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Gamified Approach Towards Time Table Management System

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Abstract: This paper is an implementation of a new interface for creating a timetable of different courses for the University/ School. This is an interface where students will have flexibility to fill their own preferences or choices for timetable based upon their different requirements. In a University/School there are many lectures, labs, rooms, sections, teachers etc., which should be arranged in such a way so that time slot problem must be solved and resources must be assigned effectively for satisfactory timetable.

This is the result of survey satisfaction of timetable system with fulfillment of all constraints and solutions with respect to faculty, student and resources so that both are satisfied. Here an opportunity is given to all the students to design their own timetable through an interface which already contains typical constraints/challenges predefined by academic operations coordinator in all respects. The feedback given by students on this is also being considered for further action and students are also agreed upon their regular feedbacks on this interface.

Keywords: Constraints, Gamification, Gamified, Preferences, Pedagogies Tools, Questionnaire.

1. INTRODUCTION

Gamification is the concept of applying mechanics and techniques to engage[1] and encourage user to take interest[2] in creating timetabling system. Basically it is to provide a way through which it gamifies[3] the traditional way of creating timetable. And also making the interface easier to operate and interactive for creating timetable.

It is an effort to improve user engagement, comfort of use and helpfulness of systems while creating timetable. There are many Schools/institutes/universities[4] where they have to set the timetable for the scheduling of classes manually[5]. It may happen that the timetable which is being allocated by the University/School for different courses may not be satisfying all constraints[6] for every student as well as for faculty members.

Moreover creating a timetable is a very essential task[7] which takes much time to design and after all this regressive exercise; it becomes very important that academic coordinator must be able to satisfy all the users of this system. So creating a timetable along with so many constraints is not an easy task. One may observe following timetable constraints:

1. Capacity of rooms
2. Number of students
3. Faculty timings
4. Student timings slot
5. Room availability
6. Overlapping of resources
7. Break time etc.

While designing a timetable there are so many constraints as listed above which are required to be taken care of. It is really important to determine the time slot of both faculty as well as student for better timetable and moreover satisfaction of all the constraints is also very crucial in this.

Therefore we are looking for key areas which can really affect the complete system/process. To implement this on better grounds, we conducted one survey about the timetable in the School of Computer Applications of Lovely Professional University, Punjab. After considering and analyzing survey results, we have implemented the same.

2. CHALLENGES

Typical challenges/constraints have been divided into two major categories:

1. Hard Constraints
2. Soft Constraints

Hard Constraints are the constraints which have to be followed by making timetable. Hard constraints are having higher priorities. In other words we can also say that hard constraints are constraints[8] which cannot be avoid.

Hard Constraints on which we are going to focus on are :

1. Classes timing should be in between 9-5 only.
2. At least one hour lunch break should be there for every section/faculty member.
3. It must be 5 days / 6 days a week i.e. as per guidelines.

Soft Constraints on which we are going to focus on are :

1. Not more than 4 consecutive lectures in a day.
2. There should be some free time slot allotted for Muslim prayers or any curricular activities.
3. There should not be 3 hrs. / 4 hrs. Gap between classes.
4. Not more than 4 theory classes in a day.

3. RESEARCH APPROACH

As we know that there are so many different kinds of courses provided by the University. Each course contains Lectures, Tutorials and Practical as per their requirement. So there should be a way through which all these classes should be arranged properly. So, the University needs to create a timetable in such a way by which students are satisfied with their timetable[9]. In the current scenario, administrators are making timetable and are considering their own constraints only. The constraints are listed above.

At the end final timetable is just handed over to the students which is fixed. Students have to follow that timetable and they may face some challenges. Due to which they may not feel satisfied which results in the irregularity of attending daily classes.

We have done a research through which we have seen that the major problems faced by students are:

1. They are attending more than 5 consecutive classes, due to this they feel so tired and they are not able to grasp all the concepts properly.
2. Moreover attending classes from 8-9 am or from 5-6 pm is always a big challenge for students.
3. In between gap like 3-4 hours is always not acceptable by students.
4. They also feel uncomfortable when no lunch break is providing to them.

So these are the problems by which we can say that timetable is an important issue for students as well as for faculty also[11]. We think that there should be a link between administrator and students so that an effective timetable should be generated through which students and faculty both should be satisfied with their timetable.

After studying the current scenario, we have seen that there is a problem[12], but the question is where the actual problem exists in the timetable system. So to identify the actual problem we have conducted a survey. That survey is regarding existing timetable system by which we can find the different problems which are being faced by students.

We have conducted a survey in School of Computer applications, Lovely Professional University. We have taken the feedback from 188 students of School of computer Application students. Out of those 188 students, 85 students are of Under Graduation and 103 students are of Post-Graduation programme. This survey is containing 10 individual type questions. In all the 10 questions, 5 question are based on the problems which students are facing and 5 questions are the solutions which we want to provide them.

Table 1
Questionnaire carrying 10 survey based questions

Questionnaire

Q.1. Would you like to have classes at early morning (8-9)?
Yes
No

Q.2. Are you comfortable in attending classes in evening (5-6)?
Yes
No

Q.3. Would you like to attend theory classes in morning (Before 12)?
Yes
No

Q.4. Would you like to attend theory classes in evening (After 2)?
Yes
No

Q.5. How much gap is acceptable between consecutive classes?
No gap (Consecutive 5 classes)
2 hrs.
3 hrs.
4 hrs.

Questionnaire

Q.6. Preferred lunch break-

12-01

01-02

02-03

Q.7. Can student be given a choice to select particular faculty/ course / time slot for any class?

Yes

No

Q.8. Do you want any day off in a week?

Yes Day _____

No

Q.9. Select as per your preference. 1 means first and 4 means last.

Lunch at 01-02 only

No class at 9 o'clock

No theory class at 9 o'clock

Not more than five consecutive classes in a day

Q.10. Do you want any interface by which you can book your own class slot just like you are booking a movie show?

Yes

No

4. RESULT ANALYSIS

First the data was collected from PG level and UG level of students then compiled and then analyzed.

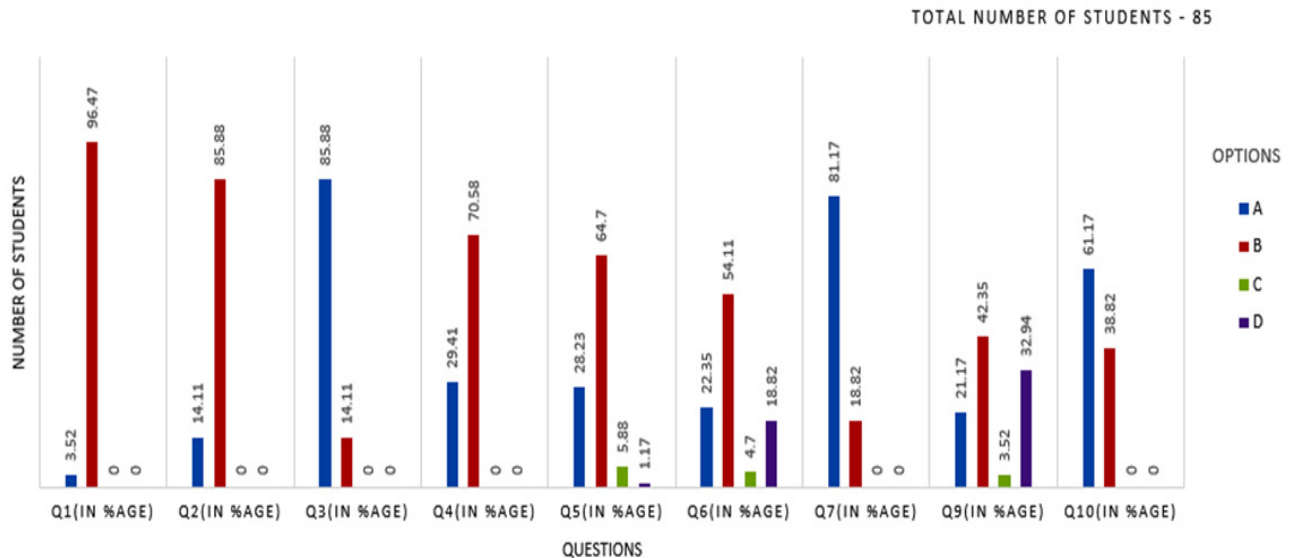


Figure 1: Graph (In %age) of Survey conducted on Under Graduation students

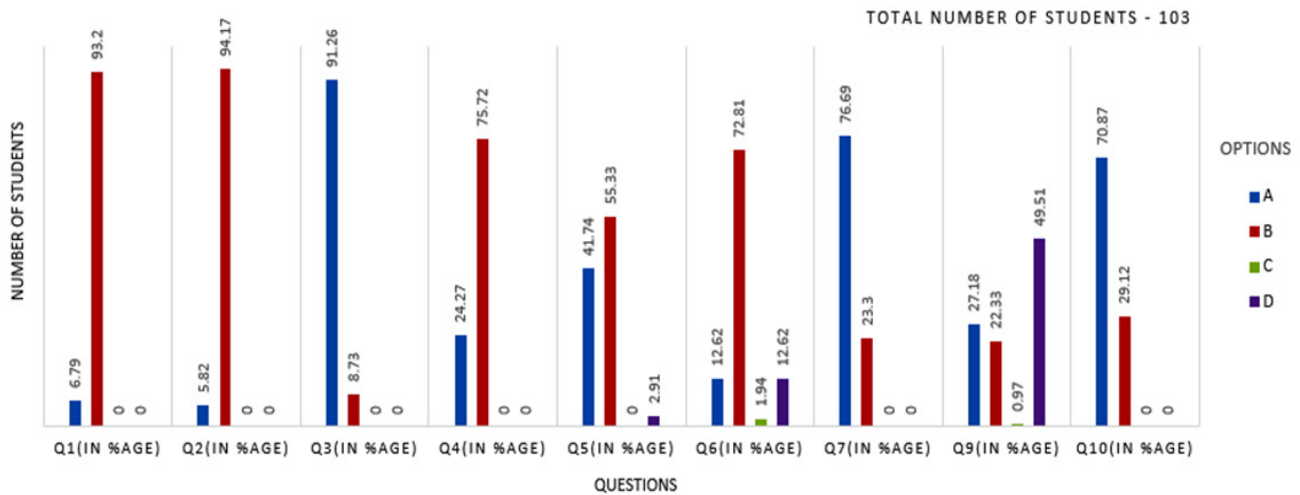


Figure 2: Graph (In %age) of Survey conducted on Post-Graduation students

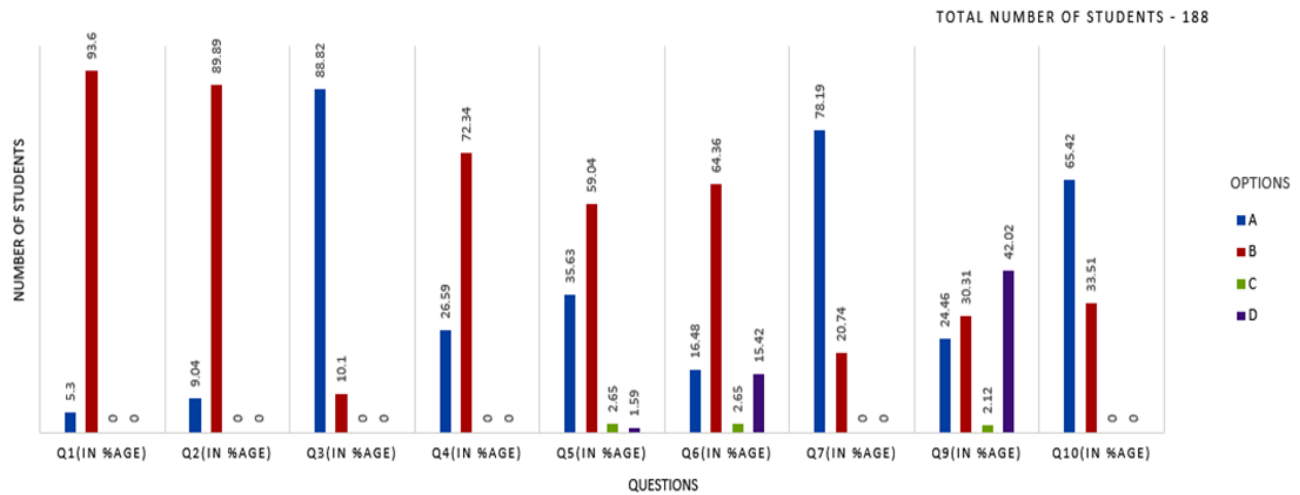


Figure 3: Combined graph (In %age) of Under Graduation and Post-Graduation

These graph shows result of the survey which we have taken. This graph is containing 4 options *a*, *b*, *c*, and *d*. And shows that majority of students has opt for which option. In the above graph –

First questions that Are students happy by attending early morning (8-9 am) classes. We have given two options (*a*) yes (*b*) no. For UG in the first graph, 82 students out of 85 have opted for option (*b*). And for PG in the second graph, 98 students out of 103 have opted for option (*b*). From the third graph we have observed that total 176 students out of 188 have opted for option (*b*). **Based on this result we have analyzed that most of the students facing problem while attending early morning classes.**

Second questions that Are students happy by attending late evening (5-6 pm) classes. We have given two options (*a*) yes (*b*) no. For UG in the first graph, 73 students out of 85 have opted for option (*b*). And for PG in the second graph, 97 students out of 103 have opted for option (*b*). From the third graph we have observed that total 169 students out of 188 have opted for option (*b*). **Based on this result we have analyzed that most of the students facing problem while attending late evening classes.**

Third questions that Are students comfortable while attending Theory classes in morning (Before 12). We have given two options (a) yes (b) no. For UG in the first graph, 73 students out of 85 have opted for option (a). And for PG in the second graph, 94 students out of 103 have opted for option (a). From the third graph we have observed that total 167 students out of 188 have opted for option (a). **Based on this result we have analyzed that most of the students wants to attend theory classes in morning (Before 12).**

Fourth questions that Are students comfortable while attending Theory classes in evening (After 2). We have given two options (a) yes (b) no. For UG in the first graph, 60 students out of 85 have opted for option (b). And for PG in the second graph, 78 students out of 103 have opted for option (b). From the third graph we have observed that total 136 students out of 188 have opted for option (b). **Based on this result we have analyzed that most of the students do not want to attend theory classes in evening (After 2).**

Fifth questions that how much gap is acceptable between consecutive classes. We have given four options (a) No gap (consecutive 5 classes) (b) 2 hrs. (c) 3 hrs. (d) 4 hrs. For UG in the first graph, 55 students out of 85 have opted for option (b). And for PG in the second graph, 57 students out of 103 have opted for option (b). From the third graph we have observed that total 111 students out of 188 have opted for option (b). **Based on this result we have analyzed that most of the students' wants 2 hrs. Gaps between classes.**

Sixth questions that preferred lunch break for students. We have given four options (a) 12-01 (b) 01-02 (c) 02-03 (d) No lunch break (can attend 5 hrs. consecutive classes). For UG in the first graph, 46 students out of 85 have opted for option (b). And for PG in the second graph, 75 students out of 103 have opted for option (b). From the third graph we have observed that total 121 students out of 188 have opted for option (b). **Based on this result we have analyzed that most of the students' wants lunch break from 01-02.**

Seventh questions that can students be given a choice to select particular faculty/ course/ time slot for any class. We have given two options (a) yes (b) no. For UG in the first graph, 69 students out of 85 have opted for option (a). And for PG in the second graph, 79 students out of 103 have opted for option (a). From the third graph we have observed that total 147 students out of 188 have opted for option (a). **Based on this result we have analyze that most of the students' wants to select particular faculty/ course / time slot for classes by their own.**

Eighth Question is that students want any day off in a week? If yes then please specify. We have given them two options (a) Yes and specify the day name. (b) No

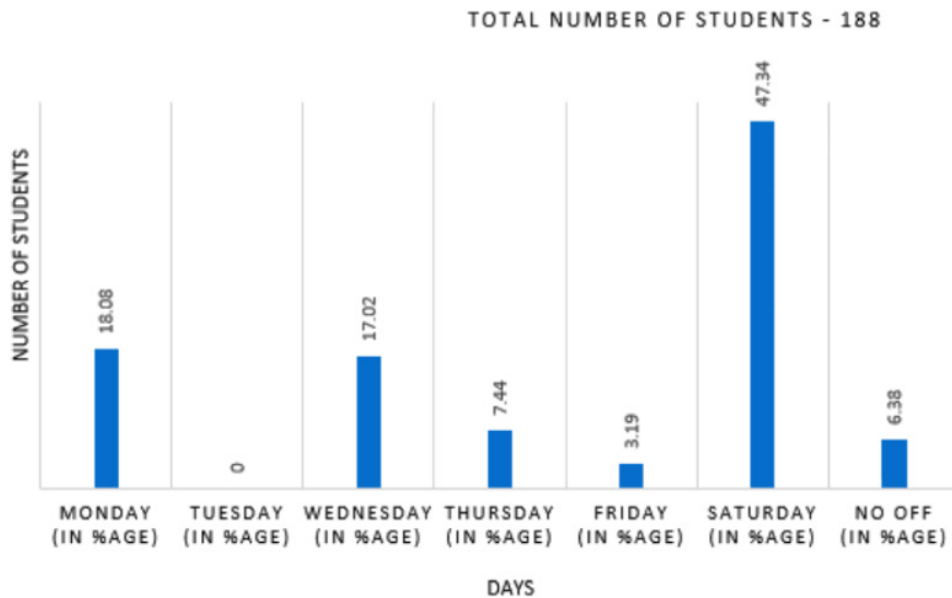


Figure 4: Graph (In %age) for Week day off

In this graph we have seen that most of the students have opted for option (a). Means they want day off in a week except Sunday. **Out of six days 88 students has selected Saturday as their day off.**

Ninth questions that student has to select as per their preference. 1 means first and 4 means last. We have given four options (a) Lunch at 01-02 only (b) No class at 9 o'clock (c) No theory class at 9 o'clock (d) Not more than five consecutive classes in a day. For UG in the first graph, 36 students out of 85 have opted for option (b). And for PG in the second graph, 51 students out of 103 have opted for option (d). From the third graph we have observed that total 79 students out of 188 have opted for option (d). **Based on this result we have analyzed that most of the students' wants to attend not more than five consecutive classes in a day.**

Tenth questions that do they want any interface by which you can book your own class slot just like you are booking a movie show. We have given two options (a) yes (b) no. For UG in the first graph, 52 students out of 85 have opted for option (a). And for PG in the second graph, 73 students out of 103 have opted for option (a). From the third graph we have observed that total 123 students out of 188 have opted for option (a). **Based on this result we have analyze that most of the students wants an interface by which they can book their own class slot just like they are booking a movie show.**

5. IMPLEMENTATION

With the help of this survey we have analyzed that there are sufficient number of students who are actually facing problems in the timetable system and want solution of those problems[13]. As we can see that in the current scenario there is not a way by which we can solve all these problems. Till now there is no interface by which students have the opportunity to fill their timetable or we can also say that they can't make their own timetable. It is found that after allotment of timetable to each course there is no such option for user (student and faculty) to give their choices or preferences. So here we provide a system by which students can book their time slot of classes as they are booking timeslot for a movie show[14]. In this interface, first administrator is going to set its own constraints such as room availability, available faculty members and other resources. The administrator has to add Faculty's constraints within that interface. After that the interface will be ready to be handed over to the students (user). From that interface students can fill the time slot whatever they want. But whatever the constraints are applied by the administrator and faculty that will remain fixed. Student can't change that and they have to fill their choice with regard to that fixed filled slot given by administrator.

Here we have taken the feedback from students to know that what is the problem and where it exists[15]. After analyzing the result we have thought that there is a need of this kind of interface and it should be implemented. So we have decided to implement this interface. After making this interface, students must be able to fill their time slot for classes like they are booking timeslot for a movie show[16]. We have observe from survey that this interface is providing a best way to satisfy each and every one with timetabling system.

5.1. Methodology

Here an interface has been implemented. That interface is having three stages –



Figure 5: Three Stages of the Interface

In **first** stage, Admin is going to fill all the constraints such as Capacity of rooms, Number of students, Room availability and Overlapping of resources etc. These all the constraints are fixed by administrator. Then only the interface will be provide to faculty as well as students.

Second stage is of Faculty. There is an interface for faculty. This interface provides the list of preferences to faculty for their timetable. In this interface, first of all faculty have to enter their USERID so that administrator can keep the record of individual faculty with their selected preferences of timetable. Each faculty have different option to select any two preferences among all. Those preference are –

1. Not more than 4 consecutive lecture
2. No class at 9 o'clock
3. Specific lunch time
4. One day off in a week
5. No theory class after lunch
6. No class after 4 p.m. etc.

Then there is a save button from where faculty can save their preferences. This interface is only just taking the preference of faculty. This interface will not give any surety that selected preference of each faculty must applied but administrator will try to consider at least one from given preference of faculty.

Now the **Third** stage is for Student. Now that interface will appear in front of student. This Interface is available to each section. Only class representative of each section have the authority to book the timetable slot on the behalf of their whole class. This slot allotment follows the **First Come First Serve** algorithm.

Now interface has a list of different section. Class Representative has to select their own section and then click on the next button to move further. Student must be having course with specified lecture, practical and tutorial. Each slot is having a list of different courses with lectures/practical and tutorials. So here all the courses are mentioned and lecture/practical/tutorial is specified in front of them. Once the student will select any slot of any course then for the rest of the timetable that course will be blocked. After booking one slot that room as well as faculty member will be fixed for that section. Likewise student will be filling all the slots. With this, course related faculty member will also fixed. In faculty's timetable also that slot will be fix. If in between the process, student is not able to select any of the slot then that will happen because of following reasons –

1. Faculty may not be free at that time.
2. Room is not available.
3. That slot is already filled by another student.

After booking the complete time slot, there are two buttons. One is for save and another is for Generate Timetable. If student has clicked on the save button the complete booking will be saved. If needed then later on student can make changes according to their convenience. But when student has clicked on Generate Timetable, then no further changes will be done from student side. Now this timetable is handled by admin end.

5.2. Working

Initially all the constraints are going to fill by the administrator. Now, figure 6 is the interface which is going to appear in front of Faculty From this interface, faculty is selecting two or more preferences based on the higher priority. Then faculty member have to click on the submit button. Then all the preference filled by all faculty member are going to save in database.

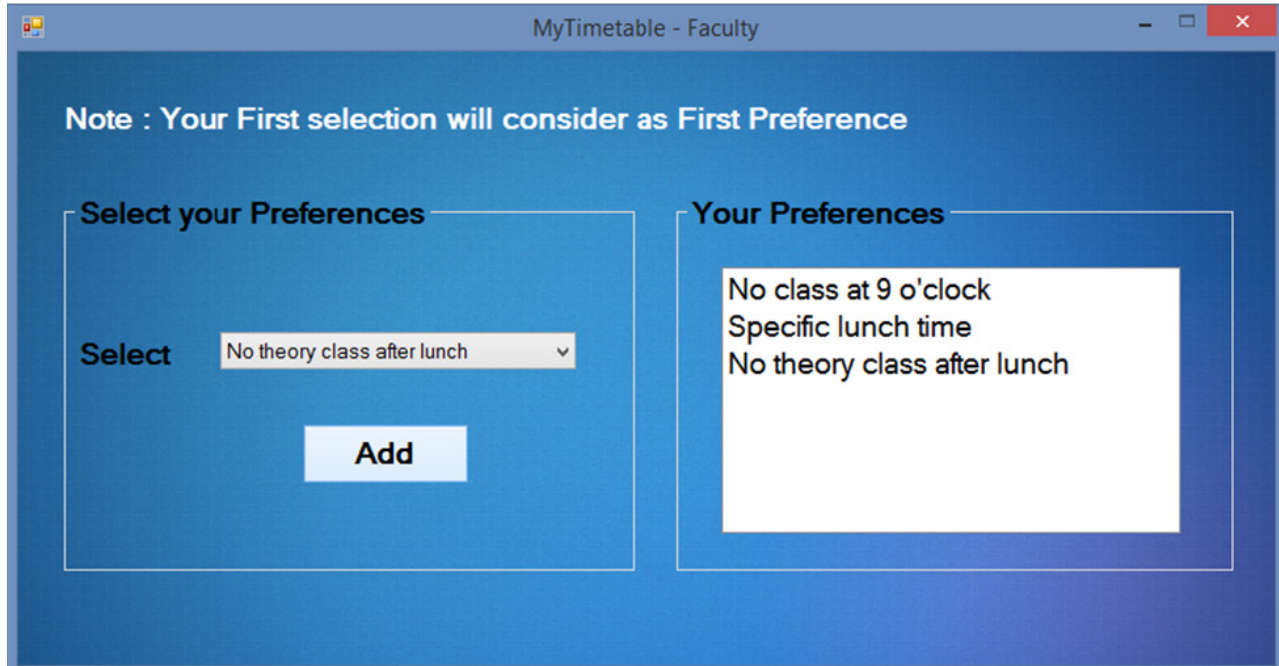


Figure 6: Faculty Interface

After that the interface (figure 7) is going to appear in front of Class Representative. Then class representative have to select their section and click next button to further proceed.

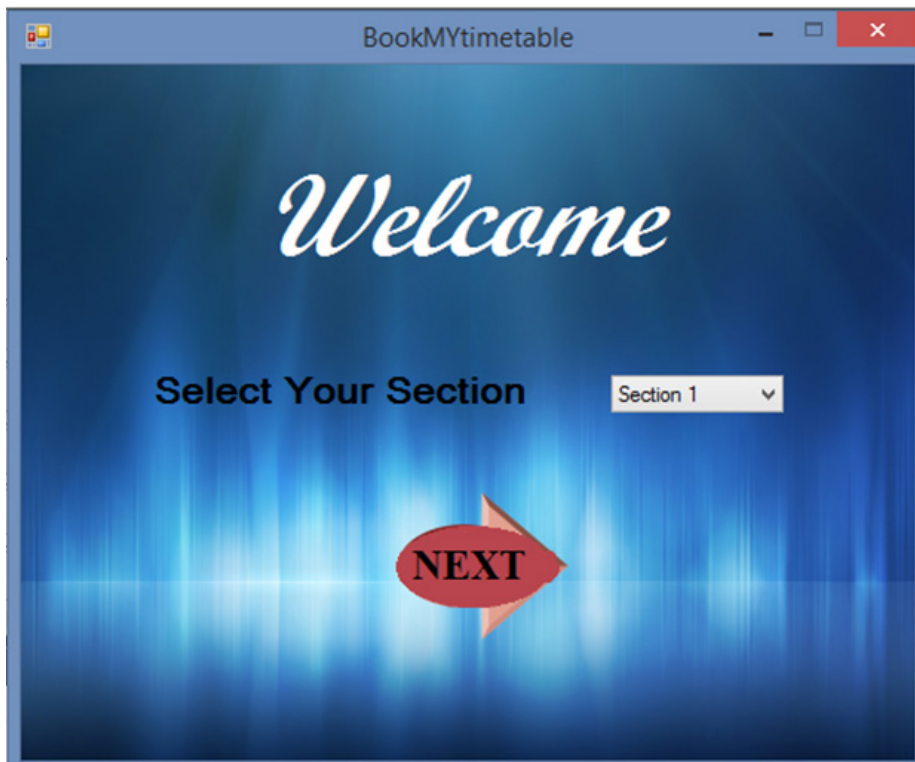


Figure 7: Student Interface for selecting Section

After this Figure 8 is the interface which will appear after figure 7.

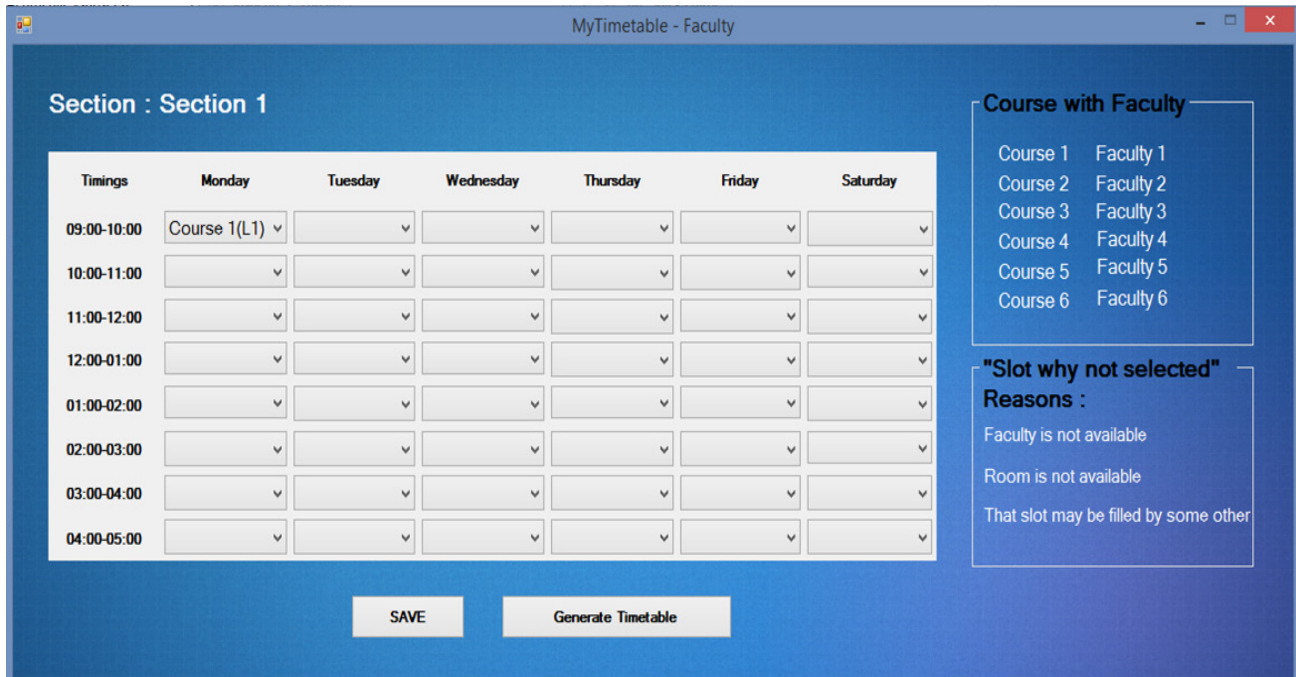


Figure 8: Student Interface for booking slot

Some of the slots are there those can't be filled. Now student has to select the particular time slot of lecture/ practical or tutorial which are in the list. From the rest timeslot that course code is going to be blocked. As shown in figure 9. In the same way student is going to fill all the slots.

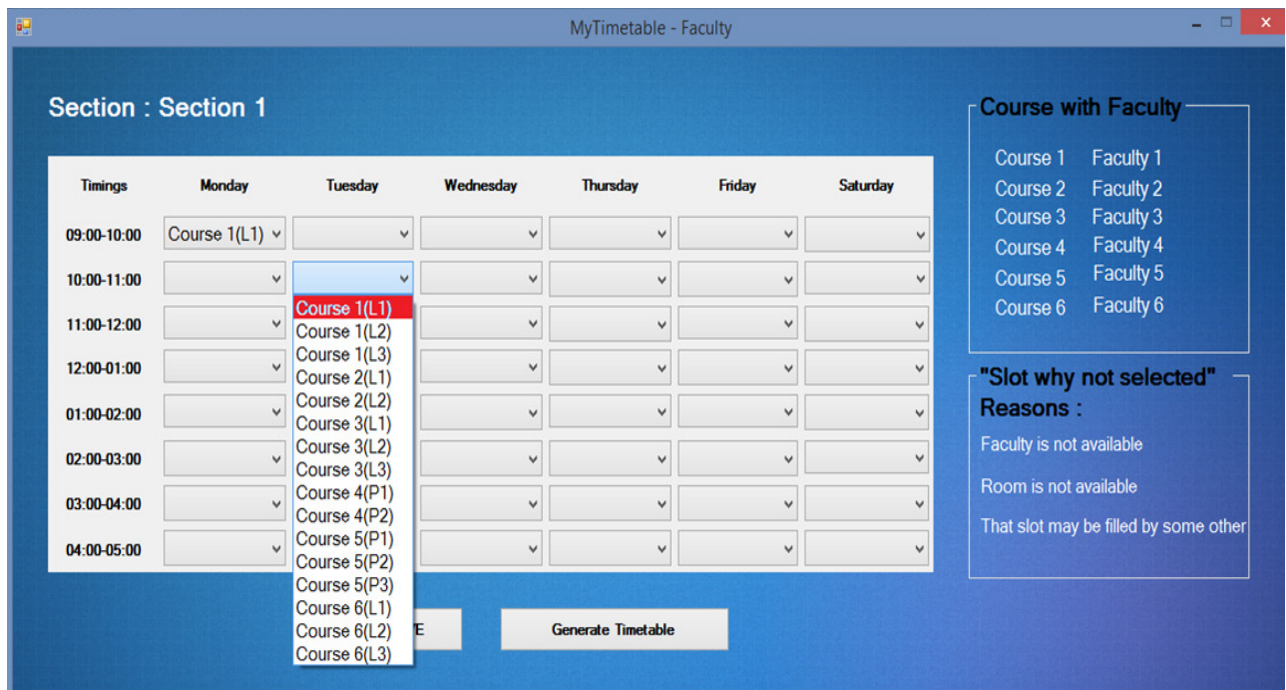


Figure 9: Student Interface for displaying slot which can't be book

After that student have to save the timeslots. After saving the slot student can modify the slots. But if he/she have clicked on Generate timetable the further changes can't be done.

6. CONCLUSION

Here, a new interface is being implemented for creating timetable for the Universities/Schools[17]. In this research paper we found out that, whether there is any problem in timetable system[18]. If yes then where it is existing and what is the possible solution for that problem. In this paper, there is an interface which when given to user (student) can create their own timetable in effective manner. To implement this we searched for different constraints, resources and their availability. Therefore it is a better option to use such an interface that helps to create a timetable which satisfies everyone both faculty as well as students. It is where users (student) will have flexibility to fill their own preferences or choices for timetable based upon their different constrains for lectures, laboratory, and tutorials. On the other hand administrator also has to fill all the hard constraints that can be managed for both students as well as faculty members. It has an advantage that before giving this interface to user, timetable administrator considers all teacher's choice and their preference for timetable[19].

This interface is being designed in such a way that it satisfies all constrains, objective and resource availability involved by timetable admin[20]. A gamified approach is used in this interface for creating a timetable that it's not only making task of admin easy but also making it more interactive for user to participate in the task of creating their own timetable.

When we are talking about the constraints it is already mentioned above such as hard as well as soft constraints, the admin has to take care of these along with users (students and faculty) constraints[21]. The survey result shows that this interface for timetabling problem is capable of providing a satisfactory solution as compared to what we had before and provides best way for creating timetable. In future this interface will be helpful in the Universities/ Schools for creating feasible and efficient timetables.

7. ACKNOWLEDGMENT

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