Introduction to Professional Scientific Communication
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Lecture - 11
Mileposts for the Article Writing

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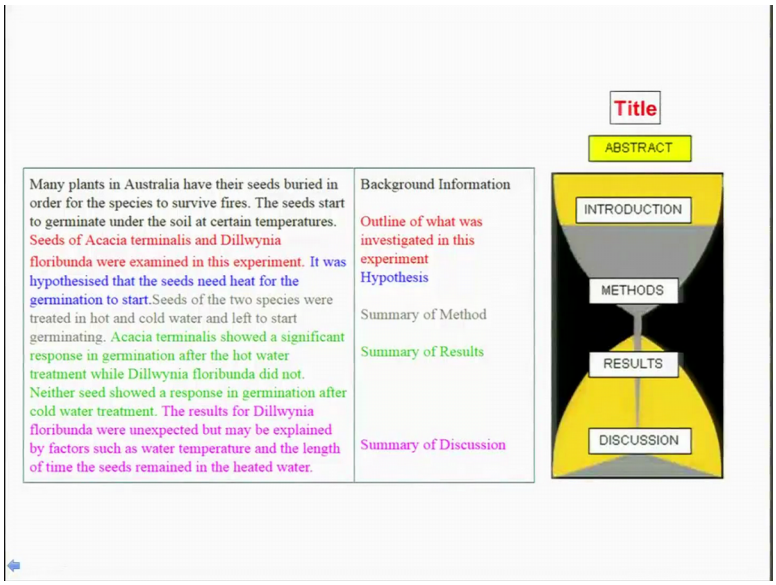

So, welcome back to this week three lectures Professional Scientific Communication course. So, in the previous lectures, we have looked into the importance of title, importance of keywords in attracting readership for your article. Now, we are going to look into the structure of your research article and how you go about basically writing the research article because the research article which in the introduction methods results, observations or discussions is what going to sort of help you to arrive at abstract and titles. So, we are going to look into how we are going to do.

The slide what is shown here, I give some recap of the point that we discussed earlier which talks about into the structure of the manuscript, we have a title, we have abstract, introduction, methods, results and discussion. What is shown on the left side is the abstract, which also has got most of the elements. Now, what you are discussed so far is about title and abstract right. We have looked into as to how do you write an abstract, some of the important guidelines in writing abstract.

And then you have spent a lot of time in title; and also we have spent time with keywords because the abstract title followed by abstract help the reader to understand what you are done, and key word is important because that is what bring the reader to your article therefore we spend time on this. Now, we are going to look into the rest of your you know the manuscript which constitute the bulk and which constitute the original discoveries and we are going to talk about how you write that particular section that is introduction, methods, results and discussion.

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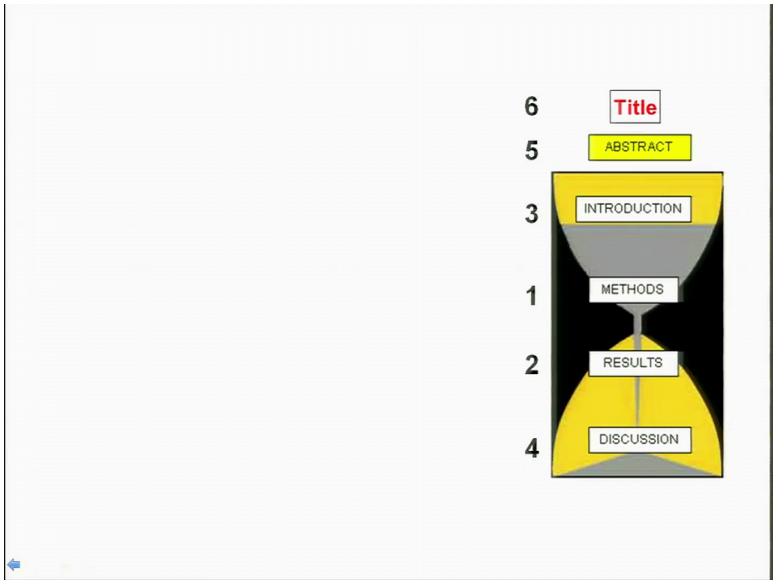

So, often you know we talked about you know title and abstract you said that although it forms the first as I showed you in the first retitle, and then abstract and then go to the rest of that elements of your manuscript. When you write often you start with methods, you do not start with title. As I emphasized title is something that you arrive at the end of writing the rest of the manuscript; before that you do abstract that is again after writing the rest of the contents of your manuscript you write abstract, because it is summary of executive summary of everything that you are done.

So, what do you normally start with, normally people start with methods, and then go and write what it is called a result the number that you shown on the left side, the sequence most often people use. And then they go and write introduction because it is based on the results that you sort of guide the or you know readers to highlight or to understand what you have done and why it is important. And finally, you discuss your

observations then you write abstract then you write title, therefore we are going to revisit and look at how do you do each one of these sections.

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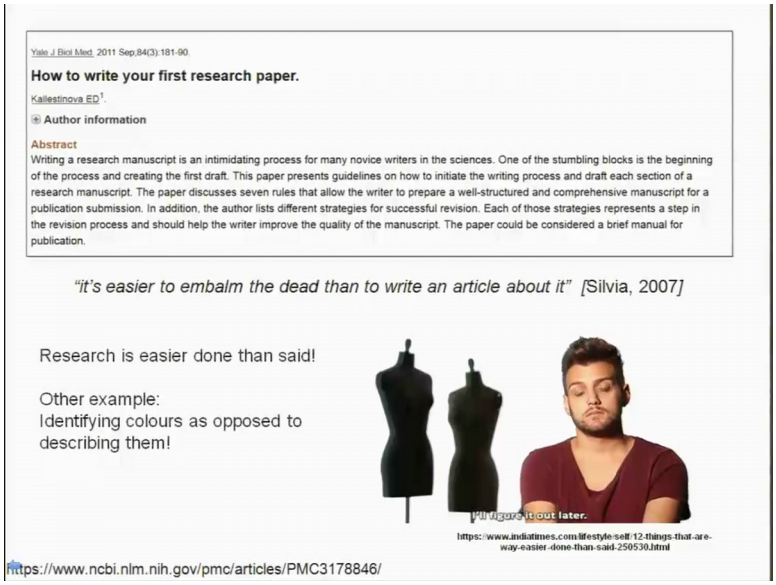

We have seen that even for title there are papers that how effective the title should be and what are the important elements and title that has. And what I going to connect you with is an important paper very useful paper written by Alana. You can go and read that paper here that is shown here a link and this is a full text available published in Yale Journal Biological Medicine. And this paper is about how to write your first research paper this is for all of you who are just into the research, who wish to write a very good research paper and you should go and read.

It is very, very informative and an important paper really written in a very lucid way which you know really sort of highlights as to what kind of barriers you go through when you start writing. So, it is an intimidating process you know whether you are writing research article or you are presenting your work to a larger gathering it is both are intimidating. When you come to a stage you find two hundred people sitting and looking at you it is intimidating exactly the same way when you write want to write a this article is intimidating because you do not know where to start, how to start, what to say first, it becomes extremely difficult when you are a beginner right.

One of the stumbling blocks is the beginning of the process of creating the first draft, you know because it is not that in one go you write manuscript; at least there are ten-fifteen

times you have to revise, edit, improve your manuscript. So, there are several strategies, you know guidelines have been suggested, strategies have been told, it is not just to one way to do it, there are multiple ways. We are going to list some of them and which would help you to write through such article in basic science field right, so that is something that I really want you to go and read that is given in that paper.

This is a very interesting anecdote right given by an a physician. He says it is easier to embalm the dead than to write an article about it, you know it talks about the procedure to fix a dead body you know and you can learn it, and you can do it, but if somebody ask you to write, it is much more difficult than doing it right. So, there are not many things in the world wherein it is easier than the answered right, research article is one. So, you are done your research, you are almost completed. And you found it is very easy, I could do the experiments, and you could document all the results you have the data with you. When your supervisor to ask you to write a thesis, then it becomes difficult, then you find it my goodness, this research carrying out research experience easier than writing what you have done right it becomes difficult.

There are not many such examples, some are like this that is what I said research is easier than the said. For example, you know if somebody asks you to identify colours right two different colours a darker green and lighter green. And say that you know tell me the difference between that you know what is the difference, but saying that in words sometimes it is difficult you know that is something that is like that when you want to write a research article.

So, this paper which I want you to read is that this paper discusses seven rules that allow the writer to prepare well structured and comprehensive manuscript for a publication submission. So, this is and we are going to basically follow this particular you know paper for the seven what is that seven rules one after the other, and give some examples and see how that could help you in writing a better manuscript. As I told this is not the only way you write, this is one of the ways right, there could be many other ways, there are many links that I am going to share with you, so you may want to go and explore some of them.

The first one is create regular time blocks for writing as appointments in your calendar and keep these appointments. This may sound very trivial, what is this. You are talking

about research article, and it says that create regular time blocks, because it is very important this is important because we need to be prepared has to how much time it will take for you to complete the writing, how much time it will take for your supervisor to complete the revision. Because you may have thought that you have written the best manuscript the best possible way that you could, but you are a beginner, but it goes to your supervisor who is much more experienced than you, you will find it that it is not at all in a stage that can be even you know shown to somebody else. So, you would you know work on it and it is comes back you may feel that my goodness, this is not something I thought it looks very different than what I wrote, but that is how the process begins.

Then you learn as to how you will written and how it has been changed what kind of a transformation you know it will happen often you know when I was a Ph.D student whenever there is a visitor to my our lab, my supervisor is to say that Ganesh why do not you tell what exactly you are done. Then I will explain something that I have done and the visitor would you know look at it a blank face, then I would understand they did not understand anything, I would be wondering probably it does not really understand, he is not from this field. Then my supervisor will start telling what I will have done and then he will appreciate that I have done a good work. Then I realize that although the work was mine, the idea was mine, I did the work I know the details better than my supervisor, but my supervisor able to tell better than I could right because that comes with time, so that this is not a easy that is what you are talking about.

So, therefore, you know it in a since you know you taught that you written a good paper it does not mean that your supervisor read it one goes a let it submit because that you would straight away will be rejected because it is not convey what you have done. And it is not the best possible way one could write. Therefore, you should know that you know if are taken three months to write my thesis or my paper my supervisor required at least three weeks to edit that. So, if I move when we are planning to submit a manuscript right then I should have planned and I should have planned that in the month of March we are planning to submit my manuscript, in April I am going to leave this lab, therefore, you know I should start preparing from now onwards. I know that I have to give the complete version the best possible version that I could make three months from now. And then my supervisor got at least one month to finalize, and submit and the next month I can go.

So, I know when I am going, therefore now I should know when I should be submitted, how much time my supervisor requires and how much time we required, this is called as planning. So, when you plan it is not that it is not that I am saying because I am exactly quoting from the paper most of us follow that, but I am saying the paper because most often somebody tells you who is sitting next across to you people say this guys no business you will see all these things. When you read such research articles where people say that this is how you should do then you realize this how the professional world works. So, you have to have the timeline fixed.

And second it is not like I have done my experiment, now I start writing, he does not most often it goes hand in hand. In fact, you may carry out a few last experiments, but at that time you start writing. And writing you cannot write whole day, you may needed you know good solid 3 hours, 4 hours a day is good enough for you to write you know for that particular day. Likewise if you work for 20 days you would complete your thesis or paper whatever it is. So, you need 3 hours.

So, you need to identify, I am going to sit in the morning, spend 3 hours work on it, I stop then I will go and do a list of the experiments and come back analyze results, and read my writing and then improve and so on. So, it is very very important that you have a calendar and keep appointments as to what is your deadline, what you know a road map as to the results I would finish by this day, methods I will finish by day, discussion I will finish by the day, and then I will give the final manuscript to my supervisor. And he might take one month, then we will submit then I will leave the lab. Because you leave the lab without publication that is going to hurt you because you know publication is an important you know kind of a certificate for the work that you are done. So, it is you have to keep that in mind and your plan you have to plan well ahead, 6 months, 1 year ahead, you have to plan all these, this is very important right.

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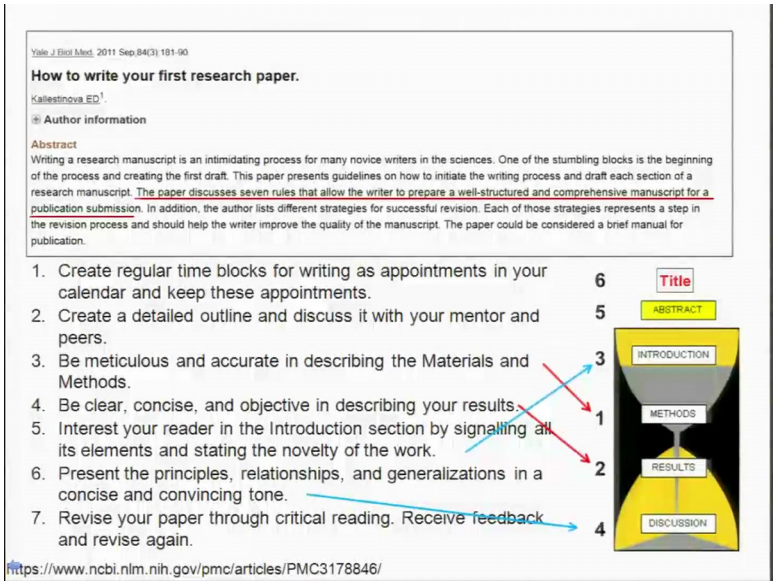

The second rule, this is called the rule by this particular author. The second rule is create a detailed outline and discuss it with your mentor and peers, mentor meaning your supervisor, peers people who also work in this area who have some experience go on discuss. What is outline we will come back little later. It is basically even before you start writing you have to put bullets. You have to say these are the little observation that I have; these are my questions and I am going to put them all rearrange and see I missed something and then you know insert, delete whatever it is. You say that these are the experiments these are the results I am going to put together to make this particular manuscript. So, you need multiple discussions for this. You have to put the bullets make an outline discuss with your supervisor, discuss with your friends, peers, and then I arrive at it, because once you have this, much easier for you to write, because it is more like expanding each bullet.

Be meticulous and accurating describing the materials and method is very important. Think about everything that you have done, go back to your notebooks write everything, because the methods and materials section in a manuscript is important for the reader to reproduce what you are done. If you are not deep you know kind of meticulously written the methods the way your than your work and if they are repeating and they did not get your results, because you are not detailed everything in your manuscript then they are going to say that whatever your published are not reproducible. It is going to question your credibility as a scientist. Therefore, it is important that you write methods the way

you have carried out your experiments. Therefore, they can reproduce and appreciate that they are reproducible and that is something easy because you have done your complete to the exponent you can easily write that is something that you can start with.

Be clear, concise and objective in describing your results. So, you have tangible results now. Methods were done with results. You know you start about writing about it, you know exactly say what you have gotten. Do not go beyond you know interpretations are not required in results. It is precisely the observation and objectives. In the sense that what are the question that you are asked, and how your approach helped to arrive at the answers that something that is what constitute the results. Interest your reader in introduction. Now, we are introduced your topics, introduce your hypothesis, introduce your objective your questions, therefore, you have to creating interest in the reader that is what about the introduction.

And then highlight the novelty of the work, why your work is important, what is new there, because if it is nothing is new and you need not have done this research at all. So, obviously, everyone who is doing research, you are doing something new, but unless you bring out that in the introduction section, I am not going to appreciate right you have to bringing in the novelty. Present the principles, relationship, and generalization in concise and convincing tone that is a discussion. A pretty much relate your observations with the rest of information that is available in the literature. And then bring out as to how you are discovery, how your invention as made a change in terms of the knowledge that is in that particular domain. But in a convincing tone you are very confident when you say you cannot be very shaky if your shaky that means, you are not confident about your result. And the results are shaky then anyway you cannot say that your results has to be strong based on certain very good methodology approach you are taken and very good objectives.

So, all these are linked, and some of these we are going to look into. Finally, the sound through revise your paper thorough after you know through thorough critical reading, you read go through many a times right and receive feedback and revise again. Show to your friends your peers and discuss with them and get feedback and then you know revise again; therefore, it gets better. So, remember it is not a just you write one version is good enough, people write 20 times, 50 times, they revise many a times; therefore the

paper gets better. So, these are the seven rules that is what you know said in this paper. Most of us follow this rule and really helps.

Let us see what really how this particular you know seven rule suggestion help with our earlier discussion as to how to write a manuscript. You remember I said that you start with methods go to result, then go to introduction and then description, abstract followed by title. You can see that whole thing happening here. Rule three be meticulous and accurate in describing material you start with that. Be clear, concise, objective is coming the result that is results. Then you go write introduction and then discussion then abstract and title.

Now, you understand how do we really build your research article; although as a reader you start with title then subtract then introduction then results and discussion methods if need be I go into that. But that is how you know when we write article you basically more often start with methods or with results and then you go to introduction discussion abstract and title right. These are the seven rules let us see some of them that is create a detailed outline and discuss it with your mentor and peers right. So, you have to put certain outline for all the work that you are done and start thinking about it how to write, the results how to convert the results into manuscripts.

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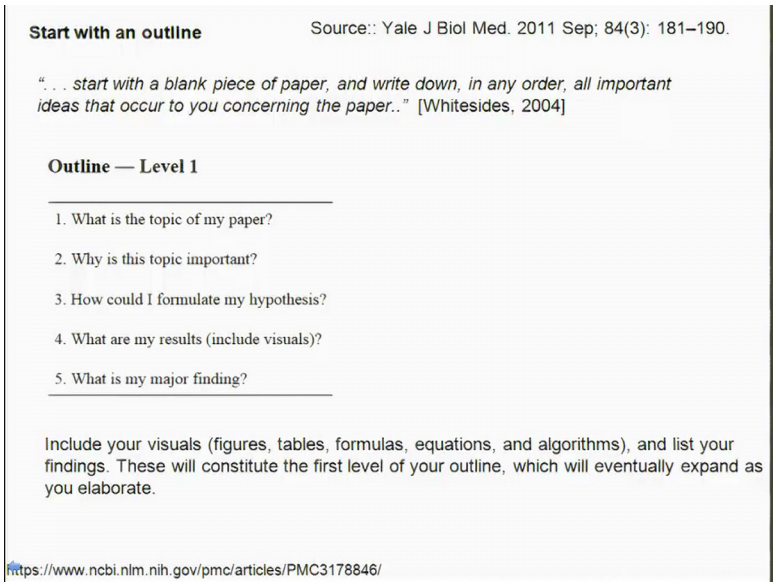

So, this is again a method start with a blank piece of paper and write down in any order all important ideas that occurred to you, concerning the paper. And then you have bullets,

discuss rearrange and then find is anything missing add them and then arrive at a structure this is how you do it. So, you have you know a results, you have your raw data, you are analyzed it, you have results, you have trends, you have certain ideas. You should know now what should I introduce first, what should I introduce second which are the point to be highlighted which are important and so on so that is an important element that is what you call as an outline right.

What do you call it level one, what do you do. So, you have to bring out the importance of the work that is level one. What is the topic of my paper these are the questions, you have to give an answer for that. Why this topic is important, how could I formulate my hypothesis, what are my results, what is my major finding you know if we can write it down this that pretty much you know gives you the basic introduction to your paper right. So, you have these are the five major bullets that you have to look into that. And you can see now what are my results. It includes visuals you may have you know chart, you know bar diagram, it may have (Refer Time: 19:25) pictures, you may have chromatography you know output or it could be table, it could be sequence, it could be you know behaviour if there is a video whatever it is you have to engather everything.

So, all in the visuals include figures tables formula equation algorithms if you are developing certain methods and also list your findings, these will constitute the first level of your outline which will eventually expand as you elaborate. And these are very very important, because when you do this you also to look into as to which journal that I am looking at which section of the manuscript I am looking and accordingly I prepare. So, you have to think about all these things even when you before you start writing your manuscript for any publication that is the very first level.

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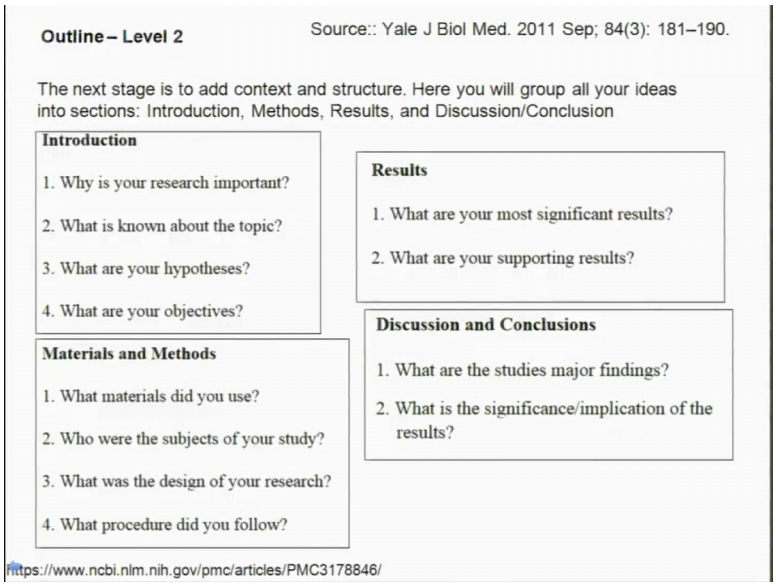

And then the level two is that each of this question that we looked at you are have more subheadings that you have to expand it that is called as level two outline. The next stage is to add text and structure. So, this is now we are going to give you a kind of a skeleton for your you know paper. Here you will group all your ideas into sections that is the introduction, methods, results, discussion, conclusion whatever it is right. So, what are your you know question that you are outlined. So, for example, what are the studies major finding, what materials do you use, what are your objectives right, these are some of the questions and you know you should have dumb readied in a few lines and bullets and so on. Now, you should know how to group them right into which eventually form their various in a section. For example, these four questions will form introduction for example, why is your research important, what is known about your topic, what are your hypothesis, what are your objectives this constitute your introduction.

What materials did you use, who were the subjects of your study, for example, if you are using human samples or some animal models, what are the what was the design of your research what procedure did you follow. This constitutes what is called the materials and methods and results what are your most significant results, what are your supporting results right these are major things. So, you have certain things that that are your major results, but to validate your major results as that you are exploring did work well and there are no problems with your regions we may do at times some supportive experiment

to prove that your things were where you know did well and these are called a supporting results.

If you look into for example manuscripts journals, they will say that these are you know some manuscript will have what is called as a supplementary you know figure supplementary material. So, these are not data that are presented in the paper itself, but they are supportive evidences to substantiate what you are inferring, what you are claiming in your manuscript. And these are called a supporting results may not appear in the major in the main text itself, but they are present you know elsewhere. So, you should know what is that major finding, what is supportive you know results.

And then finally, you have to arrive at description conclusion basically what are the studies major finding sort of summarize again restate to begin with. And then you are to bring out the significance implications of the results in relation to the existing literature. Therefore, you can say that how your work contributed to the knowledge further in the knowledge and how it may help others. So, these are some of the bullets that that you have to keep.

So, if you can really ask this question and write few lines and then organize like this, then you have the skeleton. So, all you need to do is add you know fresh to each one of this you know bone, you will get the entire body of your manuscript. So, this is how you do. So, you do not start with like what you read, you do not start with title, you do not start with abstract, you must have seen now that how it is done. So, you have to start with few bullets and then put together and form an outline. It is very extremely important unless you form an outline you know you do not know what you are writing. So, you have to be very clear.

So, remember that there are times you may introduce results not exactly in the same way as you did experiments. You may have done a given experiment, you would have gotten the result now that is not the result that you are going to do this first, it may be the third figure or the fourth figure in your manuscript, but you have to provide your results in a comprehensive way therefore you know people can understand. So, it is not a chronological order of being things that forms an outline, but it is more at the conceptual level how you are conveying to a reader as to what questions you are asked and how your observations sort of addresses the question what is the significance

So, you have to revisit all your results you know in unbiased way and regroup them and then form an outline and then you discuss you know you start that you know. So, when you write a manuscript, it is always for the reader, therefore it is very involved a third person to arrive at the kind of you know the bullets in a particular order. A third person may suggest you that well as a mizzling gear, then you may either just do a small experiment or you may have a results that you may bring in here, so that really helps you. Once we have this outline then you can really really work on and write a better manuscript.

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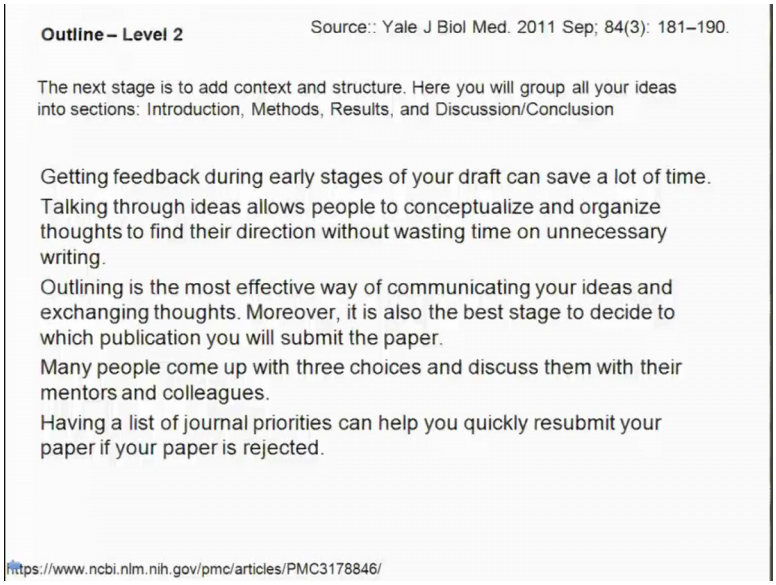

So, this is again an important thing that is the next stage is to add text context and structure to a paper. Here you will group all your ideas into sections as I told you introduction, method, results and discussion. So, this is where the outline helps you. Getting feedback during early stage of your draft can save lot of time talking through ideas. Allows people to conceptualize and organise thoughts to find their direction without wasting time on unnecessary writing. Say suppose you have not structured it well and then you are started writing you will have spent two months in writing then somebody says well this does not make sense is rearrange everything. So, all the time that you are spent is wasted, therefore, it is better to discuss on the structure first and then write therefore, you can save time and you are able to convey you know your research in a better way.

Outline is the most effective way of communicating their ideas to and exchanging thoughts right. The reason is that you wrote something 40 pages, nobody will be sitting with you and reading 40 pages because people do not have time. But if you have an outline, in 10 minutes anybody in that field can sit with you and tell it what is the best thing that you are to bring first, and what are the supportive results that you are can bring it later or it is not that important forget about it and so on. So, they give you the important feedback and outlines help because that is you know I am not going to spend too much time because I can quickly understand what it is.

Many people come up with three choices and discuss them their mentors and colleagues you will sort of go and discuss with your supporters again and again then you come up with that. Having a list of general priorities can help you. Again I told you depending on which journal we right and the way you structure articles you know differ and then journals really help, therefore, you first read journal, guidelines and which article types you are submitting, and then form the structure according to that therefore, you do not waste time in revising your manuscript. So, that is pretty much kind of summary advice for how to structure your manuscript. I am sure this is going to help you in further gives skill set as to how you communicate in a research article. So, we will the next week we will see next lecture, we will see some guidelines about how to write result section.