

## Business Intelligence Tools – Content Generation using Moodle for Self Learning as an Elective Module

Pratibha S. Yalagi<sup>1</sup>, Dattatray P. Gandhmal<sup>2</sup>, Rashmi K. Dixit<sup>3</sup>,

<sup>1</sup> Information Technology, Walchand Institute of Technology, Solapur, Maharashtra, India.

<sup>2,3</sup> Computer Science & Engineering, Walchand Institute of Technology, Solapur, Maharashtra, India.

<sup>1</sup>pratibhayalagi@gmail.com

<sup>2</sup>gdattatray@gmail.com

<sup>3</sup>rashmirajivk@gmail.com

**Abstract:** Nowadays in the competitive world of business, Business Intelligence is playing an important role for taking business decisions. Business Intelligence (BI) is the important factor to turn the data in to actionable information. A BI system is an analytical tool that can help to make successful strategic plans for the organization. It helps to get insights into consumer behavior and improves visibility. So including this course in the curriculum may give more insight to learners for their career and profession. This course is added in our curriculum as an industry elective subject. Teaching this course has the challenges: it contains more theoretical and practical approaches and due to curriculum time constraint it is not possible to cover theoretical contents with all available BI tools practical study. So there is a requirement of self learning material to generate. It has also become the requirement to study during the Information Technology Engineering study. To improve the teaching learning process we have generated a self learning study material for students through Moodle Learning Management System. The material gives in depth knowledge of various BI tools. Every tool report is generated by the students in a group. Each tool report contains: Introduction, Description, Theory, Installation &

working steps, Application, Testing data on a tool, presentation etc. The contents are generated through the group work activity undertaken as a competition. To create more interest in the subject, Gamification is added for assessment with fun learning experience.

The experiment is conducted for the final year Information Technology under graduate students as an Elective course. The results show that, this activity improves the self learning and group learning skills among the students with more interest. The ability of designing and applying the knowledge has improved. The effectiveness of the experiment is verified by the comparative results of two years university results and students feedback. It is observed that the contents generated have helped the students to score more in this subject and also the subject has grabbed the attention of the students through competition and gaming. The analytical thinking ability is also improved through this experiment.

**Keyword:** Business Intelligence, Tools of BI, Group Learning, Self Learning, Gamification.

### 1. Introduction

Business Intelligence is a kind of technology where lot of scattered data is available which is gathered together, analysed and builds the knowledge which is used to make future plans [2]. Knowledge comprises the information generated from the data about customers, competitors, business partners,

**Pratibha S. Yalagi**

Information Technology,  
Walchand Institute of Technology, Solapur, Maharashtra, India.  
pratibhayalagi@gmail.com

economic environment, and internal operations to make effective and good quality business decisions. In modern businesses, due to increased standards, automation and technologies, huge amount of data is already available. A data warehouse and mining technology is used to store the data and improves extraction, transformation and loading of the data. Business Intelligence has become the prime focus of various organizations and industries to increase productivity and profitability. It has various BI tools which are analysing the past data and predicting the future based on the statistical analysis of the available data[4].

### Importance of BI:

- BI is the important factor to turn the data in to actionable information[3].
- A BI system is consisting of various analytical tools that can help to make successful strategic plans for the organization.
- Helps to get Insights into Consumer Behavior and improves visibility.

Taking in to consideration of the importance of BI, this subject is added in the curriculum as an Industry Elective from last two years. The course is added in the curriculum of Final Year Information Technology Programme. The course contains lot of theoretical aspects of BI and the practical implements in the form of tools. The study of this subject requires the prior knowledge of database and data mining & analysis implements with some practical applications. This subject includes various BI tools to gain the practical knowledge of it.

Teaching this course that too at the last semester of engineering where students are involved in campus placement activities and projects is a challenge always. It has other challenges like: 1.The subject requires lot of theoretical and practical knowledge while studying. 2. It is not possible to study all tools at a given time due to the restriction on course contents. 3. Curriculum time constraints for delivering the course. To overcome these challenges we have developed a self learning study material through Moodle Learning Management system in a form of detailed reports of each tool [1]. The self learning contents are developed and designed by the students as a group activity. This activity is conducted as a learning activity to enhance the group learning and

self learning skills among the students and also to grab the attention of the students towards the interest of this subject.

The experiment is conducted for Final year Final semester under graduate Information Technology students. The activity mainly focuses on learning new technology with a tool including its installation, application, data testing, advantages and disadvantages. It also concentrates on group learning, team building, team work, report generation etc. The activity is conducted as a competition where various tools of Business Intelligence have studied in detail by different groups and are presented in the class. The detailed report is generated by the groups as a part of competition itself. It is judged by the panel of examiners in this subject. The report generated for tools are validated and verified by the committee and is made available to all students by the Moodle platform. To create more interest and to grab the student's attention for studying this subject, a fun learning activity in the form of gamification is also added as a part of a competition. In this activity the games which are always attracting the technology & mobile users are used and implemented through the PlayBrighter.com online gamification & study portal [10, 11]. Through this portal various interesting games are used and puzzles and question-answer games are added with multiple levels of games. It creates a fun learning environment and engages students in learning with more interest. Students live in the world of gadgets where change is the only constant thing. Active participation of students involves deep learning which is useful for lifelong.

The results have shown that, this activity improves the self learning and group learning skills among the students with more interest. The ability of designing and applying the knowledge has improved. The effectiveness of the experiment is verified by the comparative results of two years university results and students feedback. It is observed that the contents generated have helped the students to score more in this subject and also the subject has grabbed the attention of the students through competition and gaming. The analytical thinking ability is also improved through this experiment.

Through this activity a study material for different types of BI tools like data mining tool, ETL tool and reporting tool is developed. Data mining tools: KNIME, Rapid Miner, R-Programming and WEKA are considered. KETTLE, TALEND,

INFORMATICA, ORACLE Warehouse Builder, SCRIPTELLA are taken as ETL tools. The reporting tool BERT is also taken in to consideration.

## 2. Literature Review

Business Intelligence (BI) is the new emerging technology in the market. It plays very important role in building short-term and long-term plans for any particular organization. Actually, to learn from the past data and predict the future, many companies are adopting Business Intelligence (BI) tools and systems. It helps to get Insights into Consumer Behavior and improves visibility.

Gamification is phrase used in the context when used for non game environment with an intension to create interest and involve people in some learning activity[10,11]. Gamification is gaining popularity in the education field for motivating students and understands the concepts interestingly [12].

BI subject is new in the syllabus, there is very less study material available. But, this subject requires lot of theoretical and practical knowledge while studying. There are so many numbers of different types of tools available which processes the data in different manner. As the time duration provided for the course by the university is very limited, so it becomes highly impossible to study all types of tools. Business intelligence contains huge variety of applications and technologies for collecting, providing access to, and analyzing data for the purpose of helping corporate users make better business decisions. Business Intelligence is a kind of technology where lot of scattered data is available which is gathered together, analyzed and builds the knowledge which is used to make future plans. Knowledge comprises the information generated from the data about customers, competitors, business partners, economic environment, and internal operations to make effective and good quality business decisions. In modern businesses, due to increased standards, automation and technologies, huge amount of data is already available. A data warehouse and mining technology used to store the data and improves extraction, transformation and loading of the data.

## 3. Implementation

The main objective is to create a study material for BI tools and to improve the knowledge of BI among

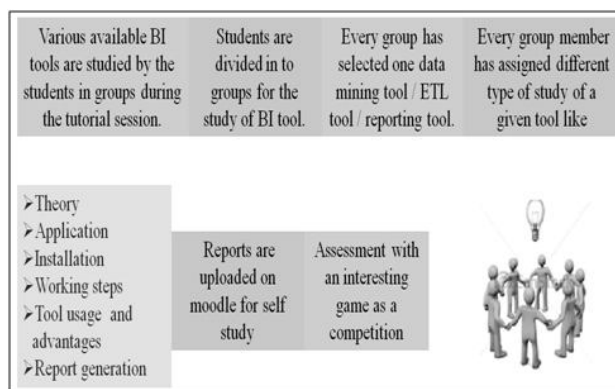
the students with the practical approach. The study and the research work regarding the BI tools are done by the students in the tutorial session.

The primary focus of this study and implementation is:

- To create a study material for BI tools and to improve the knowledge of BI among the students with the practical approach.
- To create awareness among the students, of various BI tools, ETL tools and reporting tools with self learning skills.
- To enhance the self learning and group learning skills among the students.
- Depth generation in the content using this method.
- To create interest among the students for the subject through gamification with fun learning.

The content generation is taken as a competition activity with the tool presentation. The steps are shown in the Figure 1.

The study and the research work regarding the BI tools are done by the students in the tutorial session.



**Fig. 1: Steps of implementation**

Students are divided into the different groups according to their choice. Each group is selected one of the BI tool for the study. There are many different types of BI tools like data mining tool, ETL tool and reporting tool. KNIME, Rapid Miner, R-Programming and WEKA are the examples of data mining tools. KETTLE, TALEND, INFORMATICA,

ORACLE Warehouse Builder, SCRIPTELLA are the examples of ETL tools [8]. And, BERT is the example of the reporting tool. These tools are assigned to the groups on the First-Come-First-Serve basis. Each group member has assigned different type of study on their selected tool. This study comprises various types of tasks like Theory, Application, Installation, Working steps, Tool usage and advantages, Report generation. The student expert in particular task is preferred to assign the same to him/her. All such things are taken into consideration while assigning the tasks and it is done by group leader of that particular group. All the theoretical material regarding the tool is maintained in the form of notes. The guide book is created which contains all the guideline information about the application, its installation procedure, working steps, its usage and advantage. Students will cover all theoretical and practical approach of the selected BI tool. The students will check the working of the BI tool with various data inputs. In such manner, students came to know the nature of the tool, which helps them to build the applications on them. Students also prepare the presentation on it and deliver a seminar. After the detailed study of data mining tool/ ETL tool/ Reporting tool, students gave the presentation in group in front of a whole class. The details of a tool from its installation to its actual application are demonstrated by the students. Quiz is conducted through an interesting game with various levels through PlayBrighter Gamification study portal. At the final stage, the report is generated which contains overall information about the BI tool. Finally, every group has submitted a detailed report of a tool with all detailed description and examples. And, these reports are uploaded on moodle for their self study. It is also become available for all the time to

them who wants to refer it for their future study. In all this activity, teacher will monitor each group of students and helps the students during their study. Teacher will provide all the necessary guidelines to the students also monitor their activity. At last, teachers will assess each student and group for evaluation.

The detailed stepwise working of the activity with teacher as a mentor role is mentioned in the figure 2.

According to Lee\*, “Gamification can motivate students to engage in the classroom, give teachers better tools to guide and reward students, and get students to bring their full selves to the pursuit of learning.” So gamification is added for fun learning during the activity. Finally, the evaluation is made according to the material collection, data preparation, presentation skills and report generation with group work skills through the panel of examiners.

To make the Business Intelligence (BI) subject more interesting and entertaining, it is associated with the different games. In such games, during its lifetime, the questions regarding the business intelligence subject will arise. These question set along with its correct answer set is already uploaded on the moodle. User has to log in to the moodle before playing the particular game. After successful answering of these questions, player will get the rewards like extra points or completion of the missions in that particular game. So, in this fashion, we can make this subject entertaining and interesting. Following Figures shows some glimpses of the games used for fun learning.

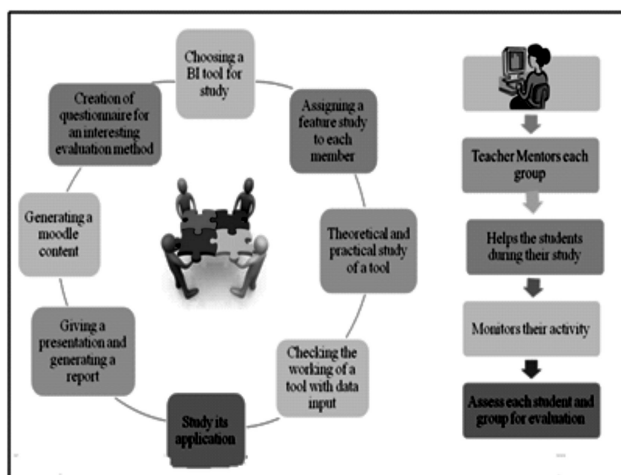


Fig. 2. Working steps with mentor role

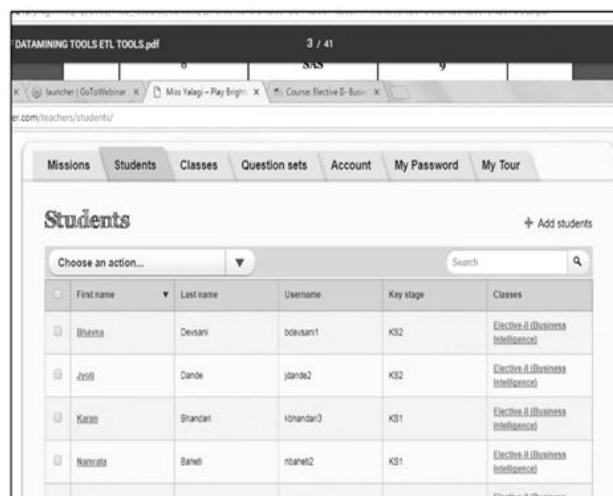


Fig. 3. PlayBrighter Portal

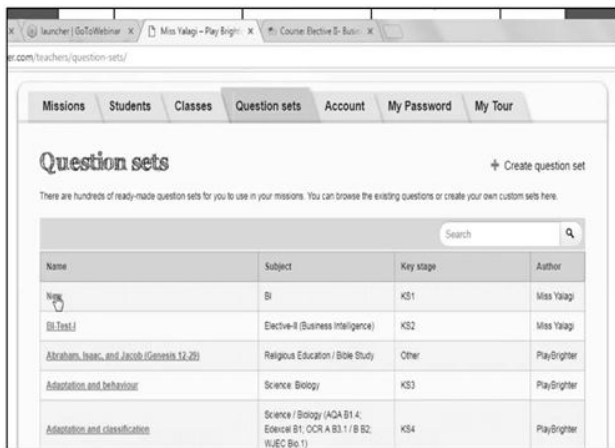


Fig. 4. PlayBrighter Portal:Question sets



Fig. 7. PlayBrighter portal: Game 2



Fig. 5. PlayBrighter portal: Game 1



Fig. 8. PlayBrighter portal: Game 3

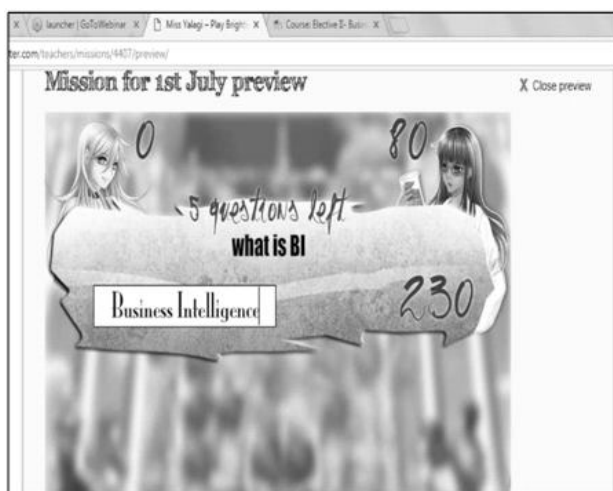


Fig. 6. PlayBrighter portal: Questions in the game for next level



Fig. 9. PlayBrighter portal: Game 4

The figure no:3 to 9 depicts the portal screens of the games used in the study. Total four games like mobile games are used for the assessment.

## 1. Experimental Results

As per university syllabus, subject Business Intelligence is included in the curriculum of Final Year Final Semester under graduate Information Technology Engineering. The course is scheduled as 4 Hrs. Theory lectures and Practical/Tutorial Session of 2 hour weekly. The results are observed by student's university results.

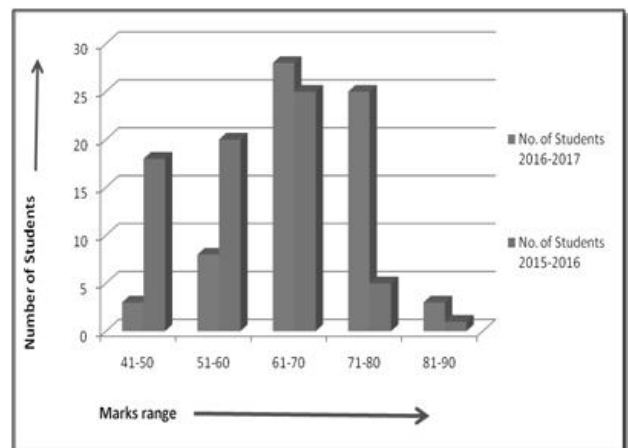
Two years results are compared for this experiment. Academic year 2015-16 and academic year 2016-17 are compared and it is observed that students in 2016-17 have scored more than the previous year students. The 2015-16 year students have undergone through traditional teaching and learning methodology and for students of academic year 2016-17 the activity is conducted and self learning material provided. A remarkable improvement among the students is observed.

The following Table 1 shows results observed in year 2015-16 and 2016-17. The analysis is done based on their marks range for University Exam.

**Table 1: Result Analysis of University Marks**

Marks Range	No. of Students 2016-2017	No. of Students 2015-2016
41-50	3	18
51-60	8	20
61-70	28	25
71-80	25	5
81-90	3	1

It has been observed that the marks range is increased by around 20% to 30% with the use of Activity, self learning material and Gamification. The following Figure 10 shows graphical representation of result analysis. This scoring more than 70 is increased drastically. The analysis reports variations in the marks range and the students scoring high scores are more as compared to the earlier results. The results are satisfactory. It also increases the involvement and engagement of the student. With the gamification students interest towards the study of the subject took in to another focus and the competitive environment also enhances the detailed study with effectiveness.



**Fig 10 the graphical representation of student marks**

The involvement and engagement of the students are observed through the survey also. Student's feedback is also collected where students agreed that their concentration while studying this subject and interest in the subject improves. The positive responses with the effectiveness are grabbed in the feedback.

Overall result is improved by the implementation of this activity. It also enhances learning ability by improving group learning and self learning ability. The games with questionnaire have improved their study skills and the competition empowers them for the study.

## 5. Conclusion

Through this experiment it is observed that for an industry elective subject like Business Intelligence which is a combination of Theoretical and Practical approach, more than 80% students found these activities are appropriate and useful for course Blending of gamification increase students interest in the class. For a student general attention span is @ 12-20 minutes, blend of traditional teaching, Group activity, Presentation and gamification increases students' engagement and attention span. It allows students to learn at a deeper level.

- Briefing the conclusion in following points:
- The activity improves the self learning and group learning skills among the students.
- It enhances the presentation skills as well as the report generation skills.

- The Moodle provides the detailed study of each tool.
- Various case studies of BI tools are provided under one portal for the students to study.
- Moodle also provides quizzes and discussions further.

### Acknowledgement:

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