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APPLYING CURRICULUM CONTENT MAPPING (CCM) METHOD FOR CURRICULUM ASSESSMENT-JORDANIAN ARCHITECTURE CURRICULUMS CASE STUDY

Anwaar M.Banisalman[1*]

[1]Al albayt University,Faculty of Engineering ,Architecture Department, Jordan,
https://orcid.org/0000-0002-5045-441X

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Corresponding Anwaar M.Banisalman
(anwaarsalman@abbu.edu.jo)

ABSTRACT

The need to adapt the higher education system to the demands and expectations of the business and community sectors has prompted decision-makers to adopt more appealing strategies. Additionally, a variety of elements, including organizational culture, institutional politics, values, educational applications, external stakeholders, and educational philosophies, impact curriculum evaluation methodologies. What is the physical disparity between Jordanian and foreign architectural schemes' competencies? Approaches to curriculum evaluation are influenced by a wide range of elements, including organizational culture, institutional politics, values, instructional applications, external stakeholders, and educational philosophies. In many nations, it is observed that there is a disconnect between the academic and professional worlds of architecture because of inadequate study strategies. This study employs the curriculum mapping method to evaluate architecture engineering study plans in Jordanian universities. It concludes that this also occurs in the Jordanian case and identifies a physical imbalance in the competencies of architectural plans in Jordan when compared to international plans. The corporation of policy planners, civil society, and teachers needs to reform the curriculum to determine what is appropriate for the market and compatible with future changes. Additionally, decision-makers in the higher education system have used a variety of strategies in response to the need to change the system to better meet the demands of the business community and the community. This research insure that it is very important to apply that global perspective to the local context, to take the lessons learned and raise the standards of quality in the local experience.

KEYWORDS: Curriculum Mapping,Pedagogy,Architecture Education,Jordan,Cultural differences.

1. INTRODUCTION

Curriculum Mapping Method (CCM)is a technique used to explore how Knowledge is taught together with skills in curriculums, depending on the competency concept (The Organization for Economic Cooperation and Development, 2020). Sixteen countries participated in the CCM exercise in 2020; OECD countries are Australia, British Columbia (Canada), Estonia, Greece, Israel, Japan, Korea, Lithuania, Northern Ireland (United Kingdom), Portugal, Saskatchewan (Canada), Sweden, and partner countries: China, Kazakhstan, and Russian Federation for comparative analysis. (maart, Frantz, & Mphil, 2021) use curriculum mapping to demonstrate the alignment of an undergraduate dental curriculum with a competency framework; curriculum mapping revealed areas for improvement or gaps in the UWC dentistry curriculum's AfriMEDS competencies. (Alshanqiti , Benaida, Alam, & Namoun, 2020) use the same method as a two-dimensional matrix expressing the relationship between the student's learning outcomes and the courses.

In general, the architect plays a vital role in the overall building development process. (Andrew, 2008) both architecture and architecture engineering are professions that play a principal part in the creation of buildings; there are some essential differences between them; architecture engineering is a profession that focuses on close interaction between architecture and engineering within the building design process. There is a strong background in structural calculations and material selection, and it is professional.Architects' engineering knowledge needs structural calculations; therefore, they need engineers' expertise; it emphasizes aesthetic value and spatial organization.Both professions have a number of things in common and have a number of common courses in their study programs. In some designs, the structure of the building is the main aesthetical accent, often termed structural art. (Parasonis & Jodko, 2013).VGTU(Vilnius Gediminas Technical University) in 2002, based on the subject matter examination of undergraduate Architecture and Civil Engineer programs at present at that time at VGTU. (Parasonis & Jodko, 2013) developed the competence model after studying the relationship between architecture and engineering as a need to get more efficient structures, see Table (1).

The selection of this model as a benchmark for competence comparison because of the following reasons:

1-Vilnius Gediminas Technical University (Vilnius Tech) is a leading higher education institution in Vilnius, Lithuania's capital. is a country in the Baltic region of Europe; established in 1956, VILNIUS TECH is one of the biggest research universities in the country, with a focus on technologies and engineering and a strong emphasis on university-business cooperation.

2-Vilnius Tech is ranked by 4 subjects in QS WUR 2020:

- #51-100 in Engineering – Civil & Structural.
- #101-150 in Architecture / Built Environment.
- Vilnius Tech is ranked in 2 broad subject areas: top #=256 Engineering & Technology ,and top #=276 Social Sciences & Management.

3-This competence model is distinguished by overlapping engineering competencies with architecture competencies.

4-It is a contextual-driven model can the university used as an example by study plan developers.

5- The competence model has a clear structure: competencies, sub-competencies, and courses, where the main competencies are: personal, social, communication, professional, and research. The courses in the Vilnius curriculum are: Architectural design, Architectural drawings, Building codes, Building engineering physics, Building engineering systems, Programming presentation tools, Communication studies, Complex projects, Composition, Construction engineering, Final project, Free elective, Geodesy, History of building construction, Humanities and social studies, Industrial training, Mathematics, Natural sciences, Physical training, Professional language, Professional practice, Project management, Structural analysis, Training (Parasonis & Jodko, 2013).

Table 1: Vilnius Tech University Competence Model.

research	professional											communication				social				personal					Competences
Common	Common	Pofessional ARCH +SE	Team Management	General	ARCH+SE	ARCH+SE	SE	ARCH	ARCH+SE	ARCH+SE	specialization	common	professional visual presentation	professional documentation	general	professional	general	profesional-legal	general-legal	team work-social	common-social	professional	general				sub competence
research	customer and personal service		management		inspection	construction material and techniques	Project Development		technical knowledge	professional practice		information			communication		legal		social	continuous professional development		analytic skills	self development	basic	sub-sub competences / course label	
																									architectual design	
																									architectual drawings/graphics/artistic expression	
																									building codes	
																									building engeneering phisics	
																									building engineering systems:design technology	
																									CAD,BIM,IT programming representation tools	
																									commuication studies;publicspeaking;foreign language	
																									complex project:architecture engineering	
																									composition	
																									construction engineering,inspection,quantity surveying	
																									final project :architecture,structure,urban,landscape design	
																									free elective	
																									geodesy	
																									history of building construction,architecture,arts	
																									humanities,social science	
																									industrial training:architectutre,structures	
																									mathmatics	
																									natural sciences	
																									physical training	
																									professional language	
																									professional practice	
																									project management	
																									structural analysis and design	
																									training/ practice surveynig	

A "competency" is a holistic and dynamic concept that includes Knowledge, skills, attitudes, and values. In 21 St century, there were a set of competencies based on skills, character, Meta-learning, and knowledge forms learning objectives in the traditional curriculums at different levels, but all

in all, considering competencies must be:

- Deliberate, so it must have been considered internationally as an opportunity for learning.
- Explicit; deserve more much focus as Knowledge.
- With comprehensive, high-quality education, students can improve their skills by encountering as many competencies as possible.
- Systematic; means that the competence must be fit with the discipline.

Demonstrable; this requires designing competencies in a way that can be measurable for any assessment process. (Center for Curriculum Redesign's Research team, 2021) With reference to the above, how effectively do architecture engineering curricula in Jordanian universities align with international standards in terms of competency distribution when evaluated using the curriculum mapping method?

2. JORDANIAN ARCHITECTURE CURRICULUMS CASE STUDY

The quality of higher education outputs is the process to verify that academic standards are compatible with the vision of the educational institution, that has been identified, defined and achieved in a manner that complies with its corresponding standards either on a national or global level and that the level of quality of learning opportunities.

The Ministry of Higher Education controls all the universities in Jordan and, subject to the National Accreditation Board, aims to reform curriculums. (Dagher, Tarawneh, & Al-Quda, 2016) their study of the Jordanian education outputs about the practice, the market found that the harmonization between them is average. Indeed, there is a gap between them (Al Wahsha, 2020).

To answer the research question: What is the physical imbalance in the competencies in the architectural plans in Jordan compared to international plans? This research uses Curriculum Content Mapping (CCM) to study AE curriculums in Jordan and uses UTV as a competency benchmark. Since we have not in Jordan a clear and specific competence model, this method requires the following process: Suggest codes A1-A24, see table2.

Table 2: Code Each Group of courses in Jordanian Curriculum's. Source: Researcher.

code	Courses
A1	Architectural design
A2	Architectural drawings/graphics/artistic expression
A3	Building codes
A4	Building engineering physics
A5	Building engineering systems: design technology
A6	CAD,BIM,IT programming representation tools
A7	Communication studies; public speaking; foreign language
A8	Complex project: architecture engineering
A9	Composition
A10	Construction engineering, inspection, quantity surveying
A11	Final project :architecture, structure, urban, landscape design
A12	Free elective
A13	Geodesy
A14	History of building construction, architecture, arts
A15	Humanities, social science
A16	Industrial training: architecture, structures
A17	Mathematics
A18	Natural sciences
A19	Physical training
A20	Professional language
A21	Professional practice
A22	Project management
A23	Structural analysis and design
A24	Training/ practice surveying

2.1. Match each course from a Jordanian university with a group of courses suggested by the UTV model, Such as:

- Building engineering physics group, the following courses: Building Construction.
- Communication studies: Communication skills, Arabic, and English.

- Humanities and Social Science: Behavior, Military Studies, Engineering Innovation, Responsibility, and National Education.
- History of buildings: Architecture Theory, History of Architecture, Urban Theory, Interior Design, and Sustainable Architecture.
- Natural Science: Physics, Chemistry, and Computer Skills. See figure 1.

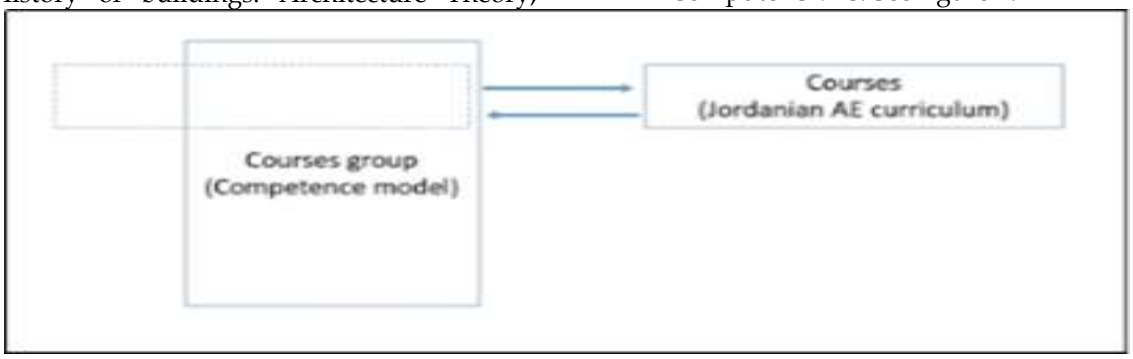

Figure 1: Match Courses in Jordanian Curriculum with Group of Courses in UTV model to know the exact competence for each course. Source: Researcher.

3. Take competencies suggested by the UTV model and match them with Jordanian courses figure (2).

4. Map the gap in each study plan.

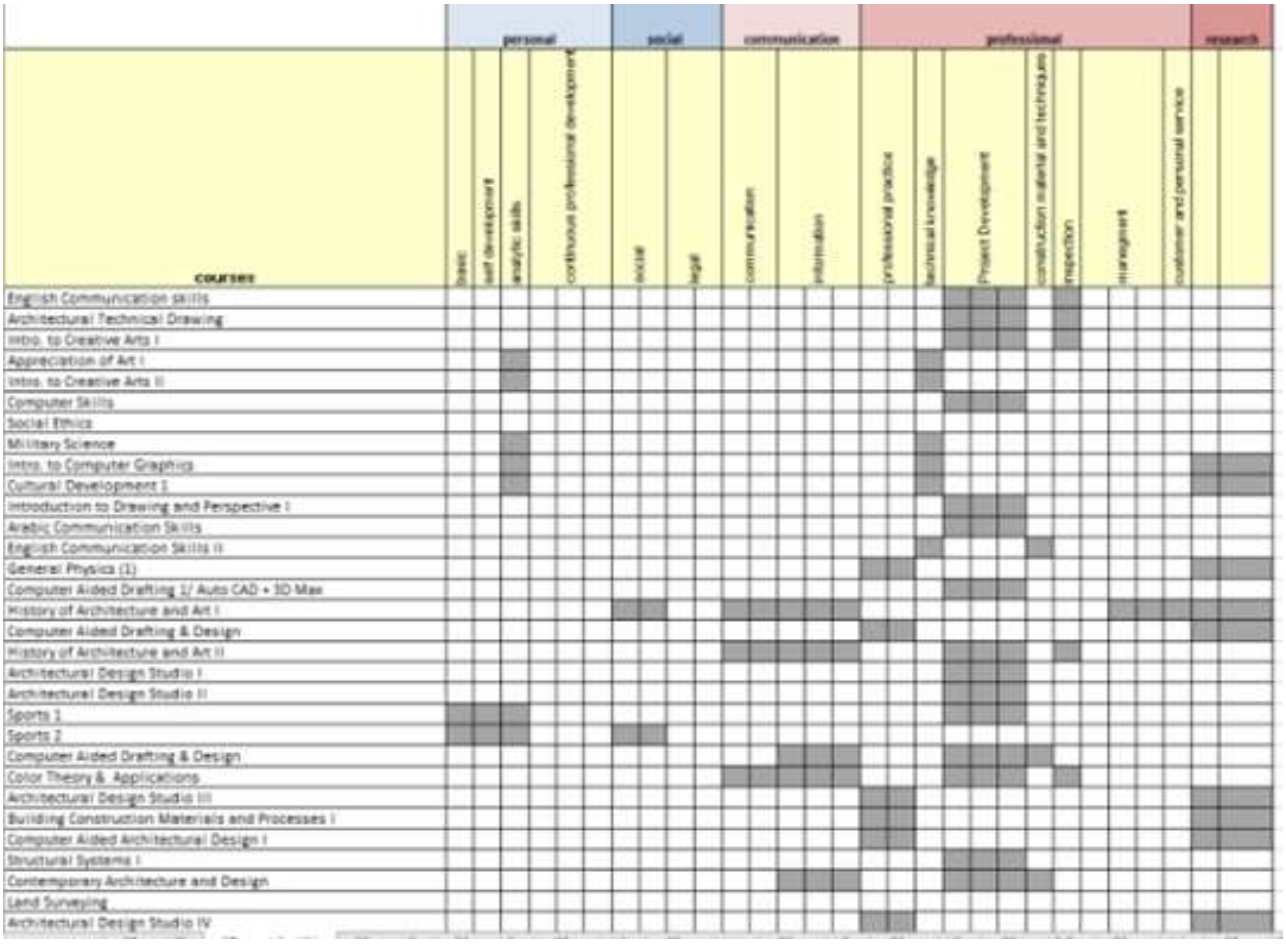

Figure.2: Match Competences extracted from UTV Model with Courses in Jordanian Curriculum. Source: Researcher.

The percentage of student to the total population in Jordan, according to (Tamimi, 2015), were 1:23, which was a high ratio, 2021 increased to 1:32,

compared to German at 1:32.4, and UK 1:25.6, which ensures that Jordan is an educated population but in other hand raise in the surface the issue of employment.

(Tamimi, 2015) Pointed out that bachelor-graduated students in Jordan were 22664, most of whom were females; the total number of university unemployed graduates was 244292 (76%) of the total number of graduated students.

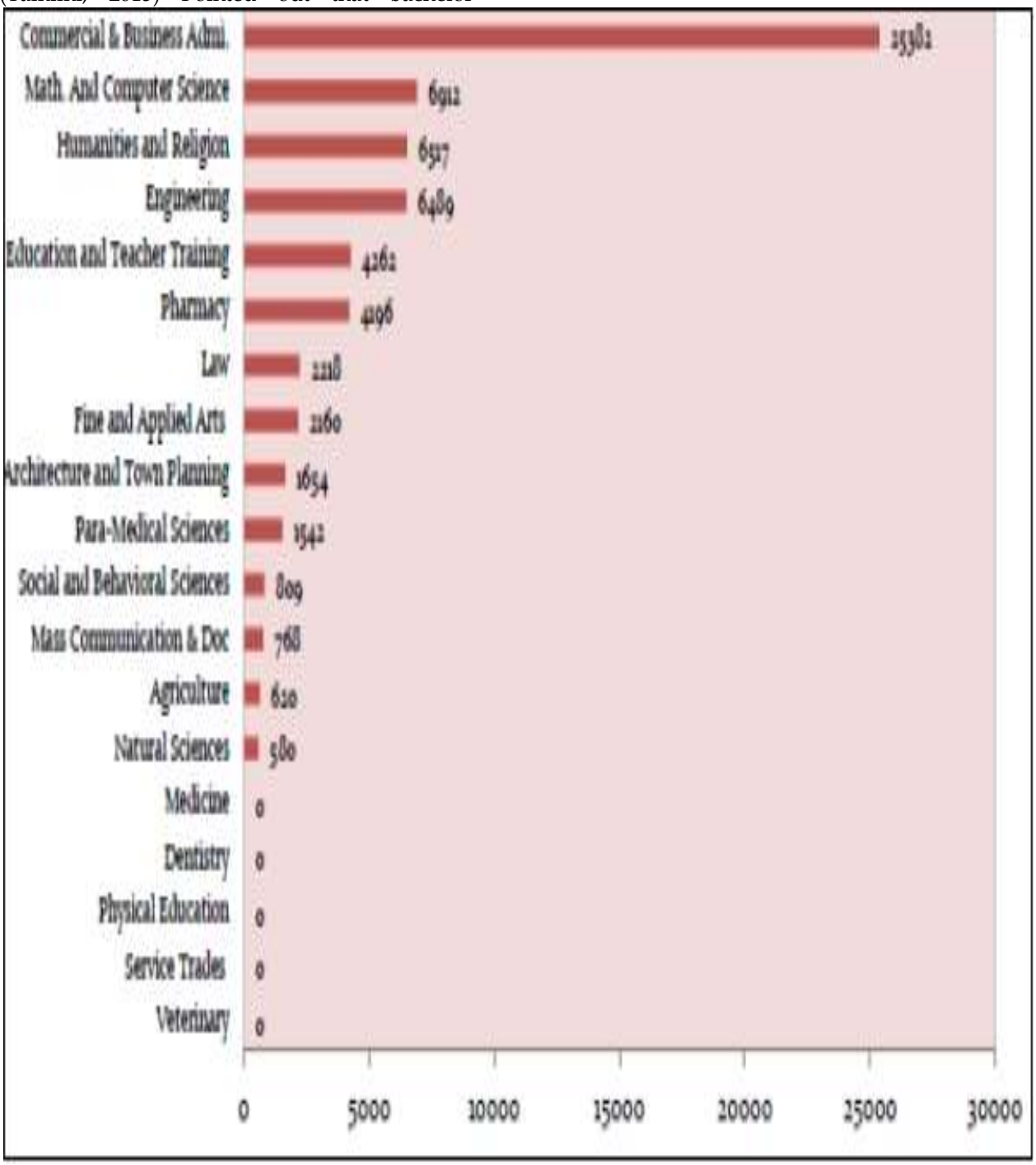

Figure3.Number of undergraduate students in Jordanian at private universities by program 2012-2013. Source: (Ministry of Higher Education and Scientific Research , 2012/2013).

(Ministry of Higher Education and Scientific Research, 2012/2013) mentioned that 66,655 students are the number of undergraduate students in Jordanian private universities program from 2012-2013. Figure (3) shows 1654 students in architecture and planning programs; it's around 2.4 % (researcher) based on (Ministry of Higher Education and Scientific Research, 2012/2013). Also, by looking at table (3), notes that the number of private universities has increased, so the number of students

with a bachelor's degree will form 28% of total BA students.

	DEGREE								
TOTAL	TECHNICAL DIPLOMA	INTERMEDIATE DIPLOMA	PHD	MASTER	HIGHER DIPLOMA	BA	UNIVERSITY NAME	TYPE OF UNIVERSITY
33343	509	5938	487	2403	259	27648	GRAND TOTAL	
513	0	0	0	0	0	513	Prince Hussein Academy for Civil Protection	GOVERMENTAL
4835	44	0	161	494	0	4042	University of Jordan	
2351	0	0	0	79	0	2272	University of Jordan-Aqaba	
4293	0	0	0	440	0	3853	German Jordanian University	
22340	0	0	61	940	52	22247	The Hashemite University	
9775	0	0	91	203	100	9381	Al al-Bayt University	
40650	0	1859	0	629	174	37038	Balqa Applied University	
8558	0	0	0	442	344	7772	Al-Hussein Bin Talal University	
6895	0	459	0	308	206	5954	Tafila Technical University	
25304	0	0	61	867	0	24236	Jordan University OF Science and Technology	
30176	0	0	1256	4229	173	25901	Yarmouk University	
19629	0	0	579	2567	363	16122	Mutah University	
246835	44	1978	297	8946	2227	219153	Governmental Universities TOTAL	
21	0	0	0	0	0	21	jordanian academy for private music	PRIVATE
1376	0	0	0	0	0	1376	The American University of Madaba	
85	0	0	0	0	0	85	Arab University College of Technology	
2730	0	0	0	271	0	2459	Irbid private university	
5103	0	0	0	361	0	4742	Al-Isra University	
4023	0	0	11	373	0	3639	Princess Sumaya University of Technology	
6380	0	0	0	90	0	6290	Petra private university	
6725	0	0	0	491	0	6227	Zarqa Private University	
8065	0	0	0	358	0	7707	Al-Zaytoonah private university of Jordan	
4340	0	0	0	520	1	3819	Middle East University	
648	0	0	0	0	26	622	Aqaba University of Technology	
5980	0	0	0	296	0	5653	private university of applied sciences	
4295	0	0	0	391	0	3904	Jadara University	
4560	0	0	0	448	79	3933	Jerash private university	
2336	0	0	0	202	88	2046	Ajloun National Private University	
6871	0	0	0	648	0	6223	Al-Ahliyya Amman University	
3485	0	0	0	987	107	2475	Amman Arab University	
3752	0	0	0	102	0	3650	Philadelphia private university	
377	0	0	0	0	0	377	Al-Khawarizmi University College of Technology	
1242	0	0	0	0	0	1242	Faculty of Educational Sciences and Arts - UNRWA	
78	0	0	0	78	0	0	Talal Abu-Ghazaleh University College for Innovation	
170	0	0	0	0	0	170	Amman Applied University College	
678	0	0	0	0	0	678	Luminus Technical University College	
41	0	0	0	41	0	0	jordanian science institute	
73368			11	5673	340	67330	private TOTAL	
896	465	0	0	0	0	431	Al-Hussein Technical University	SPECIAL LOW
11985	0	961	775	691	239	8520	International University of Islamic Sciences	
12881	465	961	775	691	239	8951	special low TOTAL	
2385	0	0	0	173	51	2161	Arabic Open University	REGIONAL
2385	0	0	0	173	51	2161	regional TOTAL	

Table. 3: Summary Of The Numbers Of Students Enrolled In Second-Degree Universities For The 2020/2021 Semester By University And Academic Degree.

3. ANALYSIS AND DISCUSSION

There are eight public universities in Jordan and 12 private and 8 private Universities that teach AE. There are 21 universities teaching architecture in Jordan until the date this research conducted, with two types of architecture schools (13 departments of architecture and seven colleges of architecture). In

terms of degrees, there are two types (6 architecture and 14 architecture engineering), see table (4).

Table. 4: Classification of Architecture Schools in Jordan. D: Department,C:College, AE: Architecture Engineering, A : Architecture, G:Governmental University, P: Private University.

	University name	Architecture school College/Department	Pedagogy type AE/A	Private/Governmental/Special low
1	University of Jordan	D	AE	G
2	Jordan University of Science and Technology	C	A	G
3	Yarmouk Uninversity	D	AE	G
4	Hashemite University	D	AE	G
5	Albalqa Applied University	D	AE	G
6	Philadelphia University at Jordan	D	AE	P
8	AlAl-Bayt University	D	AE	G
9	Muta University	D	AE	G
10	University of Petra	C	A	P
11	Middel East University Jordan	C	A	P
12	Applied Science University	D	AE	P
13	German Jordanian University	C	A	G
14	Al Zaytoonah University	C	A	P
15	Al Ahliyya Amman University	C	AE	P
16	Zarqa University	D	AE	P
17	Amman Arab University	D	AE	P
18	American University of Madaba	C	AE	P
19	Al Isra Private University Amman	D	AE	P
20	Jerash university	D	AE	P
21	Al aqaba university for technology	D	AE	P

Researcher conduct a CCM analysis approach related to the UTV model to answer the first question according to the following aspects:

1. Computerized courses, digital design courses.
2. Competences, group of courses.
3. Curriculum characteristics.

The Researcher collected all the curriculums from 13 architecture engineering schools at Jordanian universities and mapped the computer courses and digital design courses in university, college, and department compulsory courses. Analys shows that (0-6%) of the study plan in AE are separate courses that teach computer science as stand-alone courses ;(2DCAD,3D CAD, C++, GIS), and there are no digital design studios as separated courses.Using CCM referenced to UTV University AE Competence, the outcomes mapping methodology aims to be an evidence-based method of curriculum evaluation and development, see figure (4) ,for Al albayt University as an example; for other universities; we find the main defects:

Comparing the main competencies, Personal, social, communication, professional, and research, two universities (Alabayt University and Amman arab university) do not meet some competencies; there is a lack of (continuous professional development) sub-sub competence in personal competence, this define the emerging patterns in competences. Even if all the qualification requirements are met (continuous professional development), the rest of the universities remained within simple limits, Albalqa University and Mota University, also group of courses:(Complex project: architecture engineering) and(Composition) were not fulfilled in the study plans in all universities; here, a prominent and clear difference appears

between local and international study plans.

In general, there are differences between universities in the number of credit hours and courses taught, even within the same competence.

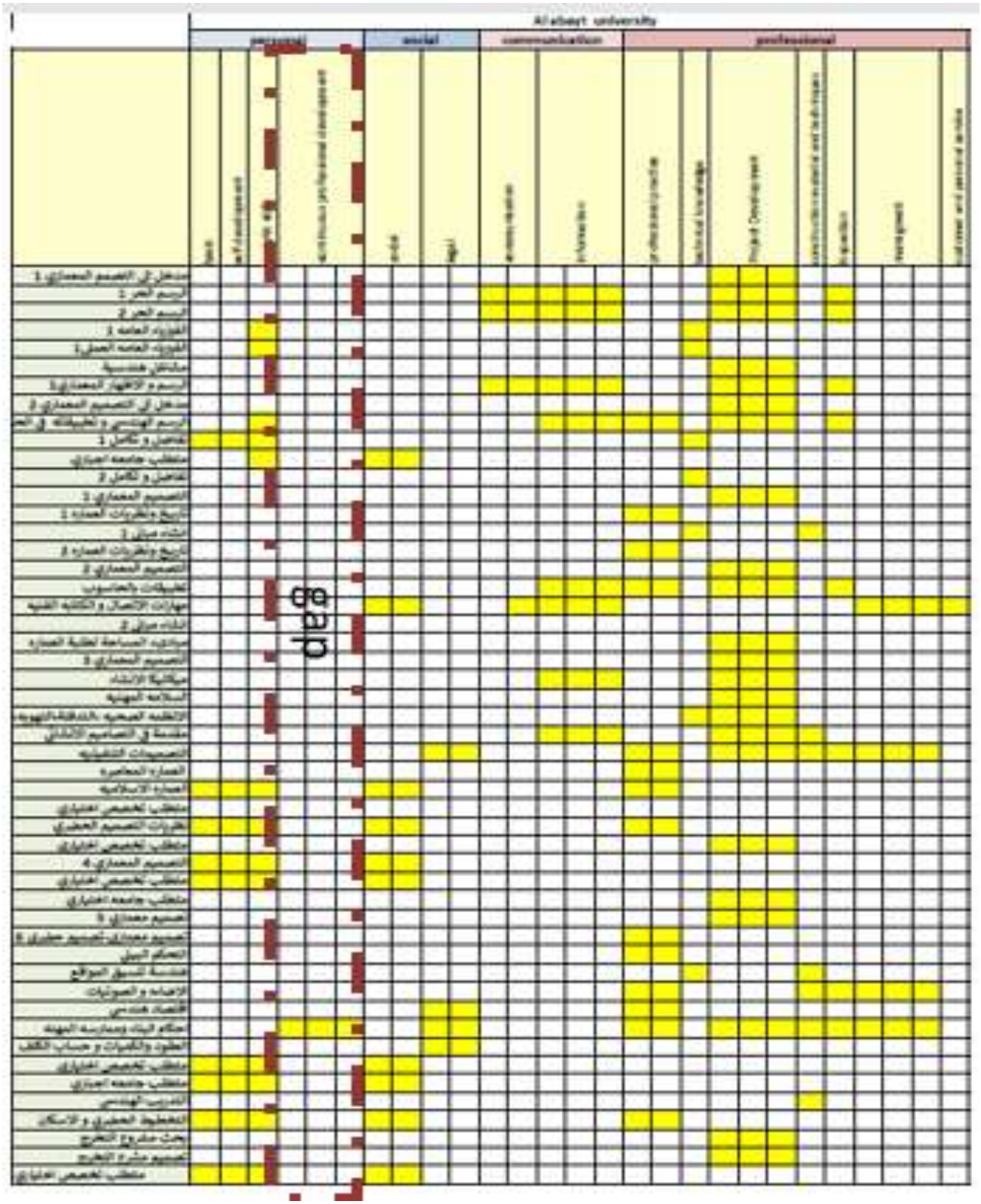

Figure 5. Sample Of Study Plan –Competence.

To visualize the methodology of this research, to be used by any educational institution or researches,

see figure 6.

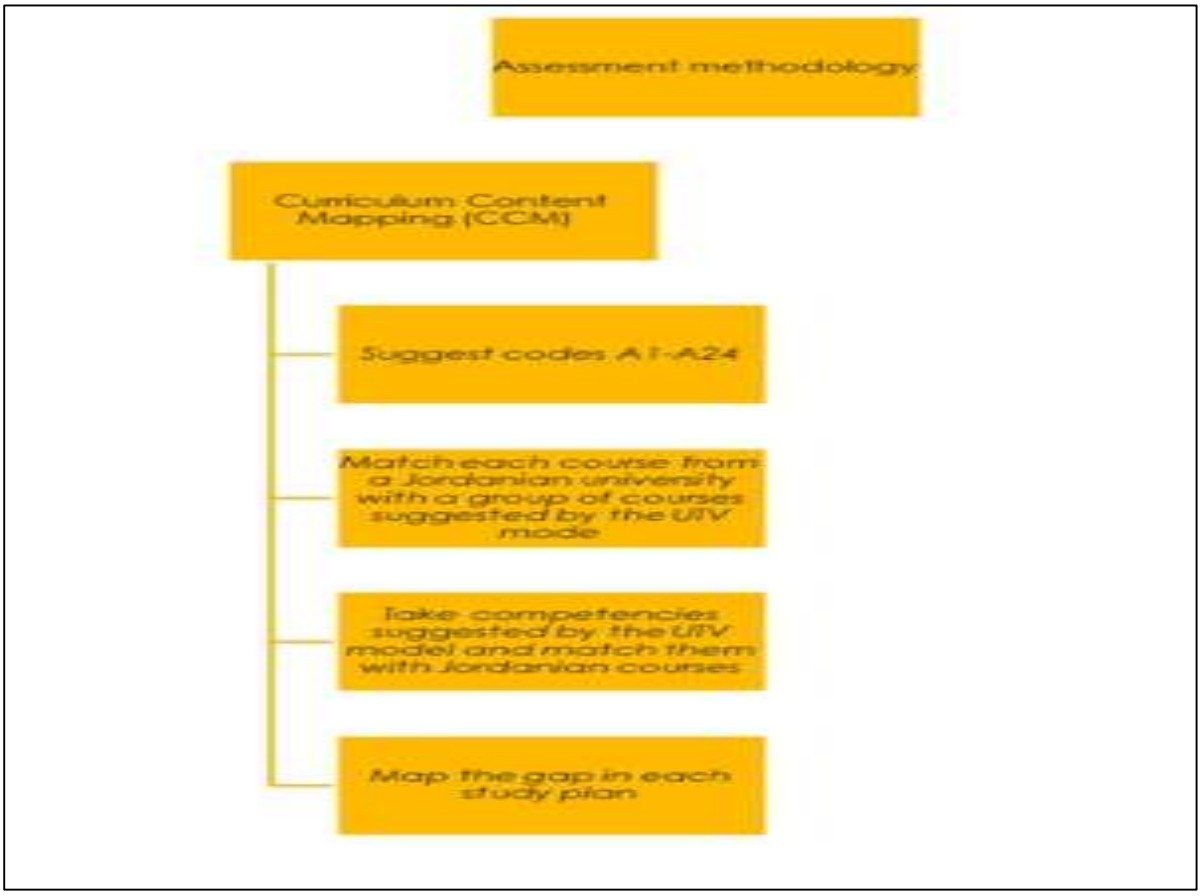

Figure 6. Methgodology to Create of Contextual Competence Model. Source: Researcher

4. CONCLUSIONS AND RESULTS

There is a need to reverse the study plans according to era needs; this is a digital era, and emerging computer skills and programs raised to the surface. Also, higher education cannot unify the required Architecture skills or competencies, and they must consider the type of work the architect must fill.

Digital architecture from this time into the future is not a course used by some computer programs for presentation or model making; instead, it's more profound discipline means that digital skills are well integrated with study plan courses as it serves the course goal and enhances student competencies. And there is a defined need to develop curriculums to meet accreditation criteria and standards for students' performance SPCs.

There is a need to change the stereotypical social view of applied disciplines and emphasizing the role of technicians and technicians in various engineering fields to accommodate and provide them with a broader opportunity in the local, regional, and global labor market taking in to consideration that Professional competence is not just for some courses but depends on overlapping between courses such as training and design, management, and communication skills. So engineering education sector should develop itself humanly, institutionally, and legally through the following:

1. Adopt a strategic planning method for the development of university education institutions.
2. Determining enrollment opportunities in university engineering education programs and community awareness
3. And new students do so.
4. Improve the outputs of engineering education in line with the requirements of development and the labor market.
5. Improve the level of internal efficiency of university education institutions.
6. Develop the human resources (faculty members and their assistants).
7. Improve the educational environment.
8. Develop all the information and communication technology in the service of the educational process.
9. Develop the role of postgraduate studies and

raise their level.
10. Encourage research institutions to enter the world of scientific research strongly.
11. Adopt a strategic planning method for the development of university education institutions according to differences in culture.
12. Determining enrollment opportunities in university engineering education programs and community awareness and new students do so.
13. Improve the outputs of engineering education in line with the requirements of development and the labor market.
14. Improve the level of internal efficiency of university education institutions.
15. Develop the human resources (faculty members and their assistants).
16. Improve the educational environment.
17. Develop all the information and communication technology in the service of the educational process.
18. Develop the role of postgraduate studies and raise their level.
19. Encourage research institutions to enter the world of scientific research strongly.

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