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BLURRING TERTIARY EDUCATION AND INDUSTRY CERTIFICATION PEDAGOGY

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Abstract:

Industry employers have been critical of the limited job-readiness in formal education graduates which requires them to invest in industry-based training to uplift skills to productive levels. This paper is authored as a descriptive case study with the intention of opening debate on the merits of formal and industry education alignment and as the basis for further research.

A preliminary literature search has revealed a paucity of extant literature relative to integrated formal and industry-based education pedagogy. Using the recent experience of The University of Melbourne's accreditation of its master's level Enterprise Architecture subject to TOGAF® certification standards as the context, this paper explores the pedagogical issues faced by education providers to bridge the gap between formal education and industry certification pedagogy. Bloom's pedagogical framework is employed to assess and compare the learning outcome standards that must be met to achieve accreditation of learning content to both formal education and industry certification. Although successful accreditation of the learning content to formal education and TOGAF® standards was achieved, several challenges in pedagogy, learning content design, delivery, and assessment were encountered and overcome. This results in graduates attaining formal qualifications, and industry certification as enterprise architects as an outcome of their studies in the Master of Information Systems.

As graduates with both industry certifications and formal qualifications join the workforce, graduate employability and employer feedback will inform the effectiveness of an integrated approach' Ongoing study of the outcomes achieved will contribute to the pedagogical body of knowledge base and, importantly, to industry practice.

Keywords: Pedagogy, Formal Education, Industry Certification, Enterprise Architecture, Case study

I. INTRODUCTION

Higher education purports to provide graduates with the knowledge and experience as pathways to professional careers, while in industry, there has been a recent trend towards professional certification of skills and competencies offered by various vendor and standards bodies to uplift employee capability. However, criticisms of graduate job-readiness are common with employers often reporting the need to invest on in-job training to raise the level of graduate competence to productive levels.

This discussion references recent experience of The University of Melbourne (UniMelb) in gaining accreditation for its Enterprise Architecture (EA) subject for graduating students to achieve TOGAF® certification as an outcome of their Master of information Systems studies. Meeting the learning objectives applicable in the higher education and industry certification curricula required balancing often competing pedagogical paradigms.

There is an underlying assumption that student employability is enhanced by having a certification that augments the theoretical foundation gained through formal education as adds value by reflecting current technology competency (Randall and Zirkle, 2005) however, this hypothesis needs testing in the contemporary context.

This paper offers the opportunity to open the dialogue and test the feasibility of further research focusing on 1. The relationship between professional certifications and formal qualifications and 2. Test the hypothesis that there is a value proposition for educators to pursue blended certification and formal qualifications in curriculum design.

This case scenario narrates this dilemma, discusses the approach taken, and overviews the solution deployed with the ultimate aim of equipping graduates with the skills and knowledge required to 'hit the ground running' when entering the workforce.

II. BACKGROUND

Higher education is generally accepted as formal learning beyond secondary school level and typically offers coursework channeling students into specific disciplines, i.e., Arts, Science, Medicine, Engineering and Information and Communications Technologies (ICT) at universities, with trade and vocational schools providing higher learning opportunities for traditional blue-collar occupations.

The Australian Resources 2030 Taskforce [2018] recommends that industry should 're-skill, upskill and better support current and prospective resources workers, promoting a culture of continuous learning' and this sentiment is reflected internationally. In the ICT industry, various certifications in practice areas have become increasingly popular and are common features of professional development. Consequently, there has been a recent trend towards Higher Education providers offering industry focused Micro Certifications, Credentials and MOOC's (Massive Open Online Courses) that supplement and compete with numerous vendor/product specific certifications in technology products, and independent certifications of vendor neutral capabilities including PRINCE2, COBIT, ITIL, Cyber-security and TOGAF®.

This paper notes that Randall and Zirkle (2005) posed the question "What value is added by technical certifications to learning outcomes and student employability?" However, although there is an assumption that there is a link between professional certifications and student employability, this hypothesis warrants further investigation.

III. LITERATURE SCAN

The intent of this paper is to explore the feasibility of further research into the value proposition underlying certification, formal qualifications, and student employability. As a preliminary step, a concept-centric approach [Webster and Watson 2002] was adopted to search the published academic literature with the goal to discover extant literature. The search string was based on the keywords: Pedagogy, Formal Education, Industry Certification, Enterprise Architecture and applied to the UniMelb catalogue including the ScienceDirect, Scopus, Google Scholar, Springer and IEEE, databases, searching within the title, research keywords, abstract and research questions. The search excluded studies not in English, and duplicated studies, and included all journal articles, conference proceedings and book chapters [Kitchenham and Charters 2007]

The results of this search revealed a limited body of extant literature with zero results found for a search on all terms. Similarly, no results were found in response to searches on a combination of any three keywords. A significant number of results (n351) were returned on the search string containing 'Pedagogy' and 'Formal Education'. On scanning the titles of these results, it is apparent that much of the literature relates to studies in the context of formal pedagogy in both tertiary and vocational education contexts. Further narrowing of search strings and examination of the articles is needed to identify any studies have been conducted within the context of industry certifications. A limited number of results were found for other combinations of the keywords as presented at Table 1.

Table 1: Keyword Search Results

	Pedagogy	Industry Certification	Formal Education	Enterprise Architecture
Pedagogy	N/A	5	351	10
Industry Certification	5	N/A	2	21
Formal Education	351	2	N/A	29
Enterprise Architecture	10	21	29	N/A
Industry Certification + Formal Education	Nil	N/A	N/A	NIL

Formal Education + Enterprise Architecture	Nil	NIL	N/A	N/A
Pedagogy + Industry Certification	N/A	N/A	Nil	NIL

Professional Certification TOGAF®

This paper focusses on TOGAF® certification in the information systems discipline. Consequently, for the purposes of this discussion, TOGAF® certification serves as the proxy term for certification variously termed professional, industry, or technical certification.

The Open Group TOGAF® Standard, is described as "a proven EA development methodology and framework used by the world's leading organizations to improve business efficiency". The Open Group Architecture Forum evolves the standards to keep pace with the currency of industry practice and claims TOGAF® certification has been achieved by over 103,000 individuals worldwide. [Open Group 2018].

Given feedback from the employer community regarding graduate readiness and the aim to provide job-ready graduates, UniMelb explored the option to provide students with both formal qualification and industry certification as an outcome of their studies in EA within the Master of Information Systems degree programme (MIS). The value proposition for aligning academic and industry educational outcomes is presented at Figure 1. It shows the dichotomy that needs balancing between formal qualifications that are theory based and assumed not to be practical, with the need for on-the-job skilling on entering the workforce and subsequent certifications that are based in applied experience providing hands on job ready skills.

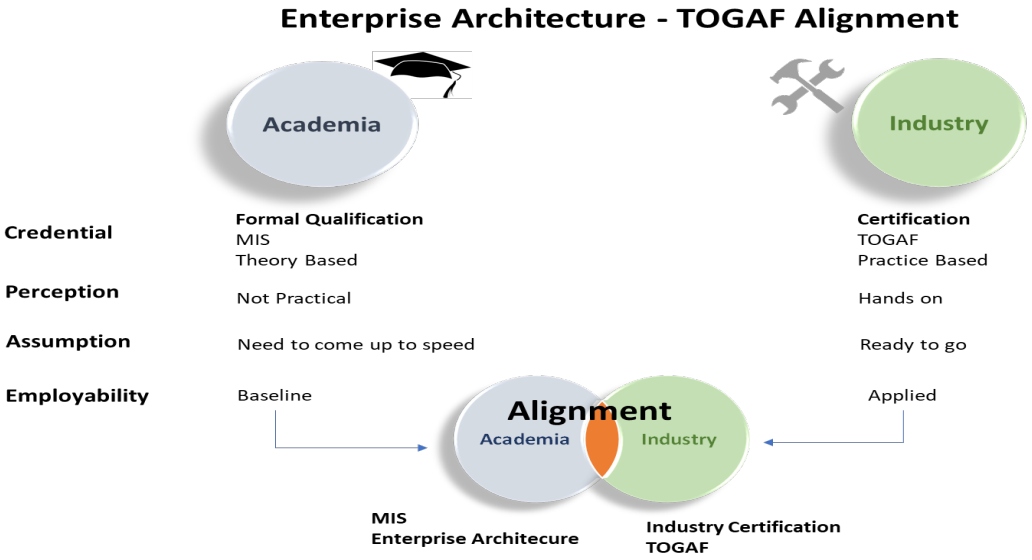

Figure 1. Value proposition formal qualification and industry certification alignment

IV. COURSE PEDAGOGY

Enterprise Architecture is a core subject with the MIS degree programme and its focus provides an opportunity to align the subject content with the TOGAF® body of knowledge to award both industry certification and formal qualification. Accreditation provides an authoritative and independent assurance of the quality and relevance of TOGAF® training courses.

TOGAF® certification is typically offered as two two-day courses for level 1 and level 2 certification. This involves 30 study hours with assessment examination of 60 minutes and 90 minutes for levels 1 and 2 respectively. UniMelb's EA subject is taught over a 12-week semester with weekly three-hour lectures and

tutorials, 36 hours in total. Assessment is by way of individual participation, group assignment and final two-hour examination. The classroom learning time equates to TOGAF® certification training however, assessment of the EA curriculum judged that 75 - 80% of content conformed to TOGAF® standards. To address this gap, a one-day bridging course was developed and accredited to TOGAF® standards by The Open Group.

The starting point for the pedagogical design that would render students eligible to sit the TOGAF® level 1 and level 2 examinations is the alignment of learning outcomes of the respective courses. To calibrate this alignment, we adopt the de-facto standard for comparing learning outcomes from Bloom's Taxonomy (2001) which provides a hierarchy of goals of the learning process as follows'

Level 1 Remember - Recognizing, Recalling

Level 2 Understand - Interpreting, Classifying, Summarizing, Inferring, Comparing, Explaining

Level 3 Apply – Executing, Implementing

Level 4 Analyze - Differentiating, Organizing, Attributing

Level 5 Evaluate – Checking, Critiquing,

Level 6 Create – Generating, Planning, Producing

The EA subject has been designed and accredited to Australian Quality Framework standards at AQF9 (Masters) level and accredited to the ACS Core Body of Knowledge [2015] which complements the role of Australia's Tertiary Education Quality and Standards Agency (TEQSA). In turn this aligns with international standards i.e., IFIP IP3 and Seoul Accord [2008] affording mutual international recognition for undergraduate and postgraduate (master's level).

TOGAF® training content is developed to conform to The Open Group Body of Knowledge Standards [Open Group 2018]. Certification is available at two levels: Level 1: Knowledge of the fundamentals of TOGAF® 9 sufficient to be able to contribute to an architecture effort or to work with the results, and Level 2: Knowledge, comprehension, and ability to analyze and apply TOGAF® 9 concepts. These are proximate to Bloom's taxonomy standards 'Level 2 - Understand' and 'Level 4 - Analyse' respectively (Figure 2). However, master's tertiary standards at level 5 are applicable which require critical evaluation.

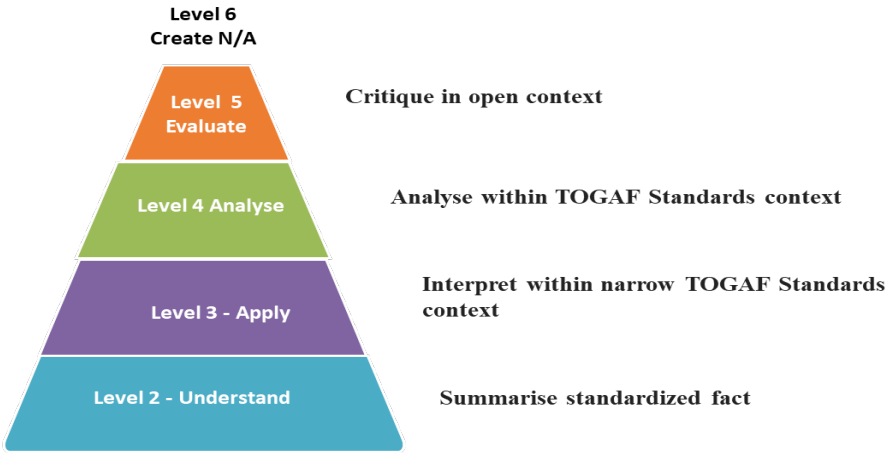

Figure 2. Blooms' Learning Outcome Requirement [1956]

V. THE ALIGNMENT CHALLENGE

At a practical level, the development of course content to comply with learning outcomes set to different standards and levels requires balancing of the learning content. This is not a straightforward task and figure 3 presents the respective courses and identifies the learning outcome gaps relative to Bloom's Taxonomy (1956).

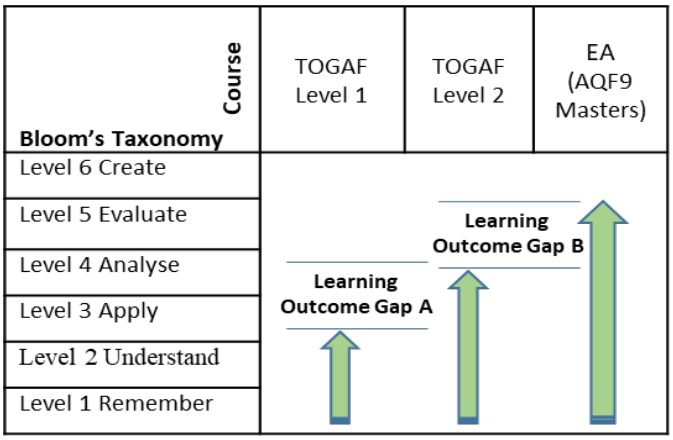

Figure 3. TOGAF® And EA Course Mapping to Bloom's Taxonomy

Learning Outcome Gap A is the gap between TOGAF® Level 1 and Level 2 courses. This gap does not present issues as standard practice for TOGAF® Certification courseware assumes each course is delivered to the respective learning outcomes i.e., separate courses. However, for the EA course to achieve TOGAF® compliance and AQF9 Masters standards Learning Outcomes Gap B must be addressed i.e., the course must provide for higher order learning outcomes required to meet 'Evaluate' standards but must also meet the lower level needs to Remember, Understand, Apply, and Analyse. Presentation of this content requires different pedagogical teaching and assessment methods. Herein lies the challenge when attempting to satisfy both learning outcome needs in one course structure.

Levels 1 and 2 require a student to learn and understand concepts and assessment will measure successful recall as a proxy for understanding. Level 3 and 4 require a student to develop an understanding of a concepts and assessment provides a scenario requiring a correct response and application in the context of TOGAF® concepts. However, to achieve Level 5 Evaluate as required in the EA course, students are required to reflect critically and demonstrate the technical and creative skills to synthesize complex problems. An assessment question would be open ended requiring interpretation and justification of a response with critical analysis drawing on a wide body of knowledge. Questions would typically include verbs like, critically assess or evaluate.

As an example, learning content requiring evaluative discussion could be prompted by general open statements assuming understanding of the topic and encouraging open and informed response (Figure 4a). Conversely, learning content aimed at foundational understanding needs to be prescriptive requiring the learner to recall structured facts (Figure 4b).

Integration of the learning outcomes produces somewhat uncomfortable fit between learning content presentation styles which are predominantly slide based. To cater to level 2 and 3 requires incorporation of detailed and often lengthy text explanations whereas higher level content presentation benefits from broader learning prompts that point to the learner in a general direction where responses are likely to be context dependent and subjectively diverse. The Figure 4a presentation slides can appear an uninspiring 'sea of text', whereas Figure 4b can be adjudged to be lacking in detail. Both observations are valid depending on the perspective of the learning objective. Interestingly, iterative submissions of learning material for accreditation assessment were frequently, returned requiring 'more detail' and/or precise reflection of the standard which tended to add more text. This results in a much larger volume of detailed slides than would be the case for master's level. To overcome this dilemma a one-day Bridging Course was developed for specific focus on the TOGAF® standards. Unfortunately, this also leads to a level of duplication between the respective courses as the context needs to be set for the detailed information presented.

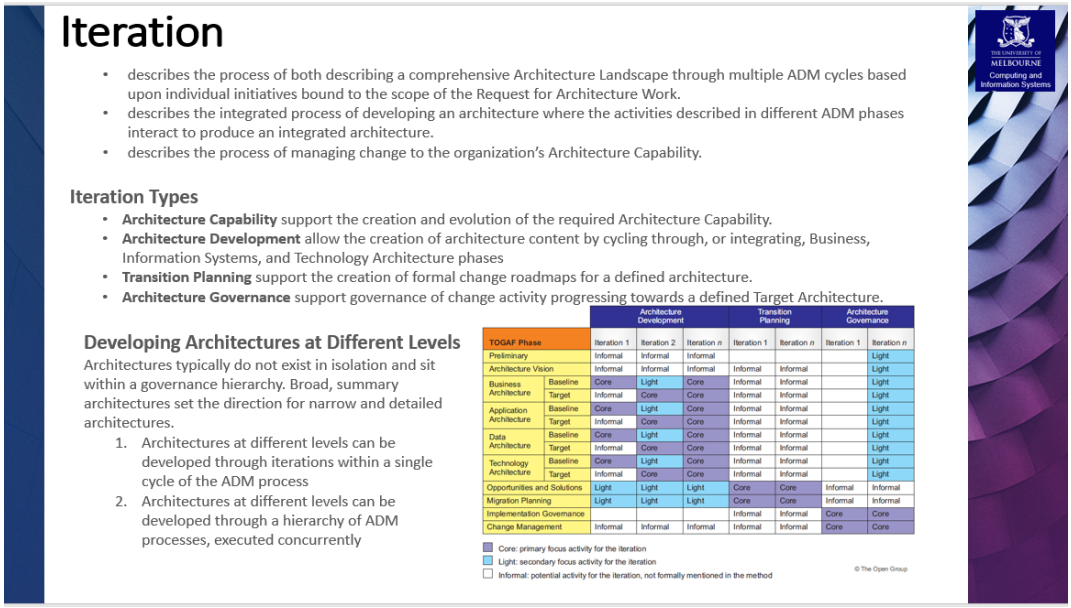

Figure 4b Level 1 -4 learning content example

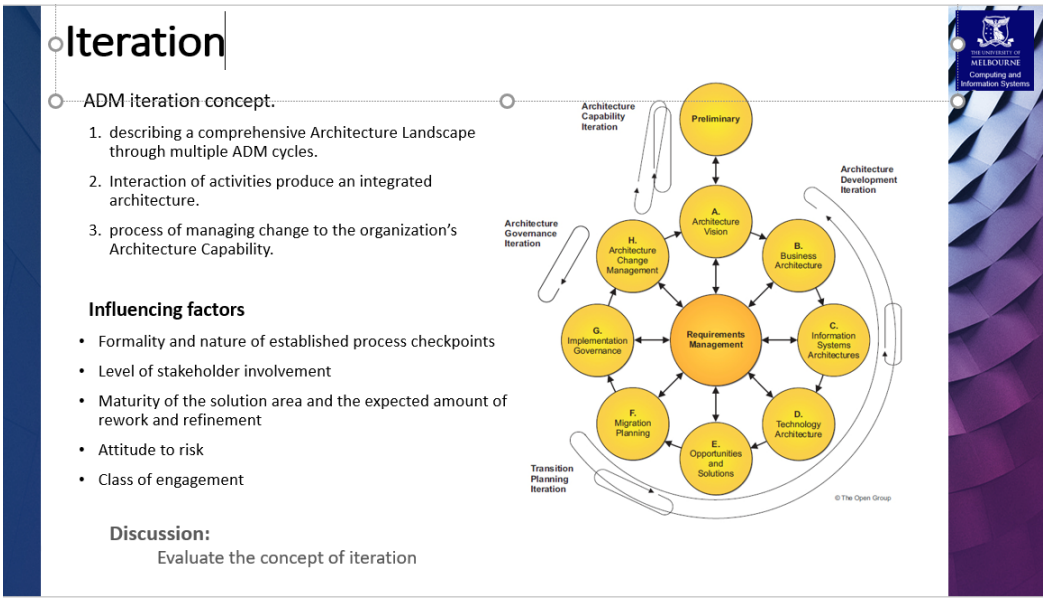

Figure 4b Level 5 learning content example

VI. PRELIMINARY FINDINGS

The preliminary literature search informs that there is a very limited body of knowledge relating to the pedagogical blending of formal and industry-based education. Therefore, our understanding of the merits, best practice and educational outcomes are unknown.

Extant studies primarily focused on technical specific certifications and posit that certifications have become a fact of life for ICT professionals (Randall and Zirkle 2005, Wierschem et al. 2010). Further, both studies discuss certifications and formal higher education qualifications as alternatives rather complementary

credentials. Randall and Zirkle (2005) claimed there was a growing trend with secondary and higher education institutions to offer blended technology certifications within formal curriculum, noting that higher education institutions have been slow to offer blended certification and formal qualification.

Blended programmes reflect current practices and improve employability (Randall and Zirkle 2005, Wierschem et al. 2010). However, it was noted that there was a lack of data to inform on effectiveness (Randall and Zirkle 2005). Both studies had a bias towards computer science and specific technical certifications and have limited applicability to technology neutral certifications such as TOGAF®.

There is a recognition of the pedagogical difference between certifications and formal higher education qualifications (Wierschem et al. 2010). A lack of formal education limits the range of range of career opportunities however, technical certifications do not provide requisite foundation skills for a successful long-term career and may be perceived as "too vocational" (Randall and Zirkle 2005).

Industry leaders do place a value on certifications as professional development credentials rather than as differentiating credentials for recruitment purposes but does support the inclusion of certifications in curriculum (Wierschem et al. 2010).

In time, the effectiveness of this integrated pedagogical approach can be validated as graduates enter the workforce. Randall and Zirkle (2005) pose the question "What value is added by technical certifications to learning outcomes and student employability" however, in the meantime, our assumption is that alignment of industry certifications within formal education programmes has the potential to provide significant value to graduates and employers alike. However, striking a balance between the differing learning outcome foci can be difficult to achieve and requires a trade-off in the presentation style of learning content. Successful integration of both industry and formal education qualifications presents a potential resolution to reconcile employer demands for 'job-ready' graduates with the theoretical learning outcomes expected of higher education.

This paper has opened the opportunity for education providers, both industry based and academic, to consider further alignment in curriculum design that blends certification and formal education outcomes with the view to enhancing student employability.

VII. LIMITATIONS

This paper is presented as an opinion piece intended to explore preliminary feasibility for further study and generate debate. It is therefore suffering a number of limitations not the least of which is the cursory literature scan conducted that revealed an incomplete body of knowledge. The reliability of the findings is therefore low.

Further, the focus of this discussion has used TOGAF® certification as the proxy for certification variously termed professional, industry, or technical certification. These certification categories required more precise definition as the behavioral attributes and consequently, any impact on employability may be variable. Therefore, observations made, and findings may not be generalizable.

VIII. FURTHER RESEARCH

Notwithstanding the limitations of this discussion, the UniMelb experience in offering students both formal educational and industry-based qualifications through an integrated learning delivery model provides a platform from which to explore the efficacy of a blended industry certification and formal education pedagogy. Given the limitations of this paper, a comprehensive literature review to compile a robust body of knowledge is required. This requires a focused examination of the extant literature to develop the theoretical model of the knowledge gaps on which to ground further research. As graduates with both industry certifications and formal qualifications join the workforce, employer feedback will inform the effectiveness of this approach and can be the focus of ongoing study. Consequently, the theoretical model can be used in data collection design and to assess the learning outcome and employability effectiveness of a blended pedagogical approach.

Further study of the learning outcome effectiveness and pedagogy will make a significant contribution to academic understanding of educational effectiveness. Importantly, this will make a valuable contribution

to educational practitioners when designing and delivering learning content in endeavour to provide job-ready graduates to workforce employers.

IX. REFERENCES

Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that
1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
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