Understanding Network Protocols: An Information Technology Lesson Study with Year 10 (14-year old) students

James Calleja (lesson study facilitator) in collaboration with the lesson study team members Ann Marie Zammit (IT Head of Department), Daniela Zerafa (IT Education Officer) and Larissa Micallef (IT Teacher).

Introduction

The lesson focused on networking protocols, a theoretical topic which students find difficult to comprehend. In this lesson, students carried out research to list a number of protocols and determine whether of these are secure or not, as well as outline their use. During the lesson, different teaching approaches were used, including the use of co-teaching strategies to further engage students especially those with learning and behavioural difficulties.

The goal of the lesson study team was to introduce co-teaching to facilitate teaching particularly for students with different abilities, learning difficulties and behavioural issues. With the incorporation of co-teaching strategies, the lesson study team intended to support students' understanding so that they could better grasp networking protocols which is a rather theoretical concept – hence, very challenging for students.

School context and the students

St Benedict's College Secondary School has a population of over 750 students and a teaching staff of over 150 teachers and learning support educators. The school is one of thirteen, both primary and secondary, forming St Benedict's College. It acts as a receiving school for boys and girls hailing from the eight Southwest villages of Birżebbuġa, Żurrieq, Għaxaq, Gudja, Mqabba, Qrendi, Safi and Kirkop. The entire school is fully accessible for persons with special needs.

The school's vision is to create a centre of creativity and learning where all students from all backgrounds and through different educational paths, acquire and develop the skills to adapt and succeed in an ever-changing world.

The targeted class was a group of 12 students who are in Year 10. This class is in their second year of studies in Information Technology. The group is a heterogeneous one, having students with both behavioural and social issues, as well as learning difficulties. In the class, there are also a three learning support educators.

This class was selected for two main reasons:
- the chosen topic of Networking Protocols is taught in Year 10;
- the class has various difficulties which do not make it easy to teach them this theoretical topic, as it is not easy for the students to relate to such content.

The lesson study involved the following people:
- **The lesson study team**: a lesson study facilitator working with a teacher, a head of department (HoD) and an education officer (EO) of Information Technology – the HoD and EO co-taught the lesson
- **Observers**: an assistant head of school and two other teachers from the same school (both teaching a VET subject)
- **Knowledgeable other**: the lesson study facilitator

The lesson study team met online to discuss the material – there were six synchronous meetings. Besides this, work was carried out in an asynchronous manner, particularly to go through the course materials and to exchange ideas, via email, about the lesson plan. However, on one occasion, the teacher, head of department and education officer met face-to-face.

The post-lesson discussion was held just after the lesson on 22nd February 2023. The lesson was 80 minutes long and the post-lesson discussion took 35 minutes.

Lesson scope and focus

Although the teacher, HoD and EO collaborate on various initiatives, this was a first opportunity to plan a lesson together, do a lesson study and co-teach.

This lesson study, is intended to help students to learn:
- how to research for information online
- to differentiate between secure and unsecure networking protocols
- about the use of different protocols

Towards this end, the ongoing discussions held during meetings helped so that the lesson study team could unravel the issue and plan a lesson accordingly. During the lesson observation, observers were presented with an observation sheet that include the main lesson targets with a focus on student learning. The data collected by observers was then used to inform our post-lesson discussion and to identify possible areas for improvement.

Main findings

This lesson included a variety of student-centered learning activities that engaged students with different learning needs and preferences to succeed towards the lesson outcomes and learn at their own pace. For example, students were required to take an inquiry approach by conducting research to list different networking protocols and whether such protocols are secure or not. Students were also required to collaborate and discuss their findings through a group work activity, as well as evaluate their understanding through games and a given worksheet. Incorporating an applied and hands-on approach to learning, even though the chosen topic is theoretical and difficult to understand, facilitated students' learning to better engage with the content and make connections to their own experiences and prior knowledge.

This lesson study indicated that theoretical content can be simplified through meticulous planning and collaboration with colleagues. By breaking down the content into smaller, hands-on tasks and scaffolding each task to reach the set objective, even the most complex topic can be made more accessible.

In addition, there was agreement that conducting co-teaching was successful with such class that has different behavioural, social, and learning difficulties as this pedagogical approach supports and caters for all students' individual needs. In the participants' opinion, in this lesson plan, station co-teaching was very effective in providing targeted instruction about the use of networking protocols, as immediate attention and feedback on the students' work was allowed in having a smaller group. For the teacher who taught this lesson, working with another colleague with whom she used to co-teach before, enhanced the creation of an inclusive supportive learning environment that modelled collaboration and respect in complementing one another.

The most important finding was that co-teaching strategies would be beneficial to challenging classrooms, as this strategy could also be adopted between the class teacher and the LSE (Learning Support Educator) in class. It was pointed out that having the opportunity to work with an LSE, who spends more time with certain students in class, can be beneficial for providing individualised and targeted instruction to support these students with diverse learning needs. Indeed, LSEs may have a better understanding of the strengths and challenges of these students, as well as their individual learning styles and preferences, which can help the teacher to inform better instructional decisions and accommodations.

The Lesson Study journey

In the post lesson reflection educators mentioned this lesson study helped to analyse their teaching practices and to share and acquire more knowledge about different instructional practices through collaboration, principally, co-teaching. It helped educators to be more open, share their experiences and collaborate with other teachers, as well as to reflect and be more innovative on classroom practices that cater for different students' needs and motivations.

The lesson study experience facilitated a profound analysis of teaching practices through fruitful discussions amongst a group of colleagues. It provided the opportunity to explore different approaches in an attempt to transform a theoretical topic, which is commonly perceived as dull by students, into a more stimulating and engaging one, allowing students to be fully engrossed in their learning.

Collaboration and co-teaching were effective practices to learn and develop new strategies to teaching and to cater for the diverse needs of students. By working together with other educators, educators shared ideas, expertise, and resources, which can help to broaden knowledge and improve instructional practices. In addition, through co-teaching, educators felt that they were able to further address the individual needs of students, ensuring that every student has opportunities to succeed, regardless of their background, abilities, or learning style.

Educators appeared interested to work to further guide students in a group work activity. In fact, the IT teachers' aim was to better structure the group work activity and delegate each student role and responsibilities to better manage time in the group. In addition, this will also ensure that each student contributes to the group and that work is distributed evenly.

Though time was limited for the lesson study team, another goal would be that they would involve and collaborate more with the LSEs on lesson planning and curriculum adaptations to create a more inclusive and supportive class environment.