

# Intelligent Accreditation System: A Survey of the Issues, Challenges, and Solution

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**Abstract**—International educational institutes are aiming to be accredited by local and international accreditation agencies such as the Association to Advance Collegiate Schools of Business (AACSB), Accreditation Board for Engineering and Technology (ABET) and so forth to be recognized by stakeholders. The institutes are striving to meet the stakeholders' expectations by integrating quality in all standards of educational practices and guarantee a continuous improvement. This study has acknowledged the principal barriers that need to be addressed and resolved such as collection & population of data, time constrains, compensation and lack of guidance and expertise. A web-based survey was conducted to identify the obstacles and the respondents' expectations in the optimization process for accreditation. This research proposes an Intelligent Web-Based Accreditation System (IWBAS) that addresses the above issues and streamline the accreditation process.

**Keywords**—Challenges of Accreditation Process; Intelligent Accreditation System

## I. INTRODUCTION

The main responsibilities of accreditation agencies are then to establish the standards and procedures required for academic assessment and quality assurance as well as to provide training for faculty and staff members involved in the accreditation process. In this respect, each agency has created its own set of standards for the major areas of operation in education. The main areas of the standards in higher education include mission, goals, and objectives; program administration; management of the program; quality assurance; learning and teaching; student administration and support services; educational resources, facilities, and equipment; financial planning and administration; employment process; research; and relationships with the community.

During the accreditation process, all the standards are required to be addressed at several levels of detail. In specific, each standard is broken down into a number of sub-standards dealing with the requirements within each of its major areas. For example, the learning and teaching standard could be divided into a number of sub-standards that address the learning outcomes; students' learning and assessment; and quality of teaching. To be accredited, institutions have to provide a list of the good practices that are carried out within each of the sub-standards supported with sufficient evidences on the implementation of these practices.

In this regard, accreditation is asserted an effective way to assess and improve the quality of education [1]. Academic program accreditation, for example, is emphasized as an effective quality assurance mechanism that could serve a broad range of constituencies from the perspective of the profession and society. The growing interest in a sustainable improvement in the academic programs, and not just in meeting the minimal educational requirements, is a current positive trend that will help to guarantee successful educational systems. Accreditation should ultimately contribute to assure that graduates will have the knowledge and skills required to practice the profession successfully and to be of service to their societies [2]. Researchers [3] believe that the growing emphasis on accountability, assurance of learning, and the rising concern about the quality of education shed light on the significance of the accreditation process at both program and institutional levels. They stress that professional workforce is becoming internationally mobile and higher education institutions are expected to compete for participating through their graduates and research in the global economy.

Despite the positive expectations and inevitability of the quality affirming process, it still includes some barriers that need to be addressed and resolved should we require capturing all its potentialities. The nucleus of the whole process is to collect a vast amount of data and commentary necessary for fulfilling the standards required for the accreditation. Institutes' quality units are composed mainly of faculty members who are most likely not experienced in the accreditation process. In this respect, Al-Yafi [4] discussed such a lack of guidance and expertise as the principal obstacle to many institutions not to complete their evaluation reports. Faculty members are also in doubt about the accreditation ultimate outcome and confused about its relative priority within their typical list of duties including teaching and research. In sum, without adequate expertise or obvious motive, faculty members are constantly under pressure to collect an enormous amount of data, analyze it, identify areas of improvements, provide evidence, and finally write reports, all besides their normal duties.

This study discusses the common barriers of the accreditation process, focusing on the key problems of collecting and presenting data. This discussion is based on the viewpoint of faculty and staff members who have been involved in the accreditation process long enough to judge its complications. The study analyses the factors that cause the

complications and confirms the necessity of an Intelligent Web-Based Accreditation System (IWBAS) to overcome the challenges.

This paper is divided into six sections. After this introduction, Section 2 includes a brief literature review. Section 3 introduces the methodology adopted in this research. Section 4 presents the main challenges that are embedded in most of the accreditation projects and how a business process might address these challenges. In Section 5, a prototype of the IWBAS is presented. Finally, Section 6 discusses and concludes the research.

## II. LITERATURE REVIEW

Brodie et al, [5] emphasizes the requirements of the academic institutes to provide a robust evaluation of the quality of their degree programs and to benchmark that quality internationally. The study addresses multiple methods that may be used to evaluate courses and programs including, surveys, grades analysis, and progression data. It also compares typical examples of some approaches to study the robustness of the link between the data collected and the evaluative judgments. The main concern seems to be in collecting and analyzing the data required for the evaluation.

The work has been [6] presented a comparison of two programs based on different accreditation criteria. The comparison is based on senior students' exit surveys and feedback obtained from faculty who taught the students of both programs. The research claims that graduates of the program following the outcome-based criteria have acquired better skills as compared to the other program following input-based guidelines. Once again, the study is based on collecting and analyzing data required for the comparison.

Gonge and Ghatol [14] assert the necessity of the classification of the educational accreditation into three groups: primary educational accreditation, secondary educational accreditation, and higher educational accreditation. They also emphasize accreditation as a continuous process that should meet specific standards of quality required for each level of education. In other words, it is a continuous process of collecting and analyzing data for evaluation purposes. However, their research focuses on the art of teaching in the learning process as an essential part of the educational accreditation, quality, and assessment. This can be contrasted with paper-based accreditation processes that highlight the importance of collecting and analyzing data.

Abou-Zeid and Taha [8] address the requirements of different international accreditation agencies such as the Saudi National Commission for Academic Accreditation and Assessment (NCAAA) and the Accreditation Board for Engineering and Technology (ABET). They discuss the challenges that arise during the preparation of the accreditation documents, including the inadequacy of knowledge of the accreditation needs and requirements. In their results, the challenges faced during the accreditation process include the inability to properly prepare required forms and documents, lack of faculty commitment to the accreditation process, high faculty turnover, and lack of proper support from higher administration. They notice that the differences between the

programs and institutes accreditation are not the problem; the readiness of the program and the institution itself is proving to be the catalyst for the accreditation process. This primary outcome by Abou-Zeid et al, [8] is further discussed in this paper to highlight the risk of the added workload on staff members that may lower the priority of teaching and research for filling the accreditation forms and conducting the surveys required. There are similarities in Abou-Zeid et al, findings and the work presented in this paper, especially the lack of belief in the outcome of the accreditation of the institution, which may hinder the accreditation process immensely.

## III. METHODOLOGY

This research utilizes a descriptive survey to investigate the hidden obstacles in respect of collecting vast data and convert it into the needed format for the different accreditation projects. A quantitative data was collected through a Web-based survey and fed into a Statistical Package for Social Sciences (SPSS V.13) to analyze the relationships among the different responses. The survey's objectives were to attempt to answer the following questions:

- How have you participated in the accreditation process?
- How has your experience been during the completion of the accreditation requirements?
- What are the obstacles that arise during the process?
- What is your opinion about the solutions including the streamlining of the whole process through automation?

On February 9, 2015, a questionnaire was posted online along with a note that provided general information on the nature and importance of the study and the significance of the contributions. Participants were assured of the confidentiality, of their responses and promised a summary of the study results if they so desired. By February 28, 2015, the researchers had received 121 responses which were analyzed using SPSS statistical software.

Surveys are used in many areas of human activity, such as analyzing the attitudes and perceptions of people towards any phenomena [7, 9]. A survey provides a quantitative description of a sample of a population could enable the researcher to generalize the findings from this sample.

The Web-based surveys are used extensively for both scientific and non-scientific purposes, because of their ability to describe a large population in terms of a broad range of characteristics, attitudes, and behaviors. Many researchers [10] have recently used Web-based surveys as an appropriate method to collect data from Internet users due to its cost effectiveness, rapid turnaround, high response volume, and ability to cover a large geographical area. Many researchers utilize Web-based surveys for several other reasons including the ability to skip questions that are irrelevant based on previous responses, more time for questions that need extra time to respond, the elimination of interaction bias, and the manner in which they facilitate the collection of a large amount of data in a relatively short period of time. Due to the electronic submission of the responses, surveying cost is relatively small with a much fewer data entry requirement.

Surveys may also be distributed to the respondents by hand or in a group to reach respondents who do not have frequent access to the Web and could offer necessary explanations concerning the questions, if required.

In contrast, the Web-based surveys still have their own drawbacks. As the respondents will be on their own, Web-based survey's questions must be carefully chosen and pilot-tested. Self-selection and unequal opportunity are significant limitations of this sampling procedure [10]. Finally, in a Web-based survey, only people who have access to the Web could participate, but this was entirely appropriate in this study.

In this research, the questionnaire is developed in-house and includes ten main questions, seven of which give the respondents the chance to select more than one answer and even allow them to add their own comments as necessary. In addition, a separate question is dedicated to allow the respondents to add their own final comments and suggestions (see Appendix A). The questions, though limited in number, could have enabled collecting valuable data about the whole accreditation experience, however, the analysis below will focus on the problems and the proposed IWBAS as a solution. The results of the other aspects of the questionnaire will be discussed in a further research.

#### IV. ACCREDITATION: CHALLENGES AND SOLUTION

This study addresses some of the complications that are encountered throughout the accreditation projects, including NCAAA, AACSB, and ABET, from the viewpoint of staff members who have been deeply involved in implementing their procedures long enough to be able to judge their pitfalls. Some of these complications, as described below, are unnecessary and absolutely not inevitable by automating the process through implementing and using an intelligent web-based accreditation system.

In their responses to the overall experience of the different accreditation projects, 63% of the respondents agree that the accreditation process is an unsatisfactory or bad experience with limited expected influence on their teaching and research activities. This result confirms the initial claim that many staff members might not believe in the accreditation process as a quality assurance mechanism and they are in doubt of its outcomes on the overall educational systems. There is a high risk that accreditation procedures are then implemented haphazardly just to comply with the regulations, without a clear understanding of their pedagogical functions. It could be argued that for some staff members, implementing the regulations has turned to be a goal in itself rather than just a way of achieving quality.

Regarding the obstacles to complete the accreditation requirements, most of the respondents have agreed that the lack of expertise and the lack of time are the main problems. It has to be stated that many of the accreditation mechanisms and procedures cannot be understood through the simple guidance attached to the reports to fill. Even if the guidance is clear, there will always be a huge set of unanswered questions. For example, how to select acceptable and consistent local and global Key Performance Indicators (KPIs)? How could benchmarking get along with the selected KPIs? What are the

appropriate assessment methods that would enable the Assurance of Learning (AOL)? How are busy staff members supposed to analyze the grades of their large number of students, for each course they teach, with respect to each learning outcome? How could a course report on the same subject with different groups be written?

Surprisingly, the same claim about the lack of expertise was discussed by researchers [13] and after 10 years now it is still unsolved. A comprehensive survey that adopted personal interviews about the NCAAA also presented the paradox of the substantial deficiencies that are often found in the submission of the accreditation documents, though prepared by experienced PhD-holder staff members [Ibrahim et al. 2016]. Surely there is nothing in these deficiencies related to the lack of skills or knowledge; it is all about an assumed expertise that does not exist. The previous research [2, 3] has suggested that the implementation and evaluation of the quality assurance process could be monitored by offering proper training to the active committees. Otherwise, it will be tough for faculties to follow the accreditation process while are not equipped with the required specialized experience.

Similarly, about 59% of the respondents agreed on the incomprehensibility of the accreditation process. In addition, about 40% confirmed that the inconsistency and conflicting feedback about the reports from the different stakeholders, reviewers, accreditation commissions is another source of confusion that delay the completion and submission of the reports. It is argued here that many different answers could be obtained for each question about the process from each different stakeholder. For example, with respect to the course report question presented above, three different viewpoints have been received: (1) statistical data of all the groups should be summarized in a single report; (2) statistical data in each group should be presented and compared to the other groups in the same report; and (3) each group has to have a separate report. Researchers of this paper have also witnessed conflicting feedbacks about the accreditation submissions from an external consultant, quality vice-deanship in their college, quality deanship in their university, and the accreditation commission. Such feedback is absolutely confusing for the committees who struggle to satisfy each of those revising authorities through repeating the work again and again. A single, consistent report would definitely be much more beneficial and take much less time to implement should an efficient communication between the quality assurance and accreditation units be established.

Regarding the main data problems, redundancy, unavailability, and the difficulty of the analysis required are the main problems confirmed by 87% of the respondents. Redundancy with respect to all the aspects of the accreditation process, including efforts, data, and communication is surely a serious cause of the submission delay and time waste. For example, considerable efforts are duplicated by all the academic programs in the same college to get and report data that are common, such as, university and college level data. Another form of redundancy is that some data are required to be repeated in different places in the forms. For example, just consider the redundancy of the learning outcomes, objectives, and assessment methods in the program specification, course

specifications, and course reports of the same academic program. Resubmission redundancy is also expected each time the documents and requirements are changed as usually happens with all accreditation commissions. Although a certain considerable bulk of the data would usually be the same in the old and new templates, significant work would be required to refill the new documents.

In the light of the barriers and the outcome of the survey with the concerned subjects, this study recommends the implementation of an IWBAS. First, the time and efforts of gathering, compiling, analyzing, managing, and presenting quantitative data in effective ways, not to mention the training and professional development required to accomplish these tasks, could exceed the time and efforts invested in designing and implementing an IWBAS. Getting accredited is not a final destination; it is indeed just a beginning of an endless continuous journey of quality fostering and maintaining process. IWBAS then is the platform that would enable and facilitate such an ongoing communication between the academic institutes and the accreditation commissions.

Second, the correct information, requirements, suggestions, guidelines, feedback, and recommendations may be available through IWBAS to provide a more robust, fair, and transparent system. The availability of a centralized online information system could streamline the whole accreditation process and speed up handling the requests than at present. The IWBAS may be accessed by the quality units and deanships to review formal and final submitted documents from colleges and departments to make final accreditation decisions. Through IWBAS, commissions can disseminate information and guidance, explain the requirements for successful accreditation, and help institutes prepare for the formal accreditation submission. In this context, IWBAS could be considered as a liaison between the institutions and the accreditation institutes that enables effective communication with faculty and staff to help them integrate and align existing documents into a coherent accreditation submission.

Third, IWBAS could work as an interactive whiteboard system on which all the comments and feedback are communicated. This availability of centralized reviews may help other programs to avoid obvious mistakes on the fly. Concerned committee members may contribute virtually in the process while not present physically. Administrators may also check the progress, assign additional resources, and make comments to speed up the process. In the absence of the interactive reviews, academic programs or concerned personal may compile data or integrate information into the reports that may not be required by the accreditation reviewers. This unnecessary excessive work could be avoided by using IWBAS that may bank all the comments, reviews, feedbacks, explanations, and responses about every submission at one place and communicate them intelligently as required.

Fourth, the serious problems of redundancy are automatically solved by the centralized database of the system. The system could then facilitate the repetitive submissions of the accreditation documents to the same commission in response of the sequential revisions or changing templates. The submissions to different local and global accreditation

institutes are no more that complicated as most of the data required for these different accreditations are quite similar and the system could enable producing the data in any format required.

The IWBAS payoff may surpass the expectations of its originators. For example, internationalization of higher education requires curriculum communication between educational institutions, as well as access to information about learning opportunities and/or outcomes achieved for other users like students, prospective employers, and administrative institutions [11]. To achieve such a centralized integration, IWBAS may serve as a central reporting mechanism and a generator of publicly available trend data about universities and their colleges, departments, and programs. It may automatically compile new measures and statistics from databases and disseminate trend data to all of the institutes involved. Each institute could benefit from publicly available trend data and guidance on how to compile, interpret, present, and use the data in many ways including benchmarking. The availability of centralized data at IWBAS could eliminate extra data-gathering practices that do not address strategic concerns or are not required for reviewers.

## V. AN INTELLIGENT WEB-BASED ACCREDITATION SYSTEM

As discussed earlier, IWBAS could assist in overcoming some common complications of the accreditation processes, streamlining its detailed procedures, facilitating the submission to different accreditation commissions, and helping to ensure the quality aimed in the first place. This research discusses the conceptual ideas of the system. Detailed analysis or design of the system is out of the scope of this study and may be carried out in a future research. The IWBAS is supposed to be a web-based or cloud application system that is developed and maintained globally by a non-profit or for-profit organization. Although the system has to be based on a comprehensive survey of the requirements of the most common accreditation institutes, it should not be restricted to these requirements. It has to be built as a quality-oriented system that satisfies excellence through accreditation. In other words, the system should be built with a mission that "To facilitate accreditation as a quality assurance mechanism, not as a goal." With respect to this mission, the system is supposed to provide the decision makers and stakeholders of the registered institutions with customizable, interactive dashboards of the historical trends and current status of the main metrics and KPIs required. In addition, this type of interface could facilitate measuring and tracking all the accreditation requirements that are declared, according to the questionnaire in this study, incomprehensible and difficult to compute. For example, a course tracking dashboard should provide information about the students' attendance; grades analysis and progression of each student and the overall students; assurance of learning of each learning outcome; and students feedback on each class or topic; all with a detailed comparison with all the other groups of the same course in the current semester and the previous semesters and automated benchmarking with local and global similar courses (see Fig. 1). Staff members will not have to worry much about the data and analysis of this dummy work anymore; they will have more time to consider teaching and course improvements.

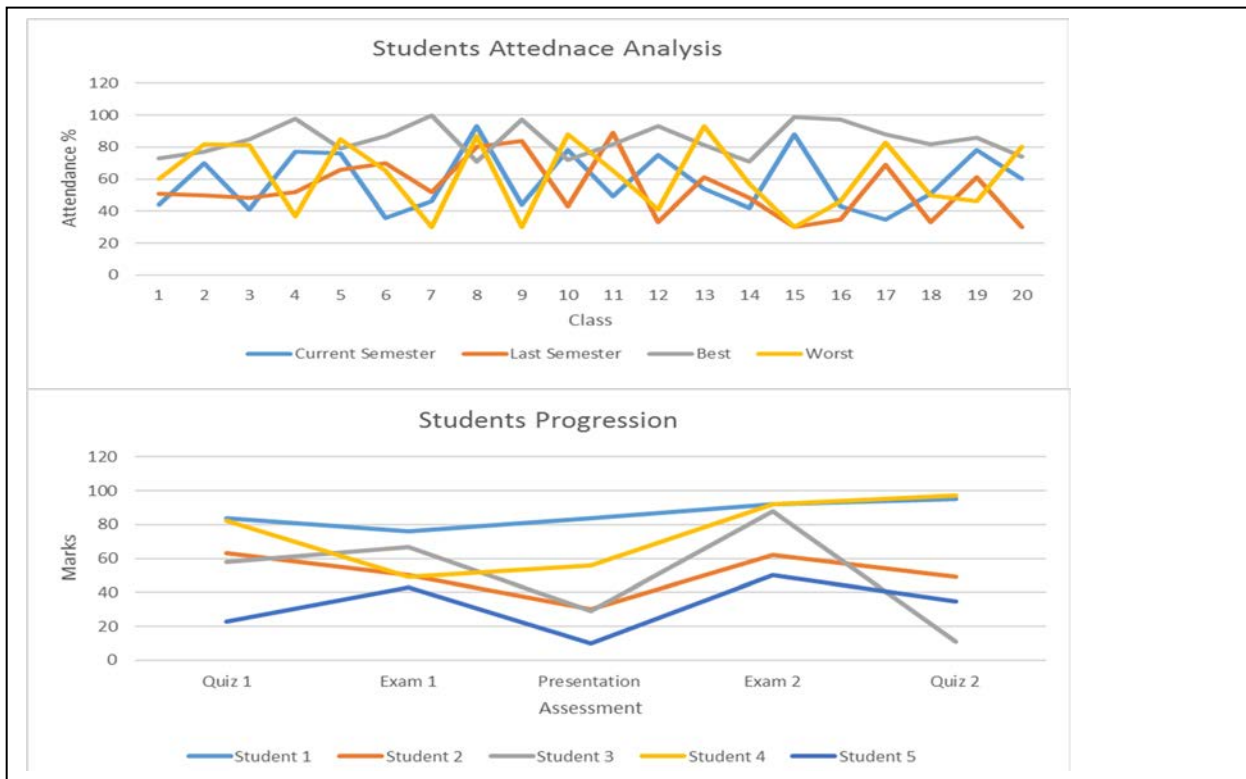


Fig. 1. Sample Course Dashboard

The system has to have a specific predefined workflow for commencing an accreditation process. The workflow starts with a step of filling a registration form including data about the institution and the type of accreditation it applies. The registration form is surely different if a university, college, department, or program is applying. An academic program application form is supposed to be automatically linked to its corresponding department application, which is linked to its corresponding college form, which is finally linked to its university (see Fig. 2). In this way, data could be easily propagated back and forth among these levels of entities within a particular institution with a substantial elimination of redundancy and a significant saving of time.

The application forms should only include the essential information about the applicants. A full access to material, forms, and regulations corresponding to the accreditation process is granted once the registration step is completed. The access would allow the applicant to traverse the material, fill the forms, get online assistance, and receive feedback.

With respect to filling the accreditation forms, that is, compiling and entering the data in the centralized database, a uniquely different approach should be adopted. Accreditation forms should be just seen as reports that are required by the agencies about the candidates. Even the format and data included in these forms are always a subject to revision by the accreditation institutes. For example, three different templates have been introduced by the Saudi NCAAA in the last 5 years. From that perspective, data must be organized and entered according to their relevance rather than the format of the reports required.

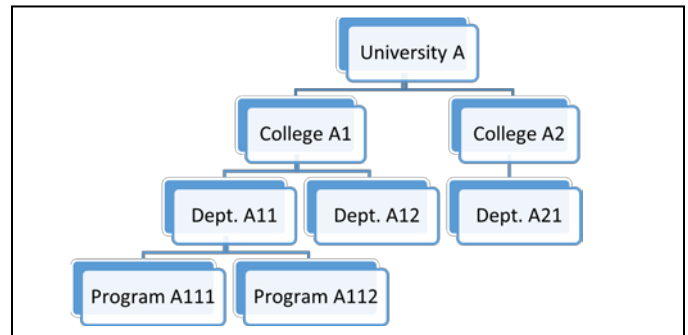


Fig. 2. Institutional Entities Registered for Accreditation

This would actually help further reduce the data redundancy as each piece of information would be entered only once, according to its relevance and can then be automatically propagated in all the reports in which it is required. Researchers of this article themselves have encountered the drafting problem twice. Once a new curriculum for one of our B.Sc. programs has been introduced, a comprehensive revision of the department's accreditation forms has been undertaken, despite most of the data has not been changed. This incident occurred again when the NCAAA commission has introduced new forms in 2013. Transferring the data from the old templates to the new ones was a tremendously tedious work while most of the data was again unchanged. The tireless work of re-entering and updating the data could be absolutely avoided by adopting the IWBAS.

As stressed above, automated data integration, propagation, and manipulation is essential for the ultimate utilization of any

IWBAS. For example, data from academic departments, academic programs, and courses offered in each of these programs could be manipulated with consistent propagation and highest integration. Fig. 3, for example, represents how the department vision, mission, and goals have to be reflected in its all programs' mission, goals, objectives, and learning outcomes, which in turn have to be considered in each of the courses the programs offer. And all of these have to be initially in a full compliance with the department's college and university vision and mission. Things should get more complicated when considering programs with different tracks, colleges with interdisciplinary departments, and universities including similar programs. Ibrahim et al, [10] stated that considerable comments and feedback are usually received with respect to the consistency among the objectives and goals of the departments, programs, and courses. It can be argued here that the absence of a platform that can present and organize these levels of details is an essential reason for the inconsistency problem rather than the staff members imprecision of setting the links required among those subjects.

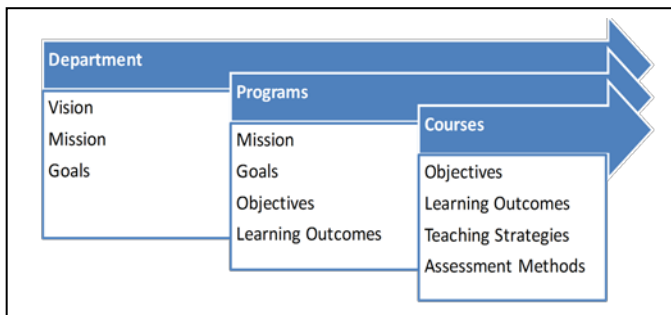


Fig. 3. Data Manipulation and Integration of Departments, Programs, and Courses

From the implementation perspective, in the case of the accreditation of an academic bachelor program of a specific department, for example, an initial web-form for the courses offered in the program must include elementary information about each course, such as, course name, level, and description. Once the courses web-form is submitted, the data must be manipulated in a way of creating, for example, a course specification web-form for each identified course. Data such as the university name, college, department, course code, course name, and so forth must be included automatically in the newly-created course specification forms. Some of this information could have a read-only restriction, while others must be left open for editing. Editing the course code, for example, must be propagated back to the courses form exactly as the data updated in the courses form propagated forth to the other forms, including the course specifications and course reports, requiring this data.

Data requirement and data granularity are critical issues of the system. Both of the obligation and granularity could be simply identified through a comprehensive scan of all the data requirements by the different accreditation systems. Data requirements are identified by the fields of the forms to be filled, while the granularity by the last field that requires this information in the different accreditation systems. For example, while the course name could be considered granular as any piece of it is not necessary in any form, the course

learning outcomes are not. Each learning outcome is needed to be linked to teaching strategies and evaluation methods. From the perspective of database concepts, learning outcomes have a Many-to-Many relationship with both teaching strategies and assessment methods. From the implementation perspective, it is so expected in the course specification web-form to include two fields for each learning outcome. The first field is represented by a Combo-Box from which the appropriate outcome "verb" is selected. The second field will be a Textbox to enable writing down the learning outcome. Two more Multiple-Selection Combo-Boxes have to be added to identify the different teaching strategies and assessment methods that correspond to the learning outcome (see Fig. 4).

The system intelligence is supposed to help validating the fields, recommending the outcome verbs, associating the right verb with the right teaching and assessment methods, and checking the relevance of all of them. Such relevancy is usually confirmed as a serious problem for inexperienced staff members, which hinders writing a precise course specification and reports. In that respect, the system can be used as a learning mechanism for the appropriate manipulation of course specification in addition to its primary accreditation and quality purposes. Learning capabilities could be incorporated in all the parts of the system to provide faculty members with the quality expertise currently required for the academic job.

Learning Outcome Verb :	Learning Outcome:	Teaching Strategies:	Assesment Methods:
Describe	<input type="text"/>	Lectures	Exams
Describe			
List			
Name			
Define			

Fig. 4. Learning Outcomes Web-Form

The system has to include an advanced *Query and Reporting Tool (QRT)*. The QRT must include predefined queries that initiate all types of forms and reports required by the different accreditation agencies from the data entered and saved in the system. Also, the QRT should enable querying the database for any other ad-hoc reports. The QRT retrieves the data required for a particular report/form and organizes the data in any particular predefined format. For example, short, full, or ad-hoc course specification reports can be extracted and developed from the database as long as all the data required about courses are saved without the need of any extra efforts. Changing the accreditation templates is not a problem anymore.

As this study is intended to shed light on the concepts and applicability of IWBAS, many capabilities that could be added to the system are omitted here. Development of unified standard exams of similar courses around the globe, comparisons of similar academic programs, and benchmarking with suggested national, regional, and international institutions are among these additional functionalities. Online automated assistance and guidance should be a part of the intelligence system. Sophisticated dashboards for each level of administration in the educational institutes, online data analysis, automated feedback, students' progress reports, staff members' evaluations, etc. are highly applicable with the data

available. Online communication among similar departments or colleges could be also permitted to enable new applicants to get benefited from the experience, expertise, and material of the institutions ahead.

## VI. CONCLUSION

The rationale of going through the rigorous process of accreditation to make sure that high quality in educational processes, continuous improvement efforts, assurance of student learning, emphasis on ethics and code of conduct, faculty and student engagement, and mission-driven management processes are firmly ingrained in academia.

An accreditation is a quality-affirming process that includes the creation of accreditation standards and awarding of accredited status. Contrary, it is a laborious task if not planned appropriately from the start-up. In this respect, online survey was conducted with the people who are involved in the accreditation task. The rationale of the survey is to learn the existing challenges and hardship and expected solution.

The collected data showed that several problems exist in the current practices of data gathering and formulating reports for the accreditation process, such as, redundancy, decentralization of information, lack of expertise, the inherent difficulty in reaching the quality assurance personals, conflicting feedbacks, and insufficiency of time allocated for data gathering and writing reports. These concerns represent real challenges and issues and required an intelligent tool to replace the tedious labor and streamline the whole process.

This result revealed that many respondents do not believe in the accreditation process as a quality assurance mechanism and are in doubt of its outcomes on the overall educational systems. They have stated that lack of expertise and lack of time are the main problems. On the same note, they mentioned that accreditation mechanisms and procedures cannot be understood and followed through the inaccurate guidance provided to populate the reports and forms. It has been noted from the responses that many agreed on the complexity, redundancy, unavailability, inconsistency and conflicting feedback on the accreditation process.

This study suggested the that Intelligent Web-Based Accreditation Systems (IWBAS) to be implemented to standardize the whole accreditation process, eliminate redundancy and wastage of time, avoid repetition of general information, and provide the availability of 24/7 communication channels. IWBAS then is the platform that would enable and facilitate such an ongoing communication between the academic institutes and the accreditation commissions. The proposed system could generate accurate information, suggestions, guidelines, feedback, and recommendations to facilitate the robust, fair, and transparent process. The proposed intelligent system could work as an interactive whiteboard that host comments and feedback from all stakeholders. The availability of centralized comments and feedback may help in avoiding common errors. The whiteboard could be accessed by all concerns personnel through Internet to observe latest, check the progress, available resources and comments to speed up the process. Contrarily the concerned person may compile unnecessary data or integrate information

into the reports that may not be helpful or required by the accreditation process. The system would eliminate the redundancy through the centralized database of the system. This study has presented and discussed the conceptual framework of the proposed tool while its implementation will be presented in a future study.

## ACKNOWLEDGMENT

The authors extend their appreciation to the Deanship of Scientific Research at King Saud University, represented by the Research Centre at the College of Business Administration, for funding this research.

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APPENDIX A

Online Survey Questions

As presented above, data are collected through an online survey, implemented on Google Forms, to be found at [12]:

<https://docs.google.com/forms/d/15-2Nhil0UfT9J1Xpo677BE73M7jgsNeMW15sYRyzZgE/viewform>

In addition to the introductory questions, there are three main groups of questions that address the overall experience, challenges and problems, and solutions.

There is a final question that allows the respondents to add their own comments. Table 1 includes the questionnaire.

No.	Question
<b>Introductory Questions</b>	
	Institute: College/Department (if applicable): Position: Position in the accreditation committee: Accreditation project(s) you have been working on: Period of time you have been involved in the accreditation projects (in months):
<b>I. Overall Experience</b>	
1.	How did you learn about the accreditation procedures? Internet - Colleagues - Place of work – Accreditation agencies – Trial and error – Others (Checkboxes)
2.	How was your overall accreditation process experience like? Excellent - Satisfactory – Neutral – Unsatisfactory – So bad
3.	The accreditation process has a positive significant influence on my teaching, research, and other duties. Strongly Agree – Agree – Neutral – Disagree – Strongly Disagree
<b>II. Challenges and Problems</b>	
4.	What are the main obstacles to complete the accreditation requirements? Lack of expertise – Lack of time –Lack of administrative support – Lack of support from accreditation agencies – Others (Checkboxes)
5.	What are the main challenges/problems in the accreditation process? High teaching load – Incomprehensible accreditation process – Staff resistance – Inconsistent or conflicting feedback about the reports from different stakeholders – Others (Checkboxes)
6.	What are the main problems in the data required for completing the accreditation files? Unavailability – Redundancy– Incomprehensibility – Size of data – Difficulty of the analysis required – Others (Checkboxes)
<b>III. Solutions</b>	
7.	How do you think the administrative obstacles could be solved? Administrative support – Administrative accountability – Ownership of the process – Hiring accreditation qualified staff – Others (Checkboxes)
8.	How do you think the other challenges and problems could be solved? Low teaching load – Special dedicated accreditation committees – Training – Financial compensation – Others (Checkboxes)
9.	If you are the head of the accreditation commissions, how do you think the accreditation process could be handled better? Provide online guidance – Adopting a more realistic approach – Avoid redundancy – Automation – Others (Checkboxes)
10.	An Intelligent Web-Based Accreditation System could facilitate the accreditation process and solve its data problem? Strongly Agree – Agree – Neutral – Disagree – Strongly Disagree
<b>Suggestions and Recommendations</b>	
	Any final comments or suggestions:

Online Survey Questions