

Raising the Quality of Teacher Education Programmes in Palestine through Technology Enhanced Learning, Teaching and Assessment (RQTEPP-TELTA)



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**TECHNOLOGY ENHANCED LEARNING ENVIRONMENT –
SMART LEARNING ROOM (TELE-SLR)**

DESIGN CONCEPT PAPER

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1. INTRODUCTION

The RQTEPP-TELTA project aims to promote technology enhanced teaching, learning, and assessment (TELTA) in teacher education programmes of three partner universities in the Gaza Strip and the West Bank of Palestine. One of the focus areas of the three year project is to develop students' and academic staff's capacity in using ICT in education and to enhance their 21st century skills, creativity, critical thinking as well as collaborative skills. Innovative and effective ways to support learning with ICT will be developed during the course of the project.

In order to achieve this, suitable learning environments with up-to-date educational technology will be created as places of practise. These places are called Technology Enhanced Learning Environments (TELE) and Smart Learning Rooms (SLR), and they take both physical and virtual forms. Creation of the SLR-TELE concept is driven by recognised international good practice in pedagogy and aims to deliver a versatile space for the students and academic staff to develop competences to meet the changing needs of 21st century education. Within the project the development work is mainly related to the Work Package 6. The purpose of this paper is to define the TELE-SLR concept and explain the process of its design and construction.

2. DEFINITION

The TELE-SLR concept is a combination of two larger entities; the physical and virtual aspects. SLR is the actual physical space, where teaching and learning take place; whereas the TELE is a wider concept including the ubiquitous virtual environment.

The physical aspect covers transforming regular classrooms into Smart Learning Rooms by supplying them with necessary ICT equipment and technologies, internet access, applications and furniture. The rooms are designed to provide flexible spaces where the advantages offered by the modern technology for different modes of learning and teaching can be transferred into action.

The virtual aspect means providing users with diverse online resources and software. This enables students, with guidance, to select and design tools and environments that best serve their personal learning needs. Users will also have personal online spaces they can customise and use as they want for saving their materials and works. The aim of the personal learning environments is also to encourage students to reflect upon their practices of learning and to develop their independent and collaborative learning skills. These online environments are also available for students and academic staff outside the physical SLR, wherever internet access is available.

Depending on their different needs, there may be some differences in the final design of Smart Learning Rooms in each of the three universities. Two kinds of SLRs should be designed in the project, a smaller classroom and a bigger lecture hall type. The lecture hall type SLR will be located in Al-Azhar University in Gaza, whereas the two other universities have opted for classroom type SLRs. Each of universities will provide two rooms to be developed into SLRs

3. AIM AND RATIONALE FOR THE CREATION OF TELE-SLR

The aim of designing and building the technology enhanced learning environment, including the SLRs, is to provide the partner universities with flexible, pedagogically sound and sustainable facilities for advancing the use of ICT in teaching and learning. SLR should make it easy to try out new ways of teaching with ICT, collaborate efficiently in groups and to work with student centered teaching methods. TELE-SLRs are created to provide facilities for improving the quality of teacher education in the three universities. In addition, the objective is to organize support and training needed for the active use of TELE-SLR. Yet another important goal is to provide facilities to enact the pedagogical practices and diverse needs emphasized in other work packages of the project. SLR will also act as a lab for conducting any research related to the use of ICT in teaching and learning to provide sustainability through informing the ongoing development and improvement of teacher education degree programmes.

The rationale for the need of TELE-SLR is that adequate facilities are required in order to raise the quality of teacher training to meet the needs of the 21st century education in Palestine. The SLR is intended to be used by both academic staff and students. The SLR-TELE opens the way to extend the range of different innovative learning and teaching approaches that can be designed, developed and conducted. This supports the development of positive attitudes towards the use of ICT in education and also triggers interest towards conducting research related to the use of ICT in education. Well designed, functioning Technology Enhanced Learning Environments with efficient and effective technical support service provide a context where unique intervention studies may be designed to explore different ways of using ICT to raise the quality of teacher education and learning and teaching at primary school.

4. OBJECTIVES

4.1 Designing and Building Smart Learning Rooms

The design process of TELE-SLR is a collaborative group effort involving members from all of the Palestinian partner universities supported by colleagues from the European universities. Both academic and technical staff are involved in the process. The work around the development of the TELE-SLR is mainly conducted within Work Package 6. However, the design of the ICT utilizing courses conducted within Work Package 3 provide the educational needs in which TELE-SLR facilities aims to correspond with. The Work Package team members hold regular online meetings to discuss various aspects of the SLR concept. Working documents, drafts and other materials are shared via a dedicated Project Google Drive. Work done by individuals is shared with all for comments and feedback to create a common vision. A significant part of the planning process also takes place during site visits to Palestine as well as the study visits to Europe. The design process has been conducted from December 2015 to May 2016. A list of needed ICT equipment and software has been developed as well as a plan for renovating the rooms' interiors and basic infrastructure to fit the needs of operating the ICT equipment. The design process culminates in purchasing the equipment after which installation will take place.

4.2 Using the SLR as an ICT enabled learning laboratory

The SLR is a versatile teaching and learning environment which is not only used for teaching and learning but also for academic staff and students to experiment with creative use of technology to enhance teaching and learning. Thus, the SLR may be used as a laboratory to develop capacity for conducting research. In order to capture action within the rooms for later analysis, the SLRs are equipped with versatile audio-visual recording equipment. Conducting research into TELTA will also ensure that the ICT enhanced methods of teaching and learning stay up to date.

4.3 Producing SLR training materials

Training is essential to reach the full capacity of SLRs' resources. Academic staff need to be trained first so that they can guide students in using the SLRs. Training materials will be created to support staff learning of how to use the SLR effectively. In addition to printed manuals and information sheets, instructional videos will also be developed and available online. The material will show how to operate the installed technology, and also provide practical examples of its pedagogical use. Technical staff will also be trained to support the teaching staff in the use of SLR in appropriate ways. SLR-workshops are also to be held to enable academic staff to become acquainted and comfortable with using the technology. A support forum may also be created to provide a platform for questions and peer support from across the colleagues in all the universities involved.

4.4 Sharing good practices of teaching with TELE-SLR facilities

It is vital to recognise and share the good TELE-SLR teaching practices in order to reach the full potential of the rooms. Sharing the knowledge and good experiences will promote the SLR concept and increase the confidence and motivation to develop one's own teaching skills. Case studies of innovative practices will be conducted and uploaded and promoted online. Sharing of the practices with all the partner universities and wider can be done through a blog, social media groups and through the Project website. An active online community can also work as a support forum for users. This approach is designed to continue after project life, support ongoing research activities in the partner universities and assure continued sustainability.

4.5 Providing mechanisms and strategies to ensure continued updating and sustainability beyond project life

Provision of good quality ICT equipment is essential to ensure a long life-cycle. Where possible, equipment that may be updated will be selected. Developing teaching practices that are indifferent to the use of specific technologies or equipment will ensure that use of the room can continue after the equipment is updated or changed. Bring Your Own Devices (BYOD) policy is one example of such practice. Design of the SLR also takes into account that the equipment and technologies used are compatible between different operating systems and platforms to ensure wide usability. Getting the Faculty widely involved and demonstrating the value of using the TELE-SLR as a required and established part of the teacher education degree programmes will contribute to recognition of the importance of TELTA.

5. SLR CORE COMPONENTS

This section discusses the three core components of the TELE-SLR; namely, hardware, software and applications, and basic infrastructure and furniture.

5.1 Hardware

Hardware is the visible, tangible part of the SLRs. The rooms will be equipped with versatile ICT equipment that serves a pedagogical purpose and corresponds with the content of the planned courses. Hardware in the rooms can always be used in many different ways that provides a versatile platform for classroom orchestration¹ according to any present needs. Hardware composition of SLRs will fit needs of creating, presenting and sharing digital materials for and between users. Large size interactive screen or projector works as the medium for more conventional presenting and sharing of materials from online and offline sources. The interactive features can also be used to enhance teaching. Additional flat screens, without the interactive features, may also be installed at the sides and back of the SLRs. These may be used for presenting different content simultaneously, thereby reducing the students' cognitive load. Document camera (visualiser) can be used in many ways, such as visualizing physical objects to present to a large audience, taking photographs of them and sharing them via the wireless network or uploading to internet. Despite the examples of possible uses described in this document, it should be understood that each piece of equipment in the SLRs may be used in any way the instructor sees useful.

Laptops and tablet computers are provided for students and can be used in many ways, such as searching for information, creating digital content, making presentations etc. They can also be moved around the room and used in group work activities. Computers should be equipped with accessories like webcams and microphones to enable students to communicate with the outside world. The SLR is also equipped with other small equipment such as digital USB-microscopes and data-logger kits and different sensors, which can be used for specific purposes such as learning to teach aspects of science. Cameras found in tablets may be used to take photos and record video and offer many creative possibilities for students. The fact that they can also be taken outside of the SLR gives additional possibilities in how they may be used. Mobile devices and other small equipment can be borrowed by the student teachers and taken into schools during their practicum periods. This provides real opportunities for student teachers to fully understand the capabilities and possibilities offered by TELTA. In addition to the devices offered in the SLR, the students are also encouraged to bring their own smart devices (BYOD) and use them for specific tasks thereby learning how they may be used to support everyday teaching and learning. Secure storage and recharging cabinets are necessary for the laptops and tablets to keep them available throughout the day.

Floor roamers, Makey Makey kits, Lego Robotics kits, Raspberry Pi, Micro bits etc. can also be used for students to learn about programming for educational purposes. Recording devices with microphones and video cameras are installed to make it possible to record events in the SLR. The recordings can later be used for self-assessment purposes as well as for making lecture recordings, which can be viewed remotely by students. Also the possibilities offered to research data collection

¹ Dillenbourg 2013

should be noted. A WiFi connection and a control centre for different media inputs is necessary in order for the teacher to be able to smoothly control the numerous resources and devices. Rooms are also equipped with an effective sound system.

The following criteria were discussed and agreed among the WP6 team and have been applied in choosing the equipment: quality and durability, ease of use, future-proofness, maintainability, interactivity, impact on teaching and learning, best value for money, and availability. A detailed list of the required SLR equipment can be found as an appendix of this document.

5.2 Software and applications:

Software and applications operate behind the hardware equipment and make things happen. TELE-SLR will use well-known operating systems like Windows for its basic operation. It is important, however, to ensure that the chosen systems are not exclusionary to any others that are used, so that they can all be run together without limitations. A large amount of educational and other software and applications are available freely online. This way it is also possible to try out new software and applications and identify solutions to meet changing needs over time. Specialist Software, such as for people with Special Educational Needs (SEN) can also be purchased and installed on the computers in SLR as needed. Cloud based online application and storage space are offered to the users of the TELE-SLR and they will be used extensively in all teaching and learning in the SLR. The use of cloud services provides flexibility and capability to create and share material with others from different locations; for example by collaborate on creating the same document simultaneously, from within or outside university from homes and with varied personal smart devices. The provided online storage space allows students to save all the material they have created for later use and would also be available after they leave the university. The cloud services can be used in conjunction with other existing university systems including Moodle and Mahara.

5.3 Basic infrastructure and interior

Availability of fast, wireless internet access as well as internal wireless network for large number of simultaneous users is essential for efficient and effective use of the SLRs. Most of the devices and their intended use rely on working connections between the devices inside the room as well to the outside world. Lightweight, shaped tables and chairs can be organized flexibly according to prevailing needs, such as working in groups of different sizes. Suitable furniture caters for multi-le needs of students and supports the use of interactive learning methods. Abundance of electric power outlets with both standard and USB-sockets are also important to keep the many devices powered up during the day. Solid infrastructure is needed to guarantee the uninterrupted and efficient use of SLR. The lighting should be variable to avert the effects of bright daylight on the screens. Suitable materials and colours are used in the interior of the SLR to make it into an attractive and comfortable space, that is inviting and well-liked by its users. Acoustics are improved with acoustic panels or other materials to make working in the rooms more pleasant. Air conditioning is necessary to reduce the heat emitted by numerous electronic devices.

6. WAYS OF USING THE TELE-SLRS

6.1 What should the teacher be able to do?

Teachers should be able to flexibly facilitate various kinds of learning activities by utilizing ICT equipment and digital resources, online and offline. The hardware equipment including tools for presenting and sharing contents, as well as creating them, with a plethora of digital resources at his or her disposal provides extensive choice over how to enrich teaching in any way that is seen appropriate for the given subject. For example, a document camera may be used in several ways for different purposes, like demonstrating physical objects or experiments or showing printed texts or pictures to the audience.

The teacher is able to give the students creative and challenging tasks enhanced with digital materials and expect them to create digital contents themselves. With web conferencing and recording equipment installed in the room it is also possible to make live online broadcasts or recordings for distance learning and self-evaluation purposes. The teacher can also use synchronous and asynchronous online communication in many different ways; from messaging to assessment and giving feedback. He/she may also use recording equipment to collect research data, create recorded lectures and share them online.

6.2 What should the students be able to do?

Students should be able to easily access information and other resources online either with their own devices, such as smartphones, tablets or laptop computers provided for them in the SLR. These devices may be used in many ways; e.g. to produce digital materials like video and photos, writing texts, managing blogs, and communicating with others. With their cloud service and storage space accounts they can easily share and edit documents together whether they are inside the SLR or at home. Collaborating in groups is a standard procedure of teaching and learning in SLRs and easy because of movable tables and chairs that can be rearranged into different formations according to the learning purpose. Wireless connection between devices in the SLRs also makes it easy to share documents and files with everyone in the classroom, or with online participants. Students are continuously connected to the vast online resources of applications and information, and are encouraged to find and recognize the right ones to use according to their needs. Students are equipped to create all types of documents, presentations and learning materials themselves. The array of specific accessories; for example, digital microscopes, can be used to demonstrate new ways of teaching science. Recording equipment can be used to enhance micro-teaching by allowing the student teachers to see themselves on video and engage in reflective and analytical discussions.

Borrowing the equipment, such as tablets and sensors, to be used in schools during practicum periods makes real the possibility of introducing ICT in practice in real school settings. Portability is therefore an important factor in purchasing certain equipment.

6.3 What are the expected outcomes of the use of the SLRs?

As an outcome the students will have positive attitudes towards using ICT in their learning and will know how to use it to extend, enhance and transform their process of learning. They will also be able to identify pedagogically justified and efficient ways to utilize ICT in teaching to improve the learning outcomes of the children that they teach at school during practicum. The TELE-SLR will provide the physical and virtual locations within which students develop and test new 21st Century skills involving the use of ICT; including collaborative and participatory working, inquiry based learning, communication and media skills, as well as creativity, innovation and problem solving skills. Students will also have more control over their own learning as they have more choice over the resources they are using. Academic staff will also develop their skills, capacity and confidence in using ICT to enhance their teaching and the learning of their students. The TELE-SLRs provide the locus for students and academic staff to fully appreciate the benefits of using ICT in education and the catalyst for them to continue to develop their skills outside the SLR. The ongoing research into the use of the TELE-SLR and its impact upon TELTA will ensure ongoing innovation and development of sound pedagogical teaching practices that utilise opportunities afforded by ubiquitous ICT.

REFERENCES

Dillenbourg, P. (2013) Design for Classroom Orchestration. *Computers & Education* 69, 485 - 492.

APPENDIX: SMART LEARNING ROOM EQUIPMENT LIST

This is the list of equipment needed for the Smart Learning Room (SLR). The list is divided into five categories: 1) Hardware Equipment, 2) Subject Specific Learning Equipment, 3) Software, 4) Network Devices, and 5) Furniture.

1. Hardware Equipment

- Interactive whiteboard with WiFi connection and integrated computer unit
 - Accessories: movable stand with adjustment for height and tilt, wireless keyboard and a mouse
- Interactive projector
- Flat screens (non-interactive)
- 360-degree video camera: videocamera capturing a 360 degrees wide video footage
 - Accessories: tripod-stand
- Tracking video camera system: video camera system, that automatically tracks the instructor, (incl. wireless presenter and audience microphones)
- Condensing USB-microphone
- Audio system supporting several microphone inputs and outputs. System includes an audio mixer.
- Portable video cameras
- Digital still cameras
- Tripod stand for video camera and still camera
- PC laptops
 - Accessories: headphones, mice, webcams, usb-microphones, carrying cases
- Tablet computers
 - Accessories: covers
- Charger trolley: for charging and storing the laptops and tablets.
- Document camera
- Video switcher: a system to control the digital media input and output sources for the different screens and other devices
- Speaker system: surround speaker system with centralized control for sound and volume.

2. Subject specific learning equipment

- Digital USB-microscopes
- Portable USB-document cameras
- Data loggers
- Floor roamers (simple programmable robots)
- Extendable robot building kits
- Invention kits (Makey Makey; Raspberry Pi)
- Digital voice recorders
- 3D-printer
- 3D virtual reality glasses viewer set (holders)

3. Software

- Educational software tools, subject specific programs and applications
- Software for special education needs: e.g. PECS

4. Network Devices

- Routers
- Access points

5. Furniture (to be provided through co-financing)

- Movable power outlets for student devices: standard and USB type
- Storage cupboard for equipment
- Flexible and movable small tables
- Wheeled chairs
- Adjustable curtains
- Variable lighting
- Fitted carpet
- Acoustic paneling
- Sofa

