Timing

For most of the schools involved, small numbers of students were able to complete all tasks in a reasonable time. Issues that contributed significantly to this overrun of the timing related to available computers and to students dropping out of a pairing situation and having to log back in.

Random pairing

In the PISA 2015 draft collaborative problem-solving tasks, students collaborated with an avatar (computer agent) using pre-programmed responses and not with another student. The advantage of using an avatar with pre-programmed responses is that it makes for much easier/simpler automation of

Appendix B: Preliminary data analysis

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Overview

Primary purpose

To provide a brief ‘first look’ and commentary on the tasks and the potential of these types of collaborative assessments. The goal is not to try to establish a formal scale, but to give some information towards how you might further develop tasks of this kind.

Secondary purpose

Examine dichotomous, maximum set score and sum score approaches to scoring. This approach broadly follows the initial proposed assessment framework but is not a formal evaluation of the efficacy of the framework or ways to improve it.

Outline of the current report

Tab A: Summary of method and results

Brief description of initial approaches to scoring and summary of preliminary analysis in words.

Tab B: Summary tables and figures

Tab C: Table of contents of additional item level summary statistics provided in Excel

Tab D: Table of contents of additional support files provided (e.g. code data, syntax)

- The Social management (SOM) a (communicate effectively) criteria for Lights Out Part A

Table1.2: Criteria deleted from dichotomous treatment

Task	Part	Criterion	Criterion type (action/chat)	Removal reason
Lights Out v6				

Figure1.4 “Increasing –steep” Item Characteristics Curve

Figure1.5 “Flat –slightly increasing” Item Characteristics Curve

Figure1.

Figure1.7 “Flat –upper” Item Characteristics Curve

Figure1.8 “Flat –lower” Item Characteristics Curve

Collaborative problem-

Tab C: Table of contents of additional item level summary statistics provided in Excel file ‘Item Statistics Summaries.xlsx’

Data dictionary – variable list and explanation of file contents

Dichotomous – Facility rate, fit statistics and item locations for dichotomous treatment

Poly sum – Facility rates and item locations for sum of scores polytomous treatment

Poly max – Facility rates, fit statistics and item locations for maximum score polytomous treatment

ICC summaries – Summary of item characteristics curves for dichotomous treatment by task, criterion and indicator

Sum of score vs maximum score – Comparison of highest response score and disordered thresholds for sum of scores and maximum score treatments

Tab D: Table of contents of additional support files provided (e.g. code data, syntax)

\RUMM ICCs and Catego 10.96l(A T(()))h/P <</9(b).2.8(f)-()))h/2P <6(o)0.8yv-1(ty)3.7.557 0 Tdtle1 Tm 8c1

The marking/coding for: SOMa

Social management (SOM)
Coordinate and resolve potential differences in viewpoints, interests and strategies

0 Td [(()-9.3(S)-4.7(O)- [(v)3.1(6(oordi)2.4 45cn /TT2 1 aMC 9(Td ( )Tj EMC ET 72 47/P <</MCID 848 1 0 0 scn /TT2 1 Tf 10.02 -0 02 89.22 14

The data collected

All valid responses were coded as 0. This suggests that students did not respond in any of the ways described above or that their responses could not be coded.

Part B.

Part C. Complex brightness settings

The marking/coding: SOMb

Students use the chat box to share information about their settings with their partner as they can only see the settings on their own switch and settings box. From this, they need to determine:

i) which settings make the lamp go on

ii) which settings on the settings boxes make the lamp shine brightest.

Social management (SOM)
resolve potential differences in viewpoints, interests and

The marking/coding: SOMa

	Communicate effectively (a) C	Attempts communication or responds with little, irrelevant or incorrect information	Responds appropriately	Generates appropriate communication re context, self and others	Generates and responds to communication relevant to task requirements & constraints, clarifying problems	Initiates communication re deficits in common understandings
		In the chat -box Hi, hello, who **(SOMa1)**	In the chat -box My switch up/down and My setting box circle, triangle, square, star **(SOMa2)**	In the chat -box Your switch up/down and Your setting box circle, triangle, square, star (SOMa3)	In the chat -box How dim/bright or When dimmest/brightest and When on/off (SOMa4)	In the chat -box What if (SOMa4)

The data collected

The data suggest that level 1 had some difficulty (2.5), level 2 was quite easy (-0.5), and level 3 easy (0.7), level 4 was difficult (2.5), level 5 was (1.2). This would suggest that what students iterate in the chat box (that is, how they communicate their thoughts about the problem) needs further research.

The marking/coding: CIb

Cognitive – inquiring (CI)						
Students identify, explore and organise information	**Collects and organises information (b)** **A**	**Uses an element of information**	**Uses isolated pieces of information**	**Uses relevant elements of information**	**Uses links in relevant information**	**Combines and uses relevant information from a number of sources**
		Changes settings for one component (CIb1)	Changes settings on all component (CIb2)	Records correct combination of settings for switches (CIb3)	Produces the brightest lamp (CIb4)	records correct combination of settings for both components (CIb5)

The data collected

The data suggest that level 1 was very difficult (10.3) and no further data were recorded for the other levels. Although these are similar actions to those required to turn the lamp on, it appears that to find the settings to make the lamp glow the brightest was far more difficult. This did require really good communication between the two students, as they needed to share information to achieve the result.

Part D. Finding faults

The marking/coding for: SOMc

In this part, each student had two different light bulbs, a settings box and a switch. Students could drag and drop components into their section of the circuit (indicated by blue and red regions). Students needed to work systematically to determine which components are faulty and which are working, and drag them to the correct positions. For each person, one of the bulbs was broken and either the settings box or switch.

Appendix D

Collaborative Assessment Alliance: Ireland

Significant changes in society require learners to have a wide, adaptive knowledge base and understanding to enable them to be active participants in the communities in which they live and work. The premium in today's world is not merely on students' acquiring information, but on their ability to analyse, synthesise, and apply what they have learned to address new problems, design solutions, collaborate effectively, and communicate persuasively (Pellegrino, 2014). Recent education reforms aspire to embed key competences in teaching and learning through rich learning outcomes. What is less clear is how existing assessment methods can properly evaluate skills such as critical thinking, problem solving, creativity, communication and collaboration.

No single assessment can evaluate all kinds of learning, rather, a coordinated system of assessment is needed that incorporates the assessment of higher order skills, includes real world skills of collaboration and communication, and engages students in instructionally valuable activities (Darling-Hammond et al., 2013). They argue that students need to engage in tasks that measure these complex skills and not evaluate a proxy for these skills.

Jenkins et al. (2006), acknowledge the digital and participatory worlds that young people need to negotiate. However, student engagement within these worlds is often blurred by the notion of the student as a 'digital native' and by technical and technological approaches in schools that replicate traditional methods of assessment and instruction as opposed to embracing new ones (Claxton, 2007). In this traditional format, assessment tends to be associated with institutions and sanctioned assessors, whereas Gee (2010) argues that it has a natural home in human action and learning. This human action now includes interaction with technology and in his thoughts on Actor Network Theory, Latour (2005), places objects and non-human entities on an equal footing, and states that technology and social practices are inextricably linked. Lakhana (2014) agrees with this notion that we cannot separate technology from its social relations, as people are co-constructors of knowledge. The increasing influence of digital worlds means that young people are seen to be taking on new participatory and collaborative roles in learning online and outside the classroom, and there is a growing interest in incorporating these roles and practices inside education.

This notion of the social and collaborative context of assessment is explored currently through the Collaborative Assessment Alliance project (http://www.caa21.org/), where students are assessed on their ability to collaborate on social and cognitive domains through the medium of online synchronous collaborative tasks. The local alliance in

Ireland is managed by the National Council for Curriculum and Assessment (NCCA), a statutory body with the vision for leading innovation in education. The NCCA supports innovation in schools by engaging with learners, teachers and parents through undertaking, using and sharing research as a basis for advice and debate on education. The CAA was seen as a key opportunity to promote and provoke debate on collaborative problem solving while working closely with teachers on learning design and implementation.

Thirteen schools from around Ireland developed digital synchronous collaborative tasks that challenge students to solve problems through collaborating with their partner. The teachers in these schools have explored the research and theories on collaborative assessment, and their implication for classroom and school practice. In designing their tasks, the teachers have considered how the content and the context of the lesson relates to the development of skills and how conceptual and metacognitive knowledge is built. They have further considered how the collected assessment data can be evaluated using a progression framework that identifies the student's participation and collaboration in the task on both cognitive and social domains. The skills that are targeted in the tasks align closely with the key skills of junior cycle and senior cycle education in Ireland, and recognises the role that digital learning can play in the development of these key skills. Collaborative problem-solving tasks that are mediated through a digital platform will support and enhance these key skills and enable students to flourish in an uncertain and challenging future.

It was agreed that the project would focus in on the curricular area of science, as the specifications in this subject area at junior and senior level were n

The tasks are unique in that they provide a window into how students collaborate, and how they approach collaboration; how they set their learning agenda. The professional development that teachers have recieved as a result of participation in the project has encouraged them to consider the role that digital learning has in assessment of not only the cognitive ability of students but also their social and collaborative abilities.

The indicative outcomes of the Irish research include capacity building in the understanding and implementing of digital assessment, something underexplored in the Irish context. The initiative has resulted in the development of expertise in collaborative problem solving and performance assessment, an approach that is better suited to measuring higher order skills (Pecheone et al., 2010). A model for teacher professional development in assessment of collaboration and higher order skills has been developed. There is now research evidence to support the design of tasks that validly assess collaboration and problem solving.

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