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Author(s)

Name: Esther Huertas

Position: Project manager

Organisation: AQU Catalunya (Catalan University Quality Assurance Agency)

Country: Spain

E-mail address: ehuertashidalgo@aqu.cat

Short bio (150 words max): Dr. Esther Huertas received her qualification as Agronomist Engineer from the Polytechnic University of Catalonia and her B.S. (Food Science and Technology) and M.S. (Environmental Sciences) degrees from the University of Barcelona. She has also received her Ph.D. in Chemical Engineering from the University of Barcelona. In her first appointment, Huertas served as a researcher at the University of Barcelona and followed her professional activity as an assistant professor at the University of Barcelona for three years. She began to collaborate with AQU Catalunya as a student expert at TEEP II project, and in 2006 she got a position at the Quality Assurance Department of the Agency. Huertas has been involved in different international groups as the European Consortium for Accreditation and AUDIT network. She is currently the work package leader of *Quality assurance in online higher education* in TeSLA project and the chair of ENQA's working group of e-learning.

Name: Roger Roca (Presenting)

Position: Project manager

Organisation: AQU Catalunya **(**Catalan University Quality Assurance Agency)

Country: Spain

E-mail address: rroca@aqu.cat

Short bio (150 words max): Roger Roca studied Translation and Interpreting at the University of Vic – Central University of Catalonia (UVic-UCC) where he obtained his Bachelor's degree on 2014. During his specialisation in audiovisual translation, he took part in several programme evaluations as student expert for AQU Catalunya (The Catalan University Quality Assurance Agency), where he gained experience in the quality assurance processes in Higher Education. In 2016, he joined the agency to work on the TeSLA project, being part of work package 4 (*Quality assurance in online higher education*).

His main role in the project focus on the development of methodologies and evaluation tasks. Moreover, he is the secretary of the core review panel of the TeSLA project (head panel).

Name: Jana Moehren

Position: Secretary General

Organisation: EQANIE (European Quality Assurance Network for Informatics Education)

Country: Germany

E-mail address: moehren@eqanie.eu

Short bio (150 words max): Jana has been involved in international quality assurance for higher and further education since 2006. She has been Secretary General of EQANIE since 2012, implementing accreditation procedures all around the world. She has led international projects, trainings and workshops in internal and external quality assurance, capacity building and education management. She has also participated in an agency review coordinated by ENQA as well as in the frame of EU-financed projects. She holds a Master degree in languages, business and cultural studies and is currently studying an MBA Education Leadership & Management in Canterbury, UK.

Name: Paula Ranne

Position: Deputy Director

Organisation: ENQA (European Association for Quality Assurance in Higher Education)

Country: Brussels

E-mail address: Paula.RANNE@enqa.eu

Short bio (150 words max): Paula Ranne is the Deputy Director of ENQA. She worked for ENQA in Helsinki, Finland, during 2008-2011 and joined the association again in 2014. Before rejoining ENQA, Paula worked in Finland in positions relating to higher education and science policies in all academic fields. Most recently, she worked at Universities Finland UNIFI as Senior Advisor, where one of her main responsibilities was the launching of a national student survey, which was taken into use in all Finnish universities in 2013. Paula holds a Master of Social Sciences degree with a major in social policy and other studies including management and political science. At ENQA, she is responsible for several statutory and planning duties of the association, as well as for coordinating ENQA's involvement in projects.

Name: Anaïs Gourdin

Position: Project and finance officer

Organisation: ENQA (European Association for Quality Assurance in Higher Education)

Country: Brussels

E-mail address: Anais.Gourdin@enqa.eu

Short bio (150 words max): Anaïs Gourdin has been working as the Project and Finance Officer for ENQA since June 2014. Anaïs joined ENQA in 2012, first as a trainee and then as Administrative Assistant. Her main tasks include managing financial and human resources matters for the association and coordinating ENQA's involvement in several EU projects. Anaïs studied foreign languages applied to international affairs and project management and is a graduate of Université Jean Monnet, Saint Etienne and Aix-Marseille Université.

Proposal

Title: External evaluation of e-assessment – a conceptual design of elements to be considered

Abstract (150 words max): The ever-changing landscape of higher education and the rapid technology advancement are leading to new ways of teaching and assessing. Accordingly, quality assurance (QA) must adapt to these changes to give confidence in these new realities. In the scope of the TeSLA project, QA processes aim to assure and guarantee the quality of an e-assessment system using authentication and authorship instruments. The achievement of this aim will contribute to the enhancement of educational quality in the different forms of e-learning (always in compliance with the ESG). Consequently, the proven achievement of desired learning outcomes and competencies will also increase the trust and reliability in these forms of education provision. In order to identify the essential elements for a proper evaluation, this paper first presents the overall structure and aims of TeSLA project after which it discusses in more detail the QA methodology applied in the evaluation of the TeSLA system.

The paper is based on: Research

Has this paper previously been published/presented elsewhere? No

Text of paper (3000 words max):

I. Introduction

E-learning provision is becoming more widespread in the European Higher Education Area (EHEA). Leaving aside the discussion of the challenges of new or different modes of programme delivering, this paper is going to focus on the quality concept in e-learning with a special attention to the e-assessment.

The concept of quality in e-learning is as complex as the reality of e-learning itself and is the object of analysis of different authors [1, 2, 3] and organisations [4, 5, 6, 7, 8]. If we explore different quality experiences around the world, common aspects are identified as: institutional support, course development, teaching and learning, course structure, student support, faculty support, technology, evaluation, student assessment, and examination security [2]. In light of the European Standards and Guidelines (ESG), some authors suggested that the ESG are not contradictory to the generation of relevant opportunities for innovation and enhancement of the quality assurance process in higher education, and in e-learning in particular [9]. Moreover, the ESG apply to all higher education offered in the EHEA regardless of the mode of study or place of delivery [10]. This means that e-learning provision and institutions delivering such provision are under the same umbrella as the traditional higher education system.

Assessment is a key element of curriculum design that is fundamental to the learning process. Assessment methods are of prime pedagogical importance as they are directly related to the teaching and learning provision and the student experiences during their courses. Accordingly, assessment methods should be planned and aligned with the learning outcomes within the instructional design process to enhance the quality of online learning. Online learning environments offer increased flexibility for assessment and can be used to encourage the development of creativity, critical thinking and in-depth subject matter knowledge [2].

Within the framework of the TeSLA project (http://tesla-project.eu/) aiming at developing an adaptive trust-based e-assessment system for learning, the quality assurance partners of the project have worked on an assessment methodology for the evaluation of the TeSLA system and its implementation. This methodology has been designed to assure the applicability of the system to all online and blended learning environments respecting a set of standards that guarantee its integrity and reliability. The goal of this paper is to present the work performed on the assessment methodology at this stage. The paper will provide an introduction to the project and an explanation of the technology used in the project and pilots aim. Besides, an explanation of ESG applied to TeSLA project and the methodology used for the

definition of the external evaluation in TeSLA project is included in this section. Finally, the current version of the standards for e-assessment as developed by the project is described.

II. TeSLA description

The TeSLA project - http://tesla-project.eu/ - ("An Adaptive Trust-based e-assessment System for Learning") is a Horizon 2020 project with a consortium of 18 partners: 8 universities, 3 quality agencies, 4 research centres and 3 enterprises. It runs from January 2016 to December 2018.

The main goal of the TeSLA project is to define and develop an e-assessment system that will be able to ensure learners authentication and authorship through the integration and combination of selected technologies. The system will be applicable to online and blended learning environments while avoiding the time and physical space limitations imposed by face-to-face examination. It will support both continuous and final assessment to improve the trust level across students, teachers and institutions. The project takes into account different teaching and learning processes as well as QA aspects, privacy and ethical issues and technological requirements. It will also open up new opportunities for learners with special needs as well as respecting social and cultural differences.

II.1. Authentication and authorship instruments in use in TeSLA

Instruments to ensure learner authentication and work authorship are the key to the TeSLA system. TeSLA will provide a unique portal where the teacher/instructor will be able to choose the most suitable technology/ies depending on the type of assessment in use in any specific course [11]. For these purposes, TeSLA distinguishes three main functionalities of instruments (biometrics, document analysis and security techniques) that will be integrated into a single portal (see Table 1).

Table 1. TeSLA instruments. Functionalities, description and typology [12]

Functionality	Description	Typology	Instruments
Biometrics	Allow the clear identification of humans based on some specific physical characteristics or special behaviour [13]	Authentication	• **Facial verification & recognition**: Analyses various information, such as expressions and movements. • **Voice recognition**: Through the Automatic Speaker Verification instrument, the student authentication will be verified by the voice. • **Keystroke dynamics**: Through the use of the keyboard, this instrument analyses the personal patterns of the student based on time information of pressed and released keys.
Document analysis	Involves the analysis of written material using a qualitative analysis package that describes discourse and its interpretation	FA: Authorship & Authentication PT: Authorship	• **Forensic analysis (FA):** Determines the authorship verification and authorship attribution of written documents. It is based on the comparison of current documents with stored data. • **Plagiarism tools (PT):** Detects similarities among various written documents.
Security techniques	Methods to deploy a security service provided by a layer of communicating systems.	Confidence	• **Digital signature and timestamp:** Guarantees the authenticity of a digital message or document by a mathematical scheme. Timestamp

			generates a sequence of encoded information identifying when an event is recorded.

II.2. TeSLA pilots

The research methodology of TeSLA project is based on pilot execution in order to test, evaluate and assure the reliability of the TeSLA system. The project conducts three different scale pilots with growing numbers of learners from 600 to 14,000 learners.

II.3. Application of the ESG to TeSLA project

When designing the quality assurance methodology for the TeSLA project, the ESG functioned as the core document. This applies both to the development of the elements for internal quality assurance (see below, section III) aligned to Part I: Standards and guidelines for internal quality assurance of the ESG as well as to the design of the external review methodology for the pilots.

In relation to the external quality assurance in the TeSLA project, the focus is on Part II: Standards and guidelines for external quality assurance of the ESG, and the methodology is designed focusing on standards applicable and adapted to the context of e-assessment and the TeSLA system overall. When designing the methodology for the external review of the pilots during the project, some of the standards were therefore found to be of particular importance. Nevertheless, out of the context of the project and in designing a generally applicable methodology, all standards of Part II of the ESG should be considered with regard to their applicability for the external review of online or blended learning provision. Due to the pilot nature of the project, it was carefully determined that external quality assurance procedures should have processes that are fit for purpose (ESG 2.2), should be carried out by groups of external experts that include student members (ESG 2.4) and produce reports that are published, clear and accessible (ESG 2.6). These standards have been adapted specifically to the context of the TeSLA system as follows:

- **Designing methodologies fit for purpose**

"External quality assurance should be defined and designed specifically to ensure its fitness to achieve the aims and objectives set for it while taking into account relevant regulations. Stakeholders should be involved in its design and continuous improvement".

TeSLA applicability: this standard is considered to be the core of the process as the TeSLA context is rather specific and needs an external quality assurance that is adapted and designed specifically for it. The external QA process (including an assessment methodology) was designed fit-for-purpose by the three QA organisations: the Catalan University Quality Assurance Agency (AQU Catalunya), the European Association for Quality Assurance in Higher Education (ENQA) and European Quality Assurance Network for Informatics Education (EQANIE). Quality assurance in the project focuses on the TeSLA framework characteristics and on the features of the pilots.

- **Peer-review experts**

"External quality assurance should be carried out by groups of external experts that include (a) student member(s)".

TeSLA applicability: To ensure the reliability and fairness of the TeSLA review process, an open call for experts was launched. The selected experts are individuals of recognised position in either academic and/or professional field, including students, who are selected on the basis of independence, objectivity and the absence of any conflict of interests. Geographical and gender balance were also considered.

In order to address the specificities of TeSLA in the three pilots, two different types of panels of experts were defined: head panel and regular panels. The selected head panel participates in the review of all TeSLA pilots and contributes to the meta-evaluation process which is carried out after the end of each

pilot. In addition, this panel will make a systematic review of the assessment methodology and will verify the reports of the regular panels. The regular panels will carry out the review of pilots 2 and 3.

- **Reporting**

"Full reports by the experts should be published, clear and accessible to the academic community, external partners and other interested individuals. If the agency takes any formal decision based on the reports, the decision should be published together with the report".

TeSLA applicability: The reports by the external experts, as well as the meta-evaluation reports, will be disseminated to pilot universities and the consortium partners. These reports are the basis for the institution's follow-up action of the external evaluation. In order to gather findings and in particular recommendations for the rigorous implementation of the system, the reporting was considered relevant. This standard was applied only in part as it had to be adapted to the restrictions of the project.

II.4. Methodology used for the definition of the external evaluation in TeSLA project

In order to assure the applicability of the TeSLA system to all online and blended learning environments, while respecting a set of standards that guarantee its integrity and reliability, the quality assurance partners (ENQA, EQANIE and AQU Catalunya) designed an assessment methodology for the evaluation of the TeSLA system and its implementation. The first draft of the methodology was based on the partners' experience in quality assurance of different types of educational provision in different contexts. This first approach was revised and validated by the external experts of the head panel. The next step will be the implementation of the methodology by the regular panels during the evaluation of the second pilot. After this step, a meta-evaluation analysis of the review process will be organised, which will include the analysis of the methodology design. The improved methodology will be implemented during the third pilot of TeSLA project.

III. Relevant elements for the external evaluation of e-assessment

The ESG are designed in such broad terms that they are applicable to all higher education provision offered in the EHEA regardless of the mode of study or place of delivery. They thus ensure that all forms of education provision (face-to-face, online, blended, etc.) are equally subject to quality assurance. Indeed, all standards of the ESG are fully applicable to e-learning and thus, allow parity of consideration with the standard modes of provision of teaching and learning.

The development of standards and indicators for e-assessment ensured their alignment with the ESG [9], in particular Part I [14], while at the same time emphasising the specificities of e-assessment in higher education institutions. In this regard, the standards go beyond the mere technology of the TeSLA system, but also reflect educational and teaching & learning approaches to e-learning in general. As the evaluation of assessment practices is a complex process, it is imperative to ground the discussion on the perspective of the pedagogical design, and also to consider the existing internal quality assurance system to make sure the standards are genuinely fit for purpose.

The following elements are considered essential to be taken into consideration in the external evaluation of e-assessment and define the first assessment methodology. They form the basis of the current version of the assessment methodology that will be used by the regular panels for the evaluation of the second round of pilots.

1. Policies, structures, processes and resources for quality assurance of e-assessment

The institution has appropriate policies, structures, processes and resources to ensure that e-assessment is timely and fair, and it includes ethical and legal considerations. Besides, the proposal for the e-assessment is aligned with the pedagogical model of the institution and ensures the constant achievement of its objectives.

Main aspects:

Institution policies, structures, processes and resources are in place to provide guidance on:
   a) E-assessment organisation and protection against academic fraud.
   b) Accessibility to students with special educational needs.
   c) Adoption of new technologies to ensure the expected quality of e-assessment.
   d) Technical support.
   e) Electronic security measures.

E-assessment is aligned with the institutions' educational objectives and pedagogical models and it has mechanisms and processes in place to review and renew, if necessary, the e-assessment methods.

Quality assurance procedures for external partners providing e-assessment systems or services are in place.

2. Assessment of learning

E-assessment methods are varied, facilitate pedagogical innovation and determine rigorously the level of achievement of learning outcomes. They are consistent with course activities and resources and adapt to the diversity of learners and educational models.

Main aspects:

E-assessment methods and grading criteria are informed and consistently applied to demonstrate the achievement of intended learning outcomes. They reflect innovative pedagogical practices, encourage the use of a variety of assessment methods and understand the diversity of learners.

Constructive and developmental learning feedback is timely given to students and has satisfaction procedures and student appeals processes in place.

3. E-assessment system security, capacity and authenticity

The development and implementation of the e-assessment include protective measures that guarantee learner authentication and work authorship. The e-assessment system is secure and fit for purpose.

Main aspects:

The institution has an all-inclusive fail-safe technology development plan, including:
   a) Learner authentication and antiplagiarism technologies and procedures for data protection and privacy requirements.
   b) A system to support the building and maintenance of the infrastructure for e-assessment and processes for the ongoing review of technologies.
   c) A system to ensure the operability for the maximum number of users and secure against external attacks.

The student behaviour code includes specific elements related to cheating, plagiarism, sanctions and guidance on good practice.

4. Infrastructure and resources

The institution utilises the appropriate technologies that match the course content in order to enhance and expand learning for all types of students' needs.

Main aspects:

Procedures to determine satisfaction with VLE, including:
  a) Ease of use for all students.
  b) Ethical and legal aspects.
  c) Constant update in light of technological changes.
  d) Support of a variety of methods and tools.

The technical infrastructure has been sufficiently tested prior to its use and ensures sufficient coverage, the setup of the required technical system for its alignment with the different e-assessment methods and the accessibility of the e-assessment system by students with disabilities and special educational needs.

5. Student support

Students are aware, have access and use effective and well-resourced support services for counselling, orientation, tutoring and facilitation in order to increase retention and success. Student support covers pedagogical, technological and administrative related needs and is part of institutional policies and strategies.

Main aspects:

Institutions implement student support policies and strategies to allow students have access to timely and adequate support services according to their profiles, needs and IT skills. Satisfaction procedures with student support are in place.

6. Teaching staff

The teaching staff is skilled and well-supported in relation to technological and pedagogical requirements and e-assessment methods.

Main aspects:

The teaching staff is trained and proficient in the use of learning technologies and e-assessment methods. Otherwise, procedures to identify the support requirements of the teaching staff are in place.

Technical and pedagogical support services are adequate, accessible and timely to teaching staff and have satisfaction procedures in place.

7. Learning analytics

The institution has an information management system that enables agile, complete and representative collection of data and indicators derived from all aspects related to e-assessment methodology and authenticity and authorship technologies.

Main aspects:

The institution collects, analyses and uses relevant information from stakeholders for the effective management of the e-assessment methodology.

8. Public information

The institution appropriately informs all stakeholders of pedagogical development, the e-assessment method, and resources technology. The institution publishes reliable, complete and up to date information on pedagogical methods and technical support. Students should be made aware of the hardware requirements and learning resources technology and technical support.

Main aspects:

The institution publishes reliable, complete and updated information on e-assessment methods, students' technical requirements and institutional technical support.

IV. Conclusion

The assessment methodology developed at this stage of the project is to ensure the quality of the TeSLA system and its implementation. When it is applied to virtual learning environments outside the TeSLA context, several aspects (students' support, infrastructures, etc.) have to be taken into consideration to be in line with the ESG as the basis for quality assurance of higher education. In this particular context of e-learning, and because of the specificity of the system, only certain standards of the ESG have been applied or adapted. The methodology developed and the recommendations emerging from it for the different/subsequent pilots are valuable assets for the project and more particularly for the implementation of the system in the various universities. The methodology will be applied in the next phase of the project, i.e. in the pilot 2. Subsequently, it will be adapted if necessary in the next phases of the project so that at the end of the project a fully applicable e-assessment methodology will be provided.

The planning of this specific methodology for TeSLA can be considered as an initiation to reflect more broadly on the specificities of the quality assurance of e-learning and that specifically of e-assessment. The popularity and availability of e-assessment technologies are increasing in higher education, and it is important to consider how these developments can be comprehensively incorporated as regular and not irregular part of quality education provision.

V. Acknowledgements

VI. References

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Discussion questions:

- What is the most challenging element in the assessment of e-learning for quality assurance agencies? And for higher education institutions?

- Does e-learning / e-assessment call for new approaches to internal and external QA?

- What can QA of e-learning / e-assessment contribute to the development of higher education provision? Can it widen access and delivery by making provision more open, transparent and flexible?

Please submit your proposal by sending this form, in Word format, by 24 July 2017 to QAForum@eua.be. The file should be named using the last names of the authors, e.g. Smith_Jones.doc. Please do not send a hard copy or a PDF file.