

Assessment of Credit Arrangements towards Engineering Programs/Courses

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CONTEXT

Credit Transfer (CT), Advanced Standing (AS), Credit for Prior Learning (CPL), Recognition of Prior Learning (RPL), Prior Learning Assessment and Recognition (PLAR), Accreditation of Prior Experiential Learning (APEL), Validation of Prior Learning (VPL), Prior Learning Assessment (PLA), Credit Transfer and Recognition (CTR), Recognition of Current Competency (RCC) and Credit for Concurrent Formal Learning (CCFL) are the terms used by academic institutions and engineering schools to describe several types of credit arrangements depending upon a student's current state of qualification, experience, skills and knowledge towards the requirement of his/her formal professional engineering qualification. The objectives of such credit arrangements are to make sure that the learning is not duplicated, to reduce the duration and cost of the engineering studies, to encourage working engineering associates and technologists return to engineering schools for professional engineering qualification and to help upgrade the skills and knowledge of the junior engineering practitioners, to name a few. Formal, informal, non-formal or a combination of prior learning are used for such credit arrangements. Engineering schools offer block credit, specified credit, unspecified credit and a combination of these forms of credits when recognising prior learning of any form. However, anecdotal and literature evidence suggests that the assessment of credit arrangements lacks established universal framework for assessment, lacks harmonisation, compatibility, transparency and comparability and is complex and inconsistent resulting a significant variations in the assessment for recognising prior learning across engineering schools in spite of being based on similar fundamental principles. There is a clear need of a consolidated framework in order to assess credit arrangements systematically and consistently.

PURPOSE

The purpose of this study is to develop a consolidated framework for assessing credit arrangements towards a partial requirements of a professional engineering course, program, degree or qualification. The developed framework is expected to help manage the assessment of credit arrangement process.

APPROACH

This study first critically reviews existing frameworks and literature evidences regarding the principles of credit arrangements towards a partial requirements of a professional engineering course, program, degree or qualification. This study then uses evidence-based literature knowledge (principles, processes and practices) to devise a consolidated framework for assessing credit arrangements. The framework is then expanded in order to elaborate its several components.

RESULTS

The existing frameworks and literature review suggest that for better assessment of credit arrangements, attentions are to be given on the forms of prior learning, types of credit arrangements, forms of credit recognition, required documents, characteristics of the prior learning, alignment of prior learning with professional engineering qualification and additional aspects.

CONCLUSIONS

As the assessment of credit arrangements has been a major challenge for engineering schools, the framework developed in this study is expected to help engineering schools to manage the assessment process systematically and consistently. For further study, the framework needs to be continuously implemented, monitored and evaluated.

KEYWORDS

Credit arrangements, engineering schools, assessment of prior learning.

Introduction

Credit arrangements towards a professional engineering course, program, degree or qualification are the processes that provide the means to translate different types of prior engineering learning into credit outcomes towards a formal engineering qualification offered by accredited professional engineering schools. These processes assign credits for the recognition of equivalence in learning outcomes and contents from different types of prior learning towards formal qualification (Australian Qualifications Framework Council, 2011). Effective credit arrangements towards a professional engineering qualification provide the basis for a cohesive national professional engineering qualification system and support pathways from *informal* life-wide experience, knowledge and skills, *non-formal* short-courses and trainings and *formal* TAFE and vocational education and university education to formal professional engineering qualification system.

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The benefits of such credit arrangements towards a professional engineering courses/programs are well documented (e.g., Bateman & Knight, 2003; Australian Qualifications Framework Council, 2011; King, Dowling, and Godfrey, 2011; Watson, Hagel, and Chesters, 2013; Cameron et al., 2014; Pitman and Vidovich, 2013) for students, for education and training providers and for employers and wider community. The recognised benefits *for the students* include, among other, (i) formal learning is built on existing skills and knowledge and focuses on developing new skills and knowledge rather than duplicating already acquired learning, (ii) it converts the value of any forms of prior learning towards a formal qualification (iii) real costs and opportunity costs associated with gaining formal qualification is reduced, (iv) it encourages students with limited or no post-compulsory formal education or training to undertake formal qualification (v) it supports learner transfer and progression into and between qualifications, and (vi) it genuinely supports students' lifelong learning through pathways, flexibility, mobility and career opportunities. The benefits *for education and training providers* include among others, (i) it helps to increase student numbers and eventual financial benefits, (ii) it increases responsiveness to students' education or training needs and (iii) it builds new or improved relationships and collaborative opportunities with other education and training providers. For employers and community, (i) it addresses regional, community and industry needs for skilled and knowledgeable workforce (by formally recognising the existing skills and knowledge of workers), (ii) it increases potential to advance economic goals (by stipulating mobility in the labour market), (iii) it increases potential to advance social objectives (by widening the access to education) and (iv) it increases potential to redress social injustice (by supporting learners historically under-represented in higher education).

At the same time, issues and problems of credit arrangements are also well recognised (e.g., Teichler, 2003; Fox, 2005; Sandberg & Andersson, 2011). The recognised problems include, among others, (i) lack of established universal consolidated framework for assessing credit arrangements, (ii) lack of harmonisation, compatibility, transparency and comparability, (iii)

complexity, cost and the need for validated paperwork, (iv) inconsistent policy and procedures across engineering schools, and (v) lack of rigorous data to evaluate the impacts of such credit arrangements.

Australian Qualifications Framework Council (2011) requires that the credit arrangements are to be clear and transparent to the students, are systemic and systematic, are flexible, are properly coordinated both horizontally and vertically and that eliminate unfair and unnecessary hassles and barriers to the students. For this, universities and engineering schools need to develop clear, widely promoted, easily accessible, transparent, publicly available policies and procedures. Although such policies and procedures are developed at an institutional level, it is often unclear how the institutions actually assess credit arrangement applications. Hoffman, Travers and Evans et al. (2009) reveal five distinct areas in which credit arrangement practices vary across institutions: policies and support, evaluation criteria, assessment process, application of credits, and evaluator criteria.

The assessment of credit arrangements is somewhat an educational realm without professional consensus. Australian Qualifications Framework Council (2011) requires the decisions regarding credit arrangements to be evidence-based, equitable, transparent, consistent, fair with decisions subject to appeal and review regardless of how, when and where the prior learning occurred, be academically defensible, be decided on time, meet prerequisites and formally documented. The research emphasises that the assessment of credit arrangement should be formulated in terms of tangible, observable and measureable learning outcomes leaving room for different types of evidences (formal, informal and non-formal) from a variety of possible contexts but should also make clear matches with specific curriculum requirements as much as possible. The assessors need to be independent, expert on credit arrangement, expert on broad relevant professional practice, capable of using a variety of evidences and capable of reporting and substantiating assessment results. For this, it is also important to develop assessor profile and train, select, maintain and certify expertise. Validity (the degree to which assessment measures the actual learning outcomes) and reliability (the extent to which the assessment is consistent) are the key assessment criteria for assessing credit arrangements.

Although Australian Qualifications Framework Council (2011) has been working towards some form of guiding principles and processes for such credit arrangements, the anecdotal practices regarding the assessment process within and across engineering schools is unclear and varies considerably from one institution to another. This is partly due to the diversity in the programs/courses across different engineering schools and partly due to unclear guidelines and understandings with respect to forms of prior learning, types of credit arrangements, forms of recognition, required documents, characteristics of prior learning, the breadth and depth of learning outcomes, contents and assessments, and additional aspects such as university expectations in assessing credit arrangement applications. If not assessed the credit arrangement applications transparently, adequately, consistently and fairly, it may result in students' re-assessment requests and complaints and may subsequently lead to legal challenges. In order to address this issue, this study develops an integrated framework for assessing credit arrangements.

A Framework for Assessing Credit Arrangements

Using a thorough and an extensive review of literature, frameworks and practices on credit arrangements, public policies and procedures of engineering schools in Australia, a framework for managing credit arrangements towards professional engineering programs/courses is presented in Figure 1. The framework accommodates several aspects and components of credit arrangements. The framework starts with identifying the forms of prior learning and concludes with additional aspects to consider. Although the framework is presented in a linear fashion, most components interact in complex relationships and often are not sequential. Several aspects of this framework are elaborated in the subsequent sections with the help of literature evidences.

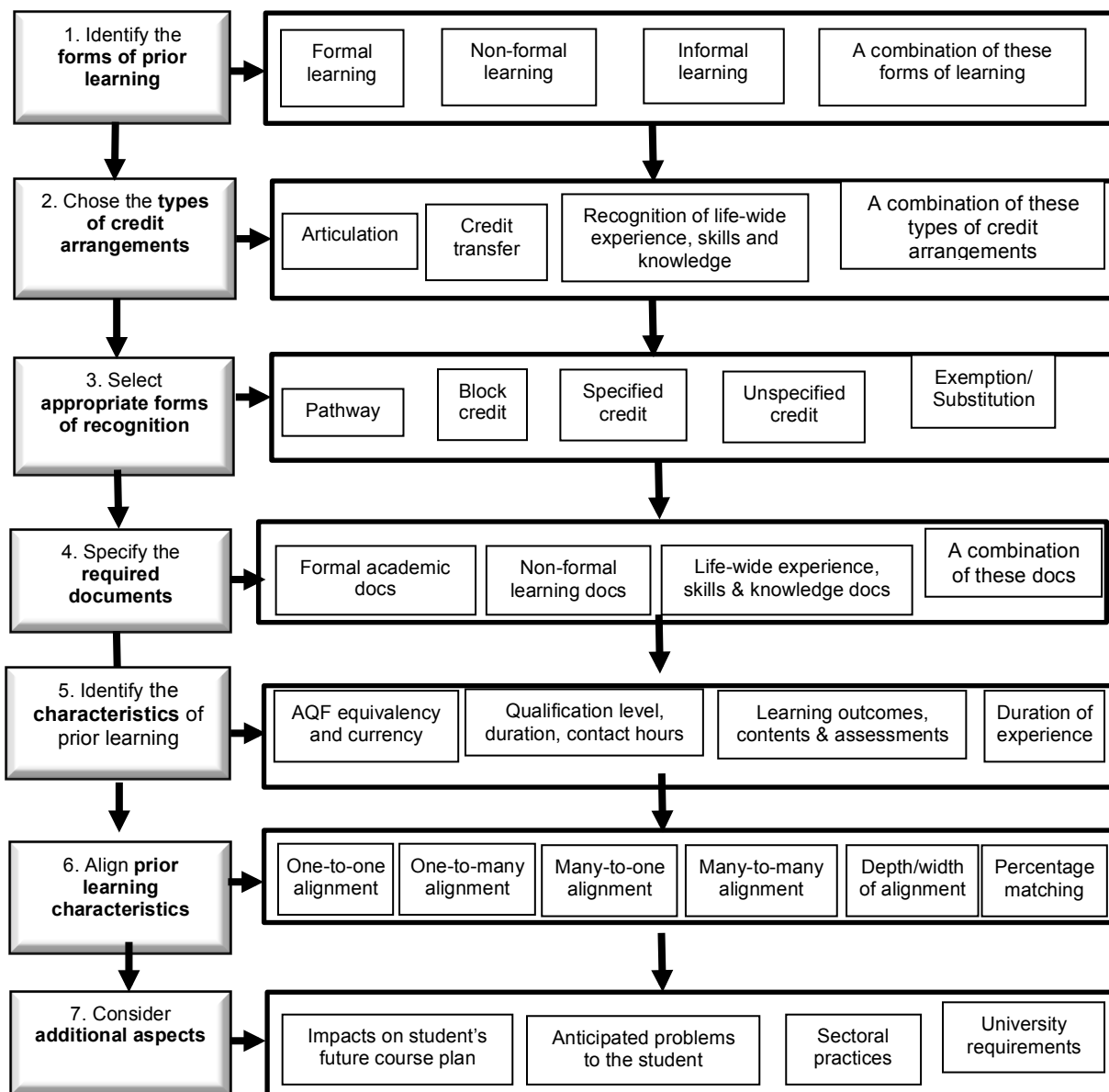


Figure 1: Framework for assessing credit arrangements

Forms of prior learning

Credit arrangements can be assessed to recognise (i) formal, (ii) informal, (iii) non-formal, or (iv) a combination of these forms of prior learning. Formal prior learning for professional engineering programs include Diploma (AQF Level 5), Advanced Diploma (AQF Level 6), Associate Degree (AQF Level 6) and Bachelor's Degree (AQF Level 7) and Bachelor's Degree-Honours (AQF Level 8). Certificate level courses (AQF Levels 1 to 4) are not generally considered for credit arrangements unless they are supplemented by rigorous evidence of informal prior learning through life-wide experience, skills and knowledge and/or non-formal prior learning through structured short-courses and training. AQF Level 4 (Certificate IV) is generally considered as equivalent to Year 12 and hence can only be utilised as an entry requirement. Credit arrangements on the basis of informal and non-formal prior learning are complex to assess and hence usually do not result in any credit arrangements unless the documents clearly prove that the student has achieved required learning outcomes, contents and assessments of the unit or units. Australian Qualifications Framework Council (2011) recommends to award about 25% for AQF Diploma (8 units) and

37.5% for AQF Advanced Diploma (12 units) and 37.5% for AQF Associate Degree (12 units) as a reference. However, as these TAFE and vocational education courses vary widely in discipline, duration, contact hours, learning outcomes, contents and assessments, it is not always result in the same amount of credit arrangements for the same prior AQF qualification level.

Types of credit arrangements

Types of credit arrangement include (i) articulation, (ii) credit transfer, (iii) recognition of life-wide experience, skills and knowledge, or (iv) a combination of these types of credit arrangements. Articulation is a process that enables students to progress from one completed qualification to another with admission and/or credit in a defined pathway (Australian Qualifications Framework Council, 2011). For professional engineering programs/courses, articulations can be developed from discipline-specific engineering Diploma (equivalent to a maximum of 8 units) and discipline-specific engineering Advanced Diploma and Associate Degree (equivalent to a maximum of 12 units). It is usually credit transfer that provides students with agreed and consistent credit outcomes based on identified equivalence in content, learning outcomes and assessments between matched qualifications. Credit transfer can be arranged from fully or partially completed prior qualification. It is usually done on an individual student basis. Credit arrangements from recognition of life-wide experience, skills and knowledge are purely of individual nature and need to be considered accordingly, rigorously and carefully.

Forms of recognition

Academic institutions and engineering schools offer (i) pathways, (ii) block credit, (iii) specified credit, (iv) unspecified credit, or (v) exemption/substitution. Pathways are the result of articulation agreements and are pre-defined. Block credit is credit granted towards whole stages or components of a degree, program or course of learning leading to a qualification (Australian Qualifications Framework Council, 2011). Examples of block credit include the first year of professional engineering program/course for completed AQF Diploma and the first year and first half year of the second year for completed AQF Advanced Diploma and AQF Associate Degrees. Block credit might impact pre-requisite system as mathematical and physical sciences units are usually covered in the first year of professional engineering programs whereas TAFE and vocational education courses do not usually cover at the same level and depth of these units. Specified credit is the credit granted towards particular or specific components of a program, degree, or course of learning leading to a qualification whereas unspecified credit is the credit granted towards elective components of a program, degree or course of learning leading to a qualification (Australian Qualifications Framework Council, 2011). Exemption/substitution is granted in lieu of a partial qualification requirement.

Required documents

For credit assessment, a number of documents are required. They include (i) formal academic documents, (ii) non-formal learning documents, (iii) life-wide experience, skills and knowledge evidences and documents, or (iv) a combination of these forms of documents. Formal academic documents include academic transcripts including what results mean, qualification certificates, course/program details (course learning outcomes, course structure, credit point system etc.) and unit/subject details (learning outcomes, contents, assessments etc.). Non-formal learning documents include short-courses and training certificates and their details including assessment if any. Informal life-wide experience, skills and knowledge documents include personal portfolio, curriculum vitae, work samples and recommendations from employers. Engineers Australia (2015) recommends specific work activities and units of study undertaken in the form of a portfolio specifically addressing the learning outcomes and copies of any certificates gained, an oral assessment/interview that allows the applicant to demonstrate the achievement of specified learning outcomes or a challenge test to show that

the applicant has met the specified learning outcomes as an evidence to support a claim for in-formal and non-formal learning. Both non-formal and informal documents are hard and complex to assess as they usually do not indicate the competency and level of achievements on learning outcomes and often the contents are not rigorous and explicitly identified. Anecdotal evidences suggest that the assessors often need to deal with insufficient documents. It is important that these documents need to be classified as essential documents and supplementary documents as it sometimes is difficult to obtain all required documents.

Characteristics of prior learning

The submitted documents need to be assessed to identify the characteristics of the prior learning. A list of characteristics include, (i) qualification level, duration and contact hours (ii) learning outcomes, contents and assessments (iii) AQF equivalency and currency (iv) relevancy and extent of non-formal learning and (v) duration and extent of informal learning. It is somewhat easier to identify formal learning characteristics than non-formal and informal learning characteristics. It is recommended to develop an extensive list of prior learning characteristics and tally the list against submitted documents and evidences.

Alignment of prior learning

Once the characteristics of prior learning are identified, alignment of prior learning towards professional engineering qualification are to be assessed. The alignment can be (i) one-to-one alignment (one prior unit to one unit), (ii) one-to-many alignment (one prior unit with many units), (iii) many-to-one alignment (many prior units with single unit) or (iv) many-to-many alignment (many prior units with many units). Most often, many-to-one and many-to-many alignments are to be made as it is highly unlikely to have one-to-one or one-to-many alignments from prior TAFE and vocational education courses towards professional engineering qualification. As it is also highly unlikely that two qualifications fully align (i.e., 100% matching), it is often reasonable to consider depth/width of alignment as well as percentage matching. Although, full alignment is preferred, it is also reasonable to align with the most important and majority of learning outcomes and contents.

Additional considerations

Although credit arrangements are usually made entirely based on student's prior learning achievements, a number of other issues are also needed to be taken into account. It is not unreasonable to look at (i) impacts on student's future course plan, (ii) anticipated difficulties to student's progresses (iii) anecdotal practices at other Australian engineering schools and (ii) how the engineering school wants to assess the credit arrangements. Universities also consider their organisational identity and status when considering what informal or non-formal learning will be accepted and what counts as prior learning depends as much upon which university is doing the assessment, its motive for doing so and the extent to which it views credit arrangement as a normative threat. Institutional strategies and systems are also at play in the credit arrangement process, and how the policy actors frequently interpret and enact credit arrangement policy for the benefit of the organisation, rather than the student (Pitman and Vidovich, 2013).

Discussion

Academic institutions and engineering schools use several types of credit arrangements depending upon a student's current state of qualification, experience, skills and knowledge towards the requirement of her/his formal professional engineering qualification. Although credit arrangements are beneficial for students, for education and training providers and for employer and wider community, there are still some issues, particularly in the assessment of credit arrangements due to lack of universal assessment system. Based on existing frameworks and literature evidences, this study has developed a consolidated framework for assessing credit arrangements towards a part of the requirements of a professional engineering course, program, degree or qualification. It lists important components and their in-depth discussions. These components include forms of prior learning, types of credit arrangements, forms of credit recognition, required documents, characteristics of the prior learning, alignment of prior learning with professional engineering qualification and additional aspects. For further study, the framework needs to be continuously implemented, monitored and evaluated.

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