TeSLA: multifactor verification for online assessment
Chris Edwards
The Open University, UK

Just to let you know:
By participating in the webinar you acknowledge and agree that:
The session may be recorded, including voice and text chat communications (a recording indicator is shown inside the webinar room when this is the case). We may release recordings freely to the public which become part of the public record. We may use session recordings for quality improvement, or as part of further research and publications.

Webinar Hosts
Professor Geoff Crisp,
Deputy Vice-Chancellor & Vice-President Academic
University of Canberra
g.crisp[at]canberra.edu.au

Dr Mathew Hillier,
Academic Lead: Digital Assessment,
University of New South Wales
m.hillier[at]unsw.edu.au
MULTIFACTOR VERIFICATION FOR ONLINE ASSESSMENT

Professor Denise Whitelock, Chris Edwards, and Alexandra Okada

chris.edwards@open.ac.uk
1. Outline of project
2. TeLSA suite
3. Pilots
4. Findings
5. Lastly...
EU HORIZON 2020 Funded Project

18 partner organisations

Completed with final review May 2019
There were a lack of technologies to support authorship and authentication.

TeSLA system is now the cornerstone technology.

There were not a European framework on e-assessment.

An e-assessment framework created by Quality Assurance Agencies is launched.

We needed
Resolve the gap in the current online evaluation system.

TeSLA

It is the solution for e-assessment

Gap is covered!
Project timeline Main results and outputs

**TeSLA**

**Requirements**
- TeSLA instruments
  - Voice Recognition + antispooing
  - Face Recognition + antispooing
  - Keystroke Dynamics
  - Forensic Analysis
  - Plagiarism
  - Time Stamping

**Technology**
- Quality experts panels preparation
- Plug-ins & external tools definition, risk plan
- TeSLA system (alpha)
- TeSLA system (beta)
- TeSLA system (release candidate), technical specs prepared for integration
- TeSLA system Final version

**EAB (External Advisory Board)**
- Management, Dissemination, Exploitation
- Legal / Ethical
  - Legal & Privacy
  - Consent forms
  - DPA, DSA
- Educational
  - Educational analysis
  - Real scenarios analysis
  - E-assessment patterns
- Pedagogical
  - SEND analysis
- Quality
  - Framework analysis
  - Indicators definition

**ELAG (Ethical and Legal Advisory Group)**
- Pilot Third Parties
- 1st Pilot (up to 6K students)
  - Achieved: 607
- 2nd Pilot (up to 5K students)
  - Achieved: 4,031
- 3rd Pilot (a) (up to 7K students)
  - Achieved: 7,327
- 3rd Pilot (b) (up to 10K students)
  - Achieved: 10,980
- Results
  - SEND
  - Achieved: 22,942 students

**FRAMEWORKS**
- Common Educational Model
- E-assessment model
- Quality assurance
- Legal & ethical

**IPR & Fair DMP**
- Exploitation Plan and agreement
- 7 learning scenarios

**EVALUATION**
- Questionnaires (pre/post), focus, SEND, interviews, contingency plans

**FINAL EVALUATION**
- Data from the system
- Audit data for teachers & statistical results
- ELAG
IMAGINE...

• If we could be certain that work submitted was the student's own
• We would be freed from one of the main constraints in the assessment of online distance learners
• Opportunities for more varied and enriched assessment would increase

Academic integrity...
CONTENTS...

1. Outline of project
2. TeLSA suite
3. Pilots
4. Findings
5. Lastly...
TeSLA is a step towards this goal

The TeSLA system Incorporates several tools within a VLE...

Face recognition and anti-spoofing

Voice recognition and anti-spoofing

Plagiarism, and authorship validation.

Keystroke patterns

Face recognition

Voice recognition

Plagiarism detection

Forensic analysis

Keystroke dynamics

https://tesla-project.eu
LEARNER – ENROLMENT ACTIVITY

LTI Learner Tool
Enrolment activities
LEARNER – ASSESSMENT ACTIVITY

[Diagram showing the flow from learner to cloud, then to server, and finally to a document output.]
### NEXT STEPS

**Join summary (All available information)**

**Summary at instrument level. Only types valid for each instrument**

1. This will be the name of the learner in LTI
2. Allows to see the detailed information

---

- **Information about learner identity**
- **Information on the document contents (authorship)**
- **Security information (Anti-spoofing tools)**

- **No information available**
  - We have a good confidence that everything is correct
  - Information is not good enough or is contradictory (Review)
  - Information tell us that probably is a cheating case
### USER ROLES

**TeSLA Admin**
- TeSLA cloud management and monitoring
- Software versions management
- Licence management
- Institution access management

**Institution Admin**
- Institution cloud management and monitoring
- Apply software updates
- Scale system according to assessment needs

**Learner**
- Accept Informed Consent
- Perform enrolment activities
- Perform assessment activities

**Instructor**
- Select instruments for activities
- Review TeSLA results for each activity

**Institution Roles**
- **Legal**
  - Manage content and versions of the Informed Consent [GDPR]
- **Data management**
  - Remove learner data [GDPR]
  - Remove old activities data [GDPR]
- **SEND**
  - Define SEND categories
  - Manage learners SEND data
- **Result analysis [Alpha]**
  - Statistical information
  - Global access to TeSLA results for learners (Course, Semester, Degree, …)
CONTENTS...

1. Outline of project
2. TeLSA suite
3. Pilots
4. Findings
5. Lastly...
18 PARTNERS INCLUDING 7 PILOT INSTITUTIONS
TeSLA: embedding the suite of tools in course assessment

Design and produce curriculum

TeSLA experience

Student

Test taker completes the assessment as he/she would normally do. TeSLA may require input/interaction during the test to be able to complete continuous analysis around identity and authorship during the test.

Report of work

Faculty members can access a full report of work authenticity and authorship together with the assessment responses.
Pilots: numbers

PILOT 1
- 637 students
- 22 teachers in 24 courses

PILOT 2
- 4,931 students
- 43 teachers - 125 courses

PILOT 3
- 17,373 students
- 392 teachers - 310 courses
Participants: subject studied

Figure 1: Field of study
Figure 3: Language of the courses – pilot 3A and 3B

Participants: language of study
51% of the students involved in pilot 3 were female and 49% were male.
We collected data on 532 activities (274 in pilot 3A and 258 in pilot 3B) in 310 courses (144 in pilot 3A and 166 in pilot 3B).

<table>
<thead>
<tr>
<th>Query</th>
<th>Response</th>
<th>% of student-activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>How was the assessment used?</td>
<td>Diagnostic</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Formative</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>Formative &amp; summative</td>
<td>58%</td>
</tr>
<tr>
<td></td>
<td>Summative</td>
<td>11%</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>8%</td>
</tr>
<tr>
<td>Was the assessment supervised?</td>
<td>Supervised</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>Unsupervised</td>
<td>88%</td>
</tr>
<tr>
<td>Was the assessment individual or collaborative?</td>
<td>Collaborative</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Individual</td>
<td>94%</td>
</tr>
<tr>
<td></td>
<td>Individual &amp; collaborative</td>
<td>4%</td>
</tr>
<tr>
<td>What was the type of response required in the assessment activity?</td>
<td>Select answer</td>
<td>17%</td>
</tr>
<tr>
<td></td>
<td>Create answer or product</td>
<td>73%</td>
</tr>
<tr>
<td></td>
<td>Perform/enact/demonstrate</td>
<td>11%</td>
</tr>
<tr>
<td>What was the response format for response type <code>Create answer or product</code>?</td>
<td>Audio</td>
<td>11%</td>
</tr>
<tr>
<td></td>
<td>Video</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td><strong>Text (natural language or code)</strong></td>
<td>76%</td>
</tr>
<tr>
<td></td>
<td>Artefact (e.g. a painting, a meal, sheet music)</td>
<td>1%</td>
</tr>
</tbody>
</table>
Note: Some partners had difficulties in identification and recruitment of SEND students, and some partners were restricted by institutional regulation.
The groups of SEND students that are most vulnerable in this respect are the blind and partially sighted students and the deaf students.

They are affected by most of the limitations of the TeSLA.

This means that the optimisation of the user interface, flexibility and adaptability of the individual instruments and interactivity/feedback of the system should be done taking into account the specific needs of this particular group of students.

The interface should be easy to navigate and usable with assistive technologies such as screen readers, and the system should be accessible through different browsers. In order to increase the usability of the system, the registration procedure needs to be as simple and clear as possible and the real assessments activities should be tailored to the student's individual abilities.

In addition, the tutors should design the assessment activities with alternative options for the use of TeSLA instruments. This could be a combination of instruments allowing a student to choose which of them is most accessible and least disturbing for her in terms of her disability.
CONTENTS...

1. Outline of project
2. TeLSA suite
3. Pilots
4. Findings
5. Lastly…
Outcomes: Students

positive experience for more than 50% of the students

>70% of participating students considered the key advantages of e-assessment with e-authentication to be: “to ensure that my examination results are trusted” and “to prove that my essay is my own original work”.

The most popular TeSLA instruments for students were Forensic Analysis and Anti-Plagiarism: these instruments were less intrusive. And less time was required for their use.

Many felt e-authentication would increase trust in e-assessment for students, institutions and employees.

The most popular reasons given included: e-authentication would make it more difficult for students to cheat.
Outcomes: Staff

were satisfied or very satisfied with the TeSLA experience (particularly TUS 70% and SU 100%).

Most teaching staff agreed that the use of TeSLA “will increase trust of e-assessment among universities and employers” and “it will help participants trust the outcomes of e-assessment”.

further improvements (ease of implementation, interoperability, graphical user interface, browsers and OS compatibility) would be welcome.

e-authentication made new types of assessments possible for the first time.

Almost all the would recommend TeSLA to a colleague and would be willing to adopt it in their institution*

*(those who wouldn’t were only concerned about the technical implementation of the prototype system in their institutions’ existing systems.)
Some other findings

The Technology Acceptance Model was modified to include a dimension of risk/trust and considered as a way to frame the introduction of e-authentication technologies. We found that when considering impact on trust – even for trusting individuals in a trusted institution and positively disposed to e-authentication – trust cannot be taken for granted. (Edwards et al, 2018a)

When designed into a course, TeSLA can be used with both formative and summative assessment when 'both the embeddedness and immediacy of the tool are used to improve learning and constructive alignment between learning outcomes, learning and assessment could be supported.' (Edwards et al, 2018b)

Cluster analysis findings: 'large majorities of [OU] participants correctly identifying what constituted cheating in online assessments.'; that 'broadly positive acceptance of and trust in e-authentication for online assessments' with women holding slightly higher levels of trust and confidence 'that e-authentication has the potential to enhance the quality of and trustworthiness of online assessments.'; Younger students tended to be 'are more concerned about data privacy, security and safety.' (Okada et al, 2019a)
Publications: to date
ORO.open.ac.uk

Bektik, Duygu; Cross, Simon; Holmes, Wayne; Aleksieva, Lyubka and Whitelock, Denise (2017). A European pilot study of a modular assessment system designed to authenticate the authorship of online learners. In: CALRG Annual Conference 2017, 14-16 Jun, The Open University, Milton Keynes, UK.


Edwards, Chris; Whitelock, Denise; Brouns, Francis; Rodríguez, M. Elena; Okada, Alexandra; Baneres, David and Holmes, Wayne (2019). An embedded approach to plagiarism detection using the TeSLA e-authentication system. In: TEA 2018 Technology Enhanced Assessment Conference, 10-11 Dec, Amsterdam, the Netherlands.


1. Outline of project
2. TeLSA suite
3. Pilots
4. Findings
5. Lastly…
FOLLOWING UP...

For information about exploring TeSLA further, contact Ana Elena Guerrero Roldan aguerrerror@uoc.edu

https://tesla-project.eu
Thank you

chris.edwards@open.ac.uk
Webinar Session feedback

With thanks from your hosts

Professor Geoff Crisp,
Deputy Vice-Chancellor & Vice-President Academic
University of Canberra
g.crisp[at]canberra.edu.au

Dr Mathew Hillier,
Academic Lead: Digital Assessment,
University of New South Wales
m.hillier[at]unsw.edu.au

Recording available
http://transformingassessment.com