

crammed into the classroom framework were then allowed to be explored by project groups in compelling ways that class time would never have achieved. For example, a project regarding the historical motivation behind Green's Theorem and its proof paved the way for deeper understanding of not only the theorem in question but also of other concepts that bear resemblance to this one. In addition, students explaining a concept to each other has an immeasurable impact on the classroom dynamics, transitioning from a teacher-centered environment to a purely student-centered one.

4.2.5. Software. The use of mathematics software, such as Maple [9], was particularly useful in courses such as Calculus II where visualizing functions in two and three variables can pose significant challenges. The software allowed students to be able to plot all kinds of parametric, multivariable functions and polar functions that would otherwise be cumbersome tasks by hand. This made for a richer experience in the classroom as functions were projected directly onto the whiteboard and discussions about their properties could easily be demonstrated. The software also had all the flexibility that would allow students to manipulated mathematical arguments and visualize the changes occurring when parameters are altered.

The Computer Science faculty also taught the Calculus I course at one point as well and it made use of the Python programming language to exhibit approximations and iterative calculations through computers. In order to facilitate graph plotting through observations, an animation of a boat moving at different velocities was displayed to the students. The animation was created using the language C++ and the Simple Direct Media Layer (SDL) [10] and displayed to the students on a projector. This ended up saving time as we did not need to perform any experiment and also helped us in creating variety as we were able to program the motion of the boat by using different mathematical formulae. This made the class both interactive and interesting as the students could relate well between the real world and the method of observation to record data. The students then plotted the observed graph and tried to come up with the mathematical equation of every plotted graph. This method of teaching is a far cry from what these students are normally used to and it resulted in making the Mathematics classes popular.

5. Observations

The strategies employed with the freshmen and sophomores helped to significantly improve student engagement and understanding as it managed to fill the gaps in their previous education. We believe that such initiatives increase student focus and help them

develop the necessary skills to perform well in the university environment. We also realize that the university is an experimenting ground where not only the students come to experience a vast number of different teaching techniques but the teachers themselves experiment with different tools and ideas to enhance the overall learning of the students. This is an evolving process and will require a few iterations in every course before we come up with a plan that maximizes learning.

Table 1. Course Evaluation

Course Evaluation	Section A	Section B
The syllabus clearly stated course objectives and learning outcomes	3.82	4.14
Grading criteria was clearly stated in the syllabus	3.73	4.14
The material presented in the course was consistent with the syllabus	3.27	3.71
The material presented in the course was engaging	3.55	4.57
The material presented in the course increased my knowledge	4.18	4.43
The homework was appropriate to the level of the course	3.20	3.80
Assignments helped to increase my knowledge and confidence in the subject	4.00	4.20
The course provided knowledge and tools I will use in the future	4.20	4.43
The course challenged me in ways that encouraged my intellectual growth	3.91	4.57
I would recommend this course to my friends / peers	3.73	4.29

Table 1 contains the evaluations regarding the Computational Thinking I course which contains elements from logical thinking, programming and discrete mathematics. It is a course that provides the students with these core experiences. All the evaluations are done on a scale of 1 to 5 where 5 stands for highest satisfaction.

Table 2 exhibits the satisfaction of students with regards to the instructor. We can see that the trend is very close to a level of 4 which is quite good in a class which contained an average of 24 students. We feel that the students were overall satisfied with both the course and the instructor which for us is a very good sign and a reason for motivation towards implementing new pedagogical techniques.

Table 2. Instructor Evaluation

Instructor Evaluation	Section A	Section B
The instructor clearly communicated the syllabus	3.90	4.29
The instructor was prepared for class	4.55	4.57
The instructor presented course material in an organized manner	4.27	4.29
The instructor stimulated my interest in the course	3.55	3.86
The instructor showed respect towards students	3.91	4.00
The instructor encouraged class participation	3.82	3.71
The instructor was available during specified office hours	3.91	4.00
The instructor provided timely feedback on assessments	3.90	4.00
The instructor provided reasons for grades assigned to me	3.80	3.83
I would recommend this instructor to my friends / peers	4.09	4.14

We have also observed that the traditional methods of teaching in the university have inherent problems as they do not enable the students to become self-directed, which is extremely important for undergraduate and higher studies. We believe that the amount of active and project-based learning should be encouraged wherever possible in order to give the students a hands-on experience and to understand the utility of their education. Engaging the students on a personal level helped immensely as it gave the students an opportunity to apply their knowledge under supervision and reduced their reluctance in communicating with their instructors. Active learning gives them a sense of ownership as students get emotionally invested in their effort and are eager to learn more, something that we do not generally see in the traditional teaching methodologies.

We also observed that collaboration between students and teachers from different departments produces some interesting combinations. Each individual from a different department brings his/her own way of thinking and the discussion leads towards something new and creative. This continuous exposure between the School of Science and Engineering and School of Arts Humanities and Social Sciences helps in providing a unique productive atmosphere which is unique and one of its

kind in Pakistan. Liberal Arts education provides a unique perspective to the engineering subjects which also helps in improving pedagogy across all disciplines.

6. Conclusion

Habib University has brought a transformative Liberal Arts and Science education experience to Pakistan. In our pursuit to be at the forefront of educational reform in Pakistan, we looked into the problems that might hinder us in achieving this goal especially in the subjects of Computer Science and Mathematics. We focused on the state of understanding and knowledge of the students that were inducted in the university in the past three years and tried to identify and fill the deficiencies that we encountered through pedagogy. We are using new ideas, design spaces, software and techniques to improve the students' understanding of scientific subjects. We are also trying to increase the interest of liberal arts students towards scientific subjects in order to create a better cohesive atmosphere between the people of different departments may they be teachers or students

A combination of flipped classroom, student engagement dialogues, and project-based learning proved useful in improving the learning process and gave timely feedback to the instructors. Students were also provided with evaluation forms in order to get feedback on the various courses and instructors to ascertain whether there was an atmosphere provided to the students that improved learning. The response has been positive, and we believe that this will only improve with time due to constant revisions and improvements.

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