This lecture talks about communication.

Communication is very important in research. Research means solving difficult and important problems. Often, the problems are not clearly defined. Many research projects solve new problems and few people understand the problems. You need to describe the problems to yourself and others. You often need to discuss with your teammates or adviser about the progress and what to do next. You need to explain what you have done for solving the problems. If you find a solution, you need to explain the solution and the evaluation results. Both speaking and writing are important.

You may have seen this cartoon about the difficulty in communication.

Let’s zoom in and see some examples.

The customer’s explanation may be interpreted incorrectly by the project leader. The analyst then misunderstand the project leader.

The business office gives an invoice that does not reflect the project and the support department has yet another interpretation of the project’s needs. What the customer really wants is something quite different from everyone else’s understanding. In fact, what the customer wants is different from the customer’s description.

Let’s do a very simple test. Consider the word “Sunday”. When someone mentions the word “Sunday”, what comes to your mind?

You may be thinking it is the day for cleaning, cooking, watching sports, calling your parents, doing laundry, or many other things. As you can imagine, the single word “Sunday” can have many different meanings to different people.

Next, imagine that you use this word when you talk to people. They will think about many different things even though it is the same word. Moreover, the meaning can change over time. For a twenty year old university student, the word Sunday may mean playing tennis with friends. A few years later, for this same person, Sunday may mean dates. If this person has a child, Sunday becomes the day spending time with the child playing soccer.

If a single word can mean so many different things, how many different possible meanings can people have after you talk for only one minute? You will be surprised by the many different interpretations people may have.

Let’s consider a game that shows the difficulty of communication. This was played by some students at Purdue. The game is played in this way:

A person writes down a few words on a piece of paper describing something that everyone in the room should know. This person passes this paper to the next person.

The second person reads the words and draws a picture describing these words.

Then, the drawing is passed to the third person. The third person looks at the drawing and writes down words describing the picture.

The next person draws a picture describing the words.

Let’s see what these Purdue students got.

The first person wrote “Purdue’s winter is pretty cold.”

The second person drew the Purdue tower to indicate this is Purdue. The temperature was negative ten degrees and it is windy. There were some trees.

The third person wrote “A student walking by the Bell Tower in freezing cold weather.” So far, not too bad. This person got the idea about Purdue and cold weather. However, a student was added, even though the first writing did not mention any student.

The next person drew Purdue Tower and a person. These things on the left side probably means snowflakes. Cold weather has become snow. Still not too terrible.

The next person wrote “Purdue Tower”. This is quite different from the drawing. It did not mention the student nor the cold weather.

The next drawing is Purdue Tower.

The next person wrote “Purdue Tower.”

The next person drew Purdue Tower. Above the tower, there was cloud. The half circle could mean the moon. Do you notice that many things are added?

The next person wrote “Purdue Bell Tower at night with a half moon in the sky.”

The next drawing seems reasonable, given the previous description. Do you notice that the moon has changed?

The next writing said, “Purdue’s Bell Tower at night.” The moon is not mentioned.

The next drawing added some stars.

The next writing said, “Night at Purdue Tower. Stars on the left.” Do you notice that the moon disappeared? Do you notice that the concept of cold weather disappeared somewhere in the middle? Do you notice that the concept of night was added even though it was not in the original writing?

When we played this game, people were laughing so hard, some could not speak. After you stop laughing, can you imagine how difficult communication can be? I encourage you to play this game in your team. It is fun and you will learn a lot about your team.

How can you have effective communication? First of all, you need to understand your audience. Who are they? Are they students? What are their majors? Are they undergraduate students or graduate students? Are they experts in your field? Are they school teachers? Are they teenagers? Are they policy makers?

Different people have different scopes of knowledge. Do not assume that everyone knows as much as you do. Some people may know your topics very well. Some may have never heard about what you are going to say.

You also need to know their intentions. Do they want to know the details of your solutions? Do they want some high-level ideas? Are they looking for investment opportunities?

The time when you are talking to them is also important. What you say in a morning meeting can be quite different from a conversation over lunch. Are you giving a speech when people eat dinner? If this is case, make sure your topic and content would be appropriate. For example, a topic related to food poisoning or sewage systems may not be good choices when people are eating. If you are talking to someone late at night, keep it short because people want to go home and rest.

If you talk to people in a research conference, you can assume that most of them are in your field and have some knowledge about your topic. If you are talking to the person sitting next to you on an airplane, it is unlikely the person has comparable levels of knowledge about your topics.

Are people standing when you are talking? If that is the case, keep it short.

Do people sit around a table?

How is the communication conducted? Do you talk to the person (or people) face to face? Can you use gestures to improve understanding? If you are in a video call, it is difficult to see gestures but your facial expression can be seen. If it is a voice call, there is no facial expression. If the communication is email, then the person may not read it and respond right away.

Some other forms of communication are one way. A news release is given to many people. Very few of them would respond and ask you questions. Thus, you must make sure what is written is clear. If it is a research paper, you can assume a lot of background knowledge about the field.

As you can see, different forms of communication require different contents.

The number of people in this communication can also be an important factor. Is this a dialog between two people? A discussion among several? Or it is a seminar given to hundreds of people?

Do you have any visual aids? Do you have a computer projector and you can show some view graphs? Do you have a whiteboard and people can draw things? Do you and the other people have paper to write and draw?

How long is this communication? You may have heard about the phrase, “elevator conversation”. It means a very short conversation, maybe one minute. Can you clearly explain what you are doing in one minute? If you have an hour, you will provide much more background and more details.

The structure of the communication should also be considered. Are you talking to your teammates? Is your supervisor present? Is there a chairperson?

In today’s connected world, it is very likely that your team have people from different countries. They may have different languages. Communication can be a challenge in an international team. Even though everyone may use the same language, for example English, people may use different words or use the same words differently. Do not assume that everyone understand what you say.

When you communicate, you often need to set clear goals. Are you explaining the requirements? Requirements must be precisely defined. Are you discussing the design? Discussion can be less precise because it is work in progress. If you are exploring directions, you want to encourage some creative thinking.

You want to make sure people understand the goals before you start. Otherwise, people may misunderstand what you want to accomplish.

You need to inform people whether it is interactive, especially when you give a speech.

If you do not know the people, try to know them first. Ask them about their background and experiences. Ask them who they are and why they want to talk to you.

Different people perceive information differently. Some people prefer textual information. They want to see things written in words. Some other people prefer visual information, expressed in drawing and graphs.

Most people are somewhat in between. That means you need to provide both textual and visual information. You may have noticed that in my presentation, I often insert pictures in the slides. This pictures are not decoration. Instead, they serve specific purposes. They provide additional channels for people to understand the information I am conveying in this video.

Do you notice how I communicate with you? I use video with slides. The slides have text and graphs. The slides and scripts are available for you to download. Why do I do this? Because I understand that different people absorb information differently. I provide multiple channels to communicate. Also, you know who I am. My name appears in the first slide. You can find more about me and you can send email to me. It is possible to have two—way communication.

As I explained earlier, people may have different interpretations about the same words. To make communication more effective and efficiently, you need to define terms. Spell acronyms. I have been to many meetings where acronyms are not defined and people talk about different things even though they use the same acronyms. If you work with people from different countries or regions of different accents, you may want to write down important terms. This can reduce confusion due to different pronunciations.

A common mistakes is to ask people, “Do you understand?” This is not helpful because people may believe that they understand and tell you “Yes”. In fact, they may misunderstand. Ask people to explain back to you and you will identify the gaps between what you want to say and what they perceive.

Whenever possible, make the communication interactive. Encourage participation. Ask them questions. If you talk nonstop for five minutes, it is almost guaranteed that some people are already lost or distracted.

It is very important that people have chances to interact and ask questions. Do not assume that everyone is following you because everyone is nodding. If possible, ask people to form small groups and give them a few minutes to explain to each other. Then, ask each group to explain their understanding back to everyone. This is a very effective way to help most people engaged. I have done this many times in classrooms. Students think they understand but they cannot explain. Then, they realize they need to ask questions.

If someone speaks and you do not understand, ask questions. Some students mysteriously believe that asking questions would be embarrassing. I do not know where that comes from. The truth is the opposite. If you do not understand and ask questions, you help yourself and the audience. Actually, the audience would appreciate your questions because you help them understand better.

Very few people are natural born communicators. Thus, it takes efforts improving communication skills. You can train yourself by reading books or taking courses to become better in communication. Join or form study groups with your classmates or friends. The study group does not have to focus on your major. When I was a undergraduate student in Taiwan University, I was in a study group discussing history.

Within your team, you should cultivate social interactions. Very often, better communication can be achieved if people know each other better.

Before you give a speech, practice in front of a mirror or record yourself. You will find these methods very helpful.