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Assessment of 21st Century Skills in Project-Based Learning
Stage 2 Report to the Working Group

Assess 21C

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This report was created by Learnovate at Trinity College Dublin.

1.   Context

The practice and development of 21st Century Skills (Problem Solving, Critical Thinking, Collaboration, etc.) are playing an increasingly important role in higher and further education (HE & FE) as educators seek to prepare their students to meet the evolving needs of a changing workplace. In response to the changing needs of both students and employers, education providers are placing more and more emphasis on the development of transversal skills in addition to the academic skills/knowledge. In many cases they have developed or adapted their own 21st Century Skills frameworks, often referred to as 'graduate attributes', and sought to embed the practice and development of these skills into all aspects of teaching and learning with their institutions.

At the same time, and very much in response to this evolving emphasis on 21st Century Skills, there has been a renewed focus on project-based learning approaches. The potential for a more holistic learning experience afforded by such approaches is seen as hugely beneficial to the learning outcomes of students since they provide them with a wider range of opportunities to practice and develop 21st Century Skills in the context of their chosen subject matter, academic knowledge, and skills.

2.   Challenge

As education providers develop their approaches to supporting their students' practice and development of 21st Century Skills, they often face the same common challenge when it comes to the assessment of these skills. As greater emphasis is placed on these skills as part of course curricula, it becomes more important that 21st Century Skills are viewed in a more formalised way. Rather than just incorporating these skills into the learning outcomes, instructional designs, and lesson plans, it is necessary to be able to quantify students' development of these skills over time, often referred to as the 'distance travelled'. The nature of 21st Century Skills and the often implicit approach to embedding them in both formal and more non-formal education contexts raises interesting questions about how to assess something that is not formally taught. 21st Century Skills assessment is an inherently challenging task that has been the subject of much research across many application

domains including schools, HE/FE and corporate learning, and much can be learned through the cross pollination of ideas from these differing domains.

In the context of project-based learning in HE/FE, one of the challenges in assessing these skills is the need to support and scaffold lecturers and tutors as they assess their students' 21st Century Skills. Lecturers and tutors are well practiced in the assessment of subject-specific knowledge and skills, of which they are themselves subject matter experts. However, they may not be as comfortable when it comes to 21st Century Skills and need an appropriate level of support. One of the recurring themes when it comes to supporting the assessment of 21st Century Skills is 'what does good look like?' and how can assessors be supported in effectively and efficiently recognising these attributes? At the same time lecturers and tutors are already time-poor and so any assessment methodology for 21st Century Skills needs to take this into account and make the process as efficient and streamlined as possible.

Another related challenge when it comes to the assessment of 21st Century Skills in HE/FE comes from the nature of 21st Century Skills themselves. Whereas a student might cover a specific subject area or topic as part of a single class or module with perhaps only one lecturer, 21st Century Skills are practiced and developed across all the student's classes and modules. To develop a complete picture of a student's skills we need to consider their performance across all of their classes, involving many different lecturers and tutors. The beauty of this is that it allows for a more holistic assessment, but it requires an approach that is designed to address balanced assessment at this skill across modules and instructors.

A final consideration might also be the need to provide more continuous feedback for students, lecturers/tutors and the education provider on the practice and development of these skills. As the focus with 21st Century Skills is often on the 'distance travelled' rather than just a final summative assessment, it could be invaluable to all stakeholders to have insight into these skills over the course of an academic year or indeed an entire degree program.

3.   Working Group Stages 1 & 2, to October 2022

In October 2021, the working group was established to co-create a proposed solution to the challenge above. The group included Hibernia College, IDA Ireland, SERC, Learning Pool, Skillnet (Technology Ireland Software), Trinity College Dublin, Akari, Digital Learning Institute and Swisscontact. In 2022, Chartered Accountants Ireland also expressed interest in the project. The project was given the title "Assess 21C".

The Working Group collaborated on investigating the problem space through a Jobs to be Done approach and subsequently developed a proposed approach through Solution Workshops. This work culminated in the development of two assets, a service mapping (see Fig.1) and a conversational prototype (see Fig.2).

Based on the outcomes of the solution workshops, the service mapping (See pdf version as appendix 1) shows the how a solution might be deployed across a timeline and looking at interdependencies. The map identified several pain points that would need to be addressed in any subsequent technology.
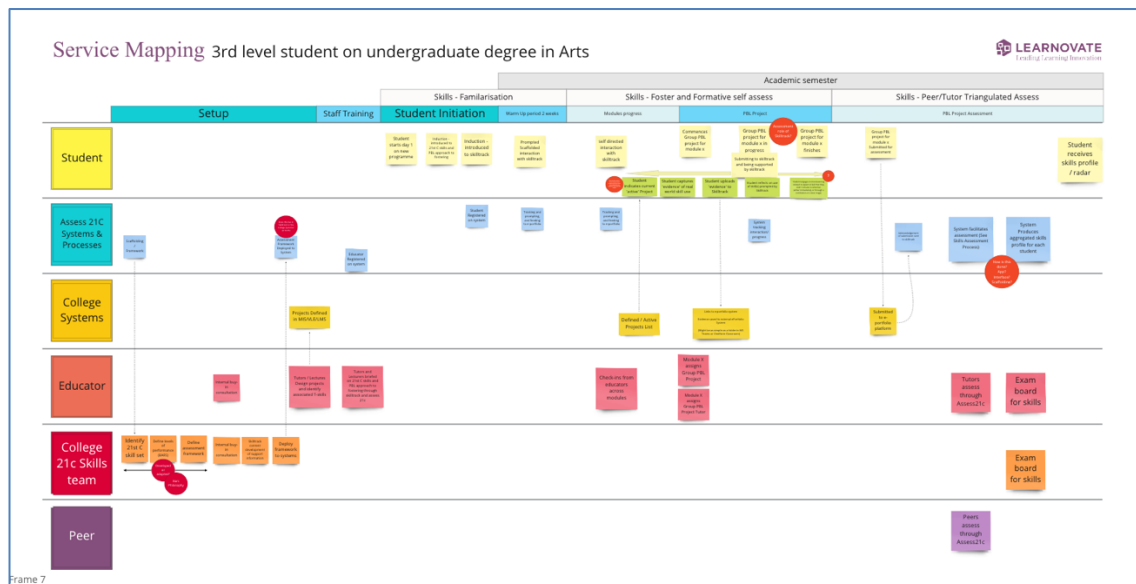

Fig 1. Image of Service Mapping, (see appendix 1 for detail)

The conversation prototype was a way to investigate the solution's value without the need to develop any technology assets. The prototype manifested through the development of a storyboard which showed how the solution could work for a student. In this case we focused

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on the persona of Elena, an undergraduate student at Hometown College. The prototype was put together as a short 8 minute video and took the form of a PowerPoint presentation with voice over, (see the video at: https://youtu.be/_Z5LH27jbt4). The conversation prototype was shared through the Working Group's contacts and resulted in nine participants from four organisations providing feedback. Each participant had the opportunity to review the video and then provide feedback through interviews with Learnovate. The four organisations were University of Tasmania (5), Swisscontact (2), Hibernia College and Digital Learning Institute. The balance of this report covers the insights from these interviews.

This report brings Stage 2 of the project to a close and we are at a decision point; see Section 5 for more detail.

Fig 2. Screengrab from the Conversational prototype (See the video at https://youtu.be/_Z5LH27jbt4)

4.   Conversation Prototype Feedback

With the permission of the participants the interviews were recorded and later analysed for thematic feedback. Ten themes emerged and are discussed in this section.

The insights are not arranged in a specific order as all insights are valuable; they are arranged in the order they emerged from the interrogation of the interview data.

The Concept

In general, there has been positive feedback in relation to the prototype. There is an agreement that the ability to 'show' what you have achieved in relation to 21st Century skills has become important, even more so since Covid19. CVs and resumés are not seen as doing a good job in this respect. However, the Skills-Radar contained within Assess21C is seen as a very positive move to achieve this meaningful communication to potential employers. In relation to the concept, it also emerged that through the project-based learning approach, not only do students get the opportunity to deploy 21st century skills, they do so in a project related to their academic area of study, bringing an alignment between the two, applied in context as it were.

"It would be great to get this piloted as soon as possible."

Privacy

Privacy is of course a concern – we understand and realise it will be fundamental to apply a 'privacy by design' approach to any solution going forward. One of our participants, building on their own experience, reiterated this concern; *"what if there is bullying or inappropriate or academic impropriety happening?"*. This is an area for consideration however, building on our previous experience the avoidance of any form of free-text feedback in Assess21C is one step toward avoiding this aspect.

Behaviour Anchored Rating Scales (BARS).

Assess21C uses a BARS system, which is a rigorous process of identifying, through rounds of investigation by experts, what different levels of a behaviour associated with a skill look like. The behaviours, in our case five for each skill, amount to identification of proficiency in a skill, with five skills indicating abilities within a competency. The behaviour statements allow for the efficient and effective assessment by peers and tutors in a more meaningful and accurate way than, for example, a Likert scale. This approach was seen as positive by avoiding a 'score' and providing a much more meaningful representation of the student's ability. It was also put forward that given each student assesses others, the students are also learning the skill of comparative judgement through the process.

"if I give it to my future employer … the one you have is so much easier for the other side".

Tutor and Organisational buy-in.

Possibly the biggest hurdle our participants saw was getting the buy-in of organisations and their staff. The advice here was that it would potentially take time to achieve this goal as institutions have many initiatives at play at any given time and to raise the importance of Assess21C could be a challenge. Once again, we do not underestimate this challenge and a pilot would help in this regard. We do also feel that academic institutions are starting to see the importance of this area and through awareness could move the initiative up the decision tree.

In relation to tutors, who also provide assessment in Assess21C, the point was made that they would need training and induction as they may not be all that familiar with the area of 21st century skills. In addition, tutors are often casual staff and therefore may not be as familiar with institution processes. Beyond this, and looking out to the wider community, it was also felt that there would be a need to educate across the institution.

While our conversation prototype did include a section on induction for students, it was raised again during the interviews the need to completely immerse the students into the concept early in the year.

"If it's a modern app they will use it but if it's not integrated into the flow of the program it's just another peripheral"

Not for First Years.

One of the aspects that we had not considered but which resonated with all participants was the challenge of introducing Assess21C to first year undergraduates. In the transition from second level education to third, it was felt Assess 21C might be too much of an ask given everything else these students are dealing with. It was felt they may not be able to get their heads around the concept, self-direct as is required with the app, and prioritise it with all the other life and scheduling changes they are dealing with. A possibility was the idea of introducing the concept toward the end of first year to get students ready to work with it in second year. We will certainly take this feedback going forward and potentially look to pilot with second years.

"I think this would definitely work much better in second, third, or fourth year students"

Subjective Bias.

To leverage a quote from the interviews *"how do you avoid the conflict that might happen in a group project, for instance if they don't get along?"* This again would be an area we would seek to explore in a pilot of the project. However, we do see there are three aspects of the project that go some way to addressing this issue. Firstly, Assess21C is seen as measuring the students' progress over their time in college, and to this end the assessment is made up of potentially 4 projects by three years each containing approximately four evaluators (three peers and a tutor). This means 48 evaluations and it could be expected that any individual variations via individual conflict would be averaged out. Secondly, through using BARS statements there is no place for individuals to provide written feedback and linked to this the third point is that the descriptive nature of BARS statements should make it more challenging to down or up grade a peer.

The Skillset.

In the conversation prototype we needed to put in some representative skills, which were; Collaboration, Problem Solving, Creativity, Communication and Leadership. The question was raised around if the project would see the development of just this set or would there be an ability to include others.

Our thinking on this is that we would develop an initial project around a final set of 21st C skills, to be decided at the development of the next stage, leveraging research into the most accepted set. The reason being is to offer an 'off the shelf' option, however we do see that it would be necessary in the future to a) develop out other options, possibly including digital/data skills as well, and b) to provide a consultancy type offer to develop bespoke skills where they were seen as appropriate.

Two other points that emerged in relation to this were the ability to nuance existing skills, for example to a 'nursing course' and the potential need to have the skills externally validated. While we are happy to explore these areas, we feel the second point could be countered by the rigour adopted in the initial development.

Value to Employers.

"We know that any work has just 10 seconds to review something, so when you show this kind of module that you've done over 4 years it helps them evaluate you better and realise ok, she's done something in practice".

Another element of feedback in relation to employers was the potential to develop the skills and BARS in co-creation with major employers in the area. For example, if we were to take Trinity College Dublin with employers like Google and Microsoft in close proximity. Not only would that that boost the impact of the Skills-Radar with these employers, it raises the profile and validity of the achievement with other employers. It was put forward that this may go as far as including their logos on the Skills-Radar in a "as accepted by" fashion.

A final aspect in relation to this was the concept of micro-credentials – while our design is based on the Skills-Radar being the accreditation, it is certainly an aspect we would look at going forward.

Pedagogy & Portfolio

The feedback on the pedagogical approach was in general positive around the formative support provided via the app. Some concerns were raised around the inclusion of project-based learning modules in certain types of modules with the example of Pharmacy being put forward. In the modern college setting the vast majority of modules will contain some

element of PBL or even team work. It is a critical aspect of the system and would be an area for investigation however would not be seen as preventing the pilot or project progressing.

With the app activity it was asked if the work could be included in an e-portfolio format that the student could export and take with them to potentially support their Skills-Radar. We would see this as being a component of the solution.

Technology Integration and the App

"The last thing we need are more systems! How will it integrate?". Integration with existing systems was seen as critical to adoption. This is another area we were aware of and one that we will seek to address in the development of a pilot. The main aspects are not to introduce 'another' thing and the ease of integration with existing technologies. Through API integrations we will seek to address these concerns. One aspect in the project's favour here is that it does not require interaction with other legacy systems to operate.

The delivery of the development support through the app was seen as favourable with the app mock-up screens seen as clear and useful.

5.   Beyond Stage 2.

At Learnovate we take a staged approach to our research. We analyse the progress of projects to ensure they are moving towards a useful solution to painful problems. This report brings Assess21C to one of these points. In this report you can see the feedback we have from organisations we identified as having this problem. The feedback shows where there is work to be done, some of which we already identified in our Service Mapping and others we hadn't. However, the issues identified are, in our view, surmountable and there is an underlying sense in the feedback from the participants and our working group that there is value in progressing this project.

There are several options available to progress Assess 21C and we are currently talking to two of the Working Group members on ways we might investigate. If you are interested in seeing this project progress, you should get in touch with the team at Learnovate to discuss.