Identifying, Developing and Grading 'Soft Skills' in Higher Education:

A Technological Approach

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Abstract

Identifying, developing and grading soft skills, i.e., transversal cross-curricular competencies, in higher education requires the recognition of key qualities, the capacity to discriminate between these qualities and a mechanism to validly and reliability grade soft skill acquisition. This research proposes a technological infrastructure that acknowledges the importance of self-assessment, peer observation and teacher evaluation when adjudicating on subjective and often personal data. The proposal has the capacity to balance, weight and triangulate the objective and subjective evidence of soft skill acquisition ensuring the validity and reliability of the resultant accreditation. Accreditation of soft skills was in the form of digital badges. Using the proposed technological approach, the identification, development and grading of soft skills can be reviewed, tracked and managed over time to demonstrate competencies with respect to both the context and situation. The technological approach empowers stakeholders as critical partners within the assessment process and supports the ecological validity of their judgements based on the evidence submitted for accreditation. Reliability is strengthened by the triangulation of these judgements. Though more significantly, the technological approach facilitates the capacity to weight stakeholders' decisions relative to the context and situation.

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Context

There is a growing awareness in Ireland and Europe of the importance of higher education in developing a knowledge-based economy (Dunning, 2002; Harvey, Locke, & Morey, 2002). Institutes of higher education are increasingly required to produce highly skilled graduates who are capable of responding to the ever changing and complex needs of the contemporary workplace environment (Possa, 2006; Sleezer, Gularte, Waldner, & Cook, 2004; Weil, 1999). In addition, the rapid expansion of higher education across Europe over the past two decades has resulted in questions being raised about the quality of the graduate labour market and the ability of graduates to meet the needs of employers (Elias & Purcell, 2004; Teichler, 2003). Indeed, serious concerns have been expressed about the increasingly wide 'gap' between the skills and capabilities of graduates (Andrews & Higson, 2008), and the requirements and demands of the work environment in an increasingly mobile and globalised society (King, 2003; Yunus & Li, 2005). Brown, Hesketh, and Williams (2004), on graduate recruitment, have shown the declining importance employers are placing on academic credentials, and the increasing importance instead given to personal skills and competencies. Although graduates may be valued for their academic knowledge and cognitive abilities, the discourse of graduate employability appears to be moving away from credentials that are merely a 'tick in the box'. Brown et al. (2004) showed that employers are increasingly defining employability more around notions of 'behavioural competence' and the capacity for graduates to demonstrate and deploy a much wider range of personal, behavioural and organisational capabilities. While this in part may reflect the changing demands of graduate employers, it may also be a means of legitimising recruitment decisions when large numbers of graduates with similar educational profiles are competing for highly

sought-after employment (Tomlinson, 2008). Ultimately, the stakes for graduate employment have risen and the markers have changed. This may lead to challenges for graduates seeking to capitalise on their participation in higher education, and the credentials they achieve from it, for their future work and employability. Despite such concerns, there is a notable gap in current knowledge which links graduate and employer perspectives of the alleged *soft skills* of higher education to graduate employment.

Grading Soft Skills (GRASS) is a 3-year longitudinal research project financially supported by the European Union (EU) focusing on representing soft skills of students of various ages and at different levels of education in a quantitative, measurable way, so that these skills can become the subject of formal validation and recognition. The project is being developed with the support of the Lifelong Learning Programme (LLP) of the EU, the flagship European funding programme in the field of education and training. The key objective of the project is to establish mechanisms that allow educators to continuously support, observe, assess, and acknowledge the development of students' soft skills by leveraging state-of-the-art Information and Communication Technology. The GRASS project consortium includes 8 partners from 4 different European countries. Each of the partner institutions have developed their own specific application cases for the purpose of identifying, developing and grading soft skills using digital badges. The context of the application cases range from lower second level education to higher third level education. A key principle of the project is to create a methodological and technological approach that will accommodate the variables of soft skills, subject disciplines and developmental stages. In the initial phase of the project Seery, Canty, O'Connor, Buckley, and Doyle (2016) proposed a methodological approach to grading soft skills that was applicable to each application case. However, an important consideration for the project is the impact that students experience and maturation has on the nature of the soft skill being presented and the level of attainment

which is evidenced through the data uploaded by students to a technological infrastructure. This paper suggests a technological approach that will support the assessment instrument designed to grade soft skills and is applicable to each application case in the GRASS project.

Defining Graduate Attributes

In the past two decades, educational researchers and practitioners alike have emphasised the importance of fostering a set of non-academic attributes, such as the 'ability' to communicate and solve problems, often referred to as the soft skills in higher education (Bennett, Dunne, & Carré, 1999; Stephenson & Yorke, 2013). In contrast to academic or disciplinary knowledge, which is subject-based, content-specific and formally assessed, soft skills comprise a range of competencies that are independent of, albeit often developed by, formal curricula and rarely assessed explicitly (Chamorro-Premuzic, Arteche, Bremner, Greven, & Furnham, 2010). Thus, soft skills are often defined as "skills, abilities, and personal attributes that can be used within the wide range of working environments that graduates operate in throughout their lives" (Fraser, 2001, p. 1). While different institutions and government reports have identified slightly different sets of attributes, there is a growing acceptance that soft skills help students to accomplish not only academic but also occupational goals after graduating (Bennett et al., 1999; Kember, Leung, & Ma, 2007). Yet, employer surveys have long reflected discontent with the extent to which these skills are being fostered in higher education (Harvey, Moon, Geall, & Bower, 1997). For example, Boud (1990) notes "there is often a gap between what we require of students in assessment tasks and what occurs in the world of work" (p. 101).

In light of this, the University of Limerick, Ireland[1] (in which the context of this research is set) has not only acknowledged this gap but has made a commitment to reducing this gap by providing a learning environment and delivering a curriculum for students to

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[1] University of Limerick, Ireland, is one of four institutes of higher education in the GRASS consortium among University of Belgrade, Serbia, KTH Royal Institute of Technology, Sweden, and University of Zagreb, Croatia.

facilitate the development of a depth of disciplinary expertise and a breadth of knowledge and experience. In addition to their own subject expertise and discipline-specific capability, the University of Limerick seeks to ensure a learning environment in which students will be enabled to acquire and display the following *Graduate Attributes* that have been persistently linked to graduate employability and seen by employers as vital for graduates embarking on careers in any field:

- **Articulate**: competence in expressing ideas clearly, effectively and professionally to different stakeholders and audiences, in different cultural frameworks and settings; the skill, versatility and influential effect in written, verbal and digital communication.
- **Collaborative:** commitment to collaboration or achieving collaboration with others; proficiency in working and thinking with others; a demonstrated capacity to operate effectively as valued members of networks, groups and teams; a capacity for working and thinking with non-experts to maximise the contributions of their own disciplines. **Creative:** to create and innovate; an orientation towards innovation; a capacity to see new possibilities and opportunities and to act upon them; resilience and inventiveness.
- **Knowledgeable**: high level of competence within their area of expertise; a developed capacity for critical thinking within their discipline; capacity to relate their discipline knowledge to real–world challenges; confidence in applying disciplinary knowledge. **Proactive**: confidence to take initiative across a range of domains; a commitment to active, lifelong development of their own skills and learning; the ambition to make a positive difference; active use of research to drive improvements and positive change.
- **Responsible:** adopting a responsible, civically aware and engaged approach to their actions and decisions at work and in society; exploring issues of corporate and social responsibility, ethical practices and sustainability; adopting a global perspective, recognising the local and global impact of actions and decisions; being personally and professionally responsible, making substantial and positive contributions to humanity.

Digital Accreditation of Skills

The University of Limerick`s specific application case investigates the attainment of each of these attributes by undergraduate students in Initial Technology Teacher Education (ITTE). To investigate this application case, researchers and teachers from the University of Limerick designed and implemented the Assessing Soft Skills in Student Teachers (ASSIST) initiative. ASSIST is a multi-disciplinary awards scheme which officially launched in September 2015 and managed by the Technology Education Research Group (TERG) in co-operation with the Department of Design and Manufacturing Technology (DMT) in the University of Limerick. ASSIST places an emphasis on exploring the nature of the evidence

produced by students in the attainment of the University of Limerick's Graduate Attributes, the triangulation of this evidence in relation to its ecological validity, and more specifically to its digital accreditation.

A relatively new advancement in technology which facilitates the accreditation of such skills and competencies is that of *digital badges* (Jovanovic & Devedzic, 2014). The concept of digital badges and the technology supporting it have developed from the Mozilla *Open Badge Infrastructure* (http://openbadges.org/), and is now a form of "alternative micro-credentialing not linked to formal academic credit as we know it" (Sandeen, 2013, p. 7). For that reason, digital badges have emerged as being validated indicators of skills and competencies acquired in formal or informal settings, inside or outside institutes of higher education (Carey, 2012). Students can earn multiple digital badges, and combine and display them on various websites such as LinkedIn, and share them for employment or further education. It is the student who decides what specific badges from his/her 'backpack' will be displayed in a specific context. Thus students can use badges to create and tell verifiable stories about their accomplishments. As Knight and Casilli (2012) explain, "a 'badge' is a symbol or indicator of accomplishment, skill, quality, or interest … [that has] been successfully used to set goals, motivate behaviours, represent achievements, and communicate success in many contexts" (p. 279). Figure 1 presents a technical diagram of the aforementioned Mozilla Open Badge Infrastructure.
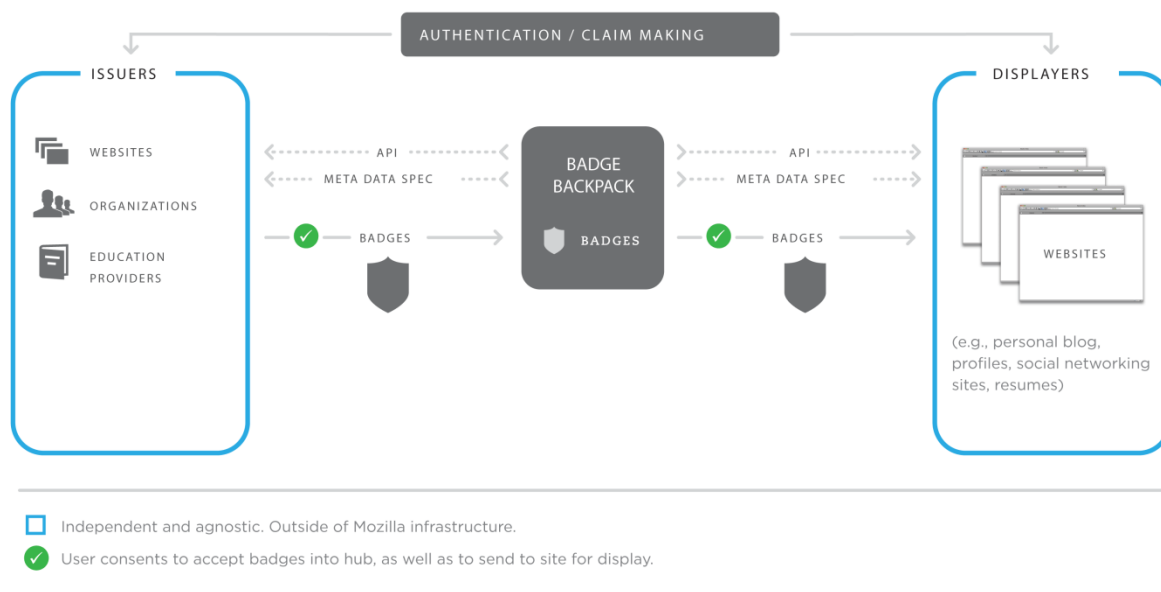
Figure 1. Technical Diagram of the Mozilla Open Badge Infrastructure

However, digital badges are not intended to replace the degrees or certificates earned within the institutes of higher education which follow traditional curricula and assessment practices; rather the aim of awarding such badges is to complement traditional recognition mechanisms, by representing evidence of additional, transversal competencies and educational attainments.

Design of Assessment Criteria

A broad range of institutions and organisations award digital badges as tokens of recognition for educational attainment in a variety of domains (e.g., math, science, technology, education). Devedžić and Jovanović (2015) further suggest that badges are used to recognise learning in all of its forms (e.g., lectures, assignments, projects, coursework, fieldwork, internships, etc.). Although digital badges can be developed by any issuer, criteria and standards for awarding the digital badge as well as the characteristics and reputation of the issuing organisation need to made transparent by the badging system. Therefore, a badge has to be described with a set of metadata elements, such as the issuing organisation, the criteria for issuing the badge, and the evidence of the accomplishment (Devedžić &

Jovanović, 2015). These data items are then embedded within the badge image file, and thus permanently available for access and review. The various stakeholders within the educational transaction also have different perspectives, which need to be considered to ensure the validity and reliability of the digital accreditation. Hence, any decision in relation to the attainment of digital badges should be an aggregation of the critique and perspective of those within the educational transaction (Seery et al., 2016). The significance of a triangulated approach to assessment that acknowledges the importance of self-assessment, peer observation and teacher evaluation when adjudicating on subjective or often personal data, is thus grounded in the ecological validity of the approach (see Figure 2).
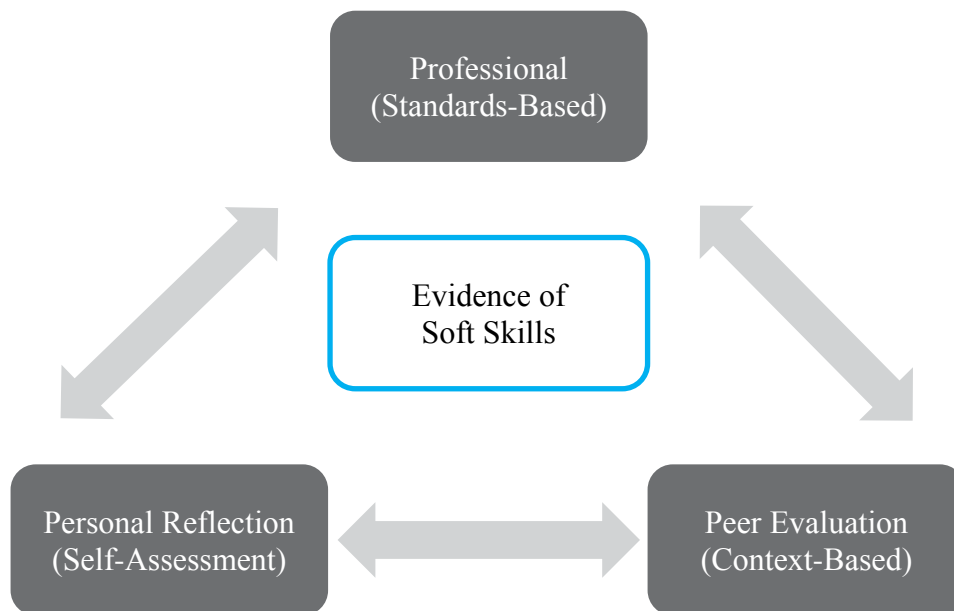

Figure 1.Graphical Representation of the Assessment Instrument

On a systems level, the design of a technological infrastructure needs to support the dynamic distribution and redistribution of the weighted impact of all three stakeholders' interpretation of the students' evidence of the particular attribute with respect to both context and standards. For example, it's conceivable that in certain situations the peers' view of the evidence may outweigh that of the professional, or the self-assessment of the student may be

a more reliable view than the peer depending on the nature of the educational transaction (Seery et al., 2016). Such a technological approach would mean that identifying, developing and grading soft skills can be reviewed and tracked over time to demonstrate progression and competency. This infrastructure would empower stakeholders as critical partners in the assessment process and support the validity of the judgements based on the evidence submitted for accreditation. Reliability is thus strengthened by the triangulation of all three stakeholders' judgements. Accordingly, this paper explores the development and exploitation of such a badging system.

Determining a Currency of Attainment

It's becoming increasingly evident that graduate employability is a complex, and somewhat vague, concept that is both difficult to communicate and define (Andrews & Higson, 2008). However, by synthesising the available literature, it is possible to identify key 'transferable' skills and competencies that are integral to graduate employability in the modern workplace. Hence, for the University of Limerick Graduate Attributes to be more attainable for students, each of the attributes was refined into bands of well-defined skills and competencies (Figure 3). In refining these attributes, the links between graduate skills and competencies and the needs of the labour market (Širca, Nastav, Lesjak, & Sulčič, 2006) were of paramount importance.
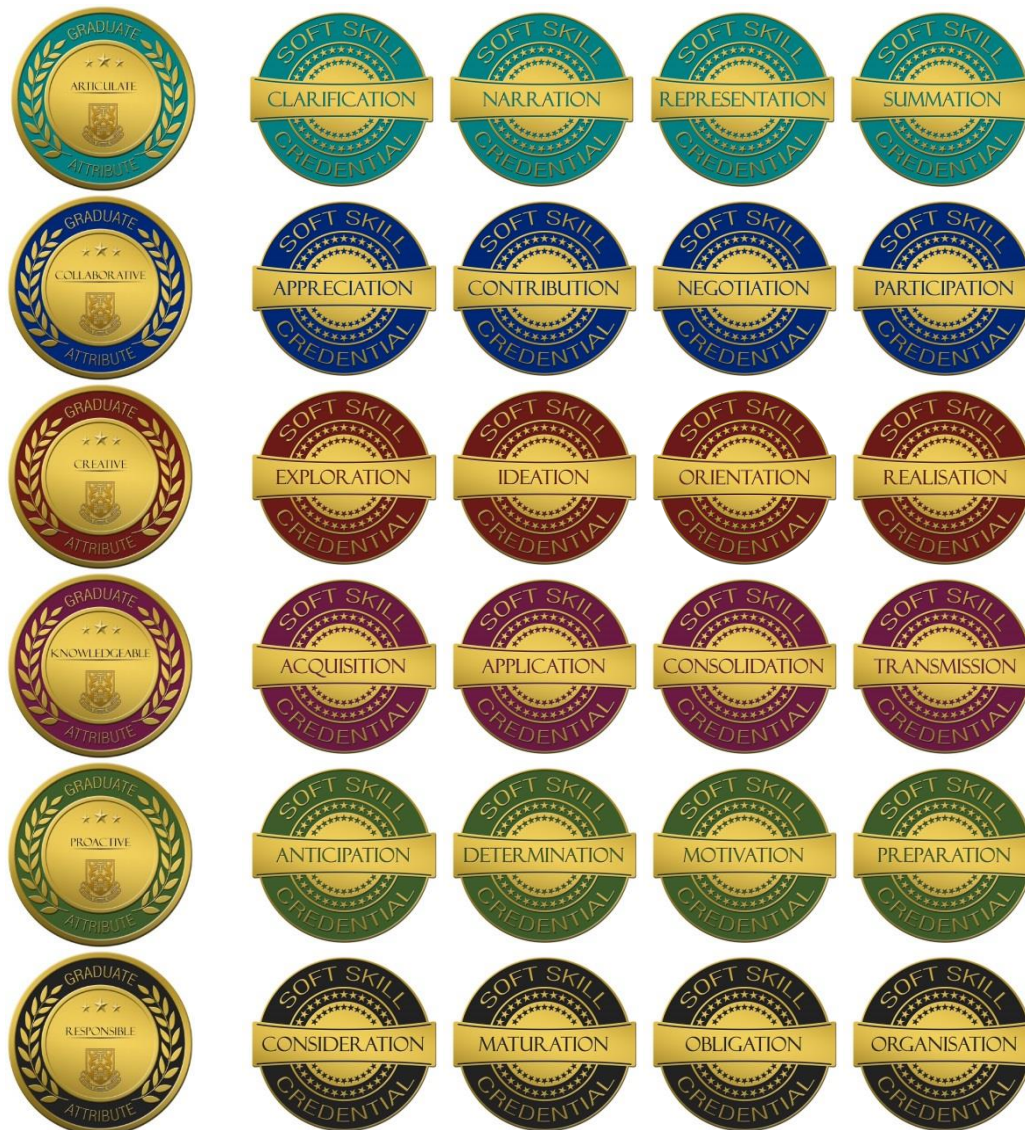
Figure 3. Digital Badges of the University of Limerick Graduate Attributes

Each of the graduate attributes badges are made up of four individual soft skill badges which first have to be unlocked before achieving the corresponding graduate attribute badge. To unlock each of the soft skill badges, participants can submit multi-modal evidence of the particular soft skill for review to the ASSIST project team. When all six graduate attribute badges have been accredited, students will then be presented with the ASSIST digital award. For more information on the ASSIST Digital Badges and how to earn these badges, please go to following webpage: http://www.terg.ie/index.php/projects/the-assist-project/assist-badges/

Developing a Technological Approach

The design and implementation of the technological infrastructure underpinning the ASSIST project was predicated on a foundational principle that ICT should assimilate seamlessly into students' educational transactions and not be disruptive to associated pedagogical practices. In an effort to develop a technological approach capable of facilitating multi-modal evidence that was appreciative of the concept that weighting different stakeholders judgements in the assessment instrument needed to be variable, a bespoke ICT system needed to be developed. Baring cognisance of the GRASS projects' aspiration to utilise pre-existing technologies, this technological approach was designed as a combination of contemporary state-of-the-art ICT.

As part of their undergraduate degree programmes, students who volunteered to participate in the ASSIST initiative regularly visit an existing website developed on a WordPress platform. Due to its ubiquity with these students and its development on a local server housed within the University of Limerick's internet firewall, this site was adopted as the badging platform. Whilst there are many potential services available for the accreditation of digital badges, the BadgeOS plugin for WordPress was deemed to be the most appropriate for this project. Although BadgeOS is a plugin specific to WordPress, it is bi-directionally associated with Credly. On a macro level, this relationship creates the capacity to have custom badges which are shareable via an array of professional and social media platforms. It also means that details of badge earners and the requirements for achieving a badge can be stored as meta-data within the file itself creating a needed transparency for attaining an appropriate currency.

Considering the translation of this software into practice, BadgeOS has the capacity to award badges under a number of automated conditions. Of particular importance was the condition that a Graduate Attribute Badge would be automatically awarded by the system

once each of its constituting Soft Skill Badges was earned. In addition to this, when a member of the ASSIST project team was logged in as an administrator, various file types which were submitted as evidence for review became available to be downloaded for assessment. Finally, BadgeOS affords the capacity for students to nominate a peer for a badge and to provide evidence associated with this nomination. These nominations are utilised to facilitate the incorporation of the 'peer' perspective within the assessment instrument as digital badges could be given conditions associated with the attainment of a number of verified nominations.

Whilst BadgeOS and WordPress were the primary elements of the ICT infrastructure, as there were multiple people involved in the assessment of the soft skill evidence, a Google sheet was shared amongst the ASSIST project team to make judgments on this evidence visible. Formulae embedded within the Google sheet indicated when a badge should be awarded if it was not already done so by the automatic conditions and commentary by the project team indicated if evidence needed to be reviewed by another member of the team for confirmation. The final piece of software integrated into the technological approach was an email client. When a student uploaded a piece of evidence for accreditation, an automated email was sent to a communal email address to inform the project team of the need to review a submission. This could be accessed by any member of the project team and thus prevented the need for continuous monitoring of submissions in the administrator section of the WordPress website. In addition to this, if a piece of evidence submitted by a student was deemed to not meet the required criteria, a number of email templates were designed to facilitate the quick delivery of feedback to students in a way that required minimal logistical effort from the project team.

Discussion

This paper highlights the importance of recognising soft skill acquisition as both an integral and aligned function of disciplined higher education. The continual evolution of modern society presents an ambiguous future for students thus emphasising the importance of developing a transferable skillset of personal and professional competencies. The novel use of state-of-the-art ICT tools and services in a focused and applied context provides the capacity to capture students' evidence of learning from a developmental perspective affording the opportunity to better integrate soft skill development from a relativist position into pedagogical practices. This combination of focus and technology produces a new form of evidence of capability characterised by potential subjectivity, ambiguity and fluidity, which as a result presents many assessment considerations as a critical focus for further discussion.

The nature of evidence associated with soft skill attainment is context and situation sensitive. Therefore, there is a need to carefully consider the authenticity of the educational transaction if the intent is to claim universal or transferable acquisition. Despite being situated in a specific context, such transactions need to ensure a principled attainment of soft skills and the development of an inherent culture which advocates their utilisation. With this in mind, it is also important to acknowledge the interrelated nature of soft skill evidence and that evidence is seldom exclusive to a particular skill. For example, an inability to untangle the evidence of 'contribution' from 'participation' would invalidate the accreditations of an associated award. However, the ubiquitous and adaptive nature of the ICT supports an initial position for ensuring the valid capture of authentic and often real-time evidence that is then later selected by the student to represent their learning or skills development. This process of selecting evidence to be considered for an award is a significant feature in determining competencies. The capacity to discriminate between the evidence of dissociable skills presents a deeper comprehension of what it means to have developed a particular skill.

Aligning the evidence with a conceptual or principled perspective is a critical aspect of the developmental process that supports a formative and iterative model of both personal and professional development. With the autonomy of creating and selecting evidence of soft skill development, assessment must then respect the intent, context and environment of the educational transaction. Therefore the approach to adjudicating on such evidence must become a more agile model of assessment. The ICT infrastructure proposed by this research has the technological capacity to weight judgments in response to specific transactions and as a result can more carefully and constructively align the interpretation(s) that culminate into the award of a digital badge. Although not proposed in this paper, the need then to consider badging and evidence of soft skill acquisition within the context of a set of developmental standards becomes more acute.

Conclusion

This research focused on the space between the formal modular structure of higher education and the intended attributes of the graduate. Although contradictory in terms, it focused on formalising the informal evidence that is indicative of future success. The paper demonstrates the capacity to capture and review evidence of soft skill attainment in a way that balances internal validity with relevance. However, the need to generate a coherent and comprehensive currency is still a challenge when focusing on identifying, developing and grading soft skills.

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