

# Performance Evaluation of Moodle System-in-Iraqi Universities

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## Abstract

The electronic method is useful to learn and communicate with students, and presents plethora of characteristics that can be accomplished during various situations.

For instance, the most widespread method is to use a learning management system. Both teachers and students, they do not have to use all the resources available within the system, they can suffice with specific modules that will accomplish the intended teaching and learning objectives, but not all modules can fulfill all learning requirements.

This study shows the features of a thorough framework to analyze the design exercise on an open source project and to outright these practices. This open source e-learning module is called Modular Object-Oriented Dynamic Learning Environment (Moodle), and it has many good features to be exploited. It also discusses carried out Moodle system at four universities in Iraq, it describes how the semantics for specifications offered by Moodle framework were applied on the e-learning system project at these universities to analyze the importance & satisfaction for both teachers and students.

The quadrant analysis, gap analysis, and Cronbach's Alpha has been applied for data analysis and number of statistical tools has been used such as average value and standard deviation to accomplish the objective of this work. Data has been collected from 30 teachers and 80 students (21 to 24 years old). The results have shown great agreement from whether teachers and students on most of the tools questioned, like accessibility, searchability, and others.

**Keywords:** e-Learning, Learning Management System, Moodle.

## 1. Introduction

For the time being, Information and Communication technologies (ICTs) are indispensable for the education process, they have to be merged to serve current pedagogical operations. In fact, Information and communications technology in all current processes encompass data gathering, processing information and knowledge building, and online education is being one of the most distinctive practices having these features.

ICTs lead to a substantial role in education, there is particular importance in educational aspect, supported by Learning Management Systems (LMS), as an example, Moodle [1]. Nevertheless at this time, it has turned into a synonymous with a software package aimed to support teachers to provide superior online courses with prospects for dynamic collaboration. Moodle is established as an Open Source software project, i.e. Moodle is obtainable as a cost-free software with General Public License (GPL) and with no licensing charge involved [2].

It works without any modification to the following operating Systems: Mac OS, Linux, UNIX, and Windows, Netware and other systems that have the feasibility of PHP coding, which is available on most web host providers as no charge benefits. Moodle information is stored in a one database, typically MySQL and PostgreSQL are the ones currently supported in Moodle; while other databases for instance, Microsoft SQL server, Oracle database, and IBM DB2 are possible to be used with some conversion steps. Current release of Moodle (3.4.1), while the first available package was in January 2008, includes many

enhancements and development of new plugins that make Moodle competent against other commercial education systems [3] [4].

Moodle is a typical Content Management System (CMS), comes with empty slots that should be filled by instructors and administrators. It has a user friendly GUI with the availability of language support of most world languages including Arabic. Its intuitive GUI makes it preferable by both students and instructors to use, with no need of training.

The present work analyses the major methods and functions obtainable from Moodle with its usage by the educational establishments. In addition, it explains the outcomes of the study through the implementation of a questionnaire to teachers and students within the aim is to describe the effectiveness of using Moodle and its major functionalities.

Finally, the work intends to add a comprehensive study of the importance and satisfaction among teachers' and students' perspective, by using Moodle in their universities.

## 2. Data Collection

The data was gathered through the questionnaire, which was distributed to thirty teachers and eighty students from universities. Each student and teacher had finished filling out a complete questionnaire with diverse sorts of questions, which are scaled equally shown in appendix A (<https://drive.google.com/file/d/0B5DynHmOYjEYzkthWVNILWRrSW8/view?usp=sharing>).

Questionnaires were completed after users become familiar with Moodle with fair amount of time. The main objective of the questionnaire was to grasp an initial viewpoint of Moodle by finding the scale of apprehension of the GUI and its modules. The questionnaire asks the users to scale their opinion in terms of service, quality, and performance of each Moodle module with the ability to rate their satisfaction and importance levels of each attribute. The users were guided to respond within the survey in 5-points Likert scale fashion [5].

### 3. Statistical Tools and Major Survey Results

The outcome of the survey are based on thirty teachers and eighty students, in terms of modules usage and in which aspect. Through implementing the survey, as mentioned before, general settings was applied to the whole system [6]. As for the questionnaire, eighteen questions for teachers and eleven questions for students were prepared. So, their answers were specified on the factors linked with accessibility, usability, quality, security and software. Users classify the factors from 1 (strongly agree) to 5 (strongly disagree).

The results are based upon questionnaire at teacher or Admin with satisfaction and importance. This study used important tools to analyze data, these tools are:

- **Mean:** is calculated by adding a group of numbers and thereafter dividing by means of the count of those numbers:

$$mean = \frac{\sum_{i=1}^N X_i}{N} \quad (1)$$

$X_i$ : set of samples N: number of samples

- **Variance:** is a measurement of the spread between numbers in a data set. The variance is calculated using the following formula.

$$Variance = \frac{\sum_{i=1}^N (X_i - mean)^2}{N} \quad (2)$$

- **Standard Deviation:** is the variability present in the values. It is also famed as a measure of how widely values are scattered from the mean value.

$$Standard\ Deviation = \sqrt{Variance} \quad (3)$$

The study is summarized in appendix B (<https://drive.google.com/file/d/0B5DynHmOYjEyZ0Z0U1IzV2FDN1U/view?usp=sharing>) for teachers first then students.

- **Cronbach's alpha:** Cronbach's alpha can be found by comparing the calculation of each calculated item with the overall calculation of point of view, after then it will be compared to variance calculation for each item result, eq. 4 shows the formula:

$$\alpha = \left( \frac{k}{k-1} \right) \left( \frac{\sum_1^k variance}{variance \left( \sum_1^n \sum_1^k y_{n,k} \right)} \right) \quad (4)$$

Where y is the sample value, n is the sample size, k is the number of questions,  $\sum_1^k variance$  is summation of the variance associated with each item, and  $variance \left( \sum_1^n \sum_1^k y_{n,k} \right)$  is the difference of the total of the entire population.

There is no fixed opinion of selection of a "good"  $\alpha$  coefficient, in fact it is arbitrary and rely on the hypothetical understanding of question weight. Most suggest a range of  $\alpha$  coefficient of (0.65 - 0.8) and the average acceptable  $\alpha$  is about (0.7) [7].

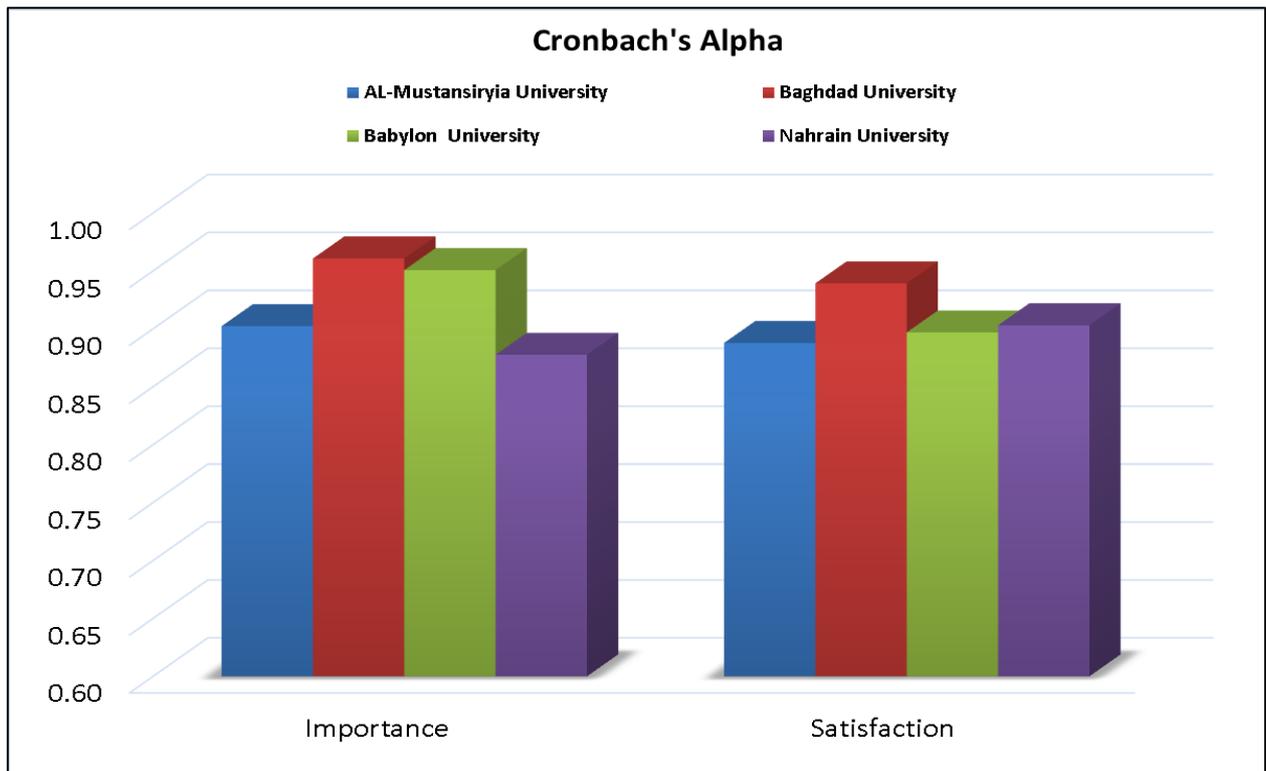


Fig1.: Cronbach's Alpha results for teachers

Table 1.: teacher and student attributes

Attribute number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Teacher Attributes	Accessibility	Searchability	Format	accuracy	Relevance	Importance	Reliability	Learnability	Memorability	Efficiency	Effectiveness	Stability	Validity	Compatibility	Availability	Replicability	Licensing	Administrator
Student Attributes	Accessibility	Searchability	Format	accuracy	Relevance	Importance	Reliability	Learnability	Memorability	Efficiency	Effectiveness							

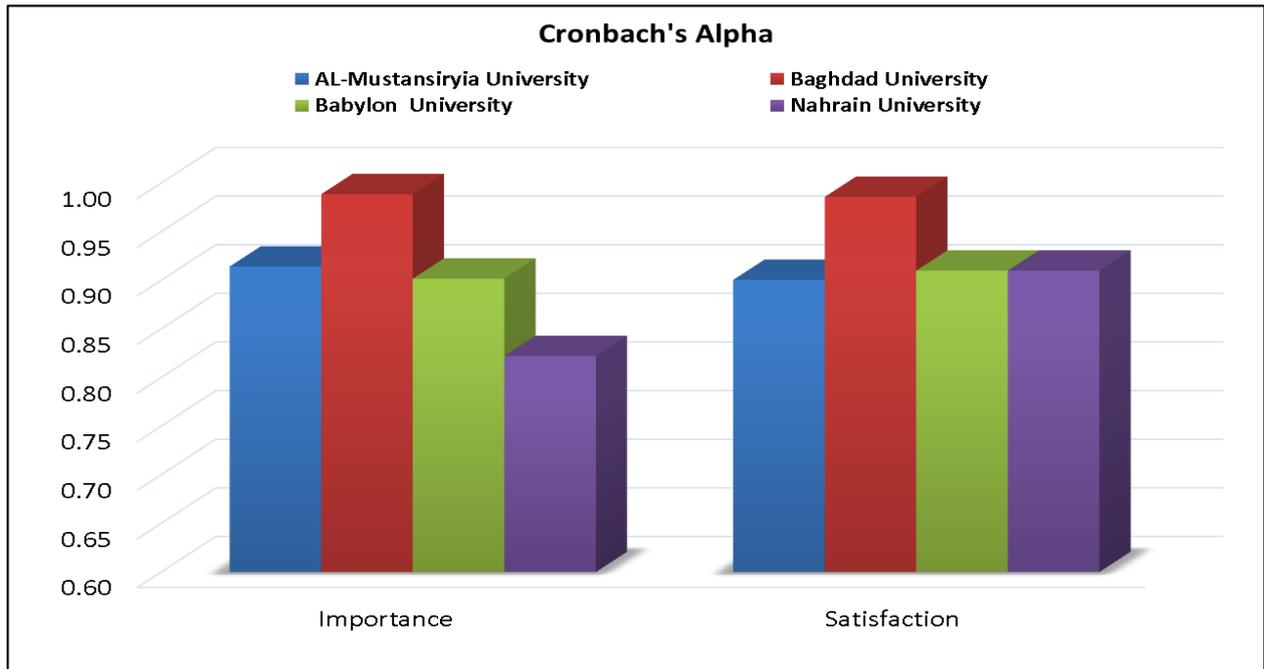


Fig. 2.: Cronbach's Alpha results for student

### 3. Data Analysis Tools

Two data analysis tools have been used to evaluate the performance of the Moodle learning management system, Quadrant analysis and Gap analysis. The conclusion of quadrant analysis and gap analysis suggest that it is probable to determine which performance attribute that have to keep, enhance, or reconsider.

#### 3.1 Quadrant Analysis

Quadrant analysis can be seen as a graphical relationship method that produce easy visualization of data [8]. QA separates service data attributes as four regions de-lined by two axes: the first dimension is drawn along the horizontal axis as the typical expectation into excellent service goodness (i.e. importance), the other dimension can be the y-axis which realize the performance (i.e. satisfaction) [9].

In this work, the displacement between the importance and the satisfaction average scores of each attribute were depicted as QA graph for both teachers (18 attributes) and students (11 attributes) as present in table (1).

The graph tool used is MS Excel scatter chart tool with the mean importance as X-axis and mean satisfaction as Y-axis, as shown in Figures (3) and (4).

In figure 3, quadrant1 (Q1) High important- High satisfaction comprises performance attributes for teachers scaled high level of importance with high level of satisfaction. As a result, all attributes in this Q1 expect attributes in Al- Mustansiriyah University: (**Accessibility**, **Memorability**, **Stability**, and **Licensing**) attribute in Babylon University are located in quadrant 4 (Q4) High Importance with Low satisfaction, while Baghdad and Al-Nahrain universities all attributes in Q1.

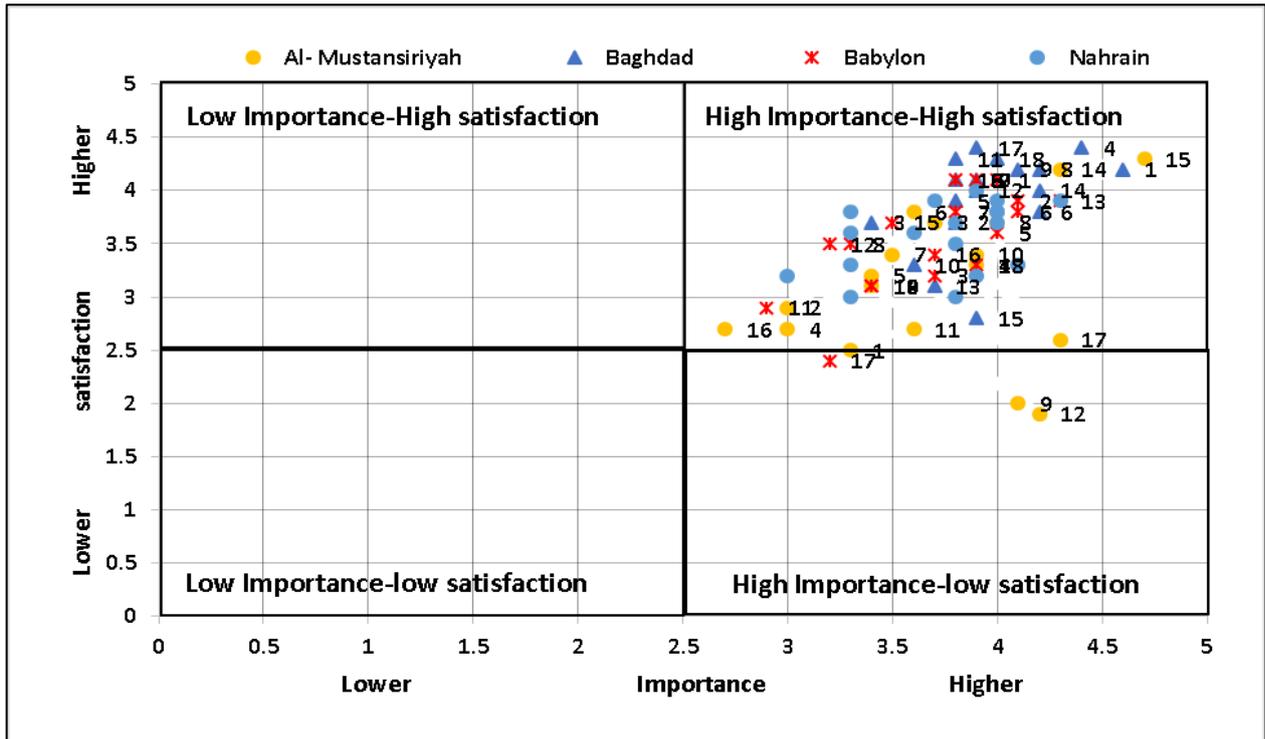


Fig. 3.: Quadrant graph for teachers

Figure 4 shows all attributes in this quadrant 1 (Q1) expect attribute **Reliability** in Al-Mustansiriyah university and **Efficiency** attribute in Babylon university are located in quadrant 3 (Q3), while Baghdad and Al-Nahrain universities all attributes in Q1.

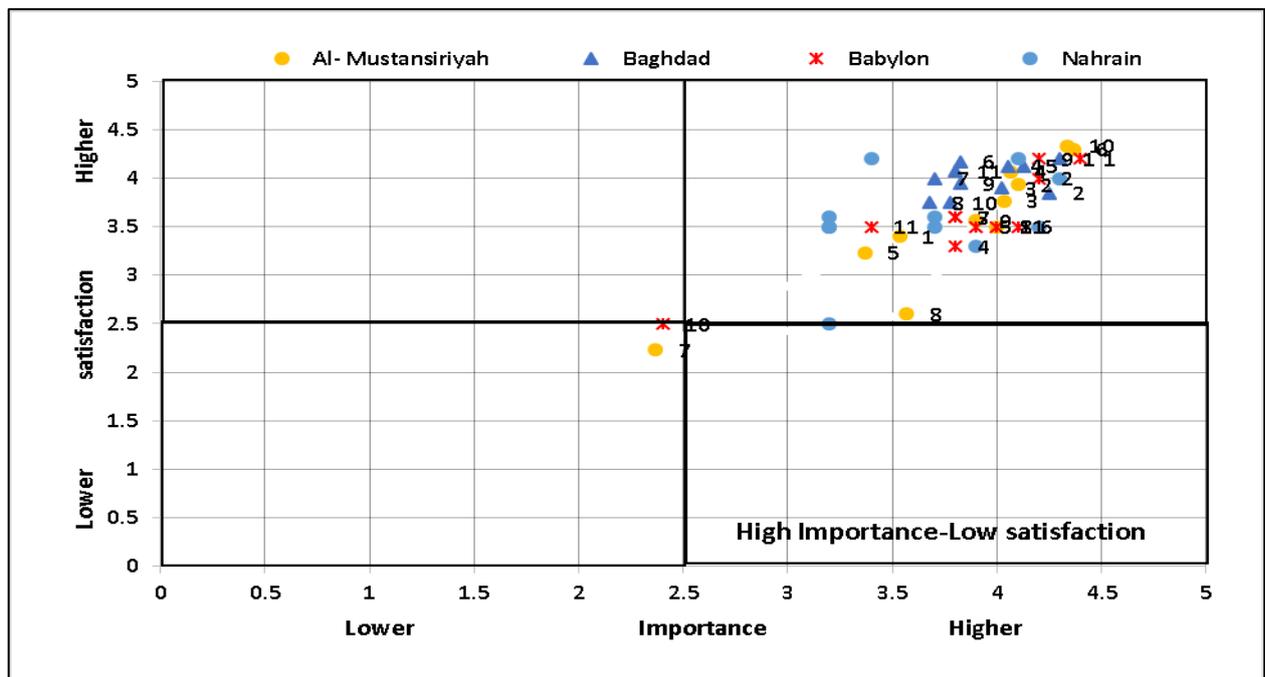


Fig. 4.: Quadrant graph for students

### 3.2 Gap Analysis

Gap analysis is another tool we used to represent our evaluation results in term of importance and satisfactory mean for each attributes. This tool explicitly specify gaps that occur between satisfaction and importance. “Large gaps between importance and satisfaction rating commonly draw attention to problems that should be corrected. Small gaps indicate strengths.” [6]. Gap

analysis differentiate between how substantial attributes are to the respondents and how they can be persuaded to the attributes. It is a beneficial way of comparing the outcomes from your satisfaction and importance questions and permits for convenient interpretation. By comparing importance and satisfaction scores on your chart, you can apply gap analysis to determine priorities for enhancement [10]. Quadrant analysis “does not clearly identify gaps which may be exist between importance and satisfaction”. Despite the clarity of performance attribute in the "high

importance and high satisfaction" region, a wide gap might appear between satisfaction and importance standard deviation." Gap analysis between satisfaction and importance results for different questions are shown in the figures below

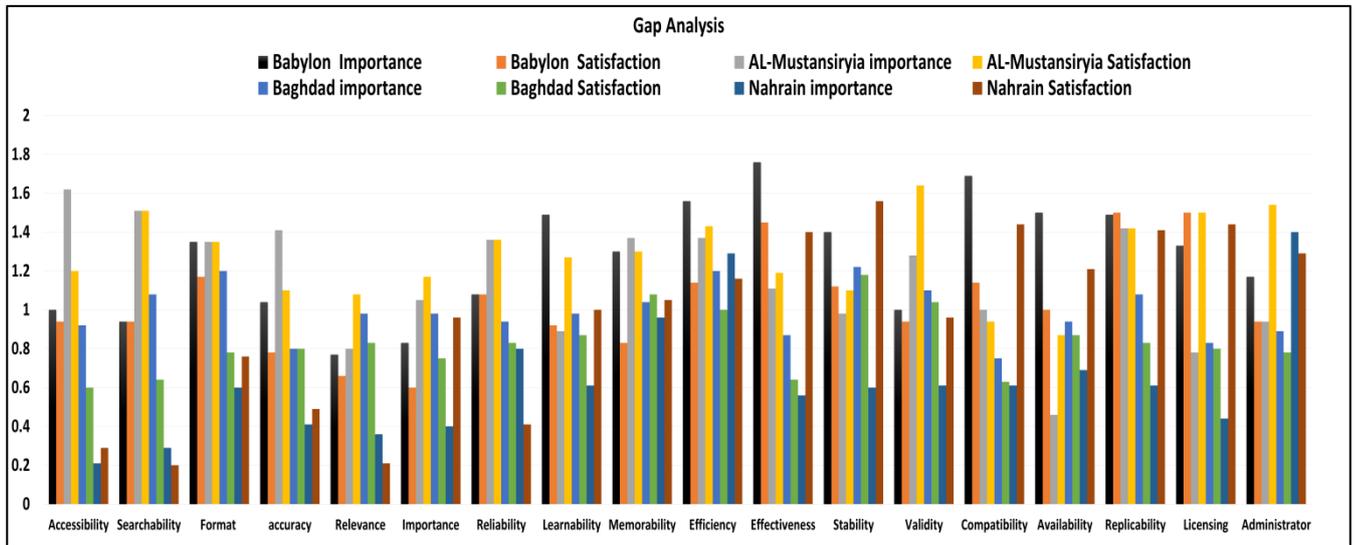


Figure (5): Gap analysis between importance and satisfaction for teachers.

$$Gap\ analysis = STD\ importance - STD\ satisfaction \quad (5)$$

Figure (5) illustrates the gaps in the satisfaction and importance of teacher results. The largest gap for AL-Mustansiryia university were (Licensing=0.7, administrator=0.6), while approximately zero gaps in (Searchability, Format, Reliability and Replicability)The largest gaps between importance and satisfaction scores for

Baghdad university were: (Searchability=0.44, Format=0.42), while approximately zero gap were: (accuracy).

And for the largest gaps in Babylon university were: (Learnability=0.57 Compatibility=0.55 and Availability=0.5), while approximately zero gap were: (Searchability, Reliability).

Finally, the largest gaps in Al-Nahrain university were: (Stability=0.96 Compatibility=0.83 and Replicability=0.8), while approximately zero gap were: (Accessibility, Accuracy).

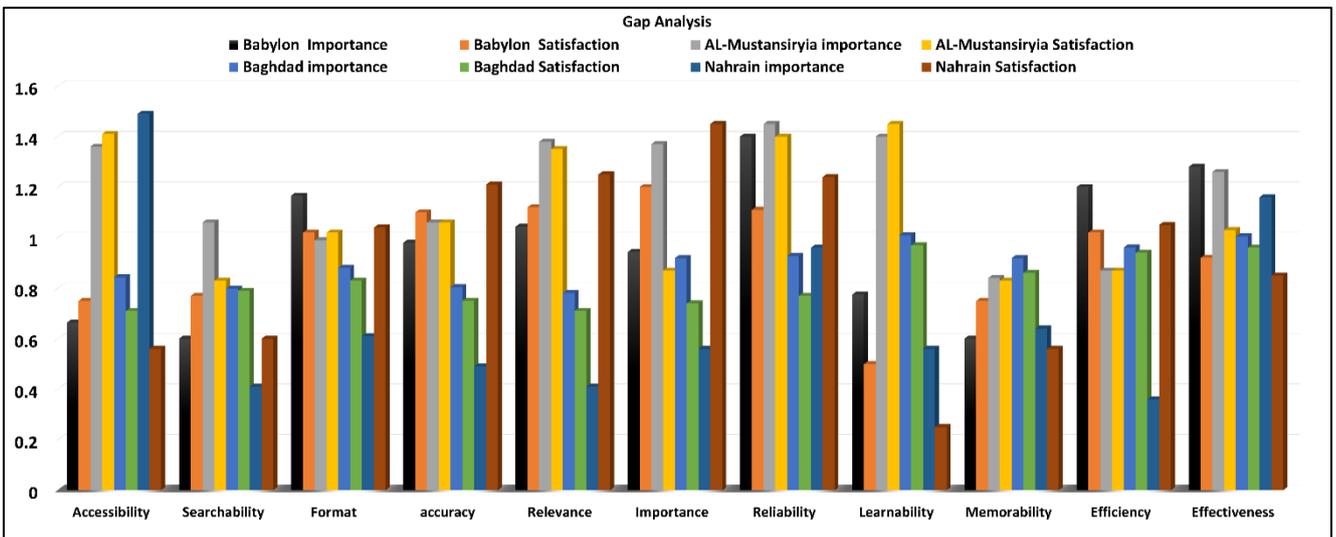


Fig. 6.: Gap analysis between importance and satisfaction for student

Figure (6) illustrates the gaps between satisfaction and importance for student results. The largest gap in the satisfaction and importance results for AL-Mustansiryia university was (Importance=0.5), while approximately zero gap in (Accuracy and Efficiency).

The largest gap in the importance and satisfaction scores for Baghdad university was (importance=0.178), while approximate zero gap in (Searchability).

And for the largest gaps in Babylon university were: (Effectiveness=0.36) while smallest gap were: (Relevance). Finally, the largest gaps in Al-Nahrain university were: (Effectiveness=0.36) while smallest gap were: (Relevance).

Finally, the largest gaps in Al-Nahrain university were: (Accessibility = 0.9), while approximately zero gap were: (Memorability).

Table (2) offers the standard deviation value. Standard deviation gives how far each question rating, the overall average standard deviation value  $\bar{x}$  gives strength to both satisfaction and importance since the values of both SDs are relatively small in AL-Mustansiryia and Baghdad universities while large gap overall questions in Babylon and Al-Nahrain universities for teachers. On the other hand, the values of both SDs are relatively small in Babylon and Al-Nahrian universities while large gap overall

questions in AL-Mustansiriyah and Baghdad universities respectively for students.

**Table 2.** Standard deviation values for Teachers and Students questionnaires

$\bar{x}$	AL-Mustansiriyah		Baghdad		Babylon		Al-Nahrain	
	SD Importance	SD Satisfaction	SD Importance	SD Satisfaction	SD Importance	SD Satisfaction	SD Importance	SD Satisfaction
Teachers	1.151	1.276	0.989	0.831	1.261	1.036	0.6361	0.957
Students	1.19	1.10	0.90	0.82	0.97	0.93	0.70	0.915

#### 4. Conclusion

This study analyzed and discussed the major functionalities and tools obtainable from the Moodle learning management system in four Iraq universities by using several evaluation testing methods, the system is tested as a whole, as well as in particular modules. The scores deliver quantifiable and qualitative picture with the expertise that offers recommendations to different system users mainly students and teachers.

According to the quadrature analysis, teachers are scored high importance with high satisfaction, all attributes in this quadrant 1 expect attributes in Al- Mustansiriyah university: (Accessibility, Memorability, Stability) and Licensing attribute in Babylon university are located in quadrant High Importance-low satisfaction, while all attributes quadrature analysis for students in this quadrant 1 expect Reliability in Al-Mustansiriyah University and Efficiency in Babylon University are located in quadrant low importance and low satisfaction.

This work evaluates gap analysis between importance and satisfaction, the University of Baghdad and Al-Nahrain University have less gap analysis than the rest of the universities and this signify that there is a balance between the importance and satisfaction.

Finally, to assess the questionnaire reliability, it was an alpha Cronbach account ( $\alpha$ ) and its value for teachers is (satisfaction: 0.9004& important: 0.914) and students are (satisfaction: 0.8877& important: 0.9022), and both values are within acceptable limits.

As for the future work, Moodle can be analyzed for different criteria as an effective e-learning tool in the pedagogue systems. In addition, the modules of Moodle can be investigated to determine its boosting effect to the learning and teaching processes.

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