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| **Deliverable Title** | ***Integration of Remote Labs into VLE*** | | |
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| **Organisation Name(s)** | ***UNED, PSUT, HU and UoJ*** | | |
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| **WP Leader** | **UNED** | | |
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Integration of the remote labs at the 4 Jordanian partner universities into the VLE was carried out by a team led by UNED and working together with PSUT, HU, UoJ, JUST and MUTAH. The objective of this task was the final integration of the remote laboratories and its associated services into the VLE. UNED has first created a Moodle server as example and a test bank for the prototypes, located at http://mercurio.scc.uned.es/moodle/ with version 1.9 and deployed with a MySQL database server. The server was finally placed at the link http://muree-vle.psut.edu.jo.

A management system middleware for its federation, a Moodle plugin was first developed so the remote laboratories can be easily accessed from the VLE Moodle. The details of this plugin were discussed during a meeting in Amman on 26 November 2014. UNED has actually hosted a special workshop in January 2015 to explain the integration of the remote laboratories into a RLMS such as RELATED and the integration with the VLE. Lecturers, engineers and technicians from Jordanian partner universities learned how to integrate the remote laboratories as an activity into their courses. The access to the remote labs via the VLE can be shown in Fig. (1).

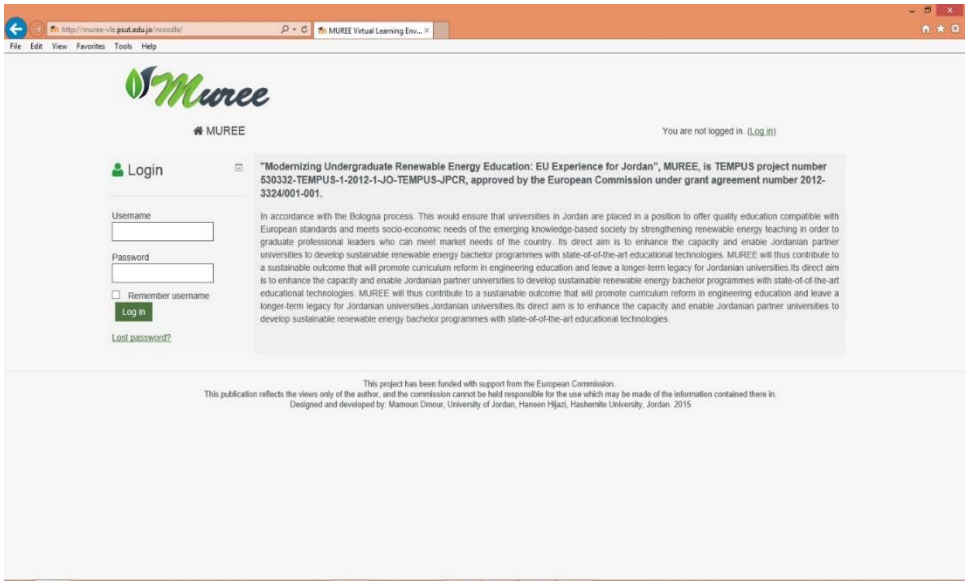



*Fig. (1) Snapshot of VLE Home Page.*

The environment of the VLE and its content including the eLearning courses, traditional courses, remote labs, surveys, and other information recommended for the user such as news, announcements, attentions, etc, are displayed as shown in Fig. (2).

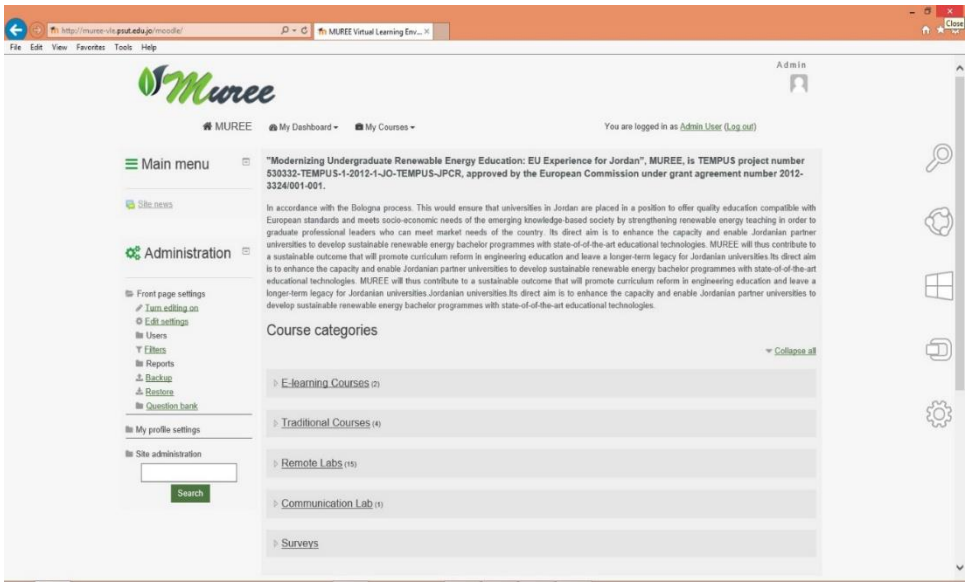



*Fig. (2) Snapshot of VLE Content.*

Students can view all experiments in the remote lab by visiting the main title of the content as shown in the Fig (3), in particular the remote labs that contains the 15 experiments in the 4 different universtities (PSUT , HU , MUTAH , JUST) which can be accessed just by click the experiment name.

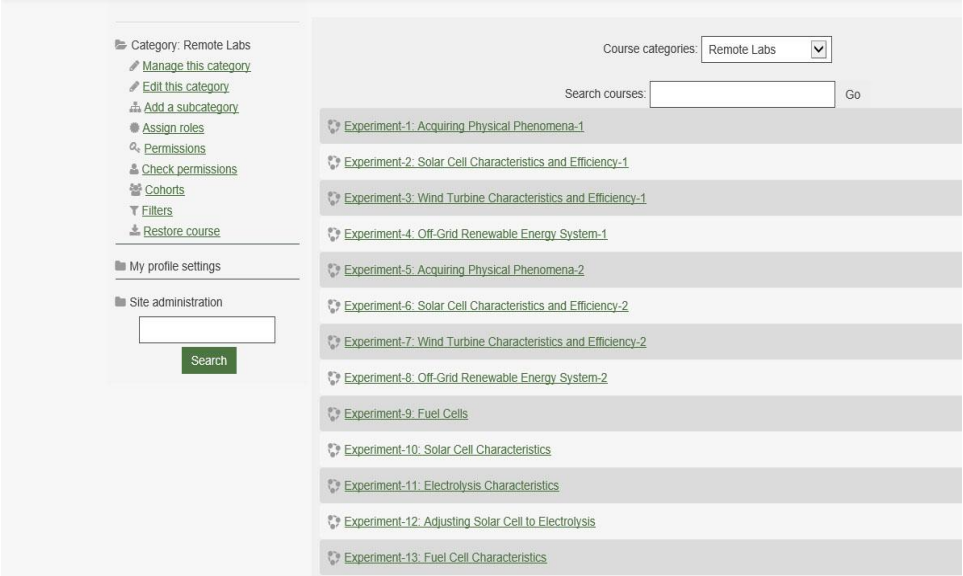



*Fig. (3) Snapshot of E-Learning Courses Page.*

Students are actually provided with a full description of the experiments and the steps on how the experiment work and how to deal with the experimental kit. The descripetion contains videos, charts, graphs, downloaded documents, etc, as shown in the Fig (4).

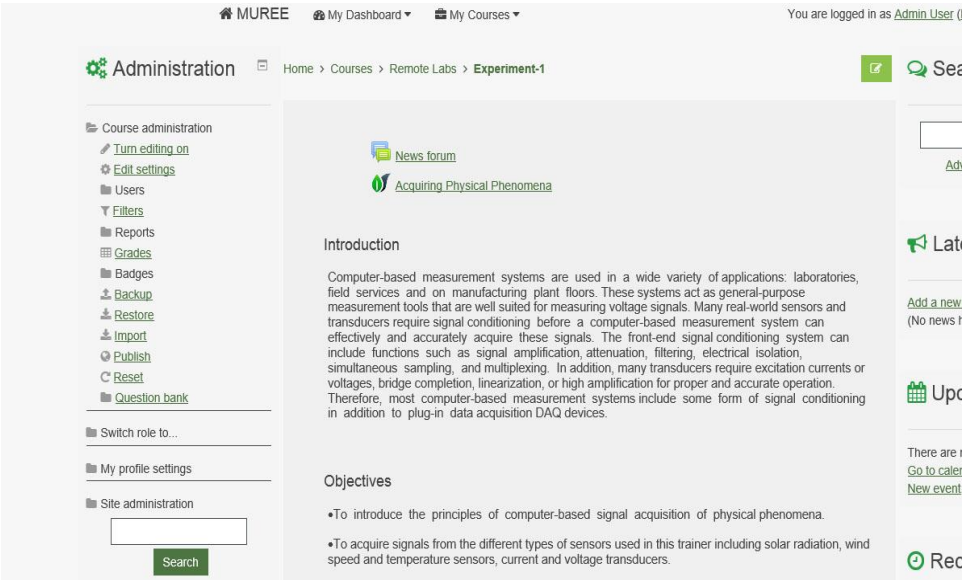



*Fig. (4) A Description and Manual about the Experiment.*

After reading the experiment manual, students will be prompted for scheduling process to book a slot of time,as shown in the Fig (5). Every student will have her/his own duration of time for the experiments and number of allowed sessions. The student will be showm a list of all booked sessions. so every student have to wait for the experiment starting time.

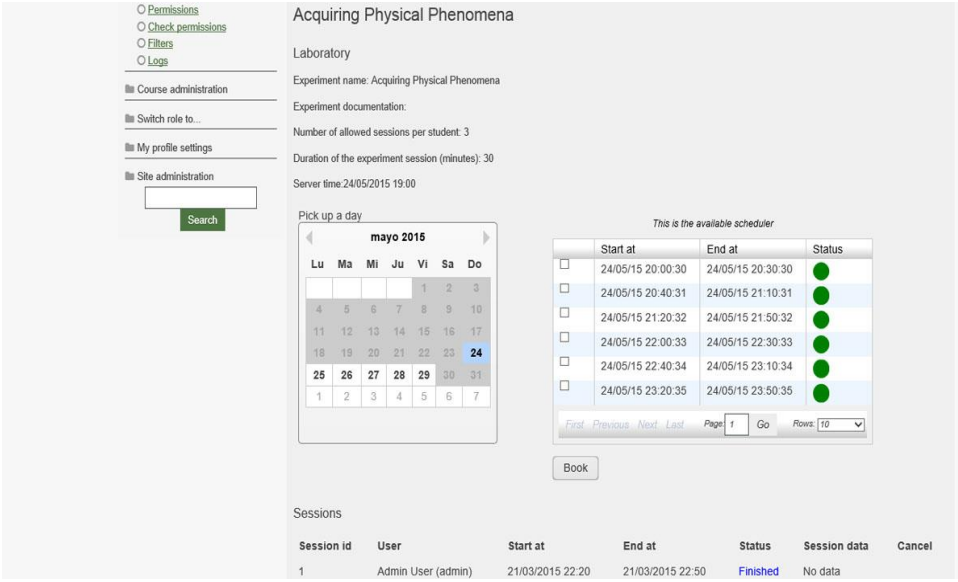



*Fig. (5) Snapshot for Scheduling Process of an Experiment.*

The main interface of the experiments and a live webcam streamin of the kit are then displayed and a brief on the main hardware is given together with a flowchart for the user interface of the experiment are shown as in the Fig (6).

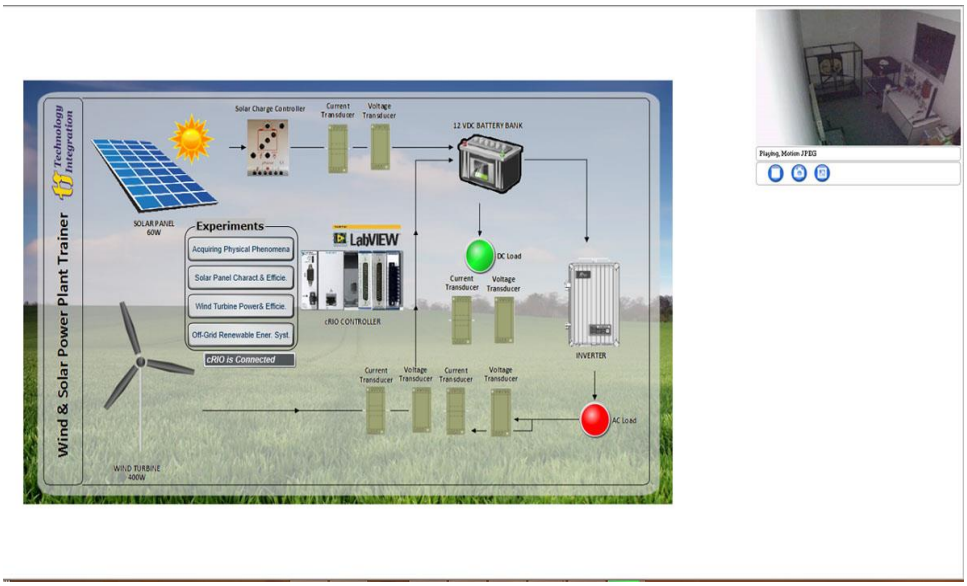



*Fig. (6) Snapshot of the Kit Experiments List.*

Thereafter, the user interface of the experiment itself is displayed to enable students to start working with the avaiable controls such as changing the Ampere, turn on light source, reading the room tempreature, etc, as shown in the Fig (7). Every student has to apply the manual steps and how the kit process the data.

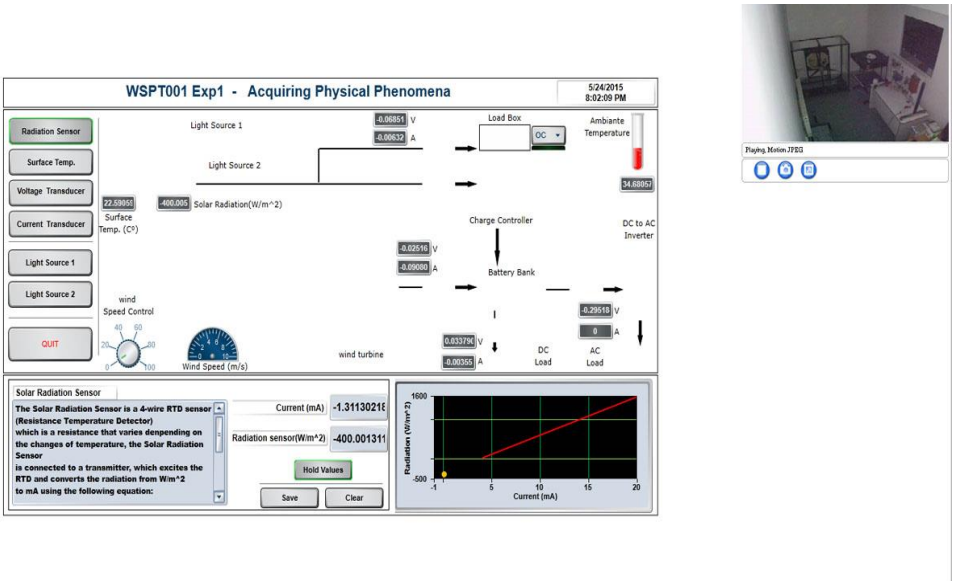



*Fig. (7) Snapshot of the Experiment User Interface.*

Students can then make sure that the kit responses to the user interface controls and changes of the values through checking the webcam live streaming of the kit as shown in the Fig (8). This is the moment of turning on the light source 1 in the experiment, for example.

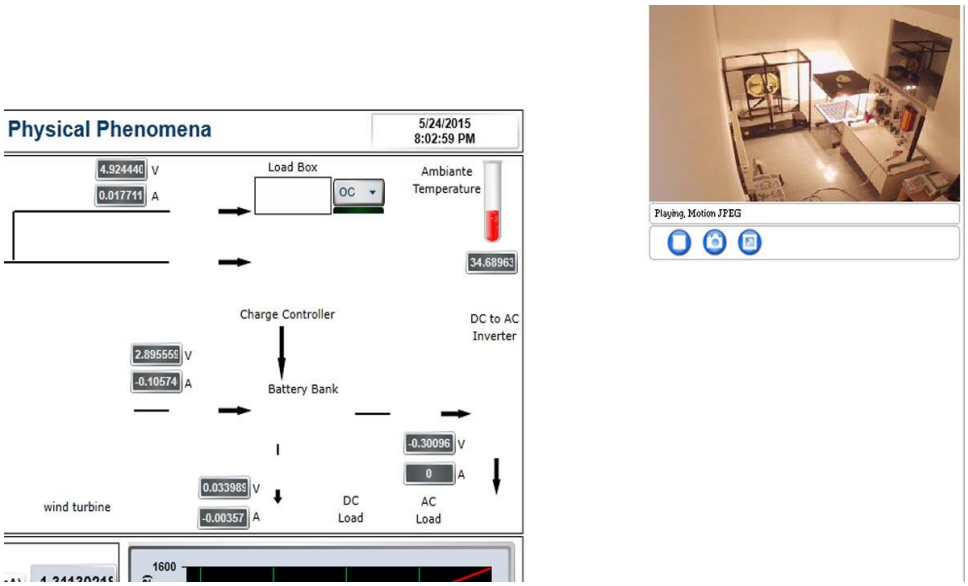



*Fig. (8) Snapshot of Webcam Live Streaming.*

At the end of the experiment and before finishing of the session, students have to make sure that everything is done correctly and allow for a proper time to download the results by clicking the save button . A copy for the student and other copy for the teacher as shown in the Fig (9). Students have to analyse the results according to the results excel file. A graphical chart saved to the results file too as shown in the Fig (10). A complete video showing the integration of remote labs into VLE is posted onto the home page of the project's website at the dissemination area.

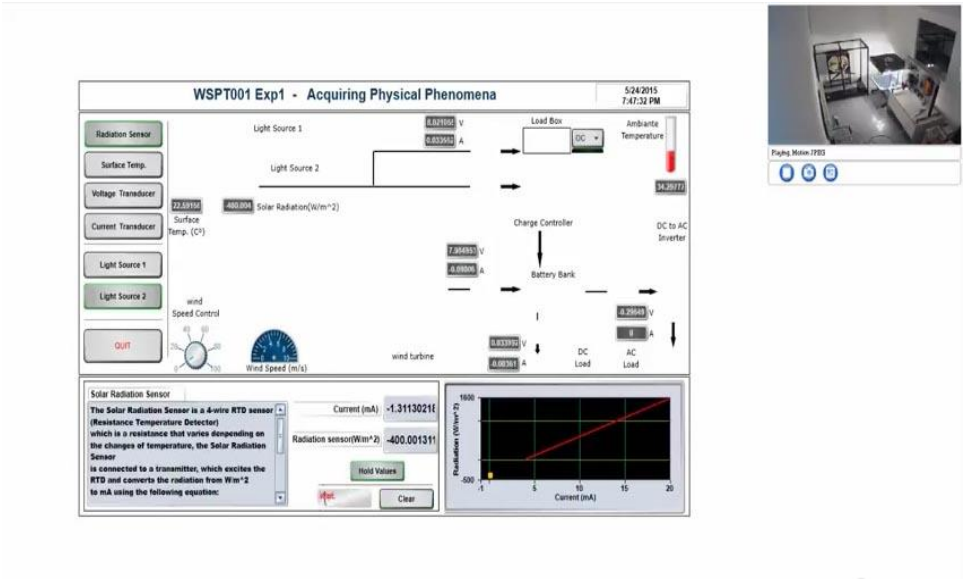
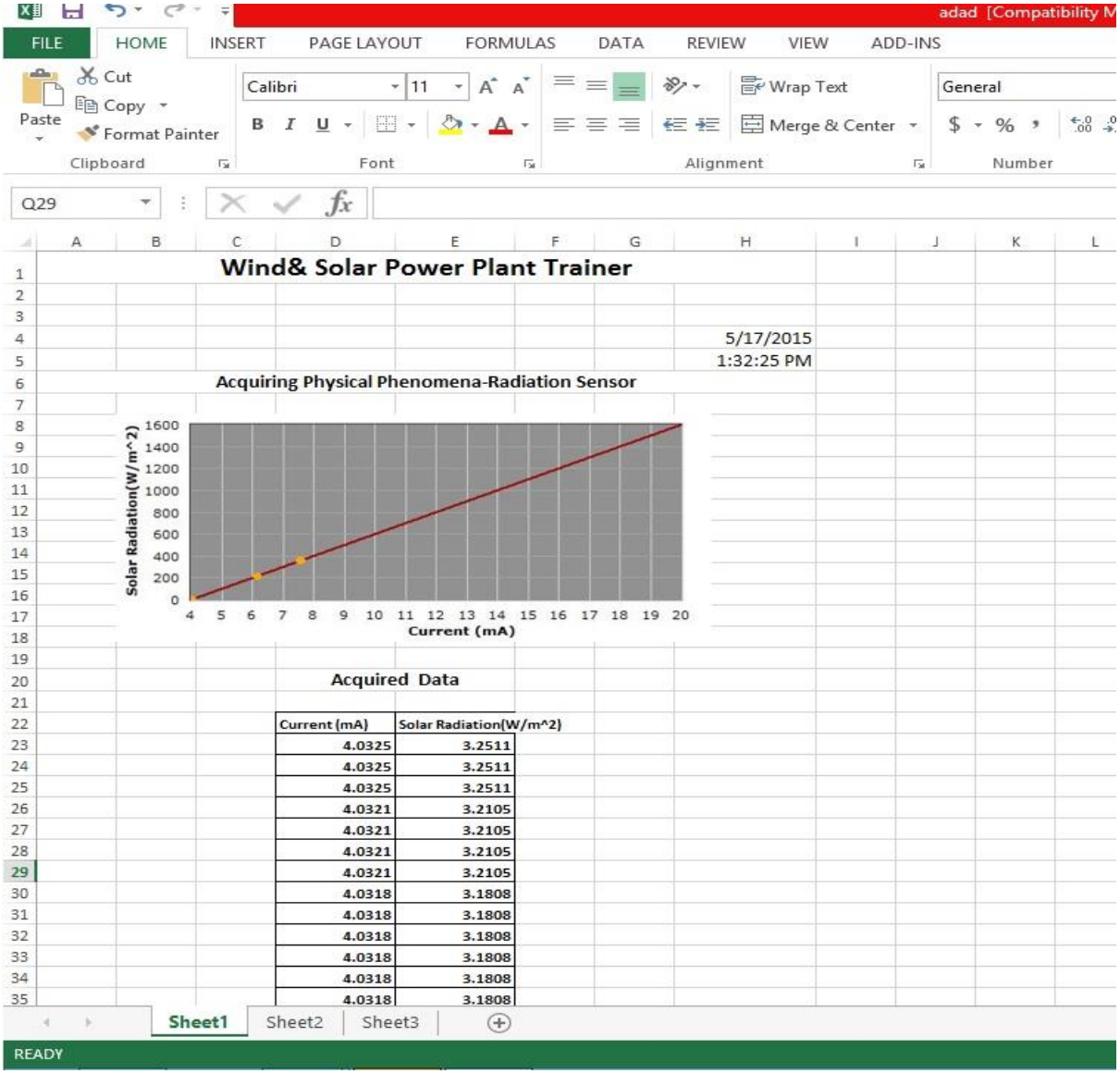



*Fig. (9) Snapshot Saving the Results Process.*




*Fi g. (10) Snapshot of the Results File (Excel File).*