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GRADUATE EMPLOYABILITY LEARNING THROUGH SELF-DETERMINED LEARNING MODEL OF INSTRUCTION (SDLMI) DRIVEN DIGITAL APP

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Abstract

Teaching graduate employability skills (GES) is a complex task that needs to be considered from the higher education (HE), employer, policy, and student perspectives. This 4- European countries partnership research has developed a digital application (the GES-App) to assist higher education students in thinking more actively about their employability skills, and supporting them to be better prepared for employers. The app allows the students to plan, record and evidence the acquisition and development of graduate employability skills (GES) throughout their university journey. As “digital natives” who have been brought up with digital technology and embrace universal smartphone use, an app-based approach to GES development is highly favourable. Drawing upon the elements of the self-determined learning model of instruction (SDLMI), the GES-App uses motivational, interactive exercises and achievable goal-based tasks, to induce a sense of fun in users and develop self-actualization patterns that will help to raise awareness of employability issues.

Keywords: Graduate employability skills, heutagogy, Learning employability skills, transferrable skills

1 INTRODUCTION

To maximize their potential, students should start thinking about their employability skills early in their degree journey, so they can reflect on their importance, and identify areas for improvement. However many students do not consider their Graduate Employability Skills (GES) until after graduation, and they lack the aspiration, attitudes and confidence to prepare themselves for future careers. Moreover, our literature review confirmed that students’ perceptions of their own GES are often inaccurate, with the majority either over-or under-estimating their skill level upon completion of their studies. At the same time, employers often complain about graduates’ work-readiness and the level and extent of their skills suggesting that epistemic knowledge, practical/workplace skills (e.g., organisation, leadership, and planning), and the ability to apply skills in non-academic settings may be key factors in graduate employability[1].

The self-determined learning model of instruction (SDLMI), in literature, has been proven an effective intervention. Although more studies have utilized the intervention for students with intellectual disabilities, scholars have advocated its wider adoption in teaching and learning practice, as well as in career development [2]–[4]. Self-determination develops across the lifespan as children and youth have opportunities to build skills and attitudes associated with self-determined actions including choice-making, decision-making, problem-solving, goal setting and attainment, planning, self-management, self-advocacy, self-awareness, and self-knowledge. [4] advocated a heutagogical approach to produce ‘learners who are well-prepared for the complexities of today’s workplace’; therefore its elements of double-loop learning and self-reflection to develop the skills of ‘learning to learn’ underpin this research.

This project has systematically amassed the academic, student and employers perspectives to design and develop an employability development App (GES-App) that caters for the needs of both the demand and supply side of the labour market by encouraging skills, attitudes and values development that will support students in gaining relevant experience, broadening of networks, and the creation of employment opportunities. The objectives of this four-country research partnership were to: (i) review the existing e-learning employability resources ; (ii) explore the range of learning activities for enhancing career development and employability; iii) conduct the user requirements assessment with

multiple stakeholders and (iv) Design and develop a digital application for career development learning (CDL) and employability. Qualitative and quantitative data were gathered from undergraduates and academics/career advisors of the four partner universities, and the graduate trainee program recruiters in Scotland, Poland, Greece and Norway. The paper first briefly outlines employability learning from its reviewed literature, followed by methodology, GES-APP design framework, presentation of emerged results, and implications for stakeholders.

2 BACKGROUND

2.1 The Self-Determined Learning Model of Instruction

“Being self-determined is about acting as the causal agent in one’s life.” [3], [5] i.e. having the enabling skills and attitudes that make or cause things to happen in one’s life. Therefore SDLMI is a heutagogical approach that emphasizes not only the development of learner’s competencies but also the learner’s capability and capacity to learn [4]. In recent times since the pandemic, its significance has only increased and is serving as a framework for digital teaching and learning in distance education. Figure 1 presents the original model developed by [5] to guide the instructors.

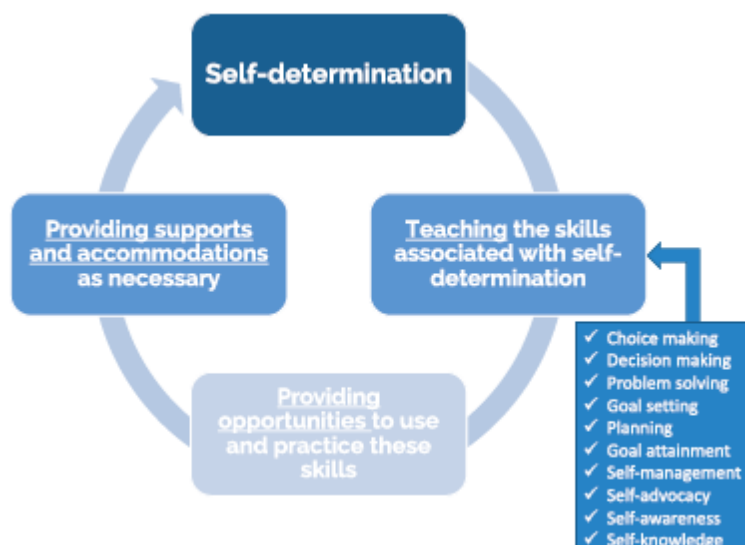


Figure 1 Self-determined Learning model of Instruction (SDLMI) developed by [5]

Founded upon the causal agency theory and Ryan and Deci’s work[6] on intrinsic motivation, the model was primarily developed to aid students with intellectual disabilities, but was strongly advocated to be utilized in general teaching practices as “self-determination is the construct pertinent to all students and not just students with disabilities” [7]. In the context of Higher Education, career development learning (CDL) has been described as a process of “... helping students to acquire knowledge, concepts, skills and attitudes which will equip them to manage their careers, i.e. their lifelong progression in learning and work [8]”. Henceforth, the model can be utilized for instructing them on skills associated with self-determination and providing them with opportunities to practice and use those skills. This will prompt reflective learning and help them achieve goals they set for themselves, improving academic and social-emotional outcomes.

2.2 CAREER DEVELOPMENT LEARNING AND EMPLOYABILITY

Substantial research has recommended practices and approaches to improving employability in the programs offered by higher education institutions around the globe ([9]–[12]). These include embedding employability in the curriculum; providing extra-curricular opportunities for students to enhance their employability; building links with the labour market; providing students with actual experiences of the labour market; using institutional career guidance services; encouraging student

reflection on their skills and increasing their capacity to articulate and communicate their learning to employers; encouraging student mobility and fostering a global perspective [13].

Our review identified a number of employability development models from the literature that HE institutions could use to promote CDL among their students. Although fewer studies have confirmed the successful application of certain models in the HE environment [14], it is established that there is a potential mismatch in what expectations universities have and how they wish to achieve those [15], [16]. Lack of cohesion in students' available careers support and their employability learning is due to the research gap between the literature on (i) graduate employability (which is explored across social and educational systems and policies, institutional strategies, and individual GE) and (ii) career development (how people make career decisions, navigate career paths, approach career issues) [17]. Further, studies have also emphasized the need to consider the rapid change in the context of students learning experience due to the influx of digitized resources and e-learning opportunities, to ensure successful learning outcomes [18]. Catering to the technological advancements, HE institutions have also been reforming their learning environments utilizing digital learning tools and blended pedagogical strategies. The effectiveness of different digital tools and resources to improve employability has been explored by a large number of studies in recent years [19]–[21]. Using the Students approaches to learning (SAL) framework, [18] established that the deep approach to online learning technologies stimulates critical thinking and achieves successful learning outcomes. This served as a much-needed impetus to work on a digital app that would encourage students to enhance their self-regulation competencies and take a more mindful approach towards their employability.

3 DESIGN FRAMEWORK OF GES-APP DEVELOPMENT

The GES-App is developed using “Design Thinking” methodology which is a non-linear and non-sequential process and provides a solution-based approach for problem-solving [22]. The five stages defined in this model by Hasso-Plattner Institute of Design at Stanford are: Empathise, Define, Ideate, Prototype and Test, as outlined in figure 1.

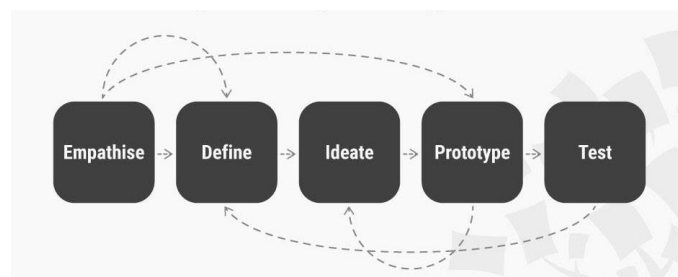


Figure 2. Design Framework[18] for GESApp development

Empathise- gain an empathic understanding of the problem. An in-depth literature review has been conducted, and the theoretical framework of employability skills is developed. To understand the user requirements, information has been gathered from identified stakeholders in the form of interviews, surveys and focus groups.

Define- Information gathered in the 'Empathise' stage is analyzed to identify the core problem and to assess user requirements. The interviews and observations have been analyzed in the light of the employability frameworks, and the individual perspective on employability of each stakeholder is evaluated.

Ideate- Through the ideation process the application framework and functionalities have been developed; main activities are identified to achieve the goals of the GES-App. Brainstorming for the scenarios also aided the identification of supporting activities.

Prototype- In this stage, the mock-up of the GES application (a scale down version of the application exhibiting the supporting activities through different functionalities) is developed using FIGMA software.

Test- the prototype Application is to be tested with users that will enable the development of the final prototype leading to a fully operational mobile application of GES.

Table 1. GES-App Design Methodology

Stage	Deliverable	Process
Empathise	Literature Review	<ul style="list-style-type: none"> i) Review of existing models of employability in Literature ii) Review of existing digital resources for employability development
Define	User Requirement Analysis	<ul style="list-style-type: none"> i) Qualitative Data Collection via Interviews and focus groups from multiple stakeholders (i.e. Employers, Teachers, Students) to understand employability and the skills development at both the demand and supply side of the labour market ii) Quantitative Data Collection via surveys from students to understand favoured features and specifications on a digital application for successful user engagement.
Ideate	Content development	<ul style="list-style-type: none"> i) Design specifications and development of a conceptual framework to identify key components of the model in line with the user requirements. ii) Conceptualization of the main activities, sub-activities, and content design that supports the conceptual framework.
Prototype	E-learning Platform (prototype)	<ul style="list-style-type: none"> i) GES-App mock-up development in FIGMA ii) App Interface Design to translate the developed content into a usable product.
Test	Evaluated Digital Application	<ul style="list-style-type: none"> i) Testing the prototype with users ii) App evaluation to assess its learning impact on graduate employability and career development skills.

4 METHODOLOGY

This project comprises 4 key deliverables as demonstrated in table 1. A mixed-methods approach has been adopted to collect data from the stakeholders (students, academics and employers) via interviews, focus groups and a survey to gain a holistic understanding of user requirements for the GES-App and to ensure a user-centric app design. The first deliverable has explored the existing literature on graduate employability skills (GESs) and existing E-learning material supporting GESs. Analysis of this qualitative and quantitative data has informed the iterative process of App design and content development. The user-centric design process involved collecting mixed data from a range of stakeholders including recruiters of graduate trainee programs, the university's career advisory team, teachers and the university students via interviews, focus groups and surveys to inform the key components of the app's content and functionality. Currently, the project is developing activities to allow users to track the progress of their skills development and set targets based on their

dream jobs. The App's prototype has been developed in the FIGMA prototyping tool and is currently entering the user testing phase.

5 RESULTS

5.1 Structure and Technological Features

This section elaborates on the GES-App's functionality and features developed in the 'Ideate' stage of the design process, which is part of the initial prototype. The key concepts utilized to encourage self-determination and assist the reflective learning process of the user include (i) documenting skill evidence in the form of experiences, artefacts or references, (ii) input skill level and skill development goals to achieve a 'dream job'. Important components of the GES App model are as follows:

5.1.1 Skills

The focal point of the GES-App model is "skill", as one of the main aims of the App is to appreciate the acquired skills by recording and tracking them with other components that will create an overview of the skill profile. Every user can have one or more skills and every skill can be supported by multiple evidence. Along with evidence, the skill level is also an important concept that defines the expertise of the user on a specific skill. For defining the skill level, the Dreyfus model of skill acquisition is employed which proposes that a student passes through five different stages; determined as (i) novice, (ii) competence, (iii) proficiency, (iv) expertise, and (v) mastery [23]. The determination of skill level requires self-reflection at the user end. Skill level may act as a catalyst in SDMLI that encourage users to set a goal to improve the level of acquired skill.

5.1.2 Goals

The 'goal' is not only an important component of the GES-App framework but also the core concept of the SDMLI model as discussed in section 2 of the paper. For the GES-App, the concept is utilized in terms of (i) new skills the user intends to acquire to improve the existing skills profile and (ii) the level of skill expertise the user desires to achieve. To support the concept of goal, different learning resources are incorporated that will enable users to learn new skills or enhance existing skill levels.

5.1.3 Dream Job

This concept is based on the ambition of the user to acquire a specific role in a particular field of career. The dream job is defined by the industry and the job/role within it. Each dream job may require a specific skill set that the user can refer to and then can add the required skill set to a goal for a better user profile.

5.1.4 Evidence of Skills

Based on the user requirement analysis, the possible evidence of skill is identified as a) the experience during which the skill is acquired or practised, b) artefact: possible output of the experience which depicts the implementation of the skill, and c) reference: the external testimony of skill [24].

- Experience: can be defined in terms of any endeavour through which the user has acquired one or more skills. Experience can be academic in terms of courses, presentations or group projects or can be professional. Assessment of experience requires self-reflection by the user that will allow the app to quantify the quality of their performance.
- Artefact: is a substantiated output of any project, course, or experience. The artefact can be recorded in different formats like video, text, link, document, software, etc. that showcases the implementation of the skill in any way possible. An artefact can also be acquired from an academic source or experience or through professional experience.
- Reference: same as that of a reference used in a CV or a resume. The reference can be from any academic or professional contacts. The main objective of recording a reference to the skill is the human verification of skill or skill set for the user.

5.1.5 Crowd-sourced repository of Skills

The reviewed literature has finalized a typology of employability skills classified across (i) Hard Skills, (ii) Organizational Skills, (iii) Communication & Interpersonal Skills, (iv) Personal Skill, Values and attitudes, (v) general workplace skills and (vi) Foreign Languages to be part of the App's Skills

repository; The repository can be accessed by users to (i) understand the relevant employability skill and (ii) select the skill to input acquisition evidence. It is reasonable to believe that this list cannot suffice the need of all users and will require expansion over time. Thus, the concept of a crowd-sourced repository is introduced for adding more employability skills to the existing repository. Crowdsourcing is a way of collecting knowledge/ information from people (users) that enables the implementation of a dynamic repository. This feature will allow the user to share relevant skills and related information with other users.

These concepts are employed to define App's learning activities that conform to the SDLMI as presented in table 2.

Table 2. GES-App Key Activities Features

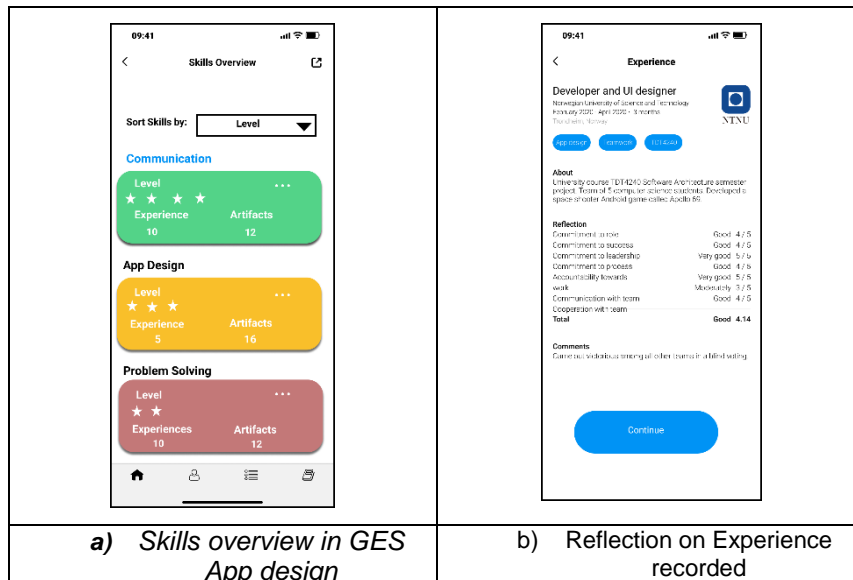
Activity	SDLMI Feature	Learning Outcome
Self-Reporting Employability Skills	Self-Initiation- Observe, Record, Reflect and Evaluate	Self-Organization, Self-Reflection; Self-realization encouraging self-regulation; knowledge of new skills through the skills repository
Dream Job	Self-Direction- Goal Setting, Critical Thinking	Choice making Skills, Understanding of different skills set related to their field of study and their desired roles; Skills development planning via external learning resources; Exposure to the labour market demands encouraging self-development
Skills Practice via learning resources and mini-games	Problem-solving, critical thinking	Skills Enhancement, Goals adjustment, Re-planning
Networking & Ethics	Sharing, decision making, critical thinking, Self-Realization	Self-advocacy
Employment Readiness (CV development, Interview Practice, goal setting)	Self-advocacy, Empowerment	Self-Scheduling, Goal Setting, Self-regulation

5.2 Early prototype design

In the early prototype design of the app, the 5 key activities as defined above are self-reporting employability skills, dream job, skill practice using learning resources, networking & ethics and employment readiness, which are deployed through different sub-activities as shown in Figure 3. The early prototype design of the app is achieved using Figma.



Figure 3 GES App “Home” screen showing all 5 activities



a) Skills overview in GES App design

b) Reflection on Experience recorded

Figure 4 Skills overview and self-evaluation of experience in GES App design

The main elements of the prototype design are defined below:

5.2.1 Self-Reporting Employability Skills

The activity of “Self-reporting employability” skills is based on the concept of skill and its components that enable the user to explore and identify the skills and record them to their skills profile through self-assessment. As shown in **Error! Reference source not found.** part (a) the skills overview records all acquired skills of the user along with their experiences, artefacts and skill levels. In **Error! Reference source not found.** part (b) the app design depicts the quantification of user performance in a particular experience as self-reflected by the user.

5.2.2 Skills Repository

The concept of the crowd-sourced repository is integrated into App design prototype as shown in Figure 5. The shared list of skills is stored in a repository with information regarding what skill is along with examples to support.

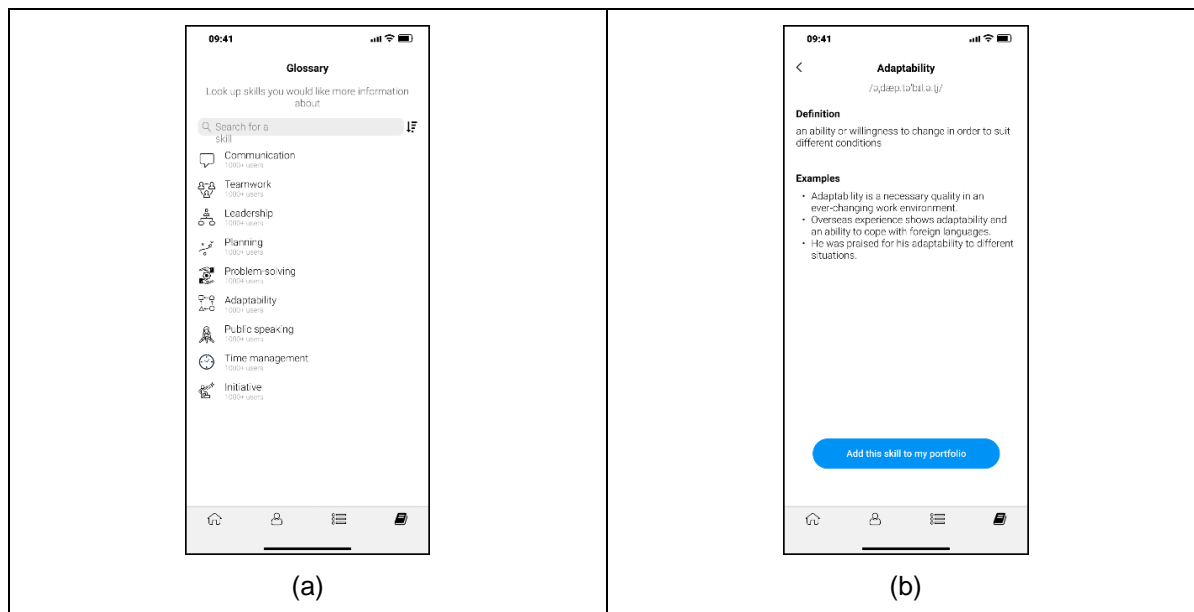


Figure 5. a) Crowd-sourced repository design in GES-App Skills shared and stored in repository b) Skill information

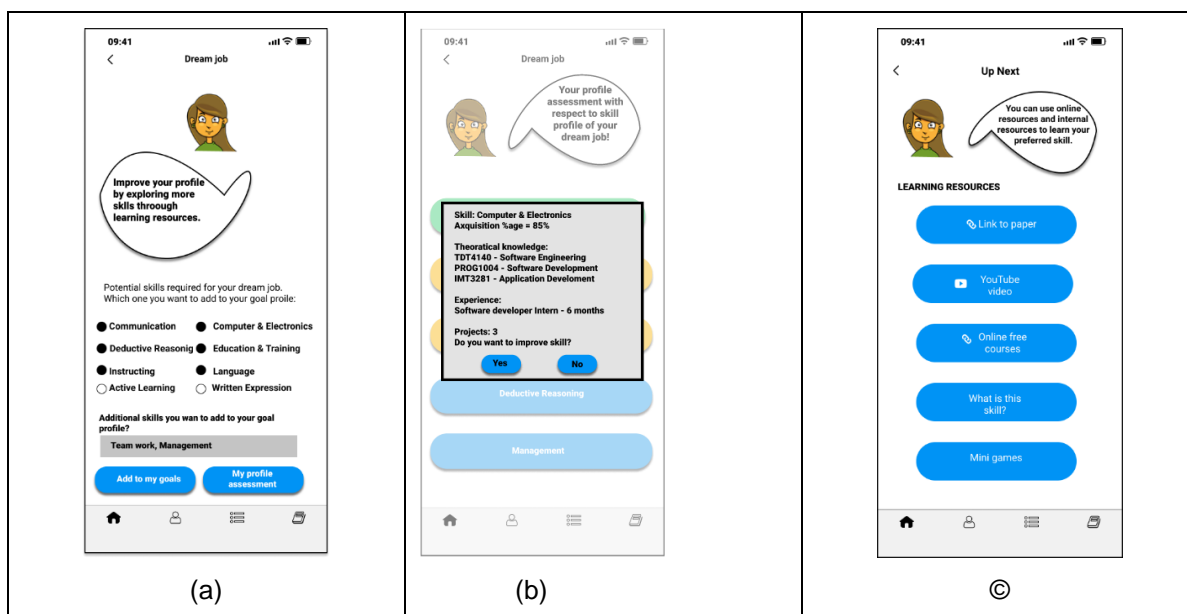


Figure 6. Dream job concept in GES App design (a) Dream job required skill set (b) Profile assessment and adding skills to goals (c) access to learning resources

5.2.3 Dream Job

The component of a dream job is integrated into app design as shown in Figure 6 where part (a) of the figure exhibits how the concept can be used to search for the required skillset while part (b) is showing how relevant skills can be used to determine gap by evaluating the current profile of the user with the required skill profile, which leads to the determination of goals by the user. Part (c) of the figure shows the access of different learning resources to users supporting the Activity of “Practice Skills” and “Employment readiness”.

6 CONCLUSION AND IMPLICATIONS

The space of employability education and careers support is complex and dynamic. A list of skills will not be sufficient to achieve the diverse range of student abilities that higher education needs to respond to effectively. Importantly, providing students with the opportunities to gain the necessary skills, knowledge, understanding and personal attributes through employability related activities is obviously of great value. However, providing students enhanced opportunities to reflect on these activities and evaluate their skills can be optimized further by introducing gamification into learning. It is hoped that the GES-App will contribute to enhanced potential for the continuous development of GESs, with students gaining more awareness of their abilities and taking responsibility for planning their professional development to achieve success and satisfaction in their careers. An in-depth review of the existing apps and digital resources has confirmed the absence of a learning resource that the project is offering. It could potentially increase their career mobility and resilience in the global employment market and contribute to the European economy. The GES App and support materials will provide a very valuable downloadable resource for careers guidance and academic employability practitioners in HE institutions across Europe.

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REFERENCES

- [1] B. Jackling and P. De Lange, "Do accounting graduates' skills meet the expectations of employers? a matter of convergence or divergence," *Account. Educ.*, vol. 18, no. 4–5, pp. 369–385, 2009.
- [2] C. Fearon, W. van Vuuren, H. McLaughlin, and S. Nachmias, "Graduate employability, skills development and the UK's Universities Business Challenge competition: a self-determined learning perspective," *Stud. High. Educ.*, vol. 45, no. 6, pp. 1280–1297, Jun. 2020.
- [3] M. Hagiwara, K. Shogren, and M. Leko, *Reviewing Research on the Self-Determined Learning Model of Instruction: Mapping the Terrain and Charting a Course to Promote Adoption and Use*, vol. 1, no. 1. Springer Science and Business Media B.V., 2017, pp. 3–13.
- [4] L. M. Blaschke, "Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning," *International Review of Research in Open and Distance Learning*, vol. 13, no. 1. pp. 56–71, 31-Jan-2012.
- [5] K. A. Shogren, S. K. Raley, and K. Burke, "The Self-Determined Learning Model of Instruction Teacher's Guide," 2019.
- [6] R. M. Ryan and E. L. Deci, "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions," *Contemp. Educ. Psychol.*, vol. 8, no. 2, pp. 225–237, 2000.
- [7] M. L. Wehmeyer, "A Functional Model of Self-Determination: Describing Development and Implementing Instruction Historical Understandings of Self-Determination," *Focus Autism Other Dev. Disabl.*, pp. 53–62, 1999.
- [8] A. G. Watts, "Career development learning and employability European Lifelong Guidance Policy Network, ELGPN View project International Centre for Career Development and Public Policy View project."
- [9] European Commission, *New modes of learning and teaching in higher education*, no. October. 2014.
- [10] M. T. Hora, R. J. Benbow, and B. B. Smolarek, "Re-thinking Soft Skills and Student Employability: A New Paradigm for Undergraduate Education," *Change: The Magazine of*

Higher Learning, vol. 50, no. 6, Informa UK Limited, pp. 30–37, 02-Nov-2018.

- [11] R. Huang and R. Turner, "International experience, universities support and graduate employability – perceptions of Chinese international students studying in UK universities," <https://doi.org/10.1080/13639080.2018.1436751>, vol. 31, no. 2, pp. 175–189, Feb. 2018.
- [12] M. Tomlinson and M. Tomlinson, "Introduction: Graduate Employability in Context: Charting a Complex, Contested and Multi-Faceted Policy and Research Field," *Grad. Employab. Context*, pp. 1–40, 2017.
- [13] J. Artess, T. Hooley, and R. Mellors-Bourne, "Employability: A Review of the Literature 2012 to 2016. A Report for the Higher Education Academy.," *High. Educ. Acad.*, 2017.
- [14] R. Maxwell and A. Armellini, "Identity, employability and entrepreneurship: the ChANGE framework of graduate attributes," *High. Educ. Ski. Work. Learn.*, vol. 9, no. 1, pp. 76–91, 2019.
- [15] M. Z. Raihan and M. A. K. Azad, "A Bibliometric Review on Outcome-Based Learning for Graduate Employability: Mapping the Research Front," *J. Educ.*, 2021.
- [16] T. Jorre de St Jorre and B. Oliver, "Want students to engage? Contextualise graduate learning outcomes and assess for employability," *High. Educ. Res. Dev.*, vol. 37, no. 1, pp. 44–57, Jan. 2018.
- [17] M. Healy, S. Hammer, and P. McIlveen, "Mapping graduate employability and career development in higher education research: a citation network analysis," *Stud. High. Educ.*, 2020.
- [18] R. A. Ellis and A. M. Bliuc, "Exploring new elements of the student approaches to learning framework: The role of online learning technologies in student learning," *Act. Learn. High. Educ.*, vol. 20, no. 1, pp. 11–24, 2019.
- [19] M. Barr, "A cross-sectional study of video game play habits and graduate skills attainment," *Res. Learn. Technol.*, vol. 28, 2020.
- [20] M. A. Hill *et al.*, "'They help us realise what we're actually gaining': The impact on undergraduates and teaching staff of displaying transferable skills badges," *Act. Learn. High. Educ.*, 2020.
- [21] L. R. Murillo-Zamorano, J. Á. López Sánchez, A. L. Godoy-Caballero, and C. Bueno Muñoz, "Gamification and active learning in higher education: is it possible to match digital society, academia and students' interests?," *Int. J. Educ. Technol. High. Educ.*, vol. 18, no. 1, 2021.
- [22] R. F. Dam and T. Y. Siang, "Design thinking: a quick overview." 08-Jun-2020.
- [23] S. E. Dreyfuss and H. L. Dreyfus, "A five-stage model of the mental activities involved in directed skill acquisition," *Oper. Res. Cent.*, no. February, pp. 1–18, 1980.
- [24] L. J. Fredheim, "Mobile Application for Graduate Employability Skills A proof-of-concept," 2021.