

Assessment in My Palm – using dynamic, web based e-portfolios for formative and summative assessment

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Abstract

This paper describes a pilot project - Assessment in My Palm (AMP). AMP was developed by World ORT and was piloted for two years in six junior high and high schools in Israel. The project used *e-scape* (e-solutions for creative assessment in portfolio environments) for documenting and assessing Project Based Learning (PBL). The schools used *e-scape* in subjects including science and technology, geography, civics and interdisciplinary projects. *E-scape* provides a dynamic web-based portfolio that supports formative and summative assessment. Students use it as a digital notebook, documenting their work through drawing, text, photography, audio and video tools. These digital tools enable students to make their thinking visible, creating assessment evidence through the “trace-left-behind” (Kimbell et al, 2009). In AMP the *e-scape* software was used to enhance the reflection and assessment processes both during and at the end of their projects. The two-year pilot was evaluated by researchers from Technology Education Research Unit (TERU) at Goldsmiths, University of London using questionnaires, semi-structured interviews with teachers and focus group discussions with students. This paper describes the pilot and its evaluation. It highlights the pedagogic and assessment value of the approach and indicates some of the challenges in introducing and using the software.

Keywords: formative assessment, summative assessment, e-portfolio

Context

During the last few years, the Israeli Ministry of Education has added problem solving, research and performance assignments as part of the matriculation exams in several subjects. In these subjects' activities the assessment focuses mostly on process. Formative assessment as well as summative assessment of the students is required. Documentation of the process and preparation of a portfolio that reflects the student's thinking and performance skills developed throughout the whole process is required. As a result a need has been identified for a dynamic e-portfolio that reflects the process, thinking skills and capabilities that students demonstrate during a project. World ORT (an educational Jewish network, works in 60 countries to develop technology education) identified a system (the *e-scape* system, developed by the Technology Education Research Unit [TERU] at Goldsmiths, University of London) as having potential in this area.

***e-scape* (e-solutions for creative assessment in portfolio environments)**

E-scape is a web-based, dynamic e-portfolio that is structured to allow evidence of performance in Project Based Learning (PBL) to be seamlessly streamed directly into a student's online portfolio. It was initially developed through a team in TERU, working in conjunction with TAG Assessments* to create an online portfolio that could be used in the context of Controlled Assessment (Kimbell et al., 2009). The system allows for students to document their project work, as it takes place, using a collection of digital tools – text, drawing, still and moving image, mindmapping, audio etc. It comprises three parts: an ‘authoring tool’ that allows teachers or examiners to structure the project/assessment task and choose the response modes available at each stage; an activity interface that can be used on a variety of mobile devices such as tablets, phones, NetBooks etc and that synchronises continuously to a student portfolio (in a secure website); and a summative assessment ‘engine’ based on the concept of Adaptive Comparative Judgment (ACJ) (Thurstone 1927; Pollitt, 2004).

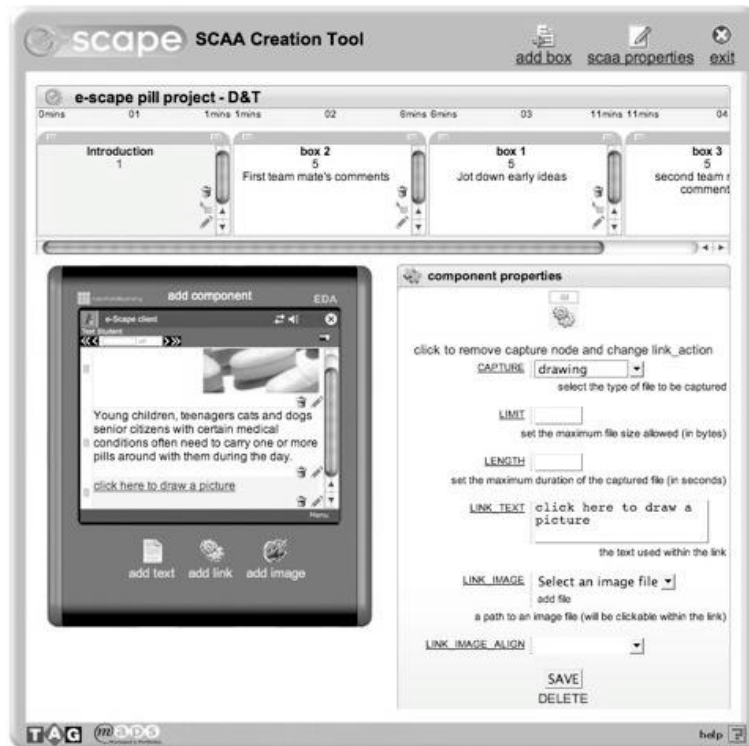


Figure 1: The Authoring tool

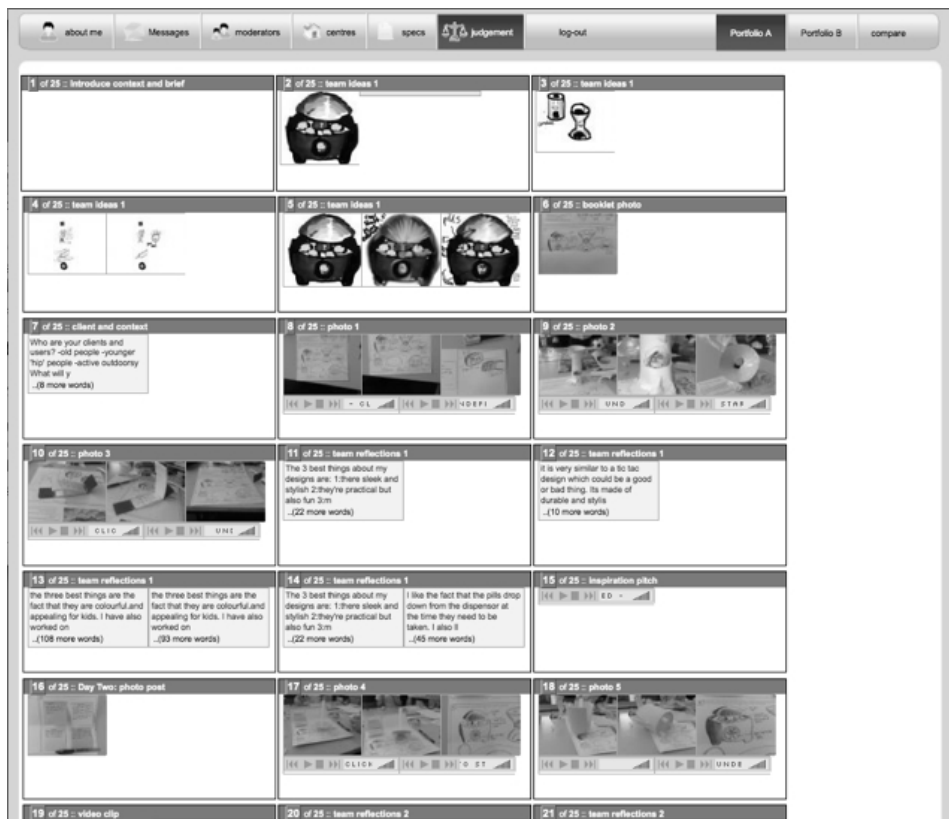


Figure 2: A student portfolio

Following from the success of the initial project a number of other pilot projects have taken place. One of these, *e-scape* in Scotland (McLaren, 2012) focused the system less on summative assessment, more on PBL and on formative assessment. This resulted in additional features, such as the possibility for teachers to add text or audio feedback directly into the student's portfolio whilst a lesson is underway, or between lessons.

The Pilot Project

The aims of the World ORT pilot project were:

- a) to assess students' thinking and documenting skills;
- b) to encourage the students' reflective abilities through the documentation of their project, as part of their learning skills;
- c) to enhance formative assessment including peer assessment and also summative holistic assessment.

The *e-scape* system offered both the pedagogic and technical tools to support these aims. The pilot made use of all aspects of *e-scape* except for the ACJ engine.

Six schools were chosen to participate in this pilot project. Each school received 14 NetBooks with touch screens, the relevant software, and teacher training and tutoring throughout the project. During an initial three day teacher training workshop, the teachers learned the concepts and experience of the *e-scape* both as students and teachers. The pilot lasted two years (2010-2012), during which each school chose the subjects, the length of the project and the teachers to be involved.

The teachers used *e-scape* to design and develop projects that would allow for authentic assessment of students' achievements and capabilities, based on the demands of the school's curriculum. All the projects were task-centered in the sense that the students took them from the starting point to a change in the made-world (Kimbell & Stables, 2007) or to an understanding of the science world. The focus was on the school's internal development of tasks and on the *e-scape* assessment done locally by the teachers. The teachers could decide which *e-scape* tool to make available for the students: writing, drawing, audio, video, photo, mind mapping and spreadsheets. The students could download and upload files and work collaboratively. The teachers in each school designed their own tasks in various subjects such as: Biology, Design & Technology, Electronics, Civic Studies, Photography and Multi-Disciplinary studies (integrating geography, biology, civic laws and environment studies). Each task had to include the development of a product or project and an e-portfolio. Some projects were as short as 1-5 lessons and some as long as 4-6 months. The teachers had the challenge of coaching the learners to demonstrate their capabilities in their project whilst also helping them to construct the new knowledge and skills that they needed. For the teachers this was both a pedagogical change as well as a change in the assessment methods. Harlen and Deakin-Crick describe two key purposes of assessment as follows.

If the purpose is to help in decisions about how to advance learning and the judgement is about the next steps in learning and how to take them, then the assessment is formative in function. If the purpose is to summarise the learning that had taken place in order to grade, certificate or record progress, then the assessment is summative in function. (Harlen & Deakin Crick, 2002, p.1)

The teachers were learning to use *e-scape* for both summative and formative assessments. They guided and tutored the student's progress during the process by giving feedback and support. At the end they gave their summative assessment according to the criteria of the subject matter.

During the second year of the project the same six schools were involved. Some of the teachers continued with new and different projects and some new teachers joined in. The following brief case study illustrates the approach, as adopted by one school.

One school's experience

The project was in Science and Technology with 9th grade students and it lasted five months. The students worked in groups of 3-4. In each project there was an integration of technology problem

solving with science inquiry. During the process each group had to identify an authentic problem, learn about it from the internet, books and experts, making some sciences inquiry; document it in *e-scape* according to the "task boxes" that their teacher designed for them. For example, a group of four boys that worked on the problem: How to design the best bicycle for doing the fastest 'wheelie'. The boys analysed the structures of various bicycles, filmed the testing of each to see which was best for doing a 'wheelie' and then, based on their new understandings of science laws picked the best components and assembled a new bike to win 'wheelie' competitions. Almost the entire documentation of their process was conducted via the video tool in *e-scape*.



Figure 3: documenting bicycle 'wheelies'

Along the process the teacher tutored the students, listening to them during the lessons, helping them with their difficulties and giving formative assessment feedback. At the end of the project students presented their work to technology, science and education experts from a nearby college who, along with the teacher, made summative assessment of each group according to specific criteria. The group that researched the 'wheelies' received the highest score from the panel, out of nine groups. The teacher considered that by using video to document their project they were able to think and understand better what they were learning. On commenting on their presentation she said

... actually, they know everything, they explained everything. For most of the children today it is better for them to speak to think how to write. ... They prefer to speak than to write. And if it is film then we can see them better. They like it, most of the children like it. (AMP Teacher Interview data, 2012)

This teacher had also used the video facility with students in the first year of the project. The following comments from the students show how valuable they saw this response mode.

Student 1. I thought this was really interesting. Normally when I do projects I will write. When I write I use a very official language. When I was doing this project it was interesting because I would just speak and my teacher was seeing a video of me speaking about my work rather than writing very formally, that's very interesting. It gives me an idea of a different way to work and express myself.

Student 2. I think when we did this the teacher could tell more about what we were saying and also understand better what we were saying. It was more of a conversation rather than a report. (Stables & Lawler, 2011, p.16)

The evaluation of the AMP pilot project

The evaluation of the project was led by TERU and was based on the following components:

- (a) Teachers and students questionnaires (only in the 1st year)
- (b) Teachers and students' focus groups interviews (1st and 2nd year).

The questionnaire was based on a series of statements with Likert-style responses (a four point scale from strongly agree to strongly disagree).

The semi-structured interviews and focus group discussions were structured around a parallel set of questions, as shown in Table 1. In both interviews and focus groups it was made clear that ideas and views were more important than good spoken English and a translator (Hebrew/English) was available at each interview and discussion.

| Overarching questions to teachers | Overarching questions to students |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Explanation of evaluation and role of interviewers | Explanation of evaluation and role of interviewers |
| Tell us about the project. Has it been successful? | Tell us about what you have been doing. Has it been fun? |
| Has the netbook and its facilities (writing, drawing, photos, audio, video etc) been good for project work? | Has the netbook and its facilities (writing, drawing, photos, audio, video etc) been good for project work? |
| Has the authoring tool been good for planning your curriculum and project? | |
| Has the authoring tool been versatile? | |
| Has it been a good way to get the students to think? | Is the approach a good way for you to think about your work – what you have done, what you will do next? |
| Has it been good in developing the students' ability to communicate? | Is using this approach a good way to communicate your ideas? |
| Has it impacted on the quality of learning? | Is it a good way to learn? |
| Is this a good way to assess, both formatively and summatively? | Is it a good and fair way to be assessed? |
| Overall, what are the best features and what needs changing, improving? | Overall, what are the best features and what needs changing, improving? |

Table 1 Overarching questions to teachers and students

This paper focuses on one of the aims of the evaluation: Do the teachers and students think that the *e-scape* approach and tools are a good way of developing and operating curriculum that supports formative and summative assessment?

Findings

Overall reactions

In interviews and focus group discussions, the teachers and students mentioned that the system encouraged flexible processes, was good for documenting work through the various tools and for reflections and corrections. They also thought it good for self and peer assessment and teacher

formative assessment in ‘real time’. Students and teachers also pointed out that the *e-scape* portfolio enabled them to work in an organized way whilst also thinking creatively and ‘out of the box’. From the Year 1 student questionnaire, which focused on using the NetBooks (seen at the time as a more helpful surrogate than using the term ‘*e-scape*’), there was strong agreement that the system supported project work, showed what students could do, helped thinking and helped learning, (see Chart 1). In discussions students also said that they found the approach fun and interesting and that it increased motivation and engagement.

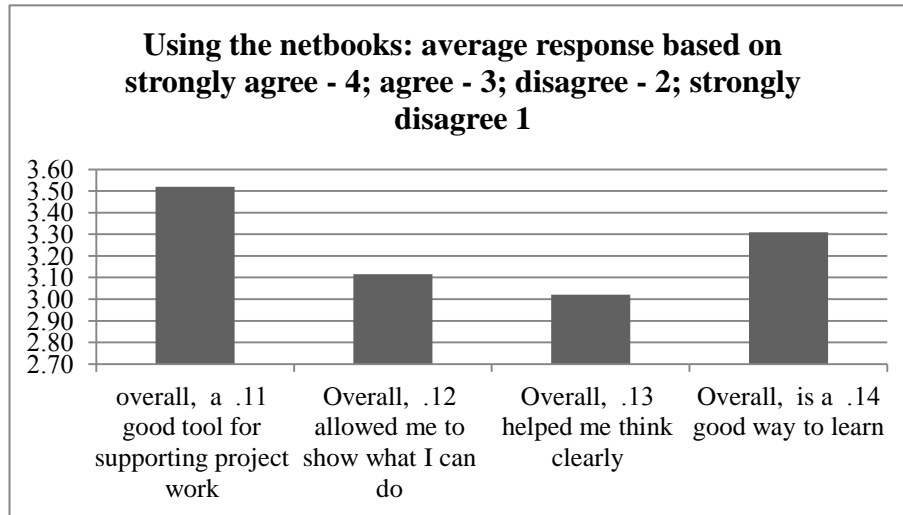


Chart 1: reaction to using the netbooks (*e-scape*)

From across the evaluation data, the following themes and issues emerged.

Formative assessment

The teachers found that they could assess student processes through the task as they occurred and could give useful formative feedback that improved performance. A common view was how the system also supported self and peer assessment, built directly out of the opportunities for students to reflect on their own and others work and to look back through the boxes in their portfolios and to continuously improve and edit their work. For a teacher working with Special Education Needs students, it was particularly useful in this respect. It was the first time the students had realized that *they could* assess themselves; it wasn't just the responsibility of the teacher!

Students' comments also show their appreciation of formative assessment, although interestingly there was some recognition that too much feedback could make them too dependent on the teacher. Both viewpoints are illustrated in the following comments taken from one focus group discussion.

... We tend to get marking at the end but not often in the middle. It improves my mark because if I get a mark halfway then I know how I can improve it before the end.

... Because the teacher can correct the small things as you go along - the end result will be better, it will be more perfect.

... I don't think it would be good all the time because we wouldn't learn how to fix our own mistakes. (Stables & Lawler, 2011, p.16)

Teachers who made use of the online audio and text feedback tool found this very important. For one teacher who was less convinced of the overall value of the system, this tool was the feature she appreciated most. Other teachers commented on how using this tool not only allowed them to provide feedback, but to do it in a way that supported autonomy, as the students could respond to the feedback in whatever way they personally saw as best. The students appreciated being given feedback in this way, partly because it was novel, but mainly because it gave personalised insight into how to make improvements as they progressed their project.

A major weakness for peer assessment was identified – the lack of ability for all students to see each other’s portfolio. Teachers could overcome this by showing a whole class an individual portfolio via a data projector (should one be available), but this did not meet the desires of students to be able to share their work in ways that paralleled sharing via social media sites. This raised a broader issue about the ability of educational software to keep pace more generally with the expectations of young people, based on their technological experiences outside of schools.

Finally, an issue was raised about the challenge of using traditional ‘marking’ processes, such as ongoing identification of minor errors, spelling mistakes etc in students’ work. While it is possible to do this within the system, the practicalities of quickly writing on a student’s work are not available, reducing the flexibility and comprehensiveness of the system as it currently exists.

Communicating thinking processes and the value of interactions

One of the teachers commented on how *e-scape* helped him create a range of interactions - between the student and his/her process and thinking processes, between the student and teacher, between the student and teammates, and between the student and an external assessor. This was particularly apparent where teachers were using the facility within the system that allowed a small group to exchange work between netbooks for the purpose of peer collaboration or feedback. There was a sense that the system ‘upped the stakes’ for documenting.

When they have to evaluate another one’s work and say good things, not only the bad things ... they have to think and organise their thinking and their words and it does help them. When they know that another one of their friends is going to see their work and tell them his opinion it's more important for them that it is okay. (Stables & Lawler, 2011, p.10)

A different area that provoked reflection for one teacher was the small number of students who didn’t want anyone to see work in progress – something that the digital portfolio specialised in. They were anxious not to expose early thinking and consequently negated the possibility of receiving and responding to formative feedback.

I think some of them are not willing to write something if they are not sure it's right. If it is a mistake [on paper] you can erase it. It was a bit frightening for some in this class. Working like this I can see the whole process but some of them just want me to see the finished neat version. The polished thing. (Stables & Lawler, 2011, p.11)

However, this contrasted with the candid comment of one student who saw some value of a system that gave no place to hide!

... it was important to be able to go back and look at what we have done and to do it again, if it could be made better or to think about what we have done so that we can move on. The teacher was able to see what work we had done. It wasn't possible to hide behind anything compared with bits of paper and the teacher was better informed as to what we have done” (Stables & Lawler, 2012, p?)

These comments highlight both pedagogic and personal learning issues and contributes to comments made by other teachers about the need for students to be experienced with the system and to feel confident enough to take risks and make mistakes, particularly if used for summative assessment in high stakes contexts.

Choice of tools for documenting

As was shown in the example of the ‘wheelie’ science & technology project, teachers could choose tight or flexible options for students in tools available to them at any given time. This opened up very significant assessment issues – if a student’s capability and understanding demonstrated in an authentic context is important, should there be any restrictions on the way their skills and understandings are documented? In an assessment context should learners be able

to choose digital tools that play to their own learning styles? It was clear from the evaluation that teachers working with Special Educational Needs students thought that they should. Generally the students liked to have choice and audio, video and photographing were more popular than anything text based. The 'wheelies' science project exemplified this well. But for some there was still a sense that for high stakes, or as one student put it 'official' assessment, writing was important.

Teachers were generally content that the students tended not to choose text as a main means of documenting. One teacher commented that students do "excellent things when they don't have to write" (Stables & Lawler, 2012, p.6). The same teacher commented on what happened when students who were used to the system weren't given options.

When I didn't give them the opportunity to record, because I didn't think about it, they said "Oh! you forgot to give us the opportunity to record. We want to record now. Let us record, let us take a photo." So I like it very much, because they knew the tools, they had thoughts about how to use them better from their side. (Stables & Lawler, 2012 p.10)

Organising and managing work for assessment

The teacher reviews in the 1st year evaluation showed that the link between the ways the students used the communication tools in the system for documenting reflection also had very close links with how assessment was being supported. This was partly a very practical issue – the ability to have all work in one place, students not losing work or not showing it to the teacher – the ability to see the whole process as it unfolded. But the students also pointed out that *e-scape* helped them in their learning processes as they could see the big picture and their progress more clearly. They felt that projects were more organized and that the structure helped them to reflect on what they had done, go back and develop their work further or move on to next steps. Teachers found that the systematic way in which the authoring tool was used to structure the task meant that they gave more thought to each stage in a project, that they spent more time planning, and that they were more precise in the way they created instructions through the authoring tool. Interestingly they felt that this resulted in the students being able to work more autonomously, as both the student and the teacher had clear view of the task and also of the evidence of learning, progress and achievements. Pedagogically teachers found planning at this level of detail a challenge, but working with the system they also found that the experienced increased their skills in planning for learning and assessment.

I think that is a very good system. It takes a big problem and breaks it into small pieces. It's like a puzzle that you fit the pieces together and at the end you have a completed project. It's a very good system for making the teacher have an understanding of the whole thing and the pieces. But is also good for the pupils because they don't have too much to do at any one time and can have a view of the whole thing as they go along. (Stables and Lawler, 2012, p. 5)

The potential for summative assessment

The students offered a range of ideas for how *e-scape* could be part of summative assessment: how it showed their process as well as their products; the advantage in large classes to being to understand each student's work; how it made assessing teamwork easier; how it made assessment more interesting for the examiner; and the easing the gender differences (as girls were seen to be more nervous about tests). They also highlighted how it showed their whole process, not just the end product, as the following student comment illustrates.

It allows you to show the whole process, that's what makes it special. Compared to if I give the person the project on paper, if they use this system they will see the whole process a lot more clearly. You are not only seeing the results. You are seeing the process of how we got there. (Stables & Lawler, 2011, p.17)

Where teachers are using *e-scape* for summative assessment there are some very positive stories, particularly where it is being used to document a detailed and rich account of students' projects, as was shown in the 'wheelie' science project. Whilst in some instances the projects teachers developed were short, and so summatively assessing quite a limited range of skills and understandings, some teachers took on very complex projects where *e-scape* really came into its own. One project in Interdisciplinary Studies engaged the students in a local issue – bringing a major new road to their town. The students researched a wide range of aspects of the project and used the software to conduct fieldwork, interviewing local residents etc. At the end of the project they made a major presentation of their findings and ideas to the local council and community. Reflecting back on this project the teacher felt that real learning took place with formative and summative assessment fully integrated into the project. One year on, the learners are still looking back at the project and remembering it with pleasure.

Further aspects supporting the potential for summative assessment included comments that no work was lost and that assessment could be done anywhere with an internet connection, without having to transport heavy project folders. The ability to include assessment of work done outside of normal classrooms, for example on field trips, was also valued with teachers seeing the possibilities of opening up assessment to parts of the curriculum that don't lend themselves to written examinations.

Technical problems hindering assessment

There were concerns raised about technical problems. Not surprisingly it was felt that any system to be used for summative, high stakes, assessment had to have no technical glitches – and teachers did report a considerable number of these through the duration of the project. In addition issues were raised about the range of files and data that would be needed, for example in engineering project assessments, concerns being expressed about the ability of the system to cope with specific software uploads. All of these issues have been reported back to the initial development team.

Conclusions

AMP project aims were to find out how the use of new approach and tools (*e-scape*) could support the development of students' thinking, reflecting, learning and documenting skills and how it could enhance formative and summative assessment. We examined these issues by using questionnaires and interviews in an evaluation process as described previously (Stables & Lawler, 2011, 2012).

In spite of some difficulties that we had in this pilot project, such as: technical, organizational and pedagogical (Dagan, 2011), we could see that this experience of learning with the *e-scape* and the notebooks had some advantages for learning processes especially for formative assessment and for summative assessment processes as well. The teachers mentioned that all the students were very motivated to work in this project, and they pointed out that students with special needs benefit a lot from the approach. They have the opportunity to use the multi-functionality of the technology (i.e. to record or use video instead of writing) and they receive a task that is organized in smaller, more manageable steps. The students, in all the projects in different ages and working on different subjects disciplines were able to capture the evidence of their thinking and actions through a portfolio. They found it a fun and motivating way to work and, importantly, that the tools were good for developing their ideas and for organizing a portfolio that showed their learning.

Answering one of our evaluation question: "Do the teachers and students think that the *e-scape* approach and tools are a good way of developing and operating curriculum that supports formative and summative assessment?" the data shows that even if the teachers in this project didn't use the ACJ engine for summative assessment, they used the system to organize the

project, they used new pedagogy for teaching; they could assess the portfolio during the development process; and they could assess the students' work summatively by looking at the *e-scape* e-portfolio as a whole and judging each task-box in detail, according to the subject criteria. From the students answers they pointed out that they welcomed the new pedagogical approach that supported their thinking and reflecting processes, they welcomed using different media that supported those skills, and getting real time feedback along the way that could help them to improve their performance.

In respect of the following issues: formative assessment; communicating thinking processes and the value of interactions; choice of tools for documenting; organising and managing work for assessment; the potential for summative assessment and technical problems hindering assessment, the data support the view that, in overall terms, the teachers were positive about the pedagogical potential of *e-scape*. The findings indicated that working with the teachers while developing tasks and implementing them in classrooms developed teachers' pedagogy and their ability to help the students to work towards better performance. The combination of using formative and summative assessment improved the students' skills and performances.

**e-scape* software, now available commercially as "Live Assess", was developed jointly by TERU and TAG Assessment. It has been used in assessment projects in a number of countries, including England, Scotland, Sweden, Ireland, Australia and Israel.

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