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Dr. Yehia El-Mashad, Hesham A. Ali:
**A novel approach for integrating and upgrading educational curricula
through blended learning: a case study of faculty of artificial intelligence -
Delta University**

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Abstract: Blended learning is a new approach to teaching. As the name suggests, it combines personalized instruction with an online learning environment. With this method, pupils have a certain degree of influence on their learning. The main objective of this paper is to present a case study of a new strategy to enhance and develop the curriculum of the Faculty of Artificial Intelligence - Delta University for Science and Technology (Egypt) by leveraging the content of the Coursera campus which provides over 5,000 + courses and over 80,000 specialized courses, professional certificates and directed projects. The article also studies and analyzes the impact of developing and raising the level of the educational process through blended learning.

This paper introduces a new framework for integrating the courses of the College of Artificial Intelligence with one of the international platforms to provide distinguished scientific content. It also presents an evaluation of the proposed strategy to study the impact of integration and the new way of managing the course on student performance satisfaction and how the interaction study affects student satisfaction. The evaluation is based on the qualitative analysis of (student feedback and statistics values of the average distribution of skills mastery across skill areas and learner distribution and mastery of skills for the top 10 competencies across domains. Evaluation and analytical analysis depict that integrating accredited content and scholarly materials available on the Coursera campus provides students with strong learning experiences that benefit from blended methods. Moreover, Maximizing Impact via integration of online and on-campus content to provide students with robust learning experiences that leverage mixed modalities. Finally, the study demonstrates a favorable association between student happiness and performance, as well as a correlation between blended learning and students' better performance.

Keywords: Blended Learning, learning platform, Integrating and Upgrading Educational Curricula performance

1. Introduction

In this article, we will focus on a novel approach to teaching and learning blended learning as an essential part of the "Smart university Framework," which consists of four integrated learning system solutions based on IT (1) Learning system solutions offered by a smart learning system made up of a thesis management system and a learning management system. (2) The only options for face-to-face instruction are "smart blended learning systems" that enable simultaneous offline and online instruction. (3) The use of "smart academic services," such as email and e-office software, to provide academic service solutions. Additionally, (4) A "smart Equipment solution" offers a classroom control option that enables customers to operate classes remotely. The architectural design of the smart University architecture that we proposed is depicted in Figure 1.

The education industry is no exception in utilizing these developments for more effective, accessible, and adaptable learning experiences as our world continues to develop and embrace technology. Blended learning, a practice that combines conventional face-to-face classrooms with online/digital learning, is a revolutionary approach. Significant studies have been carried out in recent years in relation to the use and integration of IT in education. Blended learning has been seen as encouraging [1]. The most recent statistics on Blended learning are shown in Table 1. We might draw the conclusion that Blended learning data show the unmistakable influence of this cutting-edge instructional paradigm [2].

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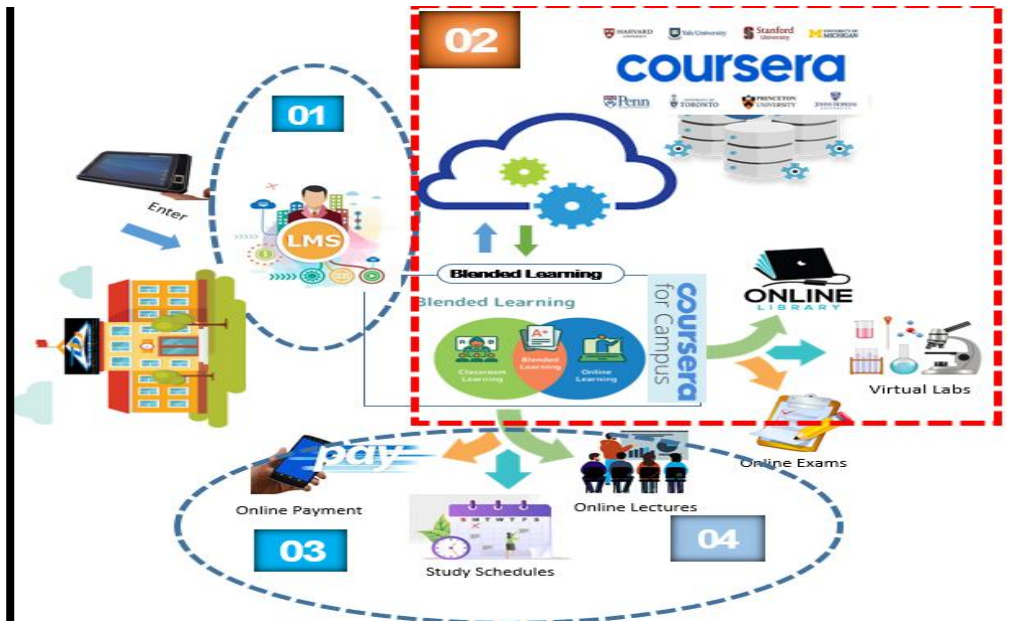


Figure 1 Proposed Smart University architecture

The Blended learning strategy is proving to be a successful technique to improve students' engagement, performance, and overall learning experiences as educational institutions adjust to the fast-paced digital environment. Blended learning is altering the educational environment and demonstrating encouraging tendencies for future growth by utilizing technology and mixing it with traditional in-person teaching methods. In addition to addressing the various needs of students today, blended learning is laying the groundwork for a more dynamic and inclusive future in education by including features of flexibility, personalization, and accessibility.

Table 1 The Latest Blended Learning Statistics Unveiled

Ref	Percentage and Value	Respondents report
[2]	92% of educators	prefer Blended learning over traditional classrooms, according to one source.
[3]	96%	improvement in student engagement via Blended learning .
[4]	60% of parents	believe Blended learning will be a part of future education models
[5]		The Blended learning market is expected to reach \$12.36 billion by 2027
[6]	73% of university students	reported satisfaction with Blended learning experiences.
	74%	Teacher satisfaction with Blended learning stands
[7]	72% of college students	would prefer at least one online course per semester for their future study
[8]	63% of university students	said they would prefer a mix of online and in-person instruction for future semesters
[9]	81% of students	who participated in hybrid courses found the workload manageable.
[10]	70% of educators	believe that Blended learning improves the quality of education.
[11]	82% of students	agreed that they enjoyed hybrid courses more than traditional courses.
[12]	75% of students	who took hybrid courses felt that the learning experience helped them develop valuable employment skills
[13]	63% of university students	said they would prefer a mix of online and in-person instruction for future semesters

Therefore, this paper aims to investigate students' perceptions of blended learning. More specifically, the main objective of the study is to study and analyze the extent to which the level of courses at Delta University for Science and Technology has benefited and evolved in relation to the impact of blended learning on the evolution of teaching methods and whether this development leads to performance improvements for students in their studies. The paper begins with an introduction to the topic as well as the main reason and objectives of the study. It then focuses on reviewing the literature. At the end of the research, the methodology used in this unique experiment is explained. The results are displayed in the Results section. At the end, the conclusions and limits of the study are presented

2. Basic and background

2.1 Transitioning to blended learning

Today's educational system increasingly incorporates online learning into the delivery of courses [14]. The student is the main force behind this shift away from the traditional classroom. Online courses provide students with self-paced learning, flexible scheduling, and top-notch programs. Online learning has certain drawbacks, even when students exhibit a strong interest in various instructional delivery methods [15]. Face-to-face interactions may enhance learning opportunities, including outdoor training, observation, early group cooperation meetings, and laboratory exercises. Additionally, navigating online courses may be more difficult for students with less computer literacy [16]. Some teachers have embraced a hybrid or blended learning method, such as [17], to fully utilize the benefits of both online and face-to-face instruction delivery modes. Rich, online learning experiences are included in blended learning, which significantly reduces the amount of face-to-face training

The flexibility typically associated with a fully online course, the impact on overcrowded classrooms, and a perceived improvement in the teaching and learning experience are all reasons why the blended learning model has seen significant growth over the past few years. Although there may be advantages, it can be difficult for both students and instructors to switch from traditional face-to-face courses to blended learning courses. For instance, in order to succeed in blended learning courses, students must be autonomous learners with solid time management skills [18]. Universities teaching blended learning courses have to adopt new technology and new mindsets to improve the likelihood of optimistic outcomes. Considering these possible challenges, transitioning to the blended learning model must be carefully achieved to confirm that both faculty and students are ready and receptive to this approach

2.2 Building and maintaining student engagement in an online environment

How my students interact with the information is one of the most crucial phases of blended learning. How do my students get along with one another? Therefore, it is imperative that the worth and significance of each member of the course community must be highlighted in the design of these systems. Multiple in-person and online opportunities should be provided for student to student, student to content, and student to instructor interactions. Maintain student participation in class and online. This is crucial, and it goes beyond merely paying attention to lectures and doing examinations. What will the pupils be doing in the classroom and online, you might wonder?

Give students opportunities to analyze concepts and problems, express themselves in meaningful ways, compare their experiences with those of others, and think back on their accomplishments through group and individual activities. Establish a communication schedule, especially for online interactions. Use a variety of communication channels, and urge students to do the same. When used wisely, tools and technologies can act as a lifeline for children who might otherwise feel lost or isolated. techniques to keep your students interested in your online course specifically:

Stay focused on your course.

Activate your learning

Provide prompt feedback

Establish a Secure and Warm Environment

Encourage discussion posts on learning design self-regulation to encourage active learning.

2.3 Blended Learning Curriculum Content

The organizational adjustments and the emphasis on creating and putting into place management strategies for their academic support services and all learning support programs have been identified as major concerns for improving the quality of their curricula in blended learning education systems. The DTUs must prepare for the requirements of the upcoming decade, when many more institutions will be required to keep up with the quickly growing level of worldwide competition. One of the main strategic issues in improving the quality of teaching and learning services is the management of blended learning pedagogies by DTUs to improve student accomplishment. [19]. During the implementation of blended learning; the following five steps aren't trivial, but they will help pave the way for a modern and flexible academic institution.

Re-design curriculum for future-ready skills and re-align it to learner needs –This is an ongoing process, but take another look at the curriculum and update it as necessary. Taking a modular approach to designing curriculum can help with updates over time. Curricula can be updated over time by using a modular design strategy.

Use of online learning platforms like Coursera, which provides courses to students worldwide. Coursera enables you to satisfy the demands of many students without incurring the same costs for human resources and infrastructure as traditional coursework.

Integrate diverse methods of student engagement into the curriculum to support various learning styles - As was noted before, convert curriculum components into platforms that use a variety of mixed media, such as video, games, and audiobooks.

Adopt cloud technology that supports a blended learning framework - Cloud technology can reduce IT worries while easing some of the strain on your local network infrastructure. It will assist you in giving students all worldwide consistent, on-demand access to your educational materials.

Find a way to implement a modern learning framework that can reside on top of the existing technology infrastructure– There is no need to reinvent the wheel. Make the best use of the infrastructure you already have to serve your updated content to students.

3. Related work

Blended learning is an educational approach that combines traditional face-to-face classroom instruction with online learning activities. Blended learning aims to create a more engaging and practical learning experience for students by leveraging the strengths of both traditional and online learning.

In recent years, blended learning has gained popularity in various educational contexts. Research has shown that blended learning can positively impact student learning outcomes, including improved academic achievement, increased engagement and motivation, and greater flexibility and personalization of learning [1].

One of the key benefits of blended learning is its ability to provide students with more flexibility and control over their learning experience. By incorporating online learning activities and resources, students can engage with course materials at their own pace and on their own schedule, while still benefiting from the support and guidance of their instructors and peers during traditional classroom instruction.

Blended learning can also help to address some of the challenges and limitations of traditional classroom instruction, such as the need for more personalized and differentiated instruction. By leveraging technology and online resources, educators can provide students with more targeted and individualized feedback and support, as well as opportunities for self-directed and project-based learning [2].

Despite its many benefits, implementing blended learning can also present several challenges for educators and students. For example, ensuring equitable access to technology and online resources can be a significant barrier for some students, particularly those from low-income or rural communities. In addition, managing student engagement and motivation in online learning activities can be challenging, as it can provide adequate support and training for teachers and other educators [1].

Several studies have been conducted to assist the efficiency of blended learning. For instance, a review of the literature by Ashraf M. A. et al. have provided a comprehensive review of the literature on blended learning. This study has identified several blended learning models, including the flipped classroom, rotation, and flex models. The review also highlighted the benefits of blended learning, such as increased flexibility, personalized learning experiences, and improved learning outcomes. The challenges of blended learning, as mentioned in this review, can be summarized in the following points: the need for appropriate infrastructure and technology, faculty training and support, and the need to ensure consistency and quality in online learning activities [3].

Emara, H. et al. conducted a study to investigate the readiness for and satisfaction with blended learning among integrated modular-based medical students at Mansoura University in Egypt. The study found that most students had a positive attitude towards blended learning and reported high levels of readiness for this mode of learning. The study also found that blended learning was associated with high student satisfaction levels. The study concludes that blended learning can be an effective approach to medical education, particularly for integrated modular-based programs. The study highlights the importance of incorporating blended learning into medical education to enhance the quality of education and improve learning outcomes. The study also emphasizes the need for ongoing evaluation and assessment of the effectiveness of blended learning in medical education [4].

Tso, A. has presented a case study at the Open University of Hong Kong for blended learning. This study aims to illustrate the application of blended learning in teaching presentation skills to university students. In 2013, a five-credit course called ENGL A122F: Presentation Skills was introduced to full-time undergraduate students at the Open University of Hong Kong, using a blended learning approach. By combining the advantages of both online and face-to-face teaching, the blended course included web-based interactive components and video in the course outline [5].

Tong D. et al. have developed a quasi-experiment study for measuring the effectiveness of the flex model of blended learning in teaching coordinates in the plane of mathematics by improving students' academic achievement, self-study skills, and learning attitudes. The quasi-experiment compared 44 students in the experimental group who used blended learning with 46 students in the control group who used traditional methods. The findings confirmed that blended learning positively impacted academic achievement, as demonstrated by the outcomes of the independent t-test analysis [6].

Hill, J. and Smith, K. have presented a qualitative study of strategy documents and expert interviews to provide a snapshot of cross-institutional UK policy and practice prior to the Covid-19 pandemic. The study found that while blended learning was not a prominent feature in pre-pandemic institutional strategies, there were commitments to it in terms of flexibility, inclusivity, and accessibility, recognizing the need for structures and support. Experts identified strategic leadership, governance structures, professional development, and ongoing support as essential requirements for the large-scale adoption of blended learning. The study concluded that, before the pandemic, blended learning had not become normalized. To normalize blended learning and facilitate sustained widespread adoption, institutions should develop institutional visions that establish support, structure, and a shared strategy [7].

Liang, L. et al. have assisted with the effect of blended learning in the undergraduate nursing electrocardiogram course. The study showed that the ECG blended learning program positively impacted students' learning outcomes and satisfaction. The study's findings support using BL as an effective teaching approach for nursing students' ECG education. Integrating classroom education with online training can enhance learning effectiveness and improve the quality of nursing education. Effective instructional design plays a vital role in the success of blended learning. Further research is needed to examine innovative BL teaching methods' long-term and large-scale effects on nursing ECG education [8]. The following table summarizes the literature mentioned above review for applying blended learning for various types of participants, displaying each approach's findings, methodologies, benefits, and drawbacks.

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Ref Year	Participants	Findings	Methodology	Benefits	Drawbacks
[23] Vaughan (2014)	In various educational contexts, students with learning disabilities	Blended learning gives students more flexibility and control over their learning experience, provides more targeted and individualized feedback and support, and provides opportunities for self-directed and project-based learning.	Literature review	More personalized and differentiated instruction, improved academic outcomes, and increased engagement and motivation can benefit students with learning disabilities or who require accommodations.	Ensuring equitable access to technology and online resources can be a significant barrier for some students, and managing student engagement and motivation in online learning activities can be challenging.
[24] TSo. A (2015)	Students in the College university at Open University of Hong Kong	Students on the ENGL A122F course developed positive attitudes towards blended learning.	Qualitative case study approach	Blended learning was associated with increased flexibility, improved student engagement, enhanced learning outcomes, and the ability to meet the diverse needs of students.	Challenges included the need for effective course design, appropriate technology and infrastructure, and faculty training and support.
[25] Picciano (2017)	K-12 schools, higher education	Blended learning can positively impact student learning outcomes, including improved academic achievement, increased engagement and motivation, and greater flexibility and personalization of learning.	Literature review	Improved academic outcomes, increased engagement and motivation, greater flexibility, and personalization of learning.	Making sure that all students have fair and equal access to technology and online resources can pose a considerable obstacle, and it can be challenging to maintain students' engagement and motivation in online learning activities.
[26] Hill, J. and Smit K. (2020)	Higher education students in the UK	The study concludes that to normalize blended learning and support sustained widespread adoption; institutions should devise institutional visions that establish support, structure, and a shared	Interpretative- qualitative approach	Blended learning offers flexibility, inclusivity, and accessibility and can provide opportunities for active learning, collaboration,	Challenges associated with blended learning include the need for appropriate technology and infrastructure, effective course design, and faculty training and support. In addition,

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Ref Year	Participants	Findings	Methodology	Benefits	Drawbacks
		strategy, in line with recommendations from the research literature.		and self-directed learning.	there are concerns about the potential for increased workload and the need to ensure that blended learning quality is equivalent to traditional approaches.
[27] Tong, D. et al. (2022)	Sample of 90 students in the tenth grade	The study found that the use of blended learning positively impacted academic achievement, self-study abilities, and learning attitudes, as Demonstrated by the outcomes of the independent t-test analysis. (Sig (2-tailed) = 0.001 and SMD = 0.6717).	Quasi-experimental design	Blended learning increased student interactions with teachers and improved self-study abilities and learning attitudes.	The study's small sample size limited the generalizability of the results.
[28] Li et al. (2023)	Electrocardiogram course for undergraduate nursing students	Blended learning can be supported as an effective teaching approach for ECG education of nursing students. The results show higher scores in ECG interpretation and total score	Quasi-experimental design	Higher exam scores compared to traditional instruction.	Limited generalizability due to small sample size and single course focus.
[29] Emara, H. et al. (2023)	592 medical students enrolled in the integrated education at the Faculty of Medicine, Mansoura University, Egypt.	Over half of the students (52%) were deemed prepared for blended learning, but only 50% expressed satisfaction with the approach. The study identified three key factors that predicted students' readiness: fast broadband internet access, being in the second academic year, sufficient family	Cross-sectional study with an analytic Component conducted during the academic year 2020-2021.	Students' attitude towards BL could be enhanced and requires interventions to optimize their usage to attain maximum advantages.	Providing hands-on training to students to utilize the available online resources effectively is essential. According to students, the most significant concern is extending semesters to allow sufficient time for studying course materials thoroughly.

Ref Year	Partici-pants	Findings	Methodo-logy	Benefits	Drawbacks
		income (with an adjusted odds ratio of 1.460).			

4. Proposed Methodology

This section of the article discusses the proposed methodology for designing a blended learning framework for curriculum design and professional development. In recent years, there has been a growing urgency for higher education, vocational technology programs, and co-education to increasingly use technology for blended classrooms and virtual/online courses. So, in the proposed framework, we are interested in using technology to expand educational opportunities so that they are reshaped, adapted, and developed in response to the ever-changing need to create rich, student-centered learning environments.

With the increasing need for blended learning aimed at increasing knowledge and circulating widespread educational materials, the College of Artificial Intelligence at Delta University of Science and Technology has integrated its courses with a wide range of materials available on the Coursera campus that are comprehensive and effective for students. Figure 2 depicts the eight steps that constitute the proposed framework. The proposed framework is composed of 4 main stages, which contain eight steps.

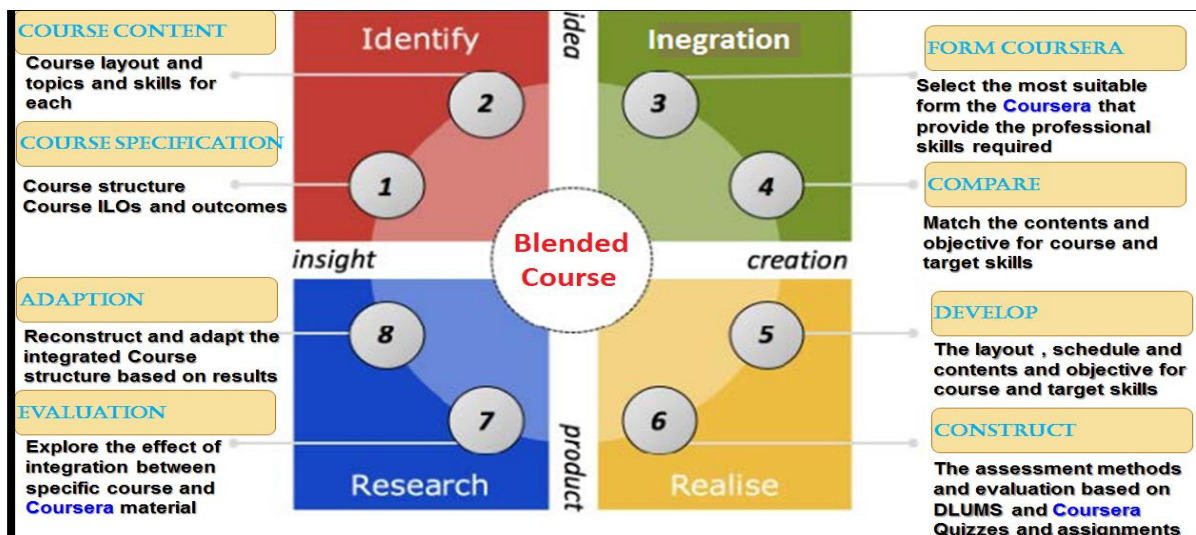


Figure 2 Proposed framework (stages and steps)

The cycle describes eight steps that can be used repeatedly in (re-designing) course content and provides professors and course designers with a flexible and clearly structured design model that enables them to reconstruct and design course content for blended learning using various learning materials.

4.1 Identify course layout and content

As with any learning strategy, the first step for designing courses is to define the objectives and goals you wish to achieve from the proposed program based on the set courses that constitute the program. So, The following questions can help you define your goals: What skills do you wish to impart to your learners? And What information should be included in the blended learning course? Your goals and objectives will be a roadmap to design your learning courses. At each step, you will be able to see where your course is headed and the points you need to modify or cover along the way. Figure 3 depicts the process which used to design a program AI at the faculty of Artificial intelligence at Delta University for Science and Technology. The output of this stage are (i) Course structure, (ii) Course ILOs, (iii) Course contents, and (iv) Course assessment

Figure 3 The process used to design an AI program at the faculty of Artificial Intelligence at Delta University for Science and Technology. Based on table 2 depicts a sample of the most recent trends and skills required, and ILOS, the course specification, and the course content identified.

Table 2 Sample the most recent trends and skill require

	Carrere	Common Job	Skill Sets
1	IT Support Specialist	IT Support Specialist IT Support Technician	Data Analysis Software Spreadsheet Software
2	Data Analyst	Data Analyst Data Specialist Business Analys	Big Data Algorithms Mathematics
3	Project Manager	Project Manager Project Director Implementation Manager	Data Analysis Software Statistical Programming Probability & Statistics
4	Data Scientist	Data Scientist Data Scientist I Data Scientist II	Big Data Algorithms Mathematics
5	Cyber security Analyst	Network Security Engineer Information Security Analyst Security Analyst Cyber Security Analyst	Data Analysis Software Probability & Statistics Data Analysis
6	Data Warehouse Developer	Data stage Developer Data Warehouse Developer Data Management Specialist	Machine Learning Statistical Programming Computer Programming

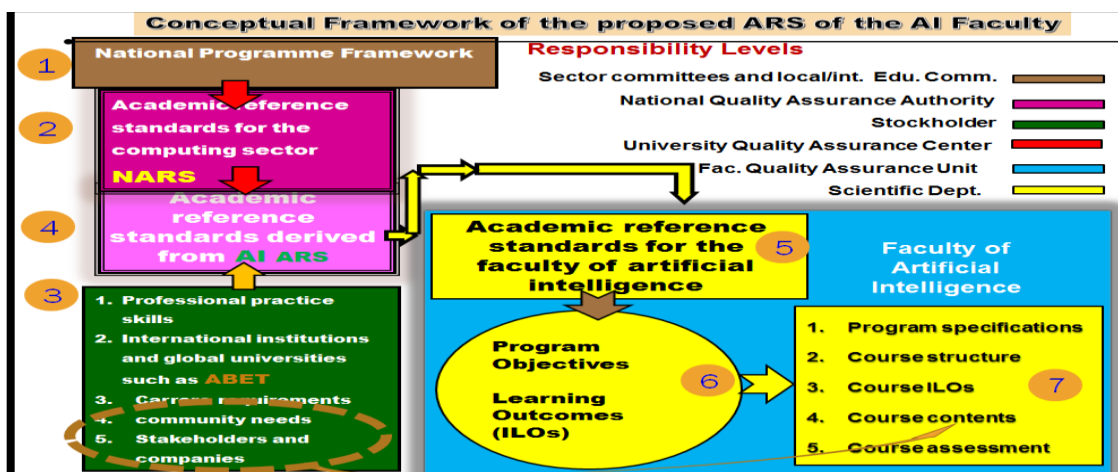


Figure 4 extracting the criteria for the program and courses

4.2 Integration with Course Material

In this stage two steps are conducted in the first one Select the most suitable form the Coursera that provide the professional skills required. In the second phase, Match the contents and objective for the course and target skills that are identified as the output of the first Stage.

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Each scientific department develops an integrated plan for teaching the courses contained in the study regulations, as depicted in Table 2. Each course is determined (the percentage of compatibility with can be obtained from courses on the Coursera platform (the second column of the table in the following example - dividing the teaching load into a theoretical and practical aspect, and for each of them the number of actual hours inside the university and outside the university and homework is determined (columns from 3-7 in the following example) column 8 and 9 for Cr Hour and the number of hours of the teaching load column The last in the table is proposed for methods of measurement and evaluation. Table 3 shows a sample of the search result from the Coursera platform, and it is clear from the table that the university's decision and what corresponds to it from the Coursera platform, the link, and the compatibility ratio.

Table 2 Plan for teaching the courses contained in the study regulations, 2

Course Name	Syllabus Match With Coursera	Lecture	Practical	Assignment and Further Reading	SWL	Credit	evaluation
DBMS	70%	Univ. 1:30 H / W	At home Course 2:30 H/W	Univ. Lab. 1:30 H/ W	At home Course 2:30 H/ W	At home 1:30 H/W	10 H 3 60% Course work /or (2 certificates or more) 40% Final exam
OO Java	80%	Univ. 1:30 H / W	At home Course 3 H/W	Lab. 1:30 H/ W	At home Course 3 H/ W	At home 1 H/W	10 H 3
Introduction to Artificial Intelligence	70%	Univ. 1:30 H / W	At home Course 3 H/W	Lab. 1 H/ W	At home Course 2:30 H/ W	At home 2 H/W	10 H 3
Probability and Statistics	60%	Univ. 1:30 H / W	At home Course 2:30 H/W	Lab. 1:30 H/ W	At home Course 2:30 H/ W	At home 2 H/W	10 H 3
Discrete Mathematics	60%	Univ. 1 H / W	At home Course 2 H/W	Lab. 1 H/ W	At home Course 2 H/ W		6 H 2
English 2	90%	Univ. 1 H / W	At home Course 2 H/W		At home Course 2 H/ W		5 H 2

Table 3 Result of matched courses in the Coursera

Name of DU Course	Credi	Name at courser	Link of	% Matching
English 1 GEN 111	2 P	Conversational English Skills	https://www.coursera.org/learn/conversation	80
English 1 GEN 111		General Academic English	https://www.coursera.org/learn/general-academic-english	85
Calculus BAS112	2+1	First Steps in Linear Algebra for	https://www.coursera.org/specializations/math	55
Linear Algebra BAS 113	2+1	Mathematics for Machine	https://www.coursera.org/specializations/math	60
Basic Electricity &	2+1	Introduction to Electronics	https://www.coursera.org/learn/electronics	65
Introduction to computer systems CSC 115	2+1	Magnetics for Power Electronic	https://www.coursera.org/specializations/pow	85
	2+1	Introduction to Computer	https://www.coursera.org/specializations/intro	85
	2+1	Intro to Programming With C#.	https://www.coursera.org/projects/introductio	90
	2+1	Introduction to Web Development	https://www.coursera.org/learn/web-development	90
Physics BAS 114	2+1	Introduction to Electricity and	https://www.coursera.org/specializations/intro	70
Applied and Forensic Medical Microbiology	1+0		https://www.coursera.org/specializations/intro	None
	2+1	Stories of Infection	https://www.coursera.org/learn/stories-of-	40%
Pharmaceutical	2+1	Heat transfer	https://www.coursera.org/learn/thermodyna	50%

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For each course stated in the table 3 , a comparison and matching is done between the content and objective as depicted in Table 4 and Table 5

Table 4 Comparison between the course contents and what is available at Coursera

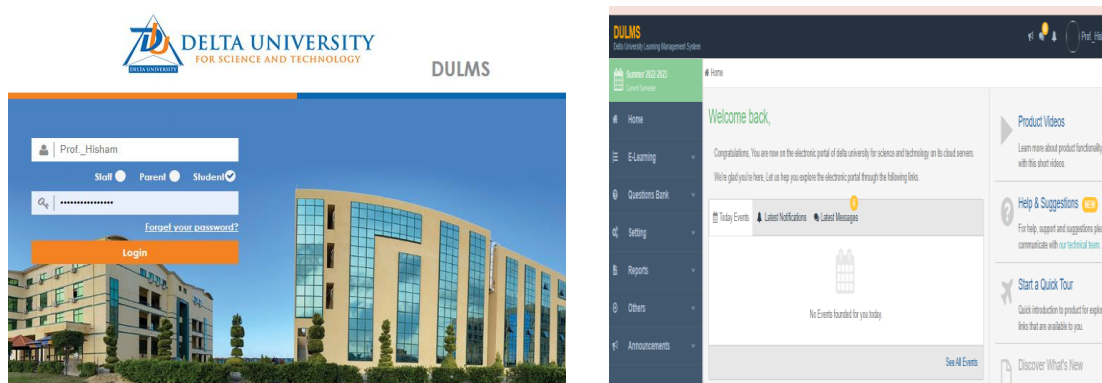
Course content Identified in First Stage	Course contents at Coursera
This is an introduction to the design and use of database systems — systems that manage very large amounts of data. Topics covered include Entity-Relationship (E/R) data model, Relational data model, the conversion of E/R and relational models. We shall also learn some database languages, both concrete and abstract, including Structured Query Language (SQL), relational algebra, etc. The course is intended for computer science student who expect to have an in-depth understanding of modern database systems	Basic concepts of DB application - Relational Database Design - Create Relational Models - Create Entity Relationship Models and Entity Relationship Diagrams E/R model - normalization and data modeling - Programming with the Structured Query Language ("SQL") - database operations, data warehouse, big data, and NoSQL - Create Entity Relationship Models and Entity Relationship Diagrams

Table 5 Comparison between the course contents and what is available at Coursera

Course Objective of the Course Identified in First Stage	Course Objective at Coursera
Providing the students with the basics and definition of Database Introduce the basic concepts of DB application and the value of structuring the data into standard model Examine the different Data model Introduce to the student Overview of RA and SQL ; designing and analyzing Introduce to the student the fundamental of Logical design (ER-normalization). Introduce to the student problem solving paradigms	Design effective, efficient databases through normalization and data modeling Develop expertise in programming with the Structured Query Language ("SQL") Knowledge about database operations, data warehouse, big data, and NoSQL Create Entity Relationship Models and Entity Relationship Diagrams

4.3 Creation of the Blended Course

At this stage, the development and construction of the Integrated Course (Delta University Learning Management System) DULMS can be achieved. This system can be considered as a distinct learning management system as Delta University has a clearly defined set of objectives when using LMS to deliver training. DULMS are highly dependent on the individual needs and desires of each application. In general, a DULMS should provide the ability to deliver, track, and monitor on a centralized platform. The chosen platform should be easy to use, intuitive, easy to update and pivot to meet the ever-changing requirements of learners and training programmes. Another thing is considered when designing DULMS is that everyone learns in different ways. This makes it important to have a good level of customization, providing learners with the chance to configure the platform in a way that best suits them. Accessibility needs also need to be catered for thoroughly. Figure 5: shows samples of the interfaces of the DULMS, which contains the following characteristics



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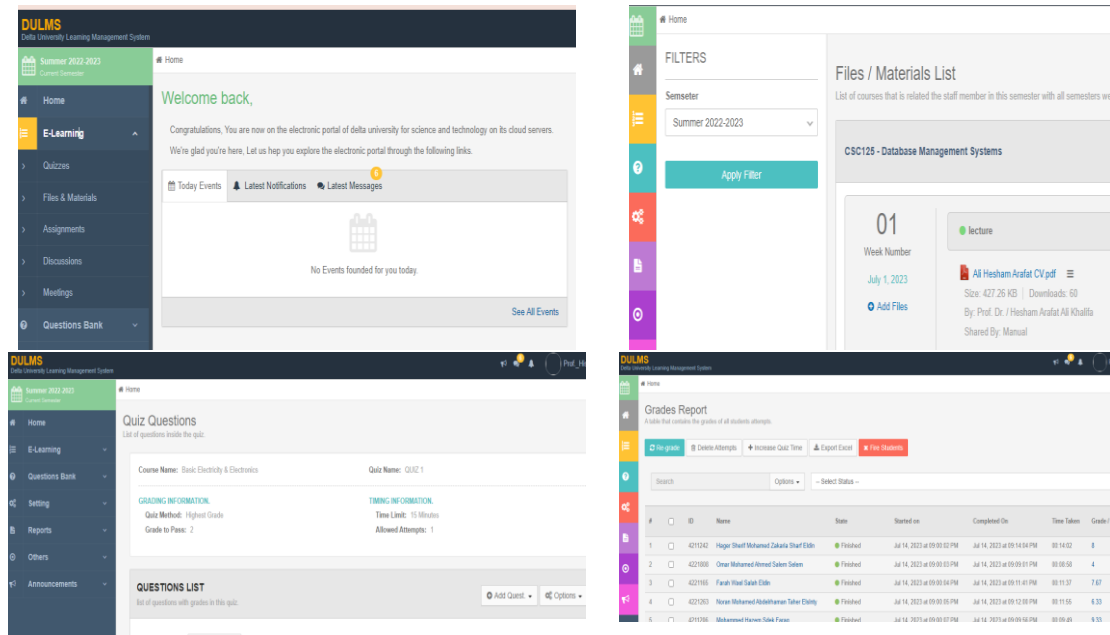


Figure 5 sample of the interfaces of the DULMS the achieve the stated criteria

1. Ease of use: Learning can already be challenging. You don't want to add an extra obstacle to the process by picking an DULMS that is hard to navigate and not user-friendly, especially for first-time learners.

2. Personalization: One of the selling points of eLearning is that it supports self-directed learning. Learners can educate themselves at their own pace with the subjects they feel are their highest priorities. DU LMS should have a suite of personalization features, allowing users to set specific goals to fill their knowledge gaps.

3. Accessibility: Yet Another key benefit of eLearning is that it can be done wherever and whenever, provided an internet connection is provided and authorized access to the DULMS is available. Being accessible also extends to the DULMS catering to the disabled. Inclusivity should always be part of the equation in workforce development.

4. Scalability: If growth is vital to your business, scalability should be a key consideration in your choosing of DULMS. It's all well and good that it can run well when you are just starting with it. How it holds up when you start branching out with various content formats, uploading more courses, registering more users, and tracking more data will tell you if that LMS is actually worth the investment.

5. Reporting and tracking: Any decent LMS should have the ability to collect data on how its users engage with the platform, such as their course progress and completion rates. You want a learning management system that can be more granular with its tracking features. For example, it would be helpful to see the dates and times when users log in, how long it takes to complete a course, and how many mistakes they make before arriving at the correct answer for a specific quiz question.

6. Security: Data privacy has become necessary as apps and other internet-connected platforms require personal data and contact info from their users. Learning management systems are not exempt, especially when accessed via homes with personal devices. Ensure your users don't suffer from a data breach and have their information leaked.

7. Course creation: You may quickly discover that getting a barebones DULMS limits the kinds of courses you can create.

8. Cloud servers: An LMS that uses cloud servers means the vendor takes care of hosting all the data. You don't have to worry about technical maintenance when choosing this option. As mentioned earlier, it also facilitates

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fast scaling since no software installation is necessary. Security, while important, won't be as much of a resource drain, as the vendor shoulders most of the burden with your data stored on their end.

9. Learner support: All the good features on DULMS might have mean nothing when you can't use them. Since users will access the DULMS from anywhere and at any time, the system provides 24/7 support services. They should be quick to respond to questions through email, phone, or online chat. At the very least, there ought to be troubleshooting or self-help guides within the DULMS.

Table 6 Sample of the course content for one course taught in the Faculty of AI – Delta University

Topic /Week		Lecture			Practical			
Week	Topic	Univ.	Material from Coursera	H	Univ. Lab	H	Material from Coursera	H
1	Characterization and evolution of Network and its components	1	V1,W1 in Fundamental V1,V2,V3,W1 in Google	1.5	Packet tracer	1.5		
2	Devices, Media, Messages and Rules and processes	1	V2,3,W1 in Fundamental V4,5,6,W1 in Google	1	Address	1.5	V3,W1 Fundamental V7,8,9,10,W1 in Google	2
3	Design and function Network NOS - functions	1	V1,2,W2 in Fundamental V11,12,W1 in Google	1	NAT	1	Project 1	1
4	OSI model layers and TCP/IP	1	V3,4,W2 in Fundamental V1,2,3,4 Google	1	Building Topology	1	Project 2	1
5	Application layer	1	V1,2,3,4,W3 Google	1.0	Building Topology	1		
6	Transport layer protocol (TCP,UDP)	1	V5,6,W3 Google	1	Building Topology	1	Project 3	1
7	Network layer (IP protocol)	1	V1,W3 in Fundamental V,7,W3 Google	1	Socket API	1	V1,2,W3 Fundamental	1
8	Network addressing and routing							
9	Data Link layer	1	V2,W3 V,8,9,W3 Google	1.5	Socket API	1	V3,W3 Fundamental	1
10	Physical Layer		V,9,W3 Google	1	Socket API	1	V4,5,W3 Fundamental	.5
11	Standard Network							
12	Standard Network	1	V9,11,12,W4 Google	1	Error Control	1	V3,4,W4 Fundamental	1
13	Wireless network	1	V13,15,W4 Google		Net Simulation	1	Project 4	.5
14	Wireless network	1			Secure Network	1	Project 5	.5
15	Course project	1	Project 2-5					4

4.4 Evaluation and Adaption

The last stage will evaluate and analyze the performance level of students according to the final results and inventory of the skills obtained according to the main trends of the fields of study in the college. One of the most important advantages offered by the Coursera platform is the various statistics such as depicted in table 7; that depicts A comprehensive overview of the general statistics of the performance of students and the extent of their regularity and progress.

Table 7 A comprehensive overview of the general statistics of the performance of students and the extent of their regularity and progress

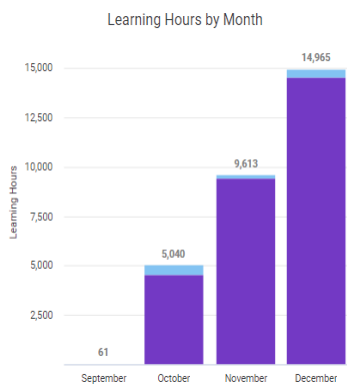
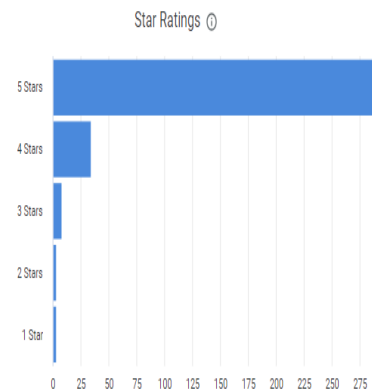
Total enrollments	17394
Total unique learners	1229
Learners who have enrolled in at least one	1229
Current members	1247
Removed members	0
Total unique courses	262
Total course completions	12997
Total verified course completions	12997
Total unique course completers	1185
Total estimated hours spent	29893
Learners who have completed 50% of a	1118
Learners who have joined the program but have not enrolled in a course	10
Learners who have enrolled in a course but have not completed any course	44
Learners who have enrolled in 1 course	14
Learners who have completed 1 course	22
Learners who have enrolled in 2 courses	14
Learners who have completed 2 courses	32
Learners who have enrolled in more than 2	1201
Learners who have completed more than 2	1131

In addition, I will discuss the skills that have been acquired through the courses offered to students and the extent of benefit, as well as follow-ups of students' progress and achievement for each course. Figure 4 depicts a sample of these statistics: ((a) the Averaged distribution of skill mastery across skill domains, (b) The distribution of learners and their skill mastery for the top 10 competencies across domains, and (c) The distribution of learners and their skill mastery for the top 10 skills across domains)

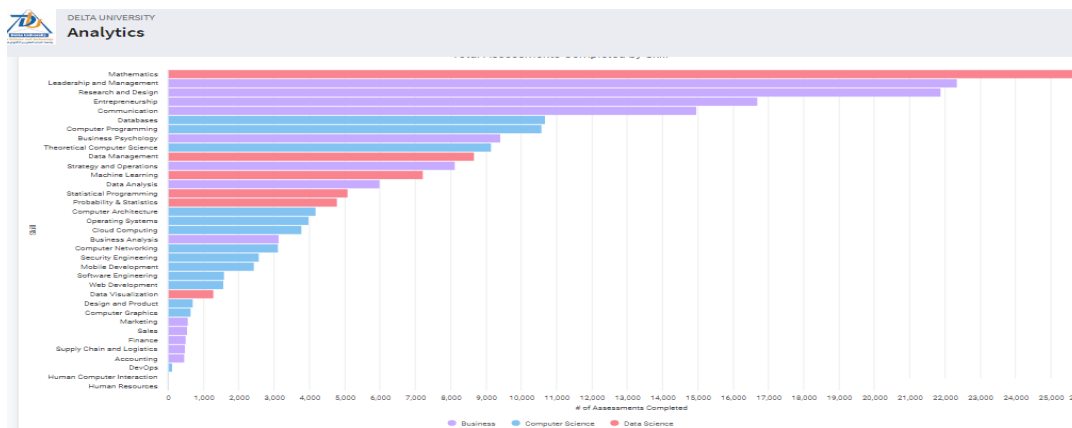
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Figure 4 depicted Sample of these statistics ((A) Learning Hours & Activity, Learner Feedback, Most Recent Feedback, (B) Learner Effort, (C) Skills Development by Domain, The averaged distribution of skill mastery across skill domains in Delta University, (D) Skill mastery and how many learners are classified as beginner, intermediate, or advanced, (E) Skill Competencies - Learner Proficiency Distribution, and (F) Overall skill mastery among your learners and identify specific individuals). , time spent in the study, success rates in assignments, and success rates in the quiz for each course.

4.8
 Organization Star Rating

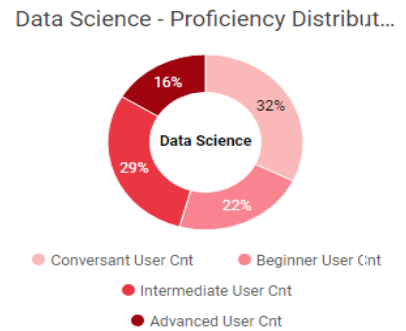
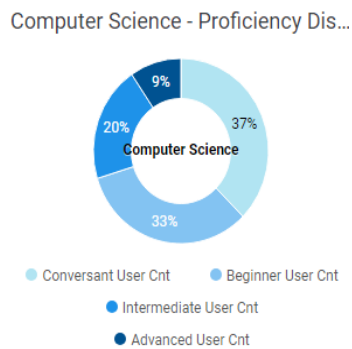
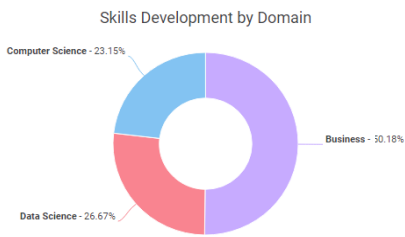


A) Learning Hours & Activity, Learner Feedback ,Most Recent Feedback

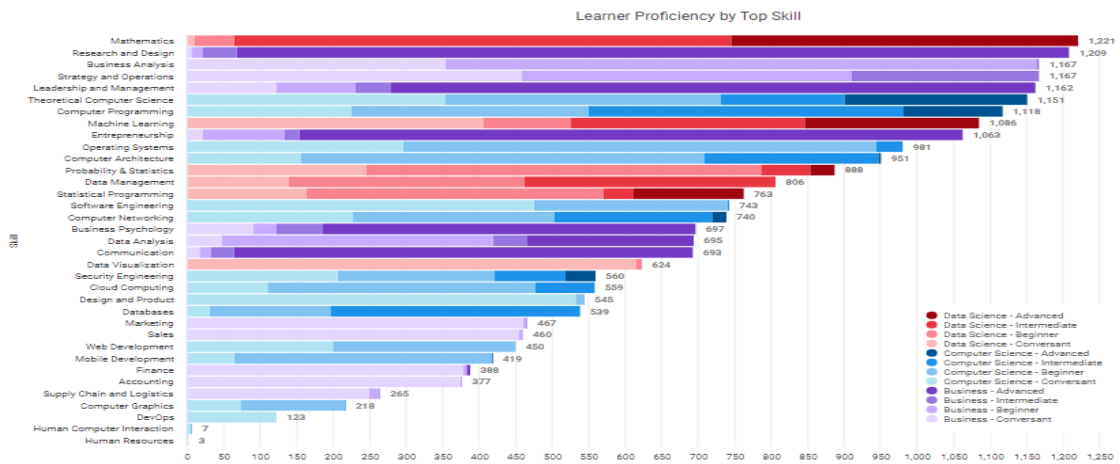


(B) Learner Effort

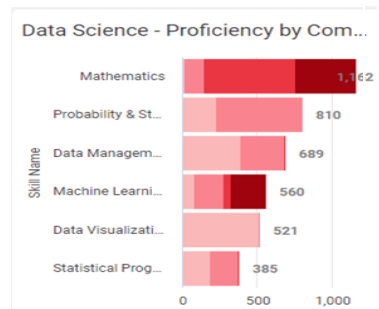
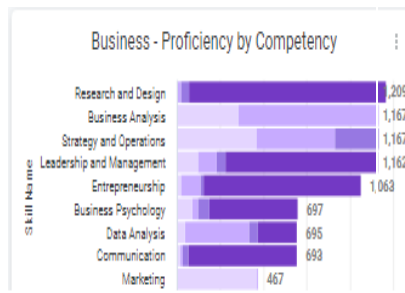
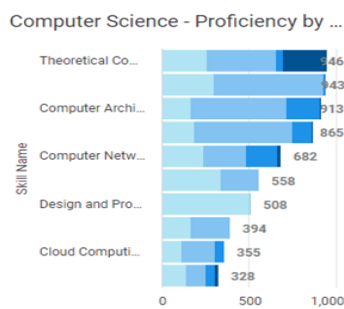
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(C) Skills Development by Domain, The averaged distribution of skill mastery across skill domains in Delta University

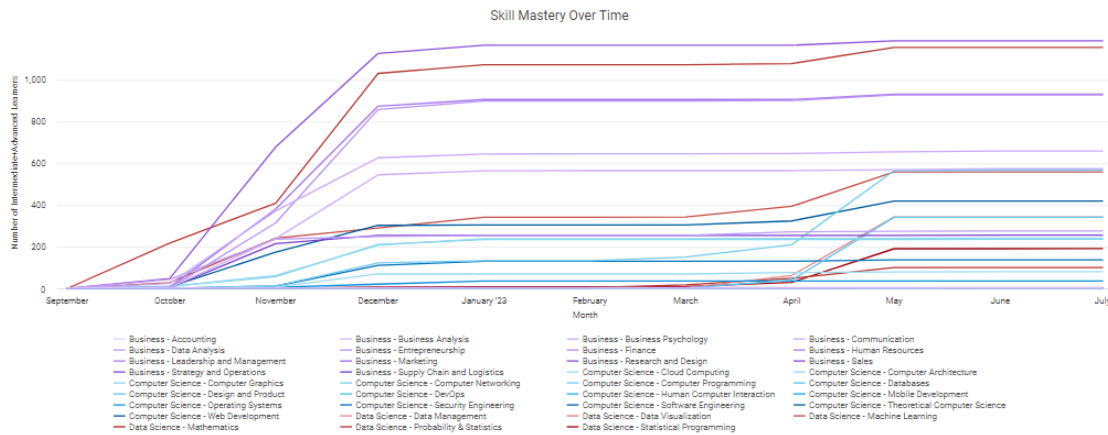


(D) Skill mastery and how many learners are classified as beginner, intermediate, or advanced



(E) Skill Competencies - Learner Proficiency Distribution

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(F) Overall skill mastery among your learners and identify specific individuals

Figure 5 Sample of these statistics

From the statistics received have been used as one of the assessment elements for each course Obtaining a certificate was not the only criterion. In this approach of relying on the Coursera platform, students are evaluated based on the evaluation that is carried out directly within the university, evaluation and statistics from the Coursera platform, and the percentage of evaluation based on the evaluation received from Coursera statistics ranged from 30% to 65% as depicted in table 8 . The following pictures show some of the reports accompanying each certificate granted and shows the beginning of registration, completion of the course, time spent in the study, success rates in assignments and success rates in the quiz at for each course In light of this information, a distinction was made between students who obtained the certificate from Coursera on the basis of effort and variation in certificate estimates was according to the statistics shown in the following table and based on the statistics shown in figures 5.

Table 8 The percentage of evaluation based on the evaluation received from Coursera Statistics ranged from 30% to 65%

Type	Course	No of Courses in Coursera	Percentage
Human sciences	ENG I	2	50%
	ENG II	2	
Basic Science	Math (Calc. Algebra)	1	30%
	Physics	2	35%
Engineering & IT	Circuit	3	45%
	Network	3	65%
	Logic	1	30%
	Introduction To Comp. Sys	3	60%
	IT	3	45%
Computer Science	Machine Learning	1	55%
	Numeric	2	55%
	OR	3	50%
Data Science	Data Mining	2	55%
Specialization	Non		

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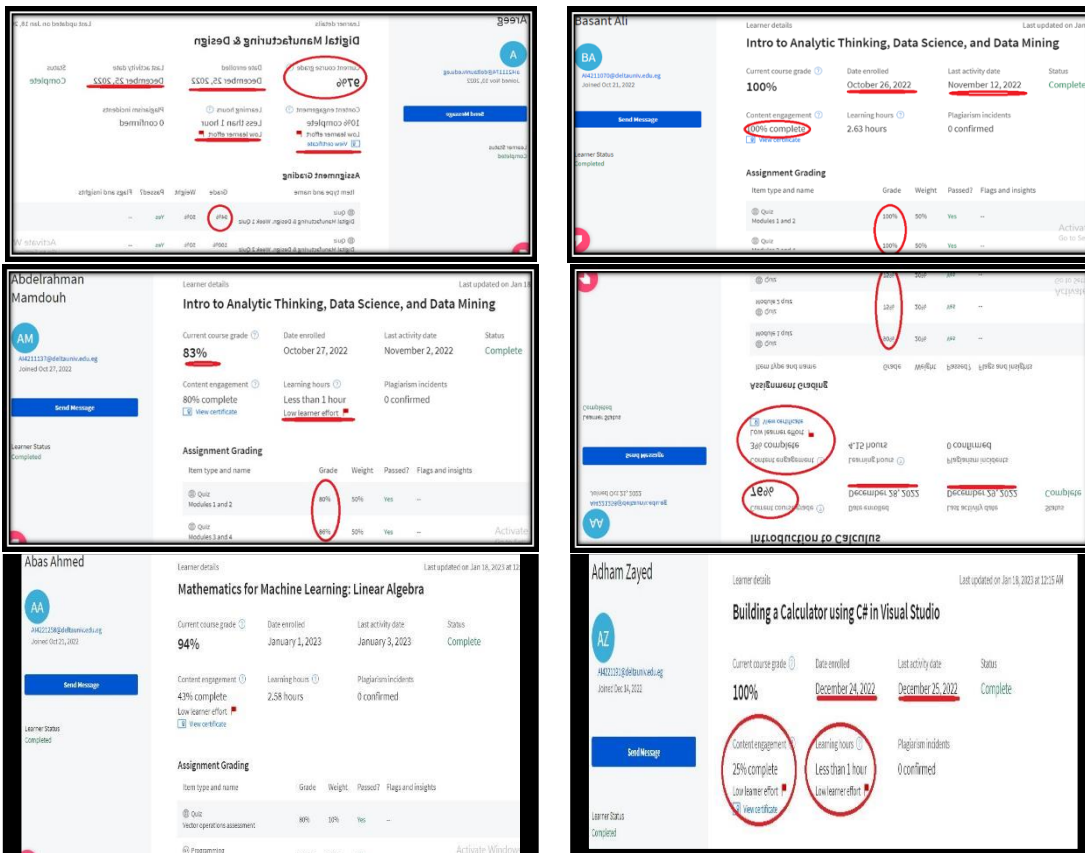


Figure 6A sample of the statistic for individual students effort

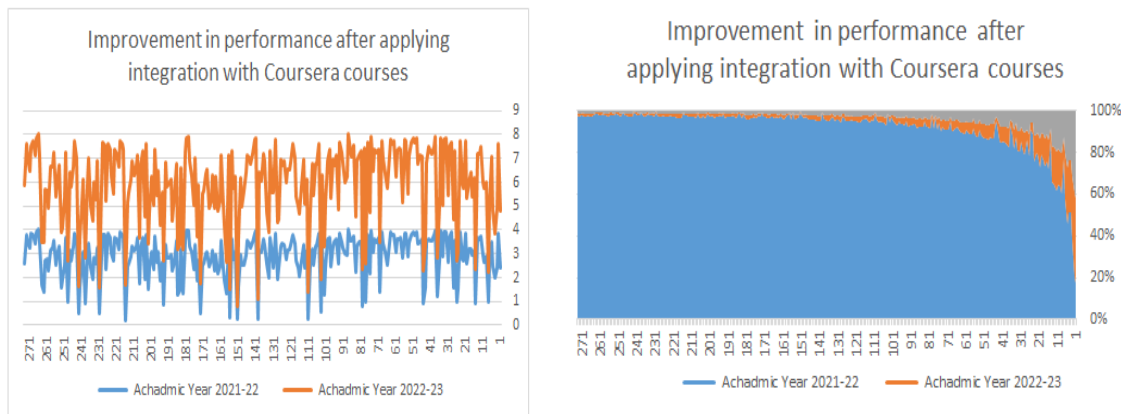


Figure 6B Improvement in performance after applying integration with Coursera courses

Figure 6-A - Analysis of results for second-level students before and after the application of the hybrid system using Coursera , Figure 6-B - Analysis of results of second-level students before and after the application of the hybrid system using Coursera. From Figure 1 and 2, it is clear that all students increased their average using the new system and after applying the hybrid system using Coursera-Figure 3, it is clear that students in higher levels

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(from 85 to 99) had little benefit while the benefit increased for students at lower levels, and this is what we were seeking.

5. Analysis and discussion

This section is a discussion based on a quantitative analysis to investigate students' perceptions of the use of blended learning at Delta University for science and technology. Additionally, several studies highlight the fact that blended learning boosts teacher-student contact, which ultimately results in student happiness. The majority of recent studies also highlight the significance that interaction plays in the learning experience [21], and it has been acknowledged as a crucial element for an online learning course to be successful. Greater teacher-student interaction is made possible by blended learning [22,23].

To properly conduct the analysis, it is important to take into account the following factors: (i) course management affects student performance; (ii) course management affects student satisfaction with blended learning; (iii) course management affects performance and performance influences course management. (iv) Interaction influences students' satisfaction, (v) Interaction influences students' performance with blended learning, and (vi) The relationship between interaction and performance is controlled by satisfaction. Table 9 depicts the statistics based on student feedback. In addition, the overall analysis of the different criteria is concluded in Table 10.

Table 9 Statistics based on student feedback

Feedback based on CM, I, P, and S	%
Course Management (CM)	
CM1. The face-to-face and online course components reinforce and complement each other.	81.0
CM2. Learning can be managed better and organized well using online learning systems.	79.4
CM3. The convenience of blended learning improves the organization and correction of assignments.	78.6
Interaction (I)	
I1. A user-friendly learning environment is created by blended learning with teachers.	85.8
I2. Blended learning enhances student-teacher connection and communication	82.4
I3. Student motivation to learn independently is increased by the use of blended learning technology.	81.7
Performance (P)	
P1. Student overall performance in classes has improved thanks to blended learning.	89.8
P2. The ideal method for raising pupils' performance, in student's opinion, is integrated learning.	89.0
P3. I have better grades in classes that combine online and face to face instructions	77.2
Satisfaction (S)	
S1. Student feel more satisfied when teacher using blended learning	88.1
S2. Student more satisfied with this learning experience compared to old-style course settings	0.795
S3 Student prefer a combined class with face to face and online	0.712

Table 10 The conclusion of overall analysis of the different criteria is

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Proposal Analysis		
Technical	We have the staff that can be able with such system Available Infrastructure is suitable Student have a skills and willing to do that The courses available at courser is suitable for our University (more 65%)	
Operational	Such proposal will help in solving the next problems Improve Self-learning -International Certificate for the student - Good relation with the international Communities	
Legal	The approval of the University Council is sufficient	
Economical	Money	Cost-benefit (profit) = (stud. Payment - cost of Licesince) Stud. Payment may be increase as the No. of certificates increase (may be = no of courses in year + 5) ROI may be increase by 300%
	Literally and moraly	Quality of the student will increase Reputation of the university will increase Digital T transformation will be improve
Schedule	Compatibility of the courses in courser with our courses , this can be handled by the Staff	

Conclusion

Blended learning is a new approach to teaching. As the name suggests, it combines personalized instruction with an online learning environment. With this method of teaching, pupils have a certain degree of influence on their learning

Evaluation and analytical analysis depict that integrating accredited content and scholarly materials available on the Coursera campus provides students with strong learning experiences that benefit from blended methods. Moreover, Maximizing Impact via integrate online and on-campus content to provide students with robust learning experiences that leverage mixed modalities. Finally, the study demonstrates a favorable association between student happiness and performance, as well as a correlation between blended learning and students' better performance.

The statistics received have been used as one of the assessment elements for each course. Obtaining a certificate was not the only criterion. In this approach of relying on the Coursera platform, students are evaluated based on the evaluation that is carried out directly within the university, evaluation, and statistics from the Coursera platform, and the percentage of evaluation based on the evaluation received from Coursera statistics ranged from 30% to 65%

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Current Expenditures per Pupil for Public PreK–12 Education Increased by 3.5 percent in FY 21 (School Year 2020-21) <https://www.nces.ed.gov>

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