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Challenges Facing Architectural Education Today: Analytical Study of Curricula Content of Selected Schools in Jordan

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Abstract
On one hand, computer technology as an innovative tool for distributing professional knowledge and skills is remarkable. On the other hand, its limitations in relation to both architectural education and profession can be a major challenge if architecture is considered to be more than problem-solving (UIA, 2012). Architectural education faces several difficult transformations. Thus it shall, constantly, update itself with the latest technological innovations in order to equip the student with tools to be capable to contribute in a constructive way to improve the contemporary information societies" life. Moreover, the increased complexity of the role of the architect obliges many international professional organizations and associations (e.g., RIBA, AIA, UIA, etc.) to reconsider the standards of professionalism in architectural practice. This study aims at assessing the validation of the existing study programmes offered at schools of architecture in Jordan. To achieve this objective, the research involved two integrated methods of several workshops and on-line questionnaire surveys that were structured to explore the current Curricular Structure of Architectural Education, and its capabilities to meet the technological, economic, socio-cultural and professional challenges and the demands of our time. Highlighting the synergy between the two, this paper intends to define a precise framework to develop the architectural education and, through that, architectural practice, knowledge and culture in Jordan.

Keywords: architectural education, curriculum, higher education, jordan

INTRODUCTION

Architecture education is a rich, varied and multidisciplinary subject that involves intellectual and practical complexities so as to deal with the constraints of the physical world with its all dimensions: historical, social, cultural, economic and environmental. It must also adapt to the changing contexts of these dimensions in terms of climate change, globalization of economy, new knowledge and the new information society demands (QAA, 2010). Therefore, the study of architecture can be defined on the biases of the "*knowledge* and *skills* that are gained from the natural and social sciences, mathematics, humanities and the creative arts, which are employed to deliver solutions that respond to the people needs and to different contexts and challenges (QAA, 2010).

Consequently, most regulatory bodies around the world believe that educational institutes, quality assurance, and accreditation commissions should assess their architecture education *program.* This *assessment* plays a crucial role as an integral part of any education process and enhances the quality of teaching to cope with the latest technological transformation, to respond to the current market and to be in line with the international accreditation standards (Martha, 2001; ARB/RIBA, 2002). From this perspective, Higher Education Accreditation Commission1 (HEAC) in Jordan has sensed the thriving urge to improve the quality assurance of all educational programs at Jordanian higher education institutions through a qualitative assessment of learning outcomes that test and measure current programs' validity, reliability and effectiveness in line with new national HEAC's requirements and international expectations (HEAC, 2016).

In August 2016, HEAC appointed a committee to assess the quality of the Jordanian architecture education program. The wider aim is to gain a deeper insight into the conditions for accreditation of architectural education curricula and in the qualification criteria that are supposed to grant access to architectural profession practice.

Architecture Education Program in Jordan

Although there are 19 schools of architecture in Jordan, but they deliver the same homogeneous educational programs, due to the Higher Education standards for accreditation of the programme, in terms of knowledge domains and the set of core courses within it. The program module design has minimum of 165 credit hours delivered within three

1 Higher Education Accreditation Commission (HEAC) in Jordan is the statutory authority responsible in determining the standards for and the accreditation of educational programmes in Jordanian higher education institutions.

levels: university requirements of 21-27 credit hours, faculty requirements of 15% of the curriculum total credit hours of a 25 credit and the department requirements that are at least 99 credit hours as shown in the table (1). Ten Knowledge domains, as shown in table 1, consist of theoretical courses such as basic sciences, history & theory of architecture, projects management & professional ethics, building technologies, engineering systems, urban sciences. And practical courses comprised of many other courses such as design, graduation projects, architectural presentation and training. The following table illustrated the knowledge domains and courses on the present architecture program.

Table 1. General Current Framework of Accreditation Architecture Program Criteria for the bachelor degree (165 Credit Hours)

Knowledge domain	Minimum CH	
	Theoretical	**Practical**
A. Basic Compulsory Knowledge Domains		
History & Theory of Architecture: History of Architecture, Modern Architecture, Contemporary Architecture, Islamic Architecture, Vernacular Architecture, Regional Architecture, Art and Architecture Criticism, Behavioral studies, Architecture philosophy & Criticism, Design theories & Styles, Architectural programing & analyses	21	0
Building Technologies: Building construction, Advanced Building Technology	9	0
Engineering Systems: Mechanical Systems, Environment Control, Surveying and Building Documentation for Architecture, Surveying Lab for Architecture, Mechanics of Materials for Architecture, Structural Analysis for Architecture, Lighting and Acoustics, Structural Design for Architecture, Sustainable and Green Architecture	18	0
Urban Studies: urban planning, urban design, landscape, housing, Heritage Conservation	3-6	0-3
Projects Management & Professional: Projects Management, Professional practice, Contracts & Regulations	8	0
Design: Basic Design, Architectural Design, Interior Design, Workshop Drawings	10	30
Architectural Presentation: Architectural Drawing, Freehand sketching, Perspective, Shade & Shadow, CAAD	3	5
B. Supportive Knowledge Domains		
Basic Sciences: Math, General Physics	6	0
C. Training		
Training : 8 continuous weeks, Candidates should finish successfully 90 CH	0	3
D. Graduation Projects		
Graduation Project- 1: Candidates should finish successfully 120 CH	2	0
Graduation Project-2	0	4
E. Studios, Workshops & Labs		
Studios: minimum 5 studios should be available		
Workshops: minimum 1 workshop should be available		
Labs: minimum 1 lab should be available		

RESEARCH METHODOLOGY

The present study focuses on studying the Architecture educational undergraduate program curriculum in the Jordanian Universities. The research involved two integrated methods of several workshops and on-line questionnaire surveys that were structured to explore the current conditions of the curricular criteria with regards to the international regulatory boards' standards, to the new technologies and society challenges and to the current labor market needs. The aim is to improve our knowledge base and the quality of architecture education. The wider aim is to suggest initiatives that can be adopted towards a

new model of comprehensive and integrated architectural design education curricular.

Workshops on the Current Situation of Architecture Education Program in Jordan

Several workshops have been conducted, in the period of August to October 2016, with educators, heads of schools and departments, directors of higher education institutions, practitioners, engineering association and other regulatory bodies that deal with program design, development and degrees accreditation. The workshop opened for a discussion between the members of the committee and the other participants with the goal to gain a deeper insight into the current architectural education curricula. Thus, the current curriculum was analyzed in term of the following benchmarks:

- Mission: Sustainability of the curricula for architecture education towards professional practice.
- Learning outcomes: Preparedness of graduates with the knowledge, skills and professional abilities necessary to meet demands required by the current professional market
- Program structure: curricular models for environmental education, digital architecture, etc.

Survey on the Current Situation on Architecture Education Program in Jordan

This part of the study involved questionnaire survey sent to 19 universities in Jordan that offered undergraduate degree program in architecture. The survey was produced in paper and online forms and based on criteria extracted from several conducted workshops. The questionnaire has quantitative and qualitative parts. The quantitative part was structured to seek the educator's views on the current curriculum capacity whether it provides graduates with knowledge and skills that are needed to join the international institutions' programs, or to join the current labor market.

The qualitative part was aimed at identifying obstacles in the current program circular with regard to knowledge domains, courses within these domains and whether these domains and courses are enough and up to date to provide students with knowledge and skills that are required to join the current labor market.

Quantitative data was analyzed using statistical analysis software "SPSS". Of the 200 questionnaires sent, 102 academic (response rate of 51%) replied, and all 19 schools of architecture were represented by at least 5 respondents.

The assessment framework has linked the *student learning outcomes* with the prerequisites of the *labor market* and the *international education and accreditation*. Therefore, the *Student Performance Survey* was designed to measure these cores respectively. Then, the *quality of teaching and the knowledge domains' assessment* were evaluated through an individual survey circulated to deans of architecture faculty. This survey was designed to measure the quality of teaching obtained by using the present infrastructure and compare it with the international education assessment criteria. The integration of the findings extracted from the two surveys believed to draft new proposal of the future Architecture Undergraduate Program by extending the knowledge domain of the existing program and enhancing the integration thereof. The present study is generally conducted based on mixed methods research of which both qualitative and quantitative data were analyzed. Two surveys were being circulated as the followings:

A. *Student Performance Evaluation Survey* circulated to School of Architecture academic staff. The purpose of which is to evaluate the *general performance of students* and their *preparedness* to enter the labor market.
B. *Architecture Undergraduate Program Evaluation Survey* circulated to School of architecture faculty deans, on the purpose of evaluating the quality of a present undergraduate program.

The following figure illustrates the Curricular Assessment Approach Framework used throughout this research.

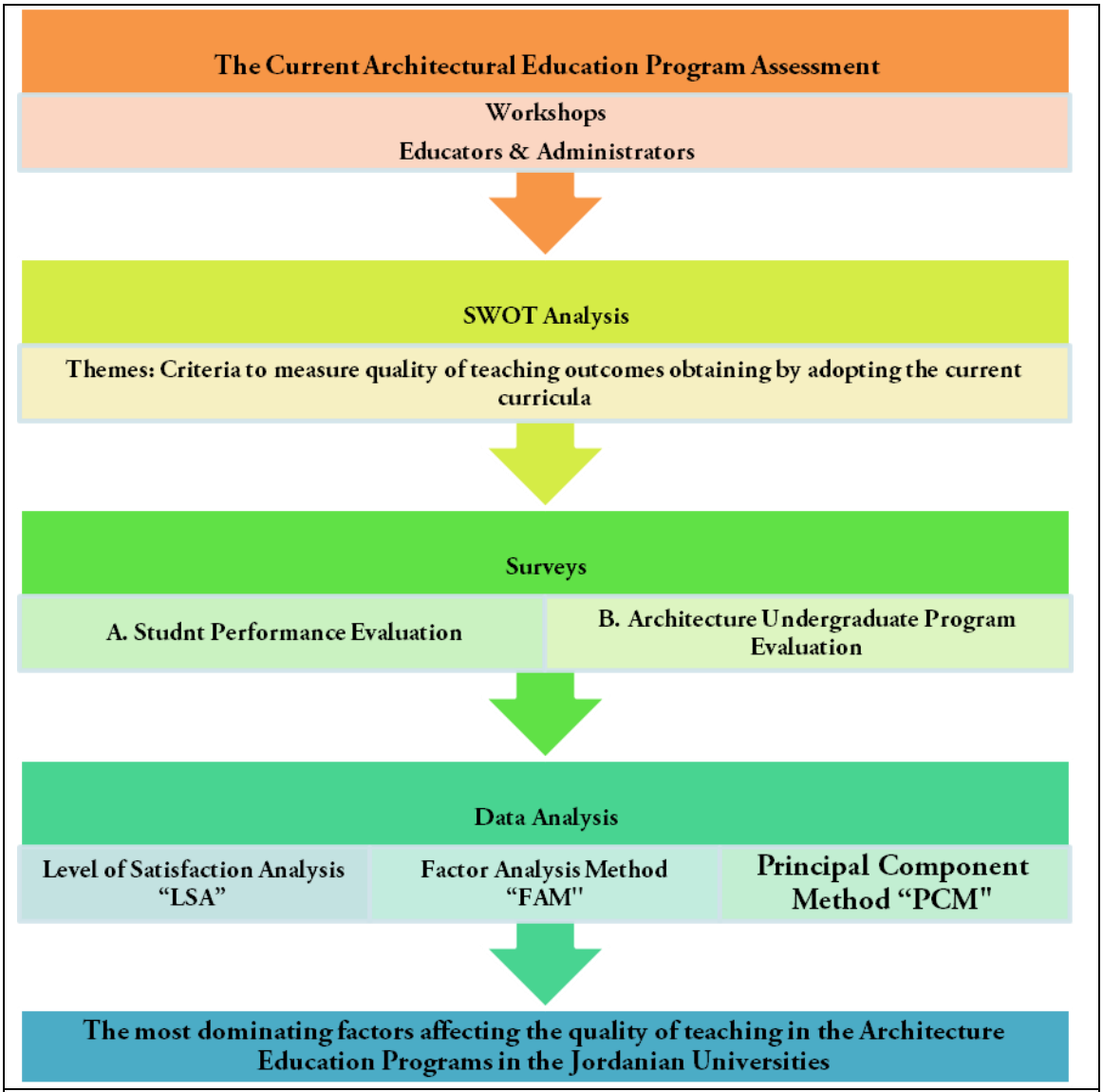

Figure 1. Curricular Assessment Approach Framework

DATA ANALYSIS METHODOLOGY

Workshops Findings

Workshop divided into 5-focus-groups, the task of each was to conduct a "SWOT" analysis to examine the effectiveness and capacity of the present architecture education program curricula basing on the defined bench marks in 3.1. The outcomes of which are summarized as follows in figure 1:

"SWOT" overall results show that the current program curriculum has a crucial issues regarding **integration** between practical and theoretical courses; **integration** between architecture courses and other multi- and inter-disciplinary disciplines (e.g., split between architecture and the building industry, digital architectural courses, and environmental design and sustainability courses). Units and lecture courses are often separated (physically and temporally) from the applied coursework; so the students are not able to engage with an integrated design process. Furthermore, environmental design and green architecture are "elective lecture-courses" that are rarely integrated in any meaningful manner within a design studio; thus their share is very marginal in the current curricula and there is no measurable indicator for quantifying and qualifying these aspects of education. Nor are principles defining the environmental skills that students should have at each stage in their education. Nevertheless, world boards and professional bodies (e.g., NAAB, RIBA, ARB, etc.) insist on the importance of developing environmental design to be introduced at every stage of the architectural curricula.

SWOT shows very important issue about curricular rigidity through marginal balance between creative and technical courses. These twenty issues were taken as data basis and main criteria to design the questionnaires of *Student Performance Evaluation Survey* and *Architecture Undergraduate Program*

Evaluation Survey that were circulated to School of Architecture academic staff and deans respectively.

Top 5 Strengths	Top 5 Weakness
- Architectural current curriculum covers an extremely broad range of theoretical / technical and non-technical areas. - Excellent academic staff with an impressive skills & experiences. - Excellent infrastructure (labs, workshops, library, etc.). - Financial resources are available. - Affordability in term of cost.	- A basic curricular split between theoretical and practical teaching. - Marginal balance between creative and technical courses. - Split between architecture courses and other multi- and inter-disciplinary disciplines. - Disintegration between environmental design and green architecture courses. - Disintegration between architectural education and the digital world.
Top 5 Opportunities	**Top 5 Threats**
- Establish/strengthen partnerships. - Effective balance between creative and technical courses. - Integration between environmental design and sustainability courses with architectural design. - Integration between digital design and creative design with other architectural courses and studios. - New ICTs skills may improve students learning outcomes. - Integration between architecture courses and other multi- and inter-disciplinary disciplines.	- A gap between architectural education and the profession - A gap between architectural education program accreditation and the international standards. - Impairing students' eligibility to join international programs. - Graduates are not fully prepared with the knowledge, skills and professional abilities necessary to meet demands required by the current professional market.

Figure 2. SWOT Analysis overall result (Top 5)

DATA ANALYSIS AND METHODOLOGY

The data analysis conducted for this report is based on the Level of satisfaction Analysis "LSA" and Factor Analysis Method. The latter of which, has implemented the Principal Component Method "PCM". Whereas, the LSA has conducted on *Student Performance Evaluation Survey* and Architecture *Undergraduate Program Evaluation* Survey by giving the answers scoring scale as follows: 1 for Very Satisfied, 2 for Somewhat satisfied, 3 for Neither satisfied nor dissatisfied, 4 for Somewhat dissatisfied and finally 5 for Very Dissatisfied.

For measuring the level of satisfactions for both surveys, the following assumptions were being considered as follows:

• If the score is less than the value (3); the level of satisfaction is deemed to be high;
• If the score is greater than the value (3); the level of satisfaction is deemed to be low; and
• If the score is greater equal the value (3), Then the view of surveyees on the level of satisfaction is deemed to be neutral.

A. *Student Performance Evaluation Survey - Level of satisfaction Analysis*

The student Performance Evaluation Survey has been conducted to study whether or not the present student academic achievement is up to the estimated benchmarks from architecture educators' perspective. Moreover, it highlights some topics relevant to assess the degree to which the quality of the undergraduate program in an architecture faculty is acceptable and achieves its academic objectives. The survey was circulated to over 200 surveyees; however, the sample considers only 102 and eliminating the remaining surveyees due to achieve a higher degree of data reliability.

Table 2. Criteria Affect Student Performance in The Architecture Undergraduate Program

Cr.1	Student Academic achievement	32%	26%	41%
Cr.2	Student ability to analyze, assess and handle environmental design	16%	28%	56%
Cr.3	Technical performance- ICTs skills	16%	25%	60%
Cr.4	Student ability to employ the architectural courses with the other scientific and engineering disciplines	24%	25%	52%
Cr.5	Students' performance in terms of using the best sustainable practices and site management	12%	25%	63%
Cr.6	Environmental orientation and sustainability	23%	17%	61%
Cr.7	Creativity and problem-solving	11%	23%	67%
Cr.8	Communication method & media to present design proposal effectively	19%	38%	43%
Cr.9	Students' performance in terms of dealing with the digital architecture tools	24%	11%	66%
Cr.10	Preparedness of the graduating students to enter the profession	19%	29%	52%

* Criteria listed above represents the questions asked in the survey.

As shown above, there was a general dissatisfaction with the performance of student at the Architecture Undergraduate Program. The highest level of dissatisfaction was listed for the Creativity and problem-solving of 67%, then the Students' performance in terms of dealing with the Digital architecture tools of 66% and finally the Students' performance in terms of using the best sustainable practices and site management Performance of 63% respectively.

The following diagram shows level of satisfaction on Student Performance at the Architecture Undergraduate Program:

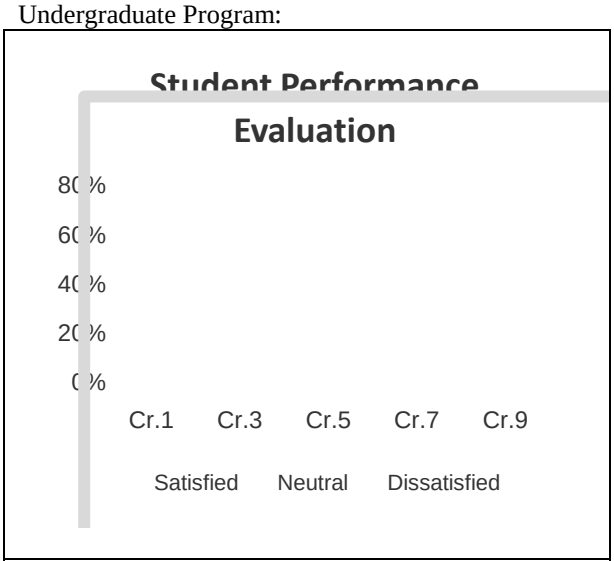

Figure 3. Level of satisfaction on Student Performance at the Architecture Program

The above investigation has extracted general findings only. The correlation of which and the degrees to which they were incorporated in generating a low level of satisfaction with the student performance were not measured. Therefore, the data was extracted using the Factor Analysis Method on SPSS. It is believed that by using "Principal Component Analysis" (PCA) the most correlated variables will be converted via an orthogonal transformation into values. These values are uncorrelated variables, which are called "principal components." In implementing this concept to the subject matter of these research ten different variables that are the criteria or question in the survey will be entered as "principal components." The variance of which was analyzed through the correlation Matrix (see A.1, appendix A), in which the results listed the correlation coefficient as per to each variable. However, the value and variance of each factor are not extracted. Thus "Total Variance Explained test" has been conducted for determining the number of variables that are most relevant to the low level of satisfaction on Student Performance at the Architecture Undergraduate Program (see A.2, Appendix A). According to this test, the number and weight of each component have been calculated. Furthermore, the test suggests retaining only two factors that are relatively responsible for generating high dissatisfaction over the student performance. The" Initial Eigenvalue" for the two selected variables (which are student academic achievement and student ability to analyze, assess and handle environmental design) was 56.447% and 10.789% respectively. However, to determine the actual factor that shall be retained the following matrix displays the correlation factor per each factor upon which the factors will be retained.

Table 3. Component Matrix a

	Component 1	2
Student ability to employ the architectural courses with the other scientific and engineering disciplines	.884	-.179-
Preparedness of the graduating students to enter the profession	.875	-.169-
Creativity and problem-solving	.849	-.012-
Communication method & media to present design proposal effectively	.822	-.116-
Student ability to analyze, assess and handle environmental design	.803	-.032-
Technical performance- ICTs skills	.786	.130
Using the best sustainable practices and site management Performance	.745	.155
Environmental orientation and sustainability	.658	.383
Student Academic achievement	.597	-.457-
Students' performance in terms of dealing with the digital architecture tools?	.308	.779

Extraction Method: Principal Component Analysis.
a. 2 components extracted.

The above matrix suggests extraction of two components which has the highest correlation and listed as follows:

- Student ability to employ the architectural courses with the other scientific and engineering disciplines at correlation amounted (0.884).
- Students' performance in terms of dealing with the digital architecture tools at correlation amounted (0. 779).

The final findings of running the Factor Analysis are emphasized on considering the above-extracted components as determining factor that has a high correlation with the subject matter as well as with each other.

B. *Architecture Undergraduate Program Evaluation Survey- Level of satisfaction Analysis*

The Architecture Undergraduate Program Evaluation Survey has been conducted to study whether or not the present academic curricular in the Jordanian University is satisfactory from the deans of Architecture Faculty perspective. The survey was circulated to over 25 surveyees; however, the sample considers only 21 and eliminating the remaining surveyees to achieve the higher degree of data reliability.

Table 4*. shows the Curricular Assessment based on ten selected criteria as follows

Cr.1	Integration of environmental studies with design studios	5%	76%	19%
Cr.2	Students' abilities to join international institutions	29%	38%	33%
Cr.3	Curricular international accreditation	29%	52%	19%
Cr.4	The quality of the architectural infrastructure; such as laboratory, library, etc.	5%	62%	33%
Cr.5	Curricular outcomes -Preparedness to enter the labor market	14%	48%	38%
Cr.6	Integration of the construction courses with architectural design	14%	48%	38%
Cr.7	Sustainability integration into the present curricular	57%	5%	38%
Cr.8	Students' Professional Ethics	71%	19%	10%
Cr.9	Technology and technical integration with the present architecture curricula	19%	43%	38%
Cr.10	Architecture curricula in terms of providing Innovation and creativity opportunities	0%	71%	29%

*Criteria listed above represents the questions asked in the survey

As shown above, there was general dissatisfaction on the general the quality of the present curricular at the Architecture Undergraduate Program. The highest levels of dissatisfaction were listed for the Integration of environmental studies with design studios of 76%, and the Architecture curricula in terms of providing

Innovation and creativity opportunities of 71% and finally the quality of the architectural infrastructure; such as laboratory, library, etc. of 63% respectively (see fig. 4).

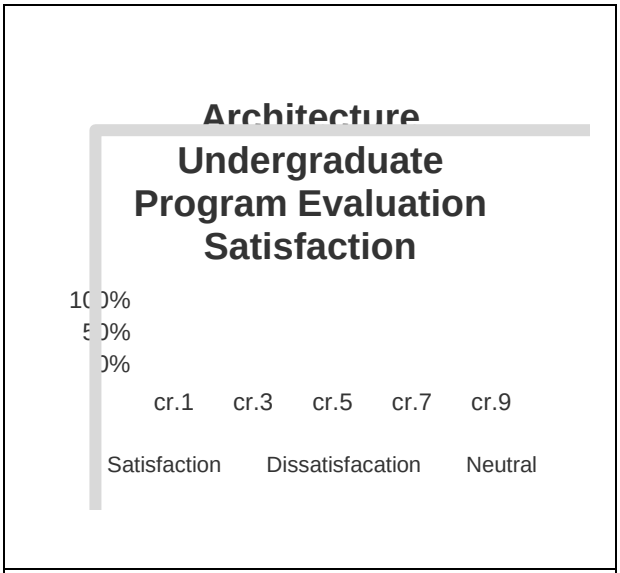

Figure 4. level of satisfaction on the curricular of the Architecture Undergraduate Program

The above findings are general and to determine the most dominating factor impacting quality of the architectural undergraduate program the Principal Component Analysis (PCA) was used in which ten different variables (i.e. the criteria or question of the survey) were entered as principal components. The variance of which was analyzed through the correlation Matrix (see A.3, Appendix A).

According to the Total Variance Explained test, the number and weight of each component have been calculated. The test suggests retaining only two factors that are relatively responsible for generating high dissatisfaction on the program curricular (see A.4, Appendix A). The first two variable Initial Eigenvalues were respectively 54.873% and 13.527%. However, to determine the actual factor that shall be retained the following matrix will display the correlation factor per each factor upon which the factors will be retained.

Table 5. Component Matrixa

	Component	
	1	2
Students' Moral Development	.540	-.673-
Curricular international accreditation	.810	-.356-
Sustainability integration into the present curricular	.869	-.204-
The quality of the architectural infrastructure; such as laboratory, library, etc.	.841	-.141-
Curricular outcomes -Preparedness to enter the labor market	.824	-.077-
Students' abilities to join international institutions	.752	.024
Technology and technical integration with the present architecture curricula	.700	.159
Integration of the construction courses in architecture design	.733	.358
Architecture curricula in terms of providing Innovation and creativity opportunities	.701	.368
Integration of environmental studies and design studios	.561	.644

Extraction Method: Principal Component Analysis.a
a. 2 components extracted.

The above matrix suggests extraction of two components, which has the highest correlation listed as follows: -

- Sustainability integration into the present curricular with the other engineering disciplines at correlation amounted (0.869).
- Integration of environmental studies and design studios with correlation amounted (.561).

The final findings of studying the most significant extracted factors that affect the performance of both the student and quality of curricular can be summarized as follows: -

- Sustainability integration into the present curricular with the other engineering disciplines.

- Integration of environmental studies and design studios with correlation amounted.
- Student ability to employ the architectural courses with the other engineering disciplines.
- Students' performance in terms of dealing with the digital architecture tools.

CONCLUSIONS

From a critical overview of the final findings of the curricular structure, it is clear that there are apparent gaps in the conditions for accreditation of curricula and in the qualification criteria path. Architecture practice is changing radically in response to the changing world around. This change is driven by social, economic, environmental and technological drivers that bring us new realities, new knowledge and new information society. It is clear that the rising awareness of "environmental sustainability" and "technological innovation" requires some changes in higher education to equip students with the knowledge, skills and competence needed to access the professional labor market. As a consequence, schools of architecture has to work with technology and has to get the benefit of its great potential through integrating it with the creative design, environmental design, urban design and other architectural subjects; so as this potential is turned into reality (Gross, 1999). To conclude, committee decided both to improve the present curricular by introducing two new domains of "Sustainable Architecture" and "digital Architecture" with number of compulsory subjects that were outlined to integrate computation and digital design and environmental sustainable subjects into design teaching.

However, Table 6 shows a new model that focuses on integrating theoretical and practical subjects, technical and non-technical areas, architectural and engineering, sustainability-related architectural sciences, digital design and creative design. The wider aim is to graduate professionals capable to handle the different aspects of contemporary design, from structural components and engineering and services to tools and techniques of the "integrated design"; and to provide the labor market with responsible architects and ethical designers who could deliver solutions that deal with environments' constrains and problems, since there can be no responsible design without a responsible designer (Findeli, 2001; Fry, 1993).

Table 6. General Modified Framework of Accreditation Architecture Program Criteria for the bachelor degree (165 Credit Hours)

F. Basic Compulsory Knowledge Domains		
Knowledge domain	Minimum CH	
	Theoretical	Practical
History of Architecture: History of Architecture, Modern Architecture, Contemporary Architecture, Islamic Architecture, Vernacular Architecture, Regional Architecture	9	9
Architecture Theory: Behavioral studies, Architecture philosophy & Criticism, Design theories & Styles, Architectural programing & analyses	6	0
Building Technologies & Systems: Building Materials, Building construction, Construction systems , Mechanics systems, Survey, Acoustics & Lighting	6-9	3-6
Urban Studies: urban planning, urban design, landscape, housing, Heritage Conservation	3-6	0-3
Sustainable & Green Architecture: Environmental Control (Architecture & Energy), Sustainability, Green Buildings	4	2
Digital Architecture: CAAD, Design Generation, Building Modeling (BIM)	2	4
Projects Management & Professional: Projects Management, Professional practice, Contracts & Regulations	8	0
Design: Basic Design, Architectural Design, Interior Design, Workshop Drawings	10	30
Architectural Presentation: Architectural Drawing, Freehand sketching, Perspective, Shade & Shadow	3	5
G. Supportive Knowledge Domains		
Basic Sciences: Math, General Physics	6	0
H. Training		
Training : 8 continuous weeks, Candidates should finish successfully 90 CH	0	3
I. Graduation Projects		
Graduation Project- 1: Candidates should finish successfully 120 CH	2	0
Graduation Project-2	0	4
J. Studios, Workshops & Labs		
Studios: minimum 5 studios should be available		
Workshops: minimum 1 workshop should be available		
Labs: minimum 1 lab should be available		

REFERENCES

AA, Architectural Association (2010) MSc & March Sustainable Environmental Design, Programme Guide 2010-11. Environment & Energy Studies Programme. www.aaaachool.ac.uk/ee. Accessed 27June 2016.

AA, Architectural Association (2015) MSc & March Sustainable Environmental Design, Programme Guide 2015-16. Environment & Energy Studies Programme. https://www.aaschool.ac.u. Accessed 27June 2016.

ARB/RIBA. (2002). Prescriptions of Qualification. London: Architects Registration Board.

European Commission. (2006). Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the Recognition of Professional Qualifications. Official Journal of the European Union, 30 September 2005.

Findeli, A. (2001). "Rethinking design education for the 21st century: theoretical, methodological, and ethical discussion." Design Issues 19(1).

Fry, T. (1993). "Re-thinking ecodesign." Object 43.
Gross, M. and E. Do. (1999). Integrating Digital Media in Design Studio: Six Paradigms. Proc. ACSA National Conference. https://depts.washington.edu. Accessed 27June 2016.

HIGHER EDUCATION ACCREDITATION COMMISSION, JORDAN. www.heac.org.jo. Accessed 27June 2016.

Martha L. A. Stassen; Kathryn Doherty and Mya Poe, (2001). PROGRAM-Based Review and Assessment: Tools and Techniques for Program Improvement.

PER OLAF FJELD, European Association for Architectural Education (EAAE), (2005). Transaction on architectural No 26. Writings in architectural education - A Revitalization of Architectural Consciousness. www.archdesign.vt.edu. Accessed 27June 2016.

The Quality Assurance Agency for Higher Education (QAA), (2010). Subject benchmark statement. http://www.qaa.ac.uk. Accessed 27June 2016.

UIA AND ARCHITECTURAL EDUCATION REFLECTIONS AND RECOMMENDATIONS Document prepared by the UIA Architectural Education Commission Text adopted by the XXIIth UIA General Assembly (Berlin, July 2002). https://www.aij.or.jp/jpn/aijedu/Reflex_eng.pdf. Accessed 20 Feb 2017.

APPENDIX

A.1 CORRELATION MATRIX

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
Factor 1	1.000	0.586	0.433	0.579	0.424	0.304	0.401	0.426	0.142	0.557
Factor 2	0.586	1.000	0.706	0.812	0.674	0.479	0.667	0.690	0.360	0.873
Factor 3	0.433	0.706	1.000	0.693	0.651	0.607	0.759	0.604	0.441	0.719
Factor 4	0.579	0.812	0.693	1.000	0.678	0.457	0.752	0.780	0.332	0.818
Factor 5	0.424	0.674	0.651	0.678	1.000	0.600	0.667	0.601	0.372	0.629
Factor 6	0.304	0.479	0.607	0.457	0.600	1.000	0.552	0.445	0.451	0.430
Factor 7	0.401	0.667	0.759	0.752	0.667	0.552	1.000	0.768	0.407	0.736
Factor 8	0.426	0.690	0.604	0.780	0.601	0.445	0.768	1.000	0.249	0.708
Factor 9	0.142	0.360	0.441	0.332	0.372	0.451	0.407	0.249	1.000	0.390
Factor 10	0.557	0.873	0.719	0.818	0.629	0.430	0.736	0.708	0.390	1.000

A.2 Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.645	56.447	56.447	5.645	56.447	56.447	4.945	49.450	49.450
2	1.079	10.789	67.236	1.079	10.789	67.236	1.779	17.786	67.236
3	.799	7.988	75.224						
4	.682	6.818	82.042						
5	.551	5.511	87.553						
6	.409	4.090	91.643						
7	.256	2.561	94.204						
8	.232	2.321	96.525						
9	.202	2.018	98.543						
10	.146	1.457	100.000						

Extraction Method: Principal Component Analysis

A.3. Factor Analysis
Correlation Matrix

		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
Correlation	F1	1.000	0.340	0.186	0.384	0.437	0.539	0.379	0.012	0.481	0.512
	F2	0.340	1.000	0.719	0.639	0.331	0.593	0.630	0.264	0.464	0.492
	F3	0.186	0.719	1.000	0.695	0.622	0.395	0.761	0.513	0.510	0.436
	F4	0.384	0.639	0.695	1.000	0.717	0.674	0.636	0.496	0.516	0.355
	F5	0.437	0.331	0.622	0.717	1.000	0.613	0.693	0.522	0.593	0.502
	F6	0.539	0.593	0.395	0.674	0.613	1.000	0.564	0.129	0.288	0.554
	F7	0.379	0.630	0.761	0.636	0.693	0.564	1.000	0.608	0.491	0.576
	F8	0.012	0.264	0.513	0.496	0.522	0.129	0.608	1.000	0.267	0.208
	F9	0.481	0.464	0.510	0.516	0.593	0.288	0.491	0.267	1.000	0.575
	F10	0.512	0.492	0.436	0.355	0.502	0.554	0.576	0.208	0.575	1.000

A.4. Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings	
Component	Total	% of Variance	Cumulative %	Total	% of Variance
1	5.487	54.873	54.873	5.487	54.873
2	1.353	13.527	68.399	1.353	13.527
3	.840	8.399	76.798		
4	.742	7.417	84.215		
5	.556	5.559	89.774		
6	.409	4.087	93.862		
7	.292	2.918	96.779		
8	.174	1.739	98.519		
9	.106	1.064	99.583		
10	.042	.417	100.000		