# 06
# Active learning strategy

ACTIVE LEARNING STRAGEGY 06

# Think, Pair, Share

Joe Smith

TU Dublin

# THE STRATEGY:

## THINK PAIR SHARE

Think Pair Share is a three-step activity whereby students work on a given problem individually for a few minutes, then compare solutions with a partner before presenting to the class. The amount of time allowed depends on the complexity of the problem. It is a useful alternative to the traditional classroom scenario whereby the lecturer asks a question and a student answers. The strategy adopts the following sequence:

### THINK

Utilising this strategy provides students with the opportunity to take some time to work on their own and to think about possible solutions before formulating their answer instead of being put on the spot for a spontaneous reply.

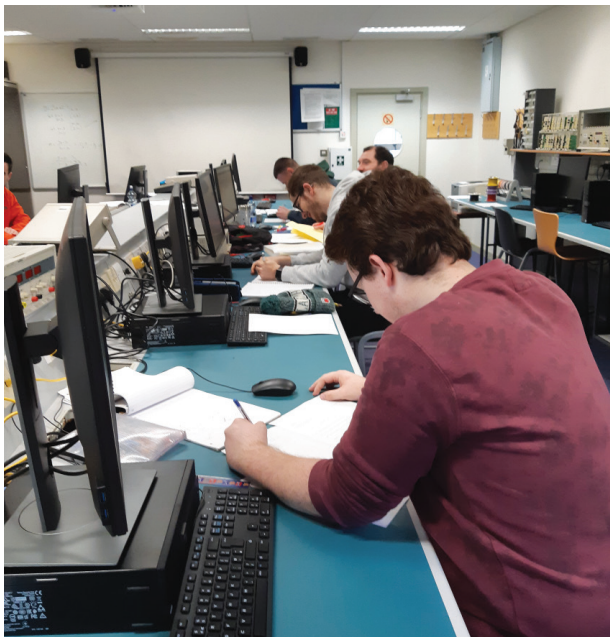


Image 1: students taking part in a Think, Pair, Share, activity

### PAIR

Time is then given for the students to work with a partner comparing and discussing answers. They are encouraged to come up with an agreed solution.

### SHARE

For the final step, one or two pairs of students are selected to present their solution to the class. The class can then compare the presented solution with their own. The students are encouraged to ask questions. This in turn leads to a class discussion during which all solutions are investigated.

Some of the benefits of Think Pair Share are as follows:

- The time allocated to work alone usually generates better quality and thought out answers.
- It encourages more student participation in classroom discussions.
- It can be used for a number of different situations.

# RESOURCES

Blank sheets of paper
A PC and projector to model the case study process.
Coloured pens

# WHAT YOU CAN DO TOMORROW

Implementation of Think Pair Share doesn't involve a large amount of work. It is better suited to lab/tutorial sessions where there are smaller numbers present than for a lecture with large numbers. In preparation, identify a few key learning points or items students need to learn or can find challenging.

Have the necessary materials available (blank pages and coloured markers).
Explain the approach to the students and the benefits that may be achieved and encourage them to participate as directed to get the most from the session.
Monitor the students as they work and encourage them to find their own answers to the problem.

# FULL IMPLEMENTATION

In preparation for the lesson, it is important to identify the key learning points and establish which ones are most suited to the Think Pair Share method. Also, make sure to have the necessary materials available to run the session. Think Pair Share is best suited to a group of no more than 20, which would often be a lab session or tutorial. The reason for this is that it can be difficult to control what is going on with larger groups and to ensure that everyone is engaged.

Explain to the class what you are going to do and what it is envisaged that the session will achieve. Pose a problem for the students or ask the group a question. Make sure the students have the necessary information to solve the problem and explain what they should be doing at each stage. Emphasise the importance of following the steps.

# STEPS FOR IMPLEMENTATION

## STEP 01

### INTRODUCTION

Advise the students to use the information they have available, such as lecture notes/books, and to work quietly on their own for a few minutes.

## STEP 03

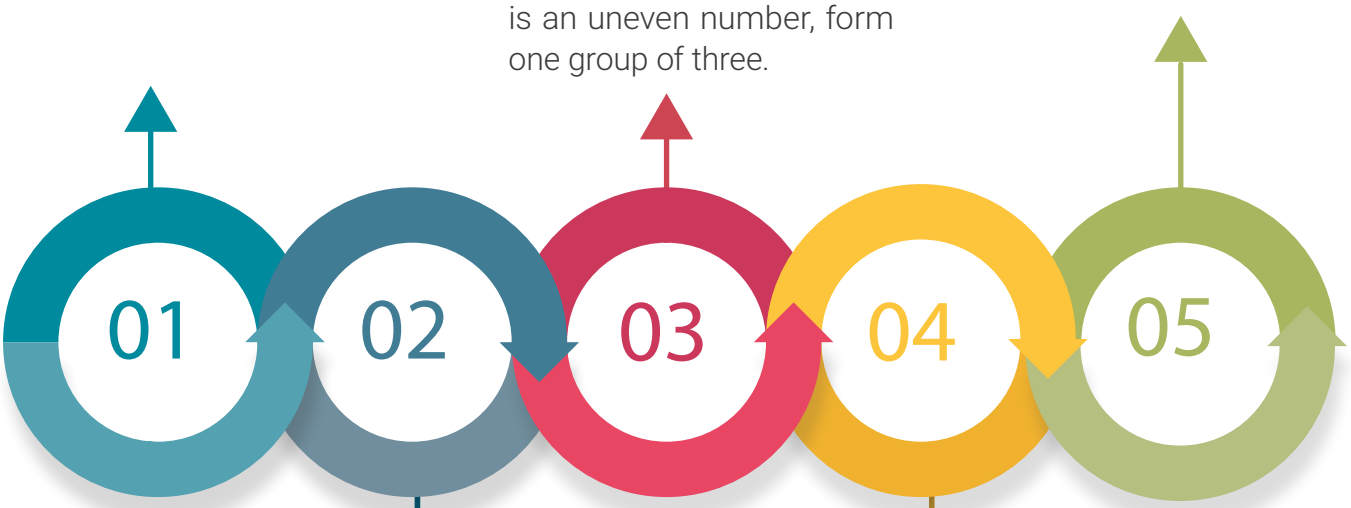
### RESOURCES

At this point place a blank sheet of paper and some coloured markers between every two students. If there is an uneven number, form one group of three.

## STEP 05

### AGREEMENT

Inform them that they both must agree on the answer they provide on the blank sheet of paper supplied.




## STEP 02

### WORKING INDIVIDUALLY

Students are allocated time to work alone and to think through their answers.

## STEP 04

### PAIRING

Pair off the students and ask them to compare their answers.

## STEP 07

### SHARING

Look for volunteers to go first to get this part started. If there are no takers, try encouraging people to give it a go. If this does not work, just pick someone at random.

## STEP 09

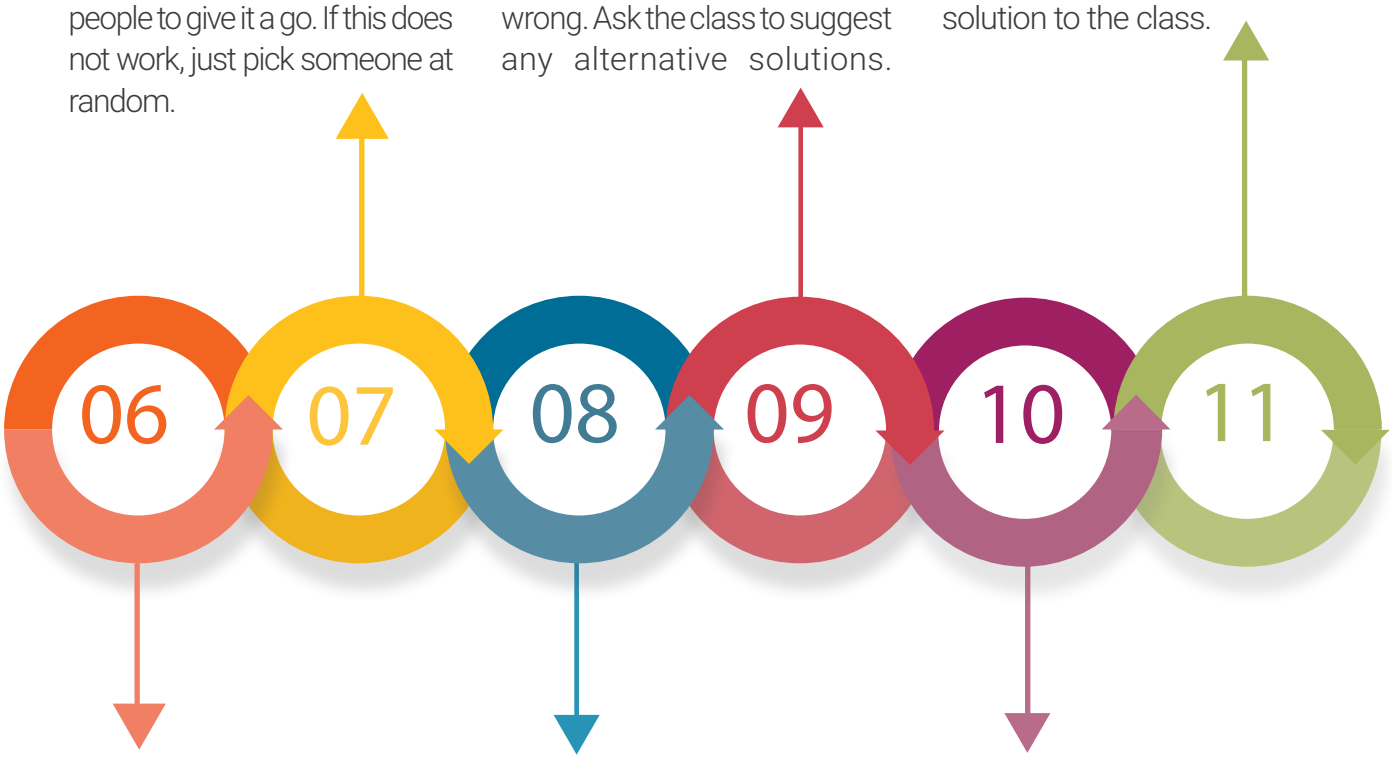
### GROUP DISCUSSION

Once the first presentation has finished, do not correct or comment on what is right or wrong. Ask the class to suggest any alternative solutions.

## STEP 11

### SUMMARISE

The lecturer summarises all answers presented and presents the correct solution to the class.




## STEP 06

### PROPS

Advise them that they will be presenting their solution to the class so to make sure that what they draw/write is large enough for everyone to see and to use colour.

## STEP 08

### SUPPORT

Support and encourage the students while they are presenting. This lets the others see that you are there for them and can create an environment where they are comfortable talking in front of the group.

## STEP 10

### SHARING (AGAIN)

Encourage students suggesting alternative answers to explain how they arrived at their solution. This can be by way of further presentations and thus explores a number of possible solutions.

# OVERCOMING PUSHBACK

Typical pushback encountered with the Think Pair Share method includes:

Students talking to each other during the time allocated to work individually – remind them that they will get a chance to discuss with a partner and the group, but that at this time working alone is important, as each individual answer is valuable.

Students not wanting to or being shy about sharing with the group – this can happen but can be addressed with some encouragement and support from the lecturer during their presentation to help reduce fear and anxiety.

# CASE STUDY

## INTRODUCTION

Students studying engineering at ITB are allocated four hours of maths classes per week, consisting of two one-hour lectures (approximately 50 students) and a two-hour tutorial for smaller groups of about 12 students. The lecture is designed to introduce a topic and explain how it works. Although questions are encouraged, the large number of students present can be an obstacle for some quieter students getting involved. The tutorial is where students complete a worksheet based on the lecture and, as the groups are smaller in size, a more personal approach is possible. It is also a good opportunity to try alternative teaching methods. The Think Pair Share method is very suited to this type of class.

## THE PROBLEM

From experience of teaching maths to engineering students for several years, I observed that most students could use the sine and cosine rules to solve problems that are drawn out for them but can struggle when there is a need to plot the problem themselves. A good example of this is vector problems.

The following case study concentrates on the plotting part of solving vector problems.

To solve a vector problem, students are encouraged to use the head to tail method, which involves joining the head of one vector to the tail of another, or the parallelogram method, which involves drawing lines parallel

to the two vectors given and joining the diagonal that goes from the tail of one to the head of the other. A typical problem is shown in the figure below. It shows vector a and vector b and the student is required to plot the two vectors and show the resultant vector of a + b.

i.e. If vector a is x long and in the positive direction on the horizontal axis and vector b is y long and at θ to the positive horizontal axis. .

When plotting most can manage to plot and solve a + b.

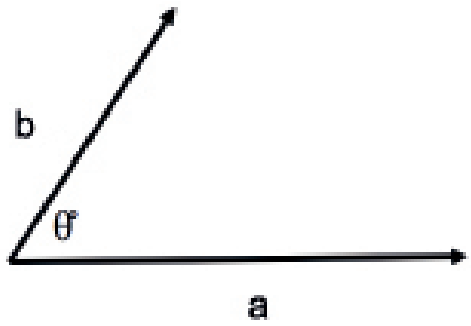



Figure 1: Vector a and vector b

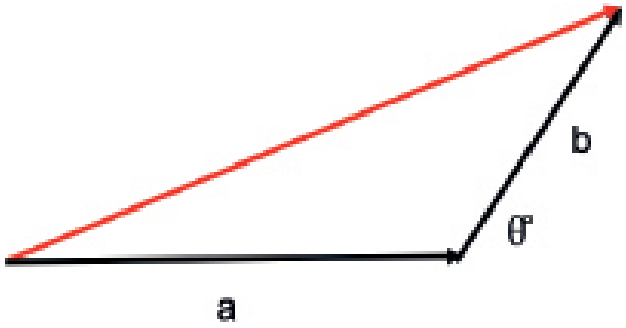



Figure 2: Tail of vector b joined to head of vector a

The head to tail method involves either joining the head of vector a to the tail of vector b (figure 2) or the head of vector b to the tail of vector a (figure 3).

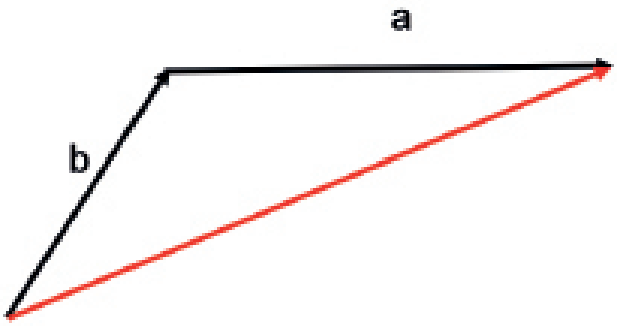



Figure 3: Tail of vector a joined to vector b

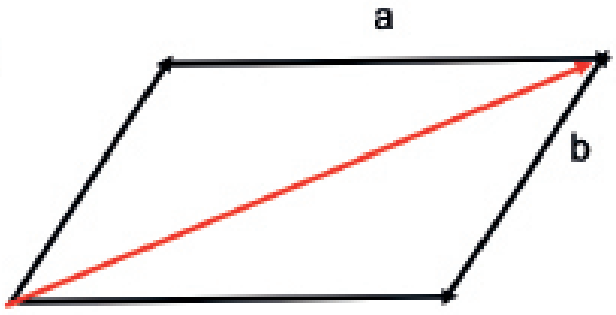



Figure 4: Parallelogram method

The parallelogram method (figure 4) involves drawing lines parallel to vectors a and b to form a parallelogram.

It can be seen from the diagrams above that it does not matter what method is used, the solution will always be the same.

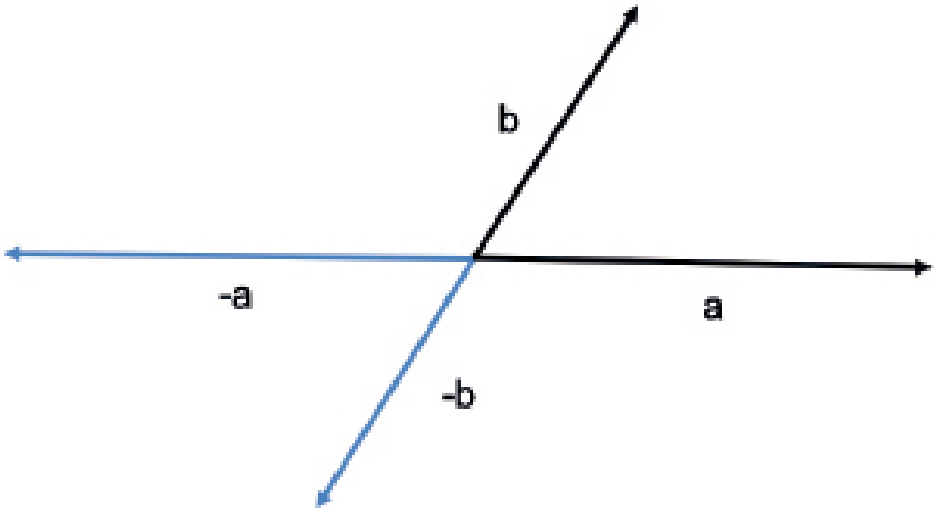



Figure 5

If vector a is of a certain length and going a given direction, then – a is the same length but in the opposite direction. In figure 5 above vectors a and b are represented by the black arrows and their negative is the blue arrow. Understanding the above helps when plotting other combinations of the vectors. Again, using either the head to tail method or the parallelogram method these vector problems can be plotted and then once plotted correctly they can be solved.

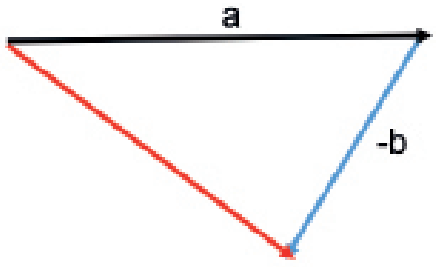



Figure 6: a – b

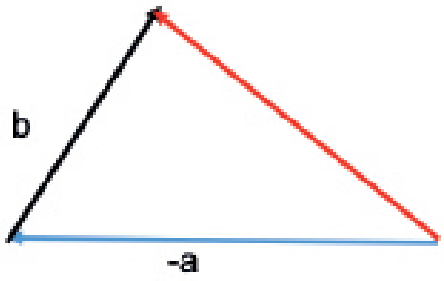



Figure 7: –a + b

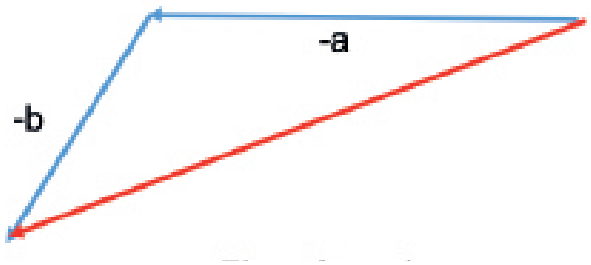



Figure 8: – a – b

The resultant of the plots is the magnitude and direction of the red line.

Students commonly encounter problems when asked to plot a – b, –a + b and –a –b. Think Pair Share was employed to help overcome these difficulties as follows:

## THINK

Firstly, the students were asked to plot a – b. They were encouraged to solve the problem on their own and given time to do this. While they were working, blank A4 sheets of paper and some coloured markers were placed between each two students. As there was an uneven number, one group of three was created.

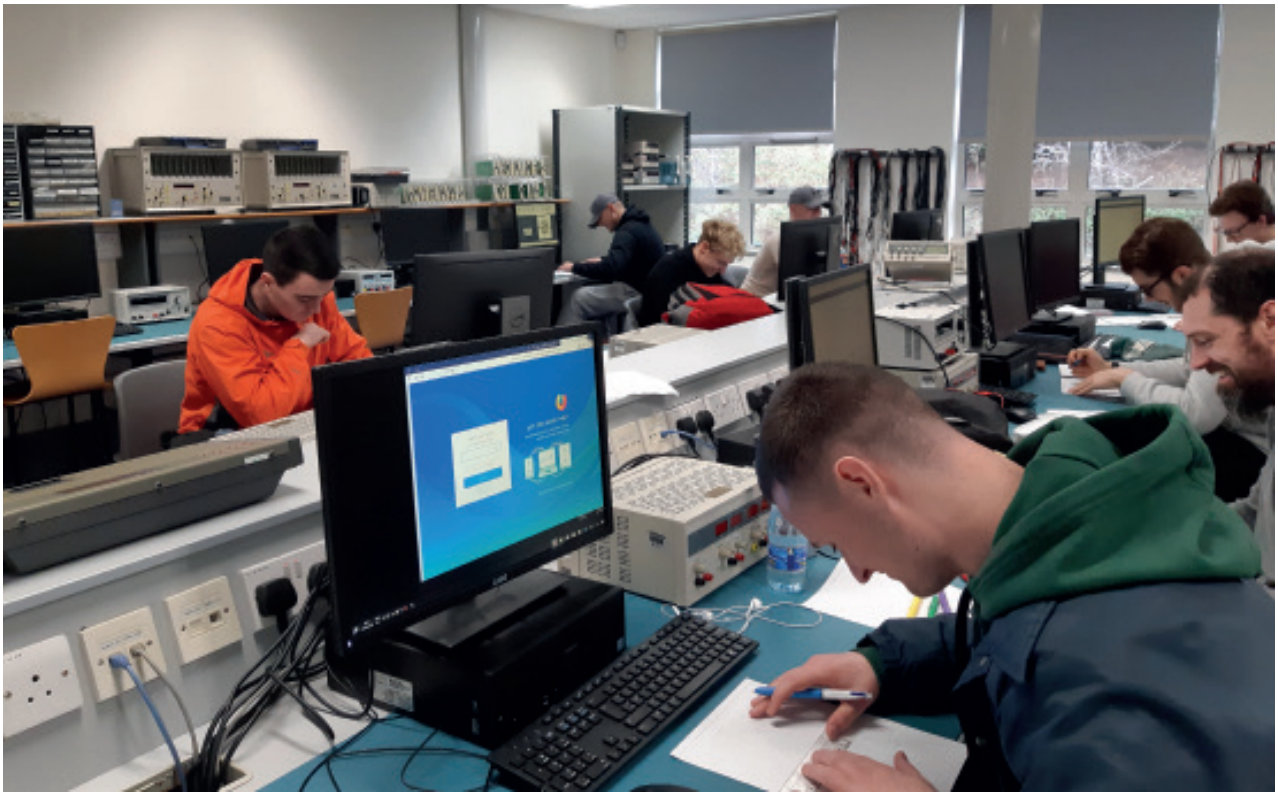


Image 1: Students working individually in the THINK stage

## PAIR

In their pairs, the students were given the following instructions:

> Compare solutions with their partner.
> Agree on a solution (if they are both the same there may be little discussion, but if they are different work through both solutions and then choose one) and put this on the blank page provided.
> Display the agreed solution on the blank sheet of paper, make sure it is large enough for the class to see and use colour to highlight important points.
> Each pair could be asked to share their solution with the class.

Image 2: Students working in PAIRS stage

## SHARE

The group was asked if anyone wanted to go first to present their solution to the class. Once the first pair presented their solution, the class were asked if they agreed with what had been presented. Where some students had different solutions, they were asked to share this with the group. After the whole group discussion, the facilitator worked through the correct solution on a whiteboard, explaining each step clearly to the group.

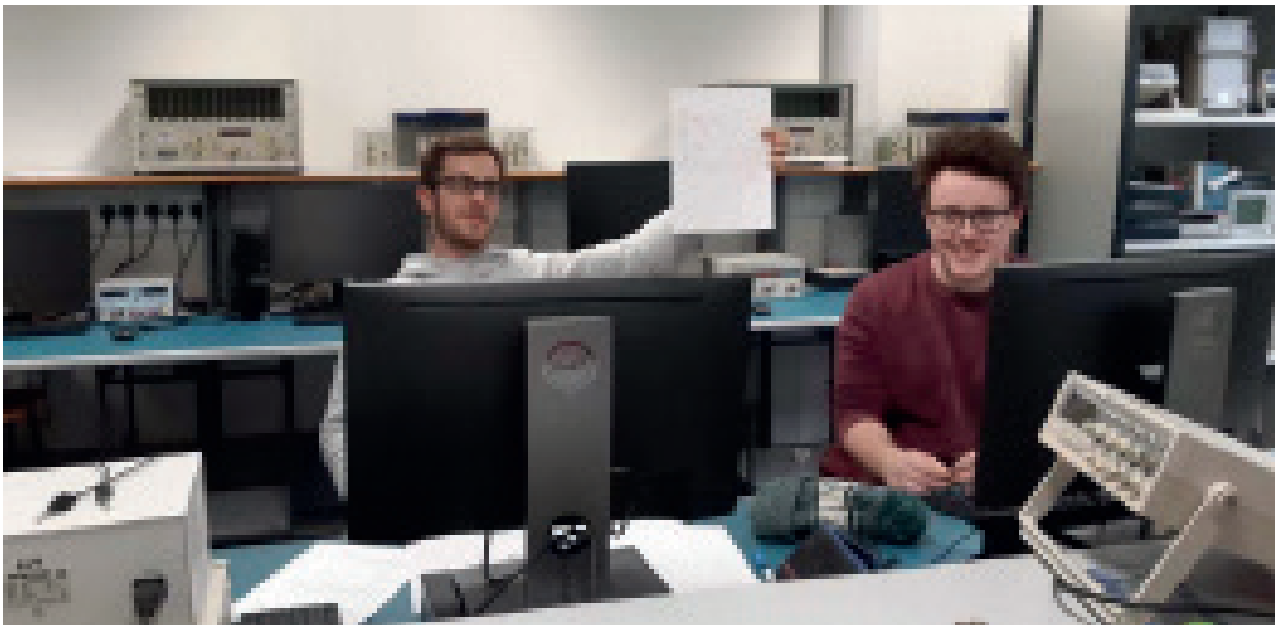


Image 3: Students working in SHARE stage

# SUMMARY

Breaking from the traditional classroom methods can be a little nerve-wracking but it can also be liberating for both teachers and learners. For a first run, try out the activity for the last part of a session to see how it goes. It is important that students work in silence for the individual part of the lesson. For the subsequent parts, discussion is good as long as it is focused on the problem at hand. Encourage good-sized images and colour for the presentation as this improves clarity and can help develop the presentation skills of the students.

# FURTHER READING

Lyman, F. (1981). "The responsive classroom discussion." In Anderson, A. S. (Ed.), Mainstreaming Digest, College Park, MD: University of Maryland College of Education.

Lyman, F., 1987, Think-Pair-Share: An expanding teaching technique: MAA-CIE Cooperative News, v. 1, p. 1-2.