# Re-thinking Architecture Education: Conceptualising Curriculum Through the Lens of 21st Century Graduate Attributes

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There has been a paradigm shift in architecture education to embrace the 21st century attributes for graduates. While attributes such as problem solving, critical and creative thinking, interpersonal and intrapersonal skills, and technological as well as global awareness have been central to the curriculum design in architectural education, this paper posits the need to critically examine the emerging 21st century attributes, and how they can be embedded into architecture education. In recent years, it is clear that these attributes have been designed and executed into design and other-related student projects through either extra-curricular platforms or at modular level, however there is a lack of exploration of these attributes as structured and intentional design at curriculum level. Using design research in education as the methodology for study, this paper explores the design thinking for architecture education that embraces these attributes. This paper justifies and argues for the need to re-think architectural education in relation to these attributes and offers a conceptual thinking, framework and principles for curriculum design.

*Keywords: Architecture education; Emotional intelligence; Entrepreneurialism; Trans-cultural perspective; Holistic graduate; Graduate Attribute*

# 1. INTRODUCTION

Education ecosystem has transformed over the centuries, underpinned by the social shifts and economic and technological discoveries. This phenomenon suggests a paradigm shift in architecture education to embrace 21st century graduate attributes, aligned to Industrial Revolution 4.0. Skills demand of graduate have changed and based on the study by World Economic Forum (2018). In architecture, these attributes are not new; however, they are not structured and intentionally design within the "intended" curriculum at the macro level, rather they are implemented in the micro and individual level. This implies that the attainment of skills is by chance, and not by design. This paper posits the need to critically examine these attributes and offers a conceptual thinking how they can scaffolded and designed into the architectural curriculum through the methodology of education design research by using the architecture curriculum of two private universities to frame the context of study.

## 1.1 21st Century Skills and the Curriculum in Higher Education

A new Forum report, The Future of Jobs, looked at the employment, skills and workforce strategy for the future in the wave of Industrial Revolution 4.0. Top job skills shifted to active learning and emotional intelligence, amongst others (WEF, 2018). To be relevant, these attributes have to be integrated into the curriculum and pedagogy of education. Such skills have been identified by FICCI (2017) in In Leapfrogging to Education 4.0. In the education ecosystem proposed by FICCI (2017, p. 34), while most principles are integrated into the curriculum through the university context and teaching pedagogies and methods, there are domains of emotional intelligence and empathy, and peer learning positioned under Society rather than University.

## 1.2 Defining Curriculum

Whilst the definition of curriculum is defined as "plan for learning", there is a differentiation between various levels of curriculum. Van der Akker (2007, pp. 37-38) described the levels as international (supra level), system/society/nation state (macro level), school/institution (meso level), classroom (micro level) and individual/personal (nano level). Morover, curriculum can be represented in various forms: Intended, Implemented and Attained (van der Akker, 2003). These representations are useful when trying to intervene the curriculum. Furthermore, curriculum problems can be approached from various analytical angles: substantive (focusing on what knowledge to be included); technical-professional (how to address tasks of curriculum development); socio-political (decision-making process in relation to values of different stakeholders) (Goodlad, 1994, cited in van der Akker, 2007).

## 1.3 Architecture Curricula and Graduate Attributes in Malaysia

Architecture education in Malaysia is governed by the Council of Architectural Education Malaysia formed under the auspices of the Board of Architects. It defined the characteristics and attributes of Part I and Part II architectural graduates, which predominantly focus on knowledge and technical competencies through design and the integration of design, and working as a team, as outlined in the MAPS (2013). At a national level, the curriculum must be aligned to the Malaysian Qualifications Framework (MQF) which frames learning outcomes into five clusters, namely (a) knowledge, (b) cognitive skills, (c) functional work skills, (d) personal and entrepreneurial skills, and (e) ethical and professionalism. The functional work skills comprised practical skills, interpersonal and communication skills, digital (ICT) and numeracy skills, as well as leadership, autonomy and responsibility. Besides this, in Malaysia, the integrated cumulative grade point average (iCGPA) system launched was one of the key initiatives (in April 2015 but no longer compulsory in 2018) to achieve "balanced approach" between academic obligations and activities outside the classroom, through assessment of nine graduate attributes: knowledge

and understanding; practical skills; social skills and responsibilities; professional skills, ethics and values; communication, leadership and teamwork; problem-solving skills and scientific thinking; information management and life-long learning; entrepreneurship and management; unity and patriotism.

Besides graduate attributes framed within national and professional levels, there is the university (and at times Faculty) graduate attributes – an orientating framework of educational outcomes that a university community agrees its graduates should develop as a result of completing their studies successfully. A literature review by Salleh, Memon & Md Yusoff (2016); Ibrahim, M. A., Wahab, M. H., & Shukri, S. M. (2018); Mohidin, H. H. B., Aminuddin, A., Rosni, A., Sediadi, E., & Razif, F. M. (2019) posited that preference of soft skills often highlighting problem solving and creative thinking, interpersonal, intrapersonal, communication skills are being importance skills. Their study on industry perspective on attributes of graduate architects in Malaysia measured 10 out of 33 attributes, namely responsibility, a positive attitude, teamwork, the ability to work under pressure, creativity, independence, problem solving skills, flexibility, leadership ability and interpersonal attributes, and concluded that responsibility, a positive attitude and teamwork skills are top three skills from the employer's perspective.

Based on the literature review, one broad issue lies in the gap between attributes required by the governing professional requirements, the national requirements and the global studies of the job skills of the future. Also, there is a gap between the rhetoric of university generic attributes and the reality of the student learning experience (Thian, Ng & Ewe, 2018; Shukri, S. M., Manteghi, G., Wahab, M. H., Amat, R. C., & Ming, W. H., 2018; Sahabuddin, M. F. M., Aminuddin, A., Muhammad-Sukki, F., & Shukri, S. M., 2022). With the skills of emotional intelligence and active learning surfacing as top skills for the future, together with other needs for culturally aware, globally situated, and entrepreneurial

attributes, there is an emerging need to study how these skills relate to architecture education. In addition, while there are efforts to embed generic graduate attributes, the colossal task appears accidental. They are led by individual teachers through either extra-curricular platforms or at modular level rather than designed at a macro level, as what van der Akker (2007) called, an intended curriculum. Taking this as a premise for study, this paper explores how these graduate attributes that support job skills of the 21st century can be embedded into architecture curriculum (intentionally). The study will offer conceptual thinking and principles for curriculum design that creates holistic graduate.

## 2. METHODOLOGY

### 2.1 Curriculum Design Research

This study employed Van der Akker's curriculum design research. Design-based research (DBR) is a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design and empirical testing, based on collaboration among researchers and practitioners in real-world settings, followed by an iterative process of reflection and leading to contribution to knowledge to be gained is in the form of contextually-sensitive design principles to support developers in their task, usually heuristic by nature (Wang & Hannafin, 2005; Amiel & Reeves, 2008; Sari & Lim, 2012; Shukri, S. M., Wahab, M. H., Awaluddin, Z. L., Aminuddin, A. M. R., & Hasan, M. I., 2022). This study adapted Van der Akker's (2007) cyclic or spiral research process involving the following: Phase 1 involved preliminary investigation which includes literature review on the various attributes particularly entrepreneurialism and emotional intelligence, consultation with the curriculum designer and administrator of the programme, and document analysis of the current state of the curriculum; Phase 2 involved theoretical embedding of the attributes into curriculum design through prototyping. The study was conducted at two private institutions offering architecture education in Malaysia. Based on the phasing of DBR, the scope of this paper covers up

to the development of curriculum design which spanned approximately one year. University 1 has undergone until Phase 2 where the architecture curriculum is analysed, and a prototype curriculum is designed. University 2 is in Phase 1 of the study. Through analysis, design and subsequently reflection, this study is aimed at achieving three purposes: (a) re-define the problems, (b) explore possible solutions, and (c) consider the principles that might best address them in embedding 21$^{st}$ century skills required by the future job landscape.

## 3. RESULT AND DISCUSSION

### 3.1 Preliminary Investigation - Literature review, Consultation and Analysis

Through consultation with the curriculum designer and administrator of the programme, and analysis of the current curriculum documents, the current state and gaps of the curriculum were identified. The following are findings from the study: the curriculum lacked intentional design as the distribution of the attributes ended up only making a small percentage in the course level (course learning outcome); the curriculum lacked alignment as the assessment of those attributes is vague pointing towards the need for constructive alignment espoused by Biggs (2014) ; CLOs are based on affective domains (MQA 2017), but they are not explicitly aligned to the attributes and the intended learning outcomes and assessments; the curriculum is aligned to the attributes and criteria as required by the professional body (MAPS, 2013), which is skewed towards cognitive and psychomotor skills, illustrating a gap to the global context; amongst the graduate attributes, problem solving, creative and critical thinking, and social responsibility are most evident and linked to assessment.

However, other attributes particularly active (or lifelong) learning, entrepreneurialism and emotional intelligence have little position in the intended curriculum, despite these being graduate attributes of the university. For example, there was intent of entrepreneurial skills relating to management, however with little focus on impact,

resilience and creating change, echoing studies of Bruyat and Julien (2001); Shukri, S. M., Wahab, M. H., & Jamala, N. (2021); there is elements of intra and interpersonal skills which focus on teamwork and self-management, however with limited perspective towards emotional intelligence; life-long learning has been propagated in the curriculum under the umbrella of self-directed learning, however elements of self-reflection is limited.

Following that, literature review was carried out for two least emphasized attributes in the curriculum, i.e. entrepreneurialism and emotional intelligence. Despite emerging trends towards entrepreneurialism, its impact on education has not been explored. The word "archipreneur" was coined in order to describe a new approach and a new generation of architects, designers and city builders who are embracing the influx of other disciplines and creating with a dual mindset- as an entrepreneur and a designer (Aminuddin, A. M. R., & Yong, G. K., 2009; Archipreneur, 2015; Shukri, S. M., Wahab, M. H., Amat, R. C., Taib, I., & Ismail, S., 2018). Contemporary entrepreneurs usually understand not only how to capitalize a business but also how to play market networks with the viral dissemination of both objects and aesthetic regimes. Drawing from the field of practice, Archipreneur (2015); Shukri, S. M., Wahab, M. H., & Amat, R. C. (2020); Hashim, M. Z., Awaluddin, Z. L., Aminuddin, A. M. R., Sarkum, S. A., Sholiha, A. B., & Aziz, A. A. (2021) conducted interviews with 10 interviews with the world's 10 leading archiprenuer. Also, the position of entrepreneurialism in architecture has been stressed by a number of institutions for example Lyon Architecture School, MIT, Yale University, through courses such as Architecture and Entrepreneurship and project based examplars that capitalizes on under-utilized space, prefabricated modular housing concept, developed a technology to turn 2D floor plans into 3D models. Exemplary cases would be late professor Richard Horden's work in the Technische Universität München that focused on multi-disciplinary approach and supported by industry to function within the design business in real world, and Lucerne University of Applied

Sciences and Arts, Switzerland, has a very interesting proposition of such program Bachelor of Arts Design management filling the gap between the current design program and the role of the entrepreneur in practice.

Emotional intelligence pertaining to the self has been studied in terms of academic achievement in design studio courses. It has been suggested that emotional intelligence is connected to the emotional intelligence and intrapersonal skills of students (Sezer, Erbil & Murat, 2016), motivation being a part of emotional intelligence in relation to success and affects architectural studio (Birer, 2012). Besides self-regulation of emotions, empathy is part of emotional intelligence, where the relationship between empathy and design has been studied (Pallasmaa et. al 2015; Dam & Teo, 2019; Joyner 2019). Studies have argued for inclusion of empathy as an attribute to learning architecture (Kruger, 2008, Hart 2016, Tuscher, 2016, Joyner, 2019, Shukri, S. M., & Wahab, M. H. 2019, Tan'G, A., & Aminuddin, A. 2019) and suggested ways of framing it in education, particularly through design (Kruger, 2008, Mediastika, 2016; Dam & Teo, 2019). It is established that the wave of social architecture in Malaysia implemented through design studio and community service courses are partially related to empathy towards what MacKay-Lyons (The International Ghost Lab Conference, 2011) with his "one-room schoolhouse" approach for three basic courses: (1) Place, (2) Craft, and (3) Community.

### 3.2 Framework and principles for Architecture Curricula

Based on the analysis of the current state and literature review, an initial prototype design for one of the architecture curriculum is developed at programme and course level to offer an intentional and balanced curriculum design. Arising from the design phase, a framework and principles for curriculum design is developed as follows:
1. Graduate attributes are scaled from a global, to national, to professional, to university and then to a programme level. Graduate attributes are contextualized within the discipline into PEOs and PLOs and made relevant to the programmes.
2. PLOs are structured and elaborated into a continuum of staged development year-by-year through the courses. This is a critical point as authentic selection of courses in relation to literature review and benchmarking is required to ensure optimum choice. Create a balance between under or over assigning courses that assesses these attributes. In designing the curriculum at the juncture between the programme and course levels, there are several design principles that is derived as follows:
   - Common understanding that attributes are not mutually exclusive of one another. They are inter-related rather than seen in silos.
   - Design studio as the anchor to embed the attributes, for example students realizing their roles as agent for change, the grit and resilience, self-reflection, self-regulation of emotion, empathy towards others and the environment.
   - Emotional intelligence through studio-based learning in the design studio modules, with critical reflection on how emotions affects behaviour and consequently decision-making.
   - Position the role empathy in design thinking and outcomes. Community and culturally aware design are part of empathic architecture.
   - Develop intentional multi-disciplinary projects and/or courses (e.g. psychology, business, IT) within the curriculum through elective/compulsory studies that integrate these attributes, hence becoming the anchor for these attributes.

3. Courses are aligned to the attainment of PLOs through their CLOs. CLOs to clearly articulate the attributes expected, and aligned to Assessment and Teaching and Learning. The assessment and teaching pedagogies creates a space for immersion and reflection of the individual student to take place. Create a balance between under or over assessing students on these attributes. Several principles of pedagogy are identified as follows:

    - Entrepreneurialism through experiential learning in a multi-disciplinary context with emphasis on a way of thinking, reasoning and acting that is opportunity oriented.
    - Self-assessment and self-reflection to be brought to the forefront practice of teaching and learning. Reflection is a central tool to assess attributes of emotional intelligence.
    - Active learning is related to the methodology of learning (how to learn) and the self. For example, through flipped classroom approach, removing teacher to student contact of content delivery, hence increasing self-directed learning, self-curiosity in learning, self-assessment and self-reflection of and for learning.

4. Map the extent and degree that each PLO is developed through the Courses.
5. Analyse the gaps in the alignment between the PLO, CLO, Assessments and Pedagogy. Reiterate the design process at programme and course levels to ensure alignment and a balanced curriculum.

## 4. CONCLUSION

Based on the study, it is concluded that curriculum design research provided a robust approach, albeit time consuming due to the cyclical and iterative process, and this study is only part of this cyclical process which involved analysis to define the problems of the curriculum based on the emerging attributes, exploring possible solutions for the curriculum prototype development, and considering the principles that might best address them. In doing so, this study contributed to a framework to embed the 21st. century graduate skills into intentional curriculum, and offered principles for the curriculum design relating to educational approach and teaching pedagogy which can be adopted by others to consider either similar attributes or alternative set of attributes. The framework provides a structured approach towards progressive and integrated learning at programme level which is open for creative interventions at course level. A conscious and authentic alignment between the global, national, professional and university requirements is integral to creating a holistic and balanced curriculum for graduates to be able to grapple with the 21st century changing job landscape.

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