

A New Software Program Using Excel to Determine the Need for Faculty Members in Saudi Universities (Qassim University as an Example)

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Abstract: *The study presents an Excel-based software program designed to automate faculty needs assessment processes in Saudi universities. The system generates reports on faculty age, service duration, qualifications, and staffing distributions, enabling administrators to make timely and accurate decisions regarding contract renewals and staffing requirements. By integrating data validation rules, conditional formatting, and dynamic queries, the program reduces errors commonly found in manually prepared reports and improves efficiency for the Needs Assessment Committee. The proposed tool demonstrates practical value for higher education institutions seeking reliable, data-driven administrative workflows.*

Keywords: Excel database, higher education, university needs committee, input and output models, dashboard

1. Introduction

The primary task of the University's Agency for Academic Affairs is to develop curricula and ensure that the colleges have the qualified staff to deliver them across all programs and academic levels. For the Agency's Needs Committee to effectively fulfill its duties, periodic reports must be submitted at the beginning of each semester describing the educational and administrative status of the colleges. These reports should detail the availability of the required number of faculty members. The signing of new faculty contracts that meet the college's needs. In addition to the termination of contracts for faculty members who have exceeded their term or the legal age limit.

Preparing the necessary reports requires significant effort and time from the members of the Needs Assessment Committee. Also, they must possess the necessary skills and experience to accomplish the task. Producing the reports will still take considerable time, even for experienced committee members. Unintentional errors may occur unless computer technology is utilized. Therefore, this program was developed for use by the Needs Assessment Committee members in Saudi Arabian universities and institutes. The purpose of this study is to develop and present an Excel-based automated system that generates accurate and timely faculty needs reports to support administrative decision making in Saudi universities.

The most important reports generated by the program:

Below, we will summarize the most important lists and reports we can obtain from the program:

- A list of faculty members who are over 60 years of age.
- A list of faculty members with more than 10 years of service.
- A list of faculty members who are over 60 years old and have more than 10 years of service.

- A list of lecturers contracted based on their bachelor's degree.
- A comprehensive list of all contracted lecturers who have bypassed the contracting system.
- Charts based on moving ranges for any of the lists mentioned above.

2. Problem Statement

The development of educational curricula and the increasing number of faculty members in universities lead to an increase in the burdens and tasks of the members of the Needs Committee. Based on the university administration's need for the reports that must be prepared regarding the educational process promptly, to make the appropriate decisions to terminate contracts and conclude new contracts, it was necessary to use computer technology to complete the necessary lists on time.

The significance of the study lies in its contribution to reducing administrative errors, standardizing reporting across academic units, and enabling data-driven decisions in faculty contract management. To complete any report, no matter how simple it is we may make some unintentional mistakes, especially if the completion process does not rely on a computer. If we take a sample of the lists completed manually in a college, we will find many mistakes. Especially about age, length of service, or teaching load. There are also coordination differences between reports of the same type received from different colleges.

The software we offer requires the use of electronic databases as a primary source for generating reports. According to the program's design, the databases we will need include college names, academic departments within the colleges, faculty members, and student enrollment figures in the colleges and departments. It should be noted that one of the requirements for employment at Saudi

universities is that the applicant must hold a doctorate or master's degree, and be under 60 years of age. Some colleges do not contract with those who do not hold a doctorate.

3. Advantages of Microsoft Excel

Excel is distinguished as a service-oriented educational program because it includes mathematical and statistical functions, date and time functions, and databases. This paper does not evaluate Microsoft Excel but highlights selected techniques used in the program.

- Date and time functions are used to calculate age and length of service.
- Compound functions are used to calculate age and time in both the Hijri and Gregorian calendars.
- Multiple validation criteria are implemented to ensure accurate data entry.
- Hyperlink technology is used for navigation between program components.
- Cross-reference functions are used to create rules for validating data in a drop-down lists.
- Multiple conditional formulas (cross-reference or union) are used in the conditional formatting setting.

This software consists of several Excel sheets. Some are dedicated to input and others to output. These sheets are linked by code, forming an integrated system. In addition, there is a main interface containing several keys and commands for navigating the program's components. The following is an image of the program's main screen:

14:18 // Saturday-17 // 01-January // 2026		المملكة العربية السعودية وزارة التعليم - جامعة القصيم وكالة الجامعة للشؤون التطبيقية	
01/03/2026	المهاجرون 74552	الميلادي	الحاسب
عبدالمجيد علي عبد القادر بلكن		1447	عبدالله ابراهيم علي النوشان
بطاقة تعريف	Databases		توزيع الأعضاء
العبء التدريسي	Input-1	Input-2	مخططات بيانية
تخصص المحاضرين	قوائم الاحتياج	قوائم المتجاوزين	تخصص المتجاوزين

Figure 1: "main screen"

4. Input and Output

The worksheets in the program are divided into two main groups: the input group and the output group

4.1 First - Set of Inputs

- The university database includes the names of its colleges and departments.
- Input page (1) contains a database of all information related to faculty members.
- Input page (2) contains the number of male and female students in the colleges and departments.

4.2 Second - Set of Outputs

This includes queries and reports related to faculty members; some require data entry into input boxes on the screen. The other also require executing a filter command to display records corresponding to the entered data, including:

- A list of faculty members over the age of 60 in a specific college or university.
- A list of faculty members with more than 10 years of service in a specific college or university.
- A list of faculty members over the age of 60 and with more than 10 years of service in a specific college or university.
- A list of lecturers (master's degree holders) in a specific college or the university as a whole.
- A list of faculty members, including all those who have exceeded the legal retirement age and are lecturers, in a specific college or university.
- Charts showing the distribution of faculty members by academic rank, gender, or nationality in a specific college or the university.

The following diagram represents the program's box-like structure:

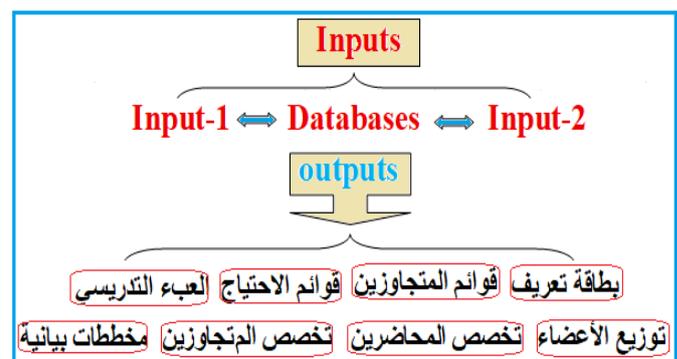


Figure 2: "box diagram of inputs and outputs"

The types of relationships that were used in designing the program are:

- One-to-one relationship $1 \rightarrow 1$.
- One-to-many relationship $1 \rightarrow \infty$.
- A many-to-many relationship $\infty \rightarrow \infty$.

5. An overview of the internal system applied at the university

An overview of the university's internal regulations Qassim University is located in Al-Mulayda, which is its main campus. It has branches distributed across several cities in the Qassim region and comprises 17 colleges offering various disciplines. Qassim University employs approximately 3,350 faculty members, about 36% of whom are non-Saudi nationals. Females make up 44% of the faculty. The Academic Affairs Agency is responsible for securing faculty members, whether by hiring Saudi nationals or contracting with non-Saudi nationals. The university contracts with qualified individuals holding doctoral or master's degrees, and sometimes bachelor's degrees, to teach foreign language, Arabic language, and Islamic studies courses. Some colleges do not offer contracts to those without a doctoral degree.

5.1. Faculty members contracted with Qassim University are subject to the following conditions:

- a) The contract is for one year and is automatically renewed unless either party (the university or the contractor) declines.
- b) The contract will not be renewed if the contractor exceeds 60 years of age (the legal retirement age for Saudi citizens).
- c) The contract is not renewed if the faculty member's service exceeds 10 years.

5.2. The president may, exceptionally, renew the contract of a faculty member who has exceeded the service period or age limit, or both, if they meet the following criteria:

- a) Undergoes a comprehensive medical examination and receives a report confirming their fitness to continue working.
- b) Undergoes evaluation by a college-level committee and must achieve a score of 70 or higher.
- c) Faculty members must achieve a score of 70 or higher when evaluated. by a college-level committee.
- d) Have at least two research papers published in peer-reviewed journals within the past two years.

These criteria are constantly changing according to the university administration's perspective, and this relates to the availability of a cadre of Saudi nationals.

6. Program design

The program was designed to ensure full compatibility with the university's internal system. Based on which the instructions are contained in the system. The two researchers used data validation rules in different ways, taking advantage of the "Offset" and "Indirect" functions when using the "Data Validation" rule to obtain the main and sub-dynamic ranges.

Conditional formats based on formulas and equations were also used, employing compound functions and logical functions such as "if", "or", and "and".

In general, data validation rules and conditional formatting were applied to both input and output tables to ensure the accuracy of the entered data and, consequently, the reliability of the resulting tables and reports. The following section outlines selected examples of these rules and formats.

For instance, when entering the name of a college that does not exist at Qassim University, this warning message appears, confirming that the data cannot be entered unless it is correct. This protection is applied to all input fields to ensure the accuracy of the data entered in inputs (1) and (2)

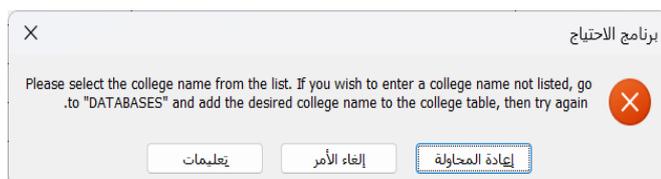


Figure 3: Warning message for entering incorrect data

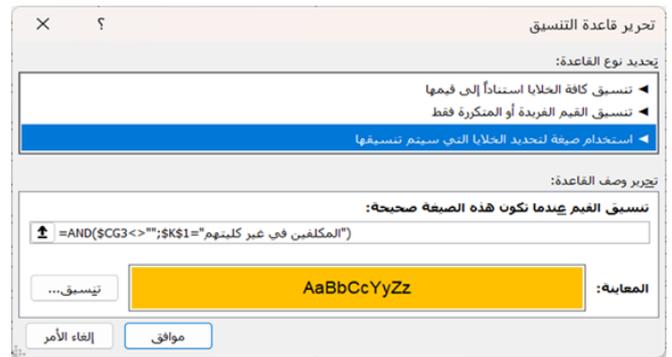


Figure 4: Conditional Formatting dialog box

Window (4) above and the following (5) describe a conditional formatting rule applied to the input table (1) to distinguish members assigned to a college other than their own.

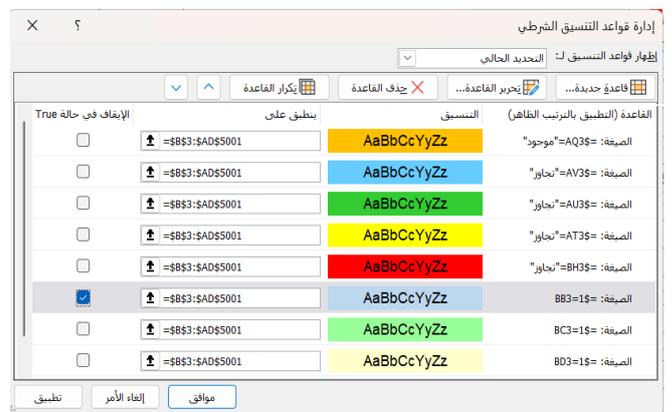


Figure 5: Conditional Formatting dialog box

Conditional formatting based on formulas was used to distinguish data that met specific criteria. In addition to precise validation rules, such as preventing duplication of faculty member numbers and names. These conditional formats and rules ensure that data entry is error-free. Which in turn helps us obtain error-free queries.

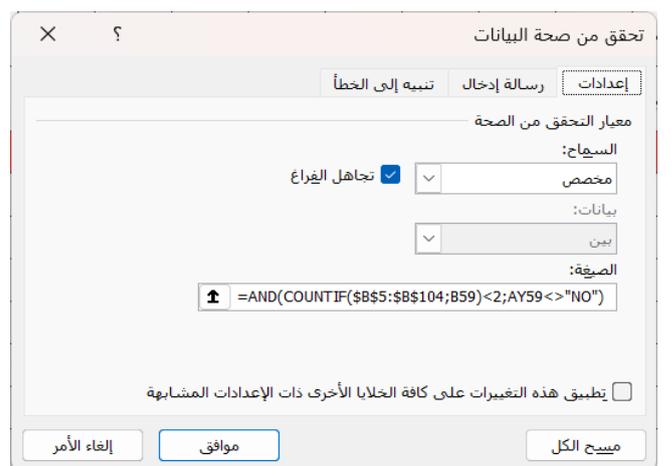


Figure (6) Data Validation Rule Dialog Box

In this window, logical functions are incorporated into a mathematical formula to establish a criterion for validating data entered into tables. This criterion ensures compliance with the predefined input list and prevents duplicate entries. Such validation criteria are essential for Excel users during

الكلية	أستاذ	أستاذ مشارك	أستاذ مساعد	محاضر	معيد
1 الأعمال والاقتصاد	8.32	9.27	10.87	11.57	10.00
2 التربية	8.34	7.41	6.21	7.57	6.97
3 التطبيقية	3.00	11.35	13.50	15.14	13.29
4 التمريض	0.00	0.25	1.11	3.00	0.14
5 الحاسب	11.50	13.68	13.37	15.82	15.19
6 الزراعة والأغذية	13.52	13.53	14.15	6.33	16.00
7 الشريعة	8.68	12.38	13.99	14.15	14.10
8 الصيدلة	7.78	6.85	7.91	2.52	0.00
9 الطب	0.08	0.07	0.01	0.05	0.00
10 الطب البيطري	12.94	9.11	10.33	11.00	16.00
11 العلوم	12.07	11.64	13.13	15.11	13.37
12 العلوم الطبية التطبيقية	6.83	7.80	8.53	11.93	4.33
13 العمارة والتخطيط	8.00	10.00	9.63	10.75	0.00
14 الفنون والتصميم	12.67	13.83	10.15	10.00	3.75
15 اللغات والعلوم الإنسانية	10.52	10.92	13.76	13.90	14.57
16 الهندسة	8.10	8.24	7.71	8.50	10.00
17 طب الأسنان	0.00	0.39	0.38	2.00	0.00

Figure 10: Average teaching load of faculty members at Qassim University

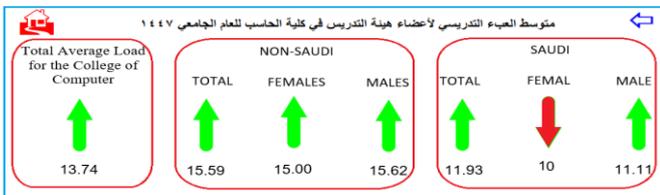


Figure 11: Average teaching load in the College of Computer

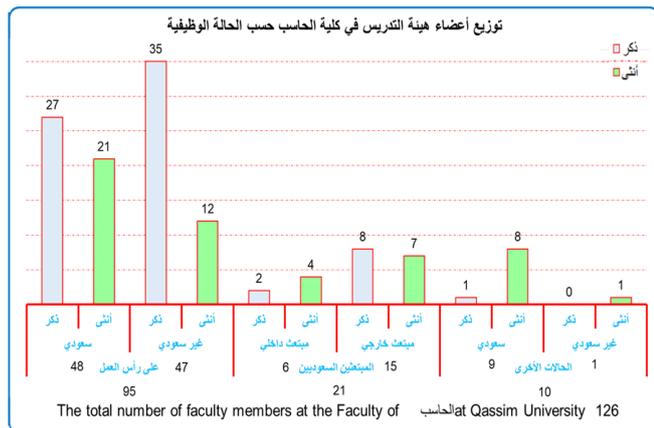


Figure 12: Distribution of members in the College of Computer according to job status.

4) From the main screen. Select the college, then click the "Charts" button. This will display several charts showing the distribution of college members by department, degree, or status. By removing the college name, you will obtain similar charts for all colleges, as shown in Figure (13).

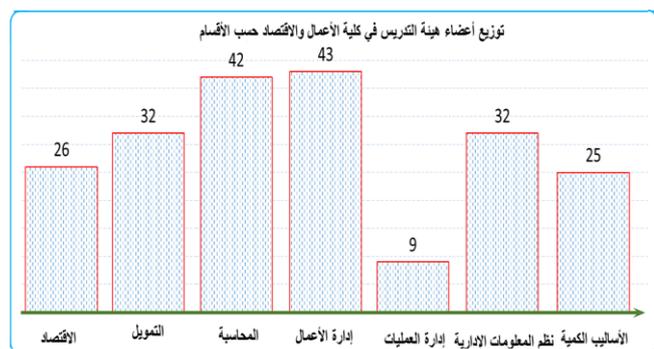


Figure 13: Distribution of faculty members in the College of Business and Economics

The graph in Figure (13) shows that the faculty members of the College of Business and Economics are distributed across seven departments. This graph will automatically change when we change the college name, because it relies on dynamic ranges. If we remove the college name, it will revert to a faculty distribution graph for all colleges within the university, as shown in the following table.

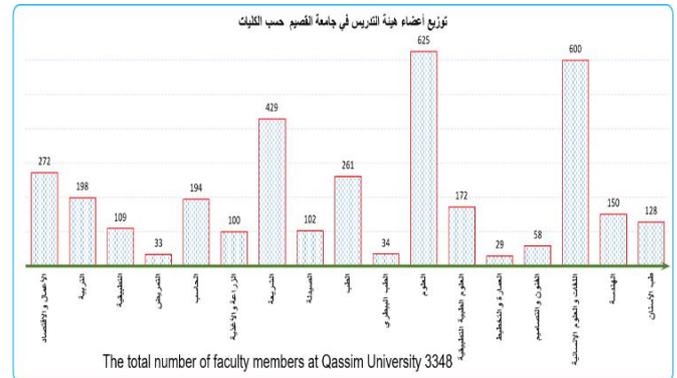


Figure 14: Distribution of faculty members at Qassim University

It is clear from the bar chart in Figure (14) that the number of faculty members at Qassim University is 3348. Distributed across 17 colleges. The number of members in the college ranges from 29 in the College of Architecture and Planning to 625 in the College of Science.

5) From the main screen, select the college name, click the "Charts" button, and choose "Pipe Chart." This will display the chart, and there is a similar chart showing the distribution of members by gender. Removing the college name will produce the same chart for all colleges, as shown in Figure (15).

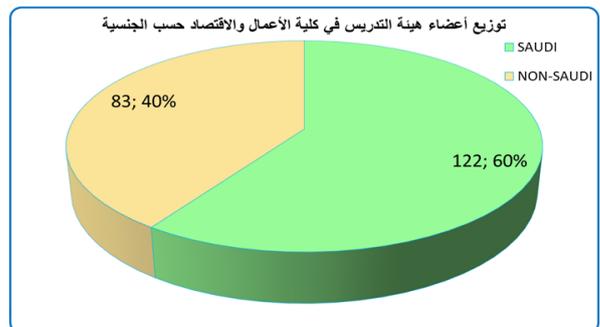


Figure 15: Distribution of faculty members in the College of Business and Economics by nationality

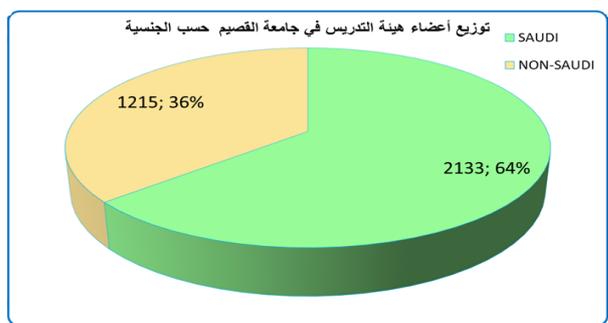


Figure 16: Distribution of faculty members at Qassim University by nationality

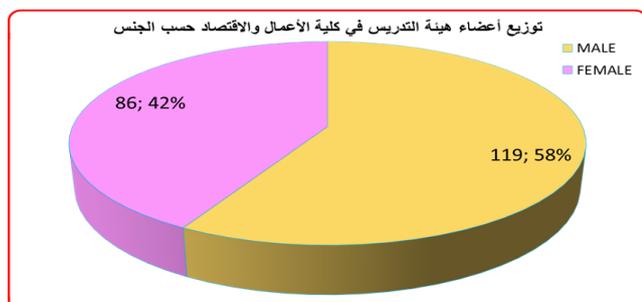


Figure 17: Distribution of faculty members in the College of Business and Economics by gender

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8. Conclusion

The presented Excel-based program demonstrates a practical solution for automating faculty needs assessment within Saudi universities. By generating accurate reports on faculty age, service duration, qualifications, and staffing distributions, the system supports university administrators in making timely decisions regarding contract renewals and staffing adjustments. Its integration of data validation rules, conditional formatting, and dynamic queries ensures reliable and error-free outputs, offering clear advantages over manual reporting methods. The program is suitable for adoption across higher education institutions seeking improved administrative efficiency. Also, we confirm that it is used in any Saudi university to accomplish the following:

- A list of faculty members over 60 years of age.
- A list of faculty members with more than 10 years of service.
- A list of faculty members over 60 years of age, and with more than 10 years of service.
- A list of lecturers contracted based on a master's degree.
- Charts and graphs of moving ranges for any of the above categories.

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