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The Scottish Innovative Student Award (SISA): preparing students to tackle wicked problems.

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The Scottish Innovative Student Award (SISA): preparing students to tackle wicked problems

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Background

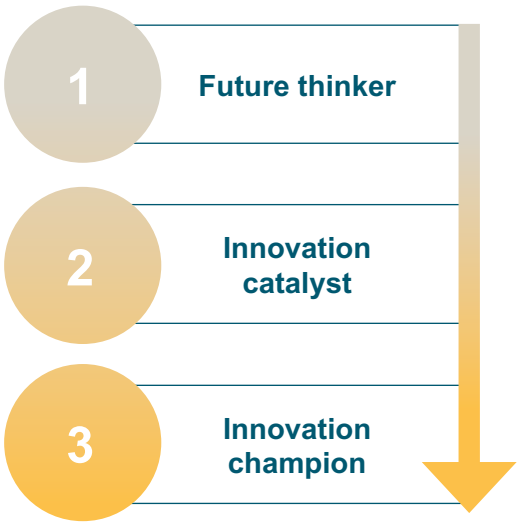
To help prepare students for the digital revolution and the evolution of Industry 4.0 (Marr, 2018), and to equip individuals with an enterprising skills-set; the universities across Scotland have been working in partnership with the Scottish Institute for Enterprise (SIE) to accredit creativity, communication and collaboration skills within modules and degree programmes. The three-tier Scottish Innovative Student Award (SISA) recognises students' high-level skills development within existing academic modules, as well as providing an opportunity for students to confront problems in new ways, through participating in a national one-day enterprise workshop and entrepreneurial-based learning activities (Henry, Hill and Leitch, 2005). The national workshops are delivered by SIE and four of Scotland's Innovation Centres: Digital Health and Care Institute, CENSIS, the Datalab, and the Construction Scotland Innovation Centre.

The initial inspiration for the Award originated from the Scottish Innovation Centres, as they were keen to engage further with university students to explore their business ideas. However, it was soon realised that SIE was the real enabler for the Innovation Centres to reach students in a multidisciplinary manner across Scotland's universities. This realisation then paved the way, over a period of 18 months, for several mini-SISA pilots in various Glasgow universities led by SIE. The final creation and launch of SISA pan-Scotland then occurred in the academic year 2017-18.

The pan-Scotland, SISA Award framework presented in Figure 1 provides an opportunity for students to:

+ recognise and evidence the innovation skills developed within their existing academic modules **(Level-1, Future Thinker)**
+ build on these skills in multidisciplinary teams and apply them, to 'wicked problems' and challenges, such as the UN Sustainable Development Goals (United Nations, nd), in a one-day, national online or in-person workshop **(Level-2, Innovation Catalyst)**
+ demonstrate intent to ideate through an online, entrepreneurial-based assessment **(Level-3, Innovation Champion).**

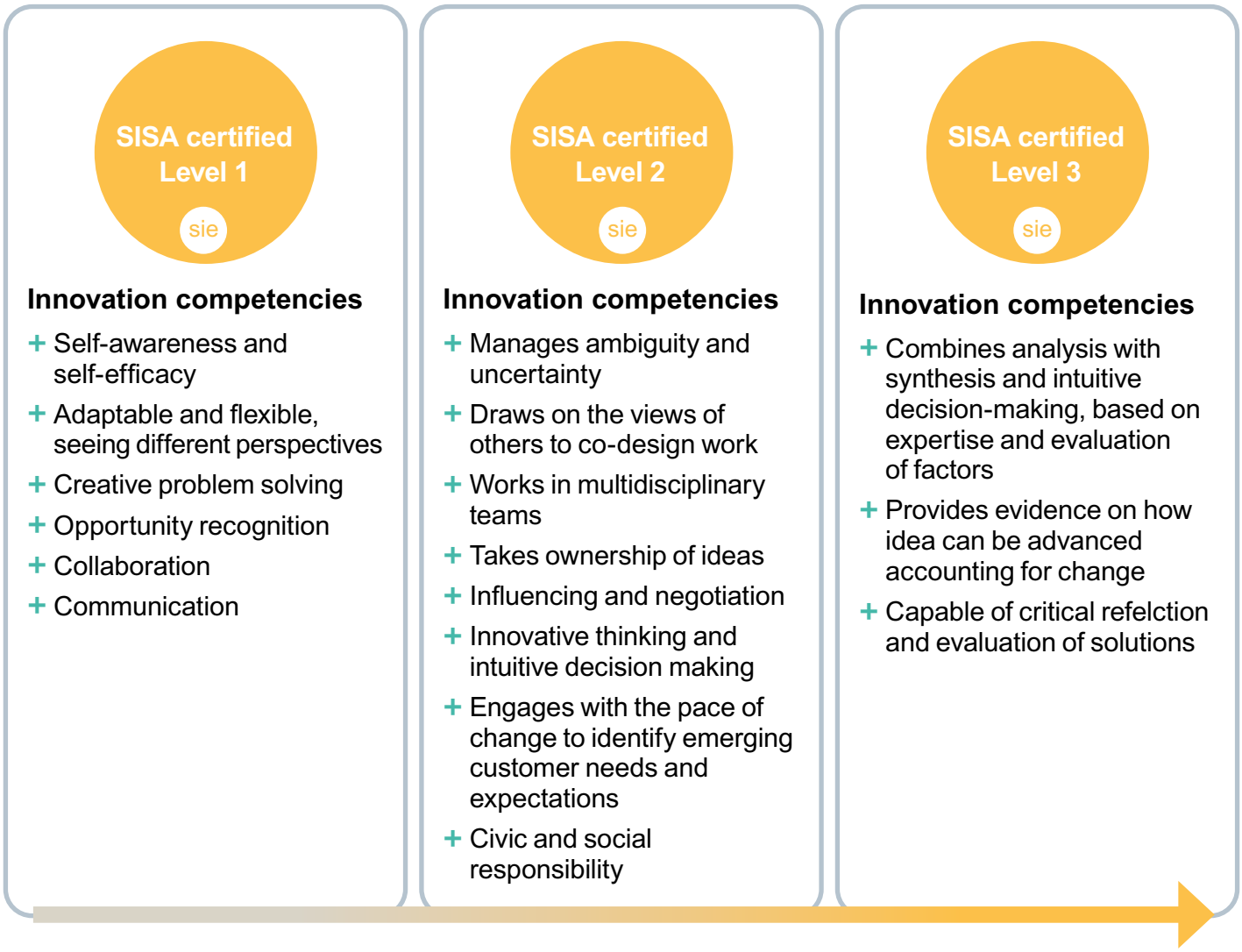
Figure 1. The three-tier SISA Award



This innovative award structure affords a more holistic approach to enterprise and entrepreneurship learning in curricular and co-curricular contexts for both undergraduate and taught postgraduate students. The awards programme also aligns with contemporary practice and the assessment framework provided in the Quality Assurance Agency 2018 guidance on Enterprise and Entrepreneurship Education (QAA, 2018), and the Entrepreneurship Competence Framework (Bacigalupo et al, 2016). Of particular note is the module accreditation process for Level-1 SISA, which has helped to build a more observable platform for academic staff participating and engaging with enterprise education. This has enabled dialogue around enterprise and entrepreneurial competencies (Figure 2), across a wide range of academic subject areas.

Our case study provides an overview of the SIE three-tier SISA framework, which was launched in 2018. It illustrates, through the experiences of two universities (University of Aberdeen and Robert Gordon University), how the framework has provided a more coherent and cohesive approach across Scottish universities to help synergise enterprise education and tackle a range of 'wicked problems'. In both universities, the impact on student achievement, and the importance of collaborative working across the Scottish higher education sector to champion creativity, interdisciplinary approaches to innovation and entrepreneurship, are covered.

Figure 2. Skills and competencies developed at each level of the award



Approach

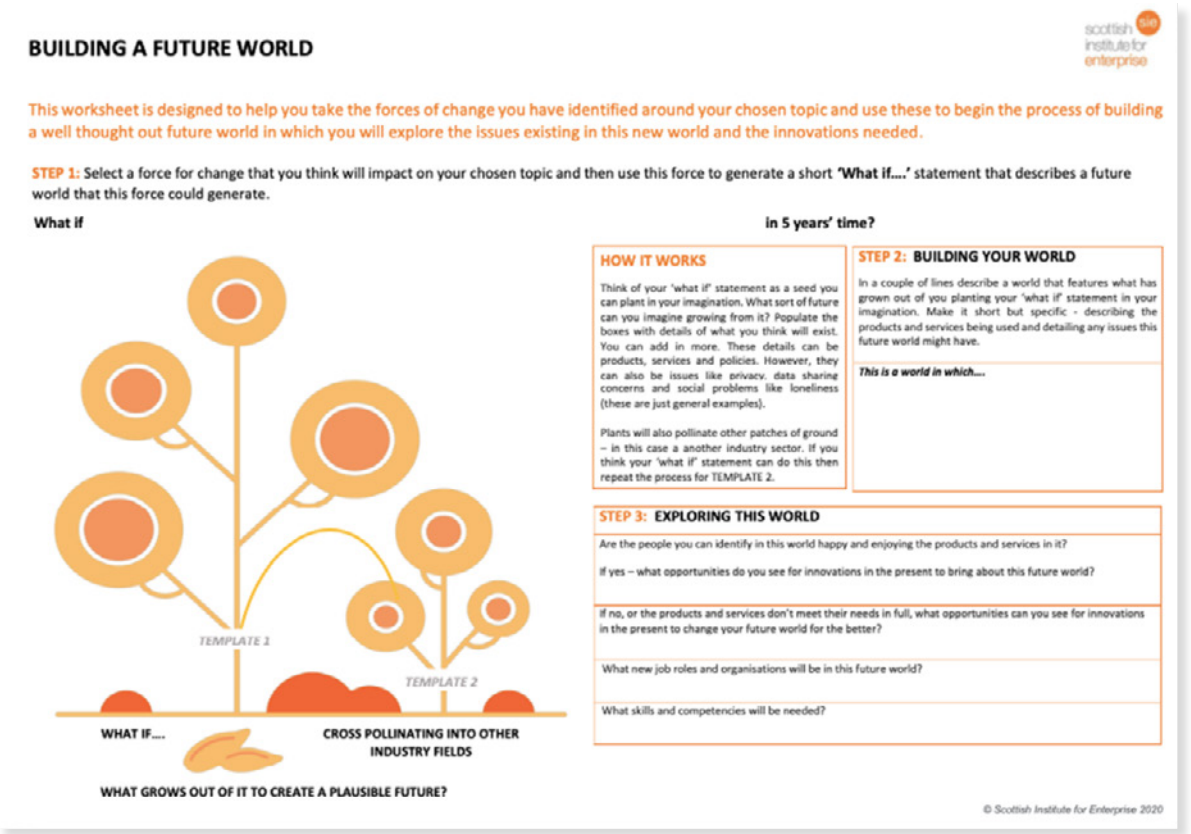
SISA is designed to empower students to stop the past becoming the present and to enable them to imagine a brand-new future that shapes the present. The format encourages them to develop their B to A thinking by looking up and out from their current situation and building their own personal landing strip into the future to explore and engage the five stages of future thinking – future shapers (Hulzebos, 2019). It is this exploration and the insights they take from it that will provide the context for their present-day actions. These actions can be developing new future-facing innovations that tackle wicked problems in a new way. However, these insights can also help them develop and plan for their professional development in a way that prepares them for the changing world of work (The World Bank, 2019). They can imagine other possibilities for their skills and experience once freed from the past and their present-day experiences.

Typically, when we think about the future, we activate the hippocampus in our brain that has us recalling our past and present experiences. Neuroscience calls this A to B (past to future) thinking and it can impact on our capacity for innovation. When asked to solve a problem we have a bias to frame our thinking and actions around existing innovations and current trends we have experienced in one way or another. This can limit our imagination to inspire new insights into how we can solve wicked problems better.

However, what happens when we think from the future to inform the present-day actions that could solve wicked problems in new and sustainable ways? Can we activate the part of our hippocampus that frees up our imagination to inspire new insights and opportunities? How can we reverse engineer our students' A to B thinking to B to A (back casting) thinking?

To help students with their 'back casting thinking' and to start tackling wicked problems, bespoke SIE worksheets have been designed (Figure 3).

Figure 3. An example SIE student worksheet – building a future world



Outcomes

The University of Aberdeen's 2040 Strategy (University of Aberdeen, nd) sets out the institutional commitment and ambitions regarding interdisciplinary education and research. Similarly, the Robert Gordon strategy (RGU, nd) highlights innovation and entrepreneurship as key competencies for developing in students' minds. Both universities aim to cultivate students' enterprising mindsets, to help develop creative solutions to complex challenges in areas, such as energy, health, artificial intelligence and creative industries. Engaging with SISA has enabled both universities to strengthen progress in developing their students' innovative and entrepreneurial capabilities to address these strategic goals. Specifically, the SISA Award has enabled enterprise education to become a more explicit and visible component of the undergraduate and taught postgraduate curricula, especially within non-business disciplines. Interestingly, the module accreditation process for Level-1 SISA has enabled exchange of ideas around enterprise and entrepreneurial skills, across a wide range of academic disciplines, namely: business, biology, psychology, engineering, education, chemistry, environmental partnership management, applied health sciences, creative industries, and politics. Notwithstanding this, the Robert Gordon in-house accreditation process for level-1 and creation of a personal development programme within the Gray's School of Art has also increased student SISA engagement.

> "The SISA Award…develops students' capacity to become innovators, to think outside the box, turning ideas into reality. I would encourage Programme Directors to engage with the Award, it really adds to the student experience."
>
> *Professor Tavis Potts, School of Geosciences, University of Aberdeen*

> "The SISA award… allows students to develop key skills, such as problem solving, teamwork, time management, communication and networking. RGU staff have continued to work collaboratively with students and staff… providing guidance, mentorship and improving students' employability."
>
> *Student President (Communication and Democracy), Robert Gordon University Union*

Student engagement has been strong across this three-tier award, as illustrated in the award data (Table 1).

Table 1. Student SISA engagement data

Award Level	All Scottish Institutions (2019-20)	University of Aberdeen (2019-20)	Robert Gordon University (2019-20)	All 19 Scottish Institutions (2020-21)	University of Aberdeen (2020-21)	Robert Gordon University (2020-21)
SISA: Level 1 Future Thinker	1027	162	379	1028	227	455
SISA: Level 2 Innovation Catalyst	214	30	57	266	71	82
SISA: Level 3 Innovation Champion	65	11	18	107	29	30

Note: Total number of students at RGU in 2019-20 and 2020-21 was 14,818 and 15,579 respectively and at the University of Aberdeen for this time period, circa 15,000.

Comments and feedback from students undertaking the Award has been overwhelmingly positive as illustrated by these quotes in Table 2:

Table 2. Evaluation feedback from SISA student recipients

Respondent A	"…pushes you to critically think about the needs of our society and how to engage creatively and devise solutions for a more sustainable and efficient future."
Respondent B	"Through the activities, I improved my ability to identify problems, develop solutions, and add value to my community by thinking outside the box either individually or as part of a team. These learnings have proved invaluable in my PhD research."
Respondent C	''Achieving SISA helped me understand the great importance of thinking outside the box. I was a part of a diverse team and completing SISA allowed me to look at issues from other disciplines. There is a strong emphasis on multidisciplinary collaboration. It was very inspiring to see and learn about different types of problem-solving."

Our next steps are to investigate the impact and reach of the SISA awards programme via a longitudinal student survey. Ensuring all students are able to achieve their potential is an underpinning ethos of Scottish degrees. Therefore, our planned research will also investigate the SISA design and delivery, to ensure the awards programme is both inclusive and accessible to all students from any socio-economic background, culture, and academic discipline.

In this case study, the three-tier SISA Award has been showcased to raise the profile and significance of enterprise and entrepreneurship education, and the transferability of the SISA model to other institutional settings across the UK. More specifically, it is hoped that the case study will stimulate debate and discussion around the strategic importance of the student skills and attributes needed for Industry 4.0 and the value of ingenious and inclusive learning for all students.

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