, how much risk you can take in the name of research whether it is actually required for the process or not. So, these are questions, which needs to be revisited before we are like adventuring for something.

Cutting corners, intentionally taking shortcuts to produce a show desired results or knowing violating good research practices. So, this recklessness means are taking unnecessarily serious risks or like taking shortcut, so that you can show desired results. These are some of the deterrents of good research practices in engineering.

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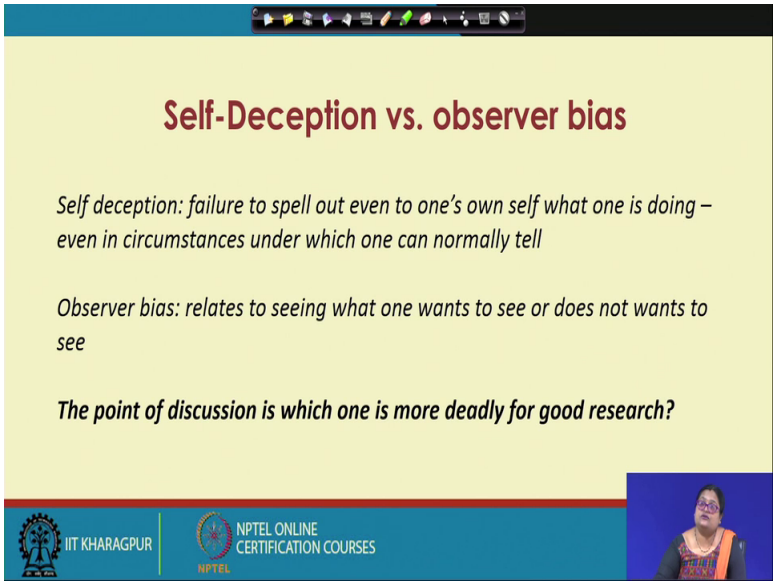

Next we will discuss about self-deception versus observer bias. Self-deception is a failure to spell out even to one's own self what one is doing even in circumstances which one can normally tell. So, it is like cheating oneself. So, habit and not even being true to oneself about what I expect, what it tend to do, how I should be doing it, what are the things that I want to as a result, what I am designing for and it is like when the researcher is not clear about things and it is as a falsified to oneself.

Observer bias relates to saying what one wants to see or does not wants to see. So, this is also while observing other facts, others like work or observing things happening, then the observer bias happens when we report something which you want to see and we do not

report something which we do not want to see. So, that will lead to like selecting data collection or like picking up certain part of the happenings which is going to be reported favourably according to our expectations.

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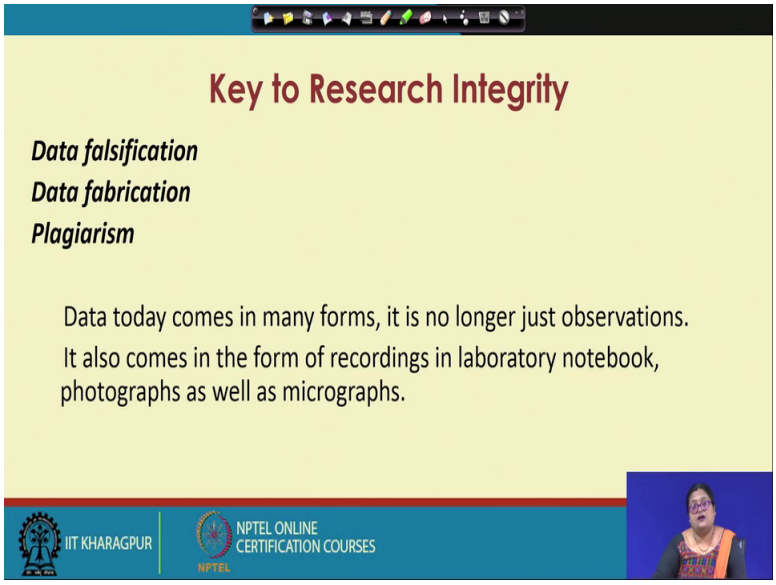

Next we have to understand like the keys if we have like data falsification, data fabrication and plagiarism. These are very important like aspects to be discussed and to be careful about when we are talking of research integrity. So, data it is not just coming in terms of observations, it is in forms of recordings in laboratory, notebooks, photographs, micrographs.

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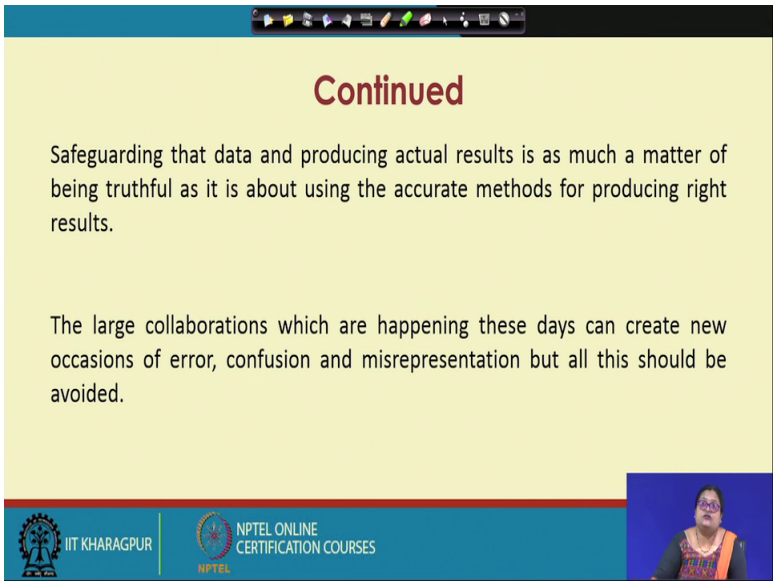

So, datas coming in many form and we need to understand how to avoid falsification and plagiarism and the other aspects, so that we do not like do something which questions our research integrity.

So, safeguarding the result and producing actual result is as much a matter of being truthful it as it is in case of about accurate methods for producing right result. So, how to safeguard your data, how to produce actual results and how to be doing it in a more truthful way? So, what is the methods you used to produce those results are very interconnected and interrelated factors which talks of research integrity.

So, because of large collaborations which are happening today as a part of research maybe throughout different countries, people are collaborating together to give a research finding. It may so happen there will be some confusion, misrepresentation and more chances of error happening when these type of research collaborations happen because people may, not all the groups collaborating with each other may not be on the same platform with respect to their research integrity and different types of like deterrents for research integrity may take over and do like malpractices or misconduct may happen.

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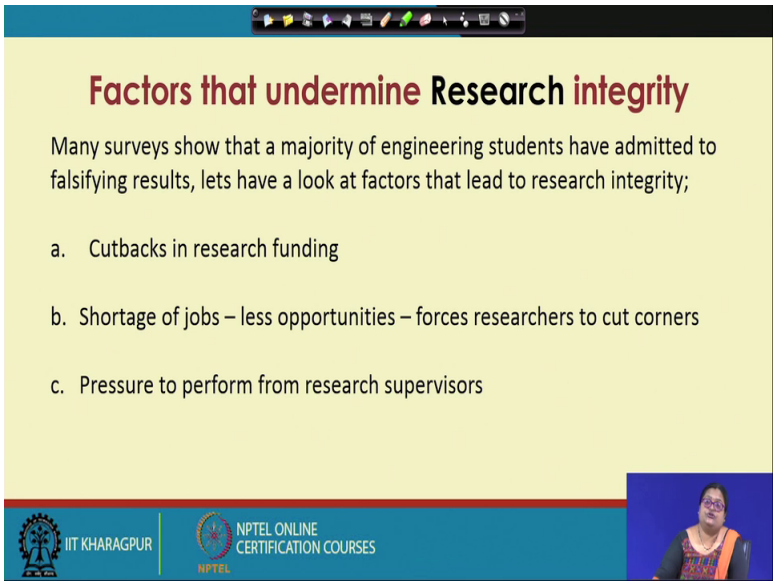

Factors that undermine research integrity, many survey show that majority of the engineering students have admitted to falsifying of results. So, some of the factors which may lead to research integrity and undermining the research integrity or like cutbacks in research findings, then shortages of jobless opportunities which forces people to cut corners precious to perform from research supervisors.

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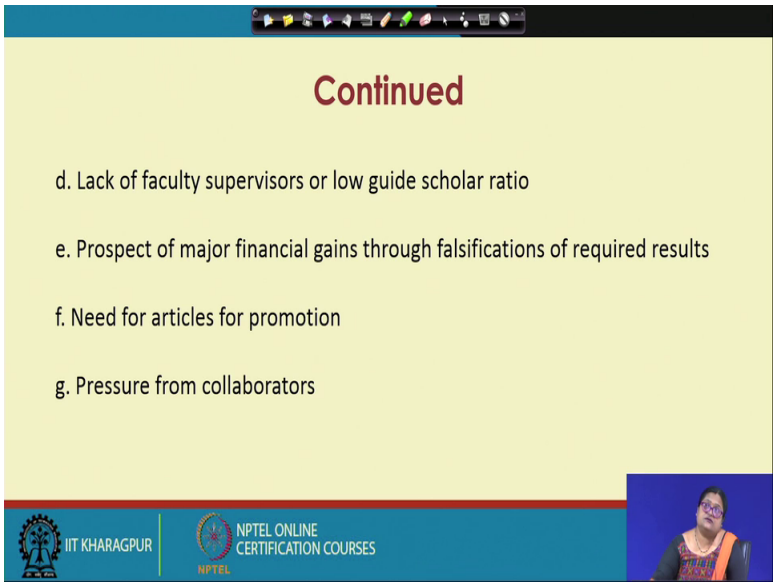

Then, maybe things like lack of faculty supervisors or low guide scholar ratio or if there is a major financial gain from falsification of liquid results needs for articles of

promotion pressures from collaborators, these are some of the reasons like which may lead to somebody's research integrity to get the stem and may fall into a trap of doing unethical things.

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The emerging in fascism fostering responsible conduct are from the correlation between misconduct charges and poor search environment. So, we can understand that better responses to subtler problems of research conduct can reduce the incidence of misconduct charges. So, what we can do is like strict supervision when restricting the guide scholar ratio, so that they can discuss more, interact more with each other.

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Awards to honest scholars, strict punishment regimes, fostering trust in relationship, fostering time bound and research based promotions. So, these are some of the steps which can be taken to promote research integrity, but what we can say at the end of the day it is like these are all extrinsic ah punishers or motivators, but a person should be intrinsically motivated, intrinsically guided value oriented to like avoid doing something which questions their research integrity.

All the steps discussed here where are like stopping research based promotions or giving good like awards to for research recognitions. All these things are only extrinsic motivators which may help you to be on the track of research integrity for sometime, but when these things are withdrawn maybe in or you get some offers which is more like attractive to you, you may again fall back on those unethical practices and again research integrity becomes questionable.

So, it depends more on the intrinsic nature of the person to avoid these things and we can in the short term, yes we will definitely get some results in keeping students, maintaining the research or other engineers in the research integrity through this extrinsic rewards, but ultimately it depends on the person himself or herself to follow it.

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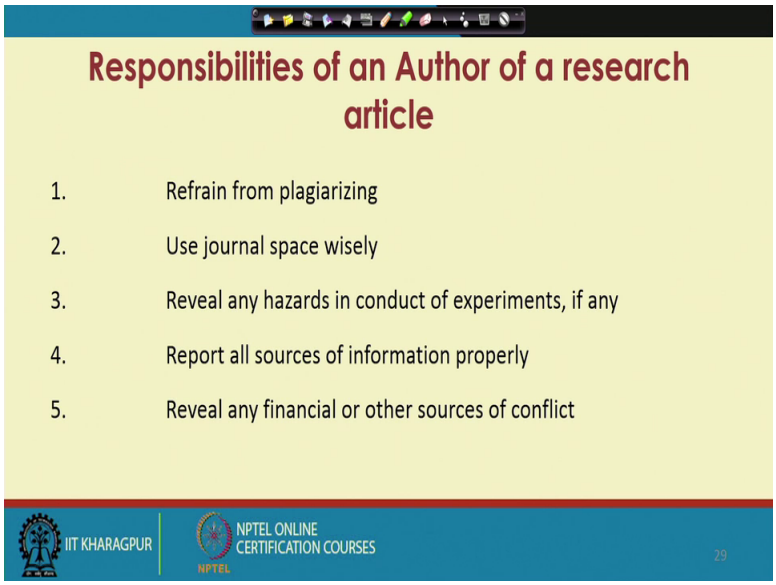

Then, responsibilities of an author of a research article. So, responsibilities are refraining from plagiarism, use journal space wisely, reveal any hazards in conduct of experiments if any report, all sources of information properly reveal any financial or others sources of conflict.

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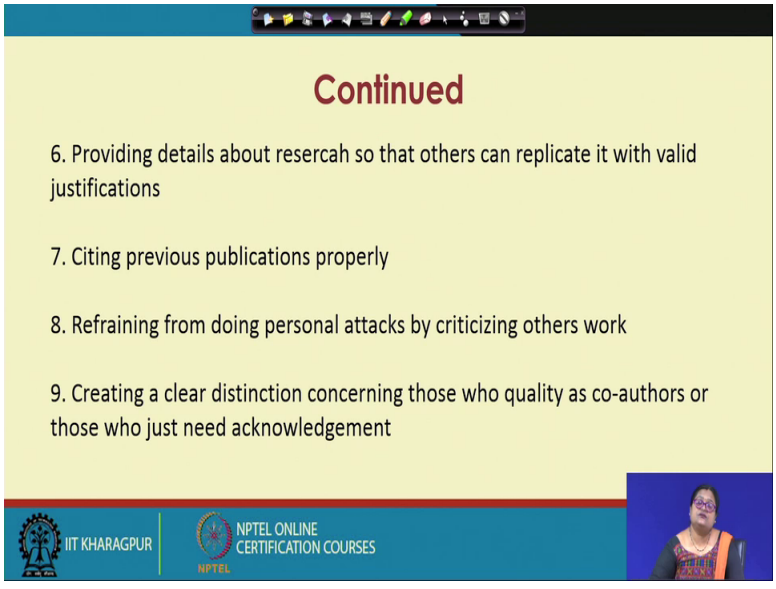

Providing details about research, so that others can replicate it with justification, citing previous publications properly, refraining from doing personal attacks, creating clear distinction concerning those whose quality as co-authors are need to be acknowledged.

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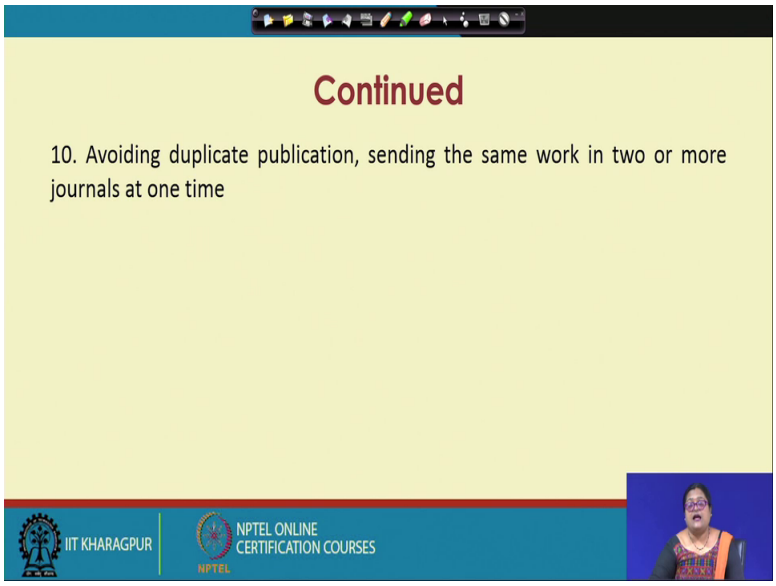

Then, avoiding duplication of publication in the same work in 2 or more journals and not like showing one result again and again and just changing the name and getting it published in different journals.

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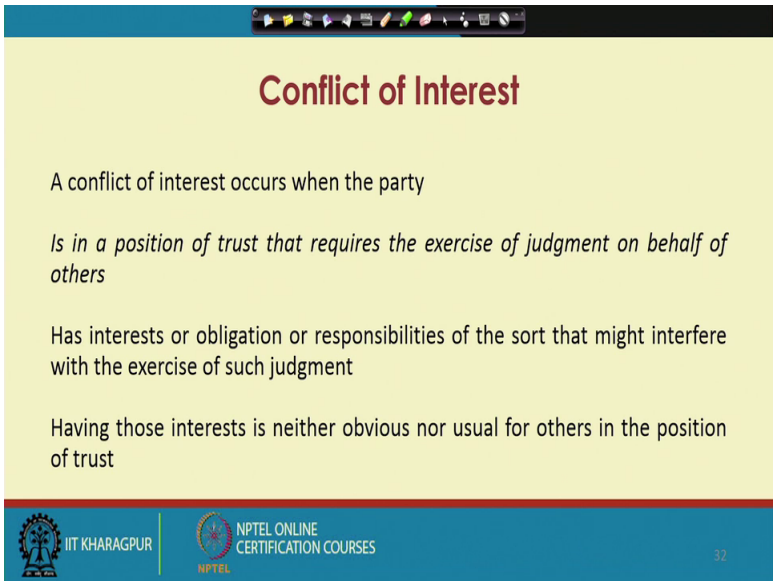

So, these are something where we need to avoid which is called the conflict of interest.

A conflict of interest occurs when the party is in a position of trust that requires exercise of judgement on behalf of others. The person has some responsibilities of the sort that might interfere with in exercise of such judgement having those interest is neither

obvious or not usual for others in the position of trust. So, if you having your own certain obligations and responsibilities which may deter you from exercising a judgement on behalf of others, then it talks of conflict of interest.

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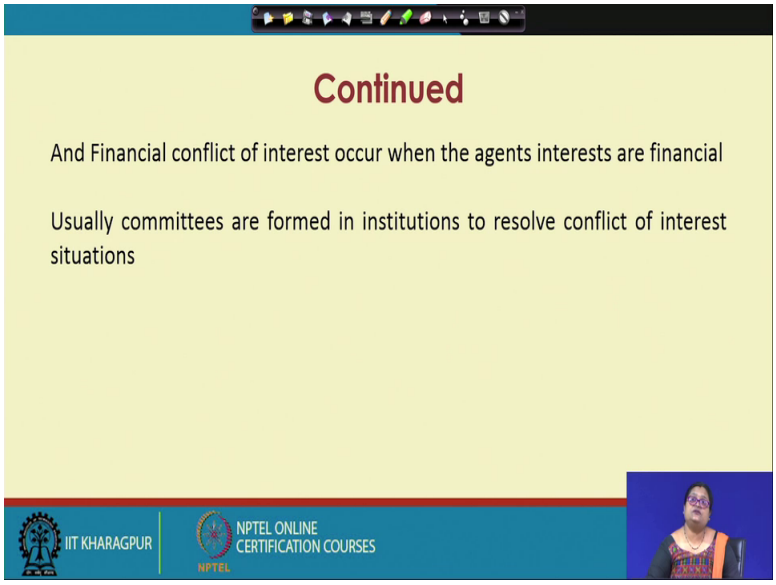

So, conflict of interest when you have, when you talking of financial conflict of interest which means like you are doing some research work because you have financial interest or you are giving out the findings of your research for financial interest. So, usually committees are formed, institutions to resolve this conflict of interest.

In the next module, we are going to discuss more about this the authors and their responsibilities, who qualifies to be an author, who is a co-author, how to cite their names and what plagiarism is, what conflict of interest is in more details in the next session.

Thank you.