Exploitation plan for

Problem based Learning Lab

ISRA University, Hyderabad

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Content

1. Name of the lab 3
2. Faculty in which the lab belongs 4
3. Purpose of the lab 5
3.1 Guidelines for use 5
3.2 Activities and courses 5
3.3 Characteristic use of the lab in a specific course 6
3.3.1 Design and Analysis of Algorithms 6
3.3.2 Final year project 8
3.3.3 Human Computer Interaction 9
4. Resources 11
4.1 Equipment 11
4.2 Staffing 11
4.3 Financial support 11

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

1. Name of the lab

The name of the lab is “Problem-Based Learning Lab”.

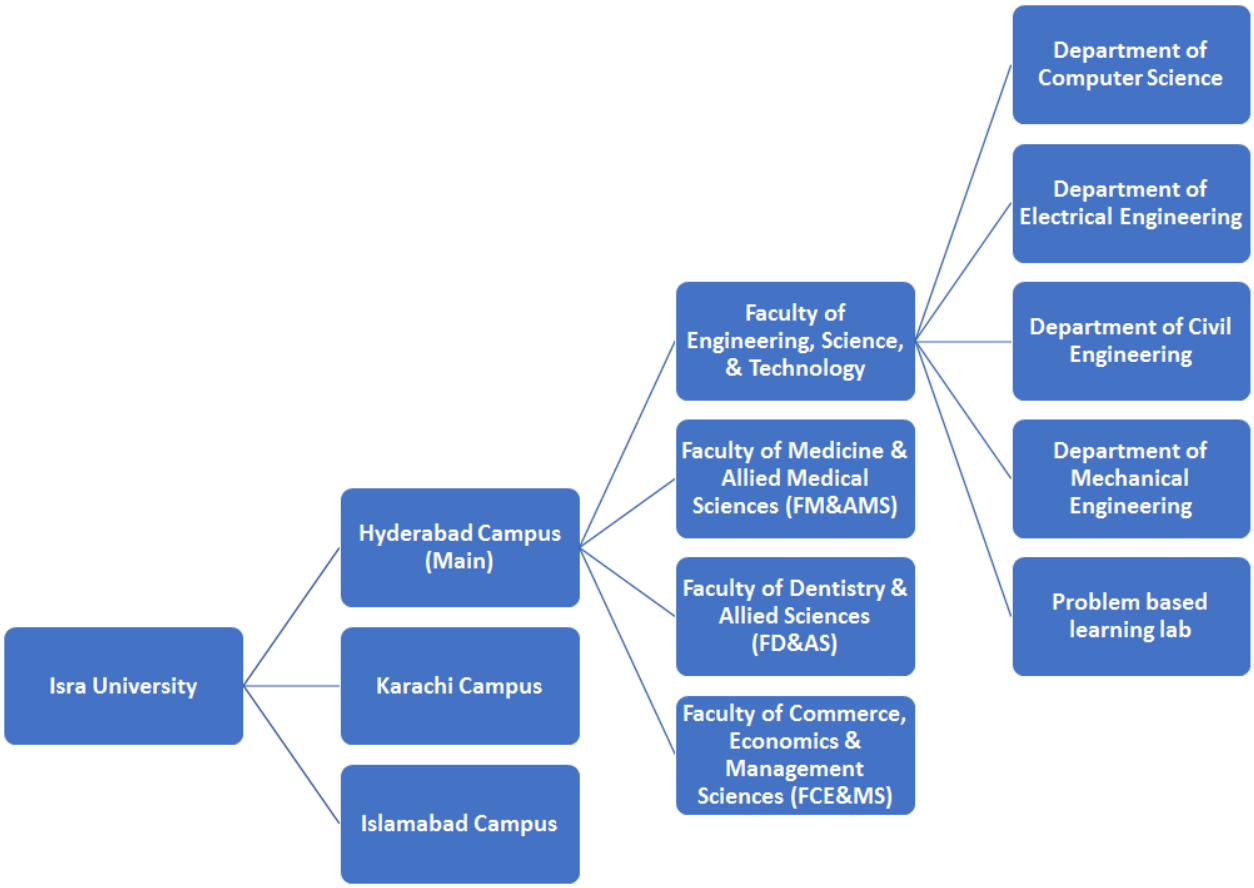

Figure 1. ISRA University organogram showing the Problem-Based Learning Lab.

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

2. Faculty in which the lab belongs

ISRA University, Hyderabad campus offers various degree programs in 4 faculties. These faculties are:

1. Faculty of Medicine and Allied Medical Sciences.
2. Faculty of Dentistry and Allied Sciences.
3. Faculty of Commerce, Economics & Management Sciences.
4. Faculty of Engineering, Science and Technology (FEST).

The Problem-Based Learning (PBL) Lab is established in Academic Block B of ISRA University, Hyderabad campus and it is accessible to all faculty members of all departments of FEST.

More specifically, the following departments use the lab:

1. Department of Computer Science.
2. Department of Electrical Engineering.
3. Department of Mechanical Engineering.
4. Department of Civil Engineering.

Figure 2. The entrance to the Problem-Based Learning Lab.

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

3. Purpose of the lab

The Problem-Based Learning Lab can be used by all faculty members of FEST who intend to use equipment available in the lab in their courses, use problem-based learning practices in the courses, or supervise problem-based related projects in the courses that they teach or final year projects.

3.1 Guidelines for use

The faculty members of FEST who intend to use the Problem-Based Learning Lab in their courses are expected to inform the departmental subject allocation committee who further informs the timetable coordinating committee to allocate the Problem-Based Learning Lab to specific teachers. This will ensure there is no clash in the Problem-Based Learning Lab timetable. The Information Technology Support Services (ITServ) department receives a copy of the timetable, allocates the use of available equipment in time slots, and resolves issues (if any) before the start of the semester. The staff that works at the ITServ department is also responsible for opening and closing the Problem-Based Learning Lab for the faculty members to use and regularly, before and after the Problem-Based Learning Lab use, inspect the equipment record to ensure that units are in working condition. Faculty members will be introduced upon request to the ALIEN digital learning platform by the coordinating person of the ALIEN project so that platform may also used in the courses.

3.2 Activities and courses

The list of courses in which the equipment available in the Problem-Based Learning (PBL) was used in the August 2019, January 2019, and August 2020 semesters is as follows:

- Introduction to Algorithms.

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

- Advanced Computer Networks.
- Final Year project.
- Object Oriented Software Engineering.
- Basic Electronics.
- Programming Fundamentals.
- Human-Computer Interaction.
- Software Quality Assurance.
- Object Oriented Programming.
- Data Communication and Computer Network

3.3 Characteristic use of the lab in a specific course

Following are the details of some of the courses in which PBL and the lab equipment of the PBL lab are used.

3.3.1 Design and Analysis of Algorithms

3.3.1.1 Description of the course

The Design and Analysis of Algorithms course introduces students to the design and analysis of algorithms and covers topics that include applied theoretical tools and techniques for analysis of algorithms, such as recurrence relations, amortization and counting, computation and reasoning on the upper and lower asymptotic bounds of the performance of algorithms, and selecting appropriate algorithms that are expected to have higher performance in a given situation.

3.3.1.2 Description of the participants

The course is mandatory for 2nd year students in the Bachelor of Science in Computer Science program. It is also an elective in the Bachelor of Science in Software Engineering and the

Co-funded by the Erasmus+ Programme of the European Union
The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Bachelor of Science in Information Technology programs. Approximately 50 students are enrolled in the course each academic year. This is an advance level course. Participants of the course have been exposed to the problem-based learning. They apply active learning for the design and analysis of algorithms related to their complexity time and space.

3.3.1.3 Description of active learning activities deploying ALIEN methodologies and tools

Students were exposed to active learning in the ALIEN Problem-Based Learning Laboratory. During the course, students performed practical activities. They followed specific steps given by the teacher to solve specific exercises. The goal of the exercises was to develop understanding of sorting and searching concepts in the analysis of algorithms. Firstly, students performed manual sorting on a deck of cards. Students performed sorting by selecting the smallest card in the unsorted pack and moving the card to a second hand. The activity was concluded when all cards have been removed from the unsorted hand; at that time the second hand contained the card in sorted order. Time taken to sort all the cards was recorded.

Steps:

1. Get a hand of unsorted cards.
2. Repeat step 3 and 5 until the unsorted hand is empty.
3. Compare unsorted cards.
4. Select the smallest unsorted card.
5. Move this card to the sorted hand.
6. Stop.

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

3.3.2 Final year project

3.3.2.1. Description of the course

The purpose of this year-wide course is to let the students go through all the major steps of the project design and development including brainstorming and planning, requirements and feasibility analysis, design, development & coding, integration and testing, implementation and deployment, and operations and maintenance.

3.3.2.2. Description of the participants

The final year project is also a mandatory lab-based course for the 4th year students in the Bachelor of Computer Science (CS), Bachelor of Software Engineering (SE), and Bachelor of Information Technology (IT) degree programs. This course is split into two semesters and each student registers it both the first and second semester of the 4th year of the degree program.

3.3.2.3 Description of active learning activities deploying ALIEN methodologies and tools

The students typically form a group themselves where each group cannot have more than 4 students. Each group is allotted a project supervisor with whom they timely coordinate, report progress and discuss issues related to the project. Each group gives three presentations to show the progress and get feedback from the committee. These presentations include project proposal which is given at the start of the first semester of the project, midway presentation which is given in-between the end of the first semester and before the start of the second semester of the project, and lastly, the final presentation at the end of the second semester of the project. One of the groups developed a home automation system using gesture recognition. Currently, two groups are exploring the use of augmented reality and virtual reality for learning of students in the classroom environment.

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

3.3.3 Human Computer Interaction

3.3.3.1. Description of the course

The objectives of the Human Computer Interaction (HCI) course are as follow:

1. To provide students with a broad view of both theoretical and practical issues in human factors for the design of human-computer interfaces.
2. To equip students with knowledge and understanding of the nature of human computer interactions, human characteristics, computer system, and interface architecture
3. To equip students with sound skills in design, development, and evaluation of user interfaces

By the end of the course, the student is expected to:

1. Understand and appreciate the human factors and the theoretical issues involved in human-computer interaction
2. Apply the theoretical design principles to the design and evaluation of user interfaces;
3. Collect user requirements, design a human-computer interface according to these requirements, and evaluate the design

3.3.3.2. Description of the participants

The Human Computer Interaction (HCI) course is mandatory for the 3rd year students in the Bachelor of Computer Science (CS), Bachelor of Software Engineering (SE), and Bachelor of Information Technology (IT). The HCI course consists of two theory classes and a lab of three hours every week. The course was partially conducted physically and partially online due to an ongoing pandemic.

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

3.3.3.3 Description of active learning activities deploying ALIEN methodologies and tools

As a part of the course, students were given exposure to all the equipment available in the PBL. Several topics were covered as a part of theory including interaction paradigms, interaction frameworks, interaction styles, interaction design process, conceptual design, physical design, evaluation, design principles, interaction design models, and usability testing. The lab sessions provided students an opportunity to use the available equipment for the design, development of the proof of prototype, or its evaluation by the users or the experts using the typical steps of design lifecycle including requirements specification, designing alternatives, prototyping, and evaluating. For instance, as a part of the heuristic evaluation topic, students were asked to evaluate the augmented reality and virtual reality applications using augmented and virtual reality design heuristics to identify the issues that need to be fixed in the application.

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

4. Resources

4.1 Equipment

The following list of equipment is available in the Problem-Based Learning Lab:

1. 2 HTC VIVE virtual reality systems HTC.
2. 3 Oculus rift and touch virtual reality system.
3. 2 LEAP motion VR DEV bundle.
4. 1 PIPO X9s, Box Android TV 8.9-inch Tablet Mini PC.
5. 3 workstations with INTEL core i7, 8700K, 8th Gen, ASUS motherboard ROG Strix B360, 32GB RAM, DVD writer, Corsair 200R casing, Corsair power supply, GIGABYTE GeForce graphing card, Logitech keyboard and mouse.
6. 3 HP Monitors 27 Inches - 27F.
7. 1 Apple MacBook Pro 15.

4.2 Staffing

All labs across the university are managed and maintained by the staff of ITServ department. ITServ staff members are hired by the ISRA University. They regularly inspect the condition of all equipment to ensure that units are in a working condition and fix any issues that may arise. The staff that works at ITServ provides access to the lab before the start of a lab session and closes the lab after the session is over.

4.3 Financial support

The laboratory equipment requires timely maintenance to ensure the working condition of the units. All departments submit foreseen maintenance costs as part of their annual departmental budget for approval by the administration. Each department then uses the allocated

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

maintenance budget for the maintenance of the equipment. Similarly, the equipment of the Problem-Based Learning Lab will also be maintained from the same organizational budget after the completion of the project. The Problem-Based Learning Lab will be taken care of by regular ITServ staff. Therefore, no additional staff will be hired to look after the Problem-Based Learning Lab and its equipment.

586297-EPP-1-2017-1-EL-EPPKA2-CBHE-JP

Co-funded by the Erasmus+ Programme of the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.