H2020-WIDESPREAD-2018-2020/H2020-WIDESPREAD-2018-03

SEIS

Scaling Up Educational Innovations in Schools

Type of Action: Coordination and support action (CSA)

Topic: WIDESPREAD-03-2018 (Twinning)

Grant Agreement no: 856954

Website: seis.tlu.ee

Conceptual and technological design of the lab (Deliverable D1.1)

Author(s): Terje Väljataga, Jussi Okkonen
Reviewer(s): All partners

Date: June 2020

Start date of the project: January 1, 2020 Duration: Three years

Revision: 1.0

Project funded by the European Commission within the Horizon 2020 programme for Spreading Excellence and Widening Participation (2018-2020)		
Dissemination Level		
PU	Public, fully open	**X**
CO	Confidential, restricted under conditions set out in Model Grant Agreement	□
CL	Classified	□

Project consortium

Center of Excellence in Educational Innovation, Tallinn University (TLU), Estonia
Tampere Research Centre for Information & Media, University of Tampere (TAU), Finland
Centre for the Science of Learning & Technology, University of Bergen, (UiB), Norway

Notices

For information, please contact Terje Väljataga (terje.valjataga@tlu.ee). This document is intended to fulfil the contractual obligations of the SEIS project concerning deliverable D1.1 described in contract 856954.

Author, Beneficiary

- Tallinn University (TLU) - coordinator
- University of Bergen (UiB) - partner
- Tampere University (TAU) - partner

Executive Summary

This document describes a conceptual and technical design of the Virtual Research Lab (VRL), which will be developed by WP1 (Co-establishment of a virtual Research Lab). The lab will consist of
1) a toolbox for researchers of the project consortium (validated research instruments, conceptual frameworks, templates for data management, ethics, etc.);
2) a repository of research cases, best practices and collected data from the SEIS project consortium partners;
3) a discussion board, event calendar and project initiation space.

The following sections of this document specify the objectives of the VRL, describe the target group and stakeholders for the VRL, outline potential functionalities and technological solutions of the lab as well as provide some examples of possible user stories of VRL.

Table of contents

Introduction

Research initiatives and projects, expert knowledge, developed and validated instruments and frameworks, “hot” research topics as well as different guidelines and templates needed to carry out ethically and methodologically sound research are scattered and managed by different research groups. One of the key elements of supporting PhD students and early stage researchers in the field of educational science and innovation is in-depth intellectual mentoring, particularly through research training (Stadtlander, Giles & Sickel, 2013) and making research assets and expert knowledge easily and timely accessible. Furthermore, science is increasingly crossing institutional, disciplinary and country boundaries, is multipolar and networked (Llewellyn Smith, Borysiewicz, Casselton, Conway, Hassan, Leach, et al., 2011). This calls for developing a dynamic and ubiquitous research supporting environment where scattered PhD students, early stage and senior researchers in the field of educational innovation can seamlessly access research assets (expert knowledge, validated instruments and frameworks, guidelines, templates, etc).

The Virtual Research Lab (VRL) has a potential to break aforementioned boundaries and challenges supporting comprehensive and evidence-based educational research in Estonia, Norway and Finland - consortium of the SEIS (Scaling up educational innovation in schools) project - from data collection and curation to analysis, visualisation and publishing (Hey, Tansley & Tolle, 2009). The access to data, tools, experts and other resources that VRL facilitates, leads to faster research results, novel research directions (Carusi & Reimer, 2010) and evidence-based decision-making.

Objectives of the virtual research lab

SEIS project’s Virtual Research Lab is a web-based working environment which is tailored to serve the needs of a research community in the field of educational innovation. The VRL has the following distinguishing features: (i) it is a web-based easily manageable working environment; (ii) it is tailored to serve the needs of a research community of practice (Lave & Wenger, 1991) in the field of educational innovation; (iii) it is expected to provide the community with the whole array of commodities needed to accomplish research; (iv) it is open and flexible with respect to the overall service it offers; (v) it promotes fine-grained controlled sharing of research instruments, frameworks and results by guaranteeing ownership, provenance and attribution (Candela, Castelli, & Pagano, 2013).

The aim of the lab is manifold:

- to promote open science by providing seamless access to research assets (data, services, tools, instruments, expertise, etc) across the boundaries of partner institutions, disciplines and beyond to favour collaborative-oriented research activities

- to enable collecting all the partners know-how and experiences into one common space and provide best practice exchanges
- to facilitate knowledge transfer activities between international partners and within institutions.

The VRL acts as an experimental space to test the outcomes of the research, creates a testbed for small scale trials and experiments. The lab will host a repository of various research assets such as validated research instruments and frameworks, templates and guidelines for addressing ethical and data management issues, best practice cases, datasets, etc.

The virtual research laboratory serves a threefold role from the local institution's perspective:

- to bring interdisciplinary research into one space and create lasting synergies between researchers from different disciplines in order to overcome the challenges of this complex research field
- to mentor early stage researchers through the steps of a research project and teach them the skills necessary to conduct their own research
- to facilitate new training and education programmes in order to support development of the future generation of researchers in educational innovation.

From an international perspective, the benefits of the virtual research lab are

- to engage international researchers and experts in a common space to form a research community in the field of educational innovation
- to promote a common language among scientific groups in different countries by developing common procedures and research studies
- to foster exchange of information among international scholars, co-ordinate and orientate research (Tichkiewitch, 2006).

Target groups and stakeholders

The VRL serves both early stage and senior researchers. Regarding practitioners and policy makers the VRL is a way to establish a permanent vehicle for the interplay between researchers and other stakeholders (Hey et al., 2009; Bartling & Friesike, 2014) such as educational technology industries, policy makers and practitioners to accelerate new discoveries, educational technology and analytics applications and provide evidence-based outcomes.

Functionalities of the virtual research lab

The web-based VRL comprises:

1) a working space with news flow, discussion board, event calendar and initiating projects

2) a toolbox for researchers (validated research instruments, conceptual frameworks, templates for data management, ethics, learning analytics tools, etc.)
3) a repository of research cases, best practices and collected data from the SEIS project consortium partners.

Working space

A working space allows a user to update and check the event calendar, follow and contribute to the news flow and initiate and sign up for different projects.

News flow
A dynamic news flow - a weblog type of solution.

Event calendar
A calendar displaying all the relevant information about the conferences, workshops, grant proposal calls, etc. For instance, a researcher gets an overview of

- conferences in the field
- special journal calls
- grant proposal deadlines
- workshops and seminars

Minimum information about the event will be provided: name, short description, link to the event, deadline for submission (if applicable), event time frame, keywords.

A potential exemplary user story: Sharing a special issue call of a journal.

Luis came across an interesting special issue call - Teacher-Researcher Collaborations as Contexts for Learning - from the Cognition and Instruction journal. Considering the focus of the call he shares it with others. He fills in the fields in the event description form of the calendar and submits for others to see.

Project initiation
An option for everybody to initiate or sign up for different kinds of projects. The projects can be, for instance, as follows:

- publication co-authoring
- co-supervision of a PhD student
- grant proposal preparation
- research instrument development
- research project contribution
- systematic literature review
- data collection activities
- data analysis
- Etc.

Minimum information about the initiation will be provided: project name, short description about the contribution needed, timeframe, deadline for signing up, contact information, keywords.

A potential exemplary user story: A PhD student is looking for collaborators for an extensive systematic literature review

Gerti, a PhD student from the School of Digital Technologies, Tallinn University needs to run a systematic literature review for his PhD studies on learning design and learning analytics in mobile and ubiquitous learning. As a systematic review is a lot of work, he looks for collaborators who would like to contribute and can also benefit from this review. He logs in to the lab, goes to the Project initiation page and advertises his project idea. He inserts the project name, a short description, timeframe for the project, deadline for joining the project, keywords, his contact details (e-mail, skype etc.) and submits for everybody to see.

Mihkel, a senior researcher from the School of Natural Sciences and Health, Tallinn University finds Gerti's request interesting. Being interested in this topic he would like to join, however, he has a few questions. Under the Gerti's project description there is an option to comment and ask additional questions, which would be visible for everybody who has logged in to the lab. Mihkel asks some details about the workload in the comment section under the project description and after Gerti's responses he signs up for the project (name, e-mail, comment if needed).

Discussion board

A discussion board allows logged in users to discuss research related aspects.

Toolbox

A **toolbox** is a collection of tools supporting research activities to which everyone can add or use for his/her own research. Potential list of the tools is:

- validated research instruments (questionnaires, interview protocols, etc.) for studying different aspects of educational innovation (new learning and teaching methods, innovation adoption and uptake in schools, teacher-led inquiry in their classroom practice etc.)
- conceptual frameworks/models for exploring and understanding educational innovations
- strategies and models for setting up university-school-(industry) partnerships for a joint research and development of innovative methods, approaches, tools, etc.
- templates for data management plans, ethics, consent forms, etc.
- digital tools for collecting data about learning and teaching (learning analytics) as well as related interactions

- productivity tools such as activity and time monitoring, reference management, etc.
- EU documents that can be used in grant proposals such as Responsible Research Innovation, Indicators for promoting and monitoring Responsible Research and Innovation, etc.

Minimum information about a tool will be provided: name, short description, contact information (if applicable), keywords.

Repository

The repository consists of an overview of potential open research topics, ongoing projects, research results and impact to be shared among the lab users.

Open research topics and questions
A list of open research topics and "hot" research questions for PhD thesis and other projects.

Ongoing projects
An overview of ongoing PhD thesis, research grants and projects.

Minimum information about the projects will be provided: name, short overview, timeframe, link (if applicable), contact person.

Research results and impact
A collection of research data, best practices, joint research publications and links to data archives, such as DataDOI in Estonia, Allas service in Finland and Open Research Data in Norway.

Technical design of the virtual research lab

Virtual research laboratory of SEIS is a virtual research environment as an online system helping researchers collaborate. Such sociotechnical environment provides collaboration support, internal and external communications channels, document hosting, and research tools for data analysis, visualisation or management. Such an environment enables spatially dispersion and asynchronic work.

As discussed above, for SEIS key functionalities are a landing page to promote the project and offer access for external partners, a shared working environment for the SEIS project and an option to create sub-spaces for research and innovation studies in partner countries, shared repositories, and shared tools for researchers.

Based on an analysis of the existing virtual research laboratory platform models there are three main models to build a virtual research environment for SEIS. Most resource intensive model is a stand alone virtual research environment that is a self-maintained

web platform. Such a model is applied to large scale projects with technical support and resources available. For example CO:RE (Children on line: Research and Evidence) is currently building a virtual research environment for all interested people to become part of the research community on the topic. It is evidently a very ambitious endeavour with high impact.

To avoid burden on platform maintenance there are suitable engines, such as Joomla coded on PHP. The limited possibilities to tailor functionalities might be an issue, yet on the other hand the practicality is high. For instance, one of the options is to make use of an integrated OSF platform - for managing and sharing research. OSF is a free and open source project management tool that supports researchers throughout their entire project lifecycle. It aims to help researchers work on projects privately or make the entire project publicly accessible. OSF being a workflow system, enables to connect many products and services already used by researchers, streamlining their process and increasing efficiency.

SEIS virtual research lab could also be set on existing services such as Researchgate and similar ones or collaboration platforms such as Slack. In this case functionalities mostly must be augmented by features. Based on assessment of the available resources, services and platforms, practicality and lifecycle costs of different virtual research environments and sustainability aspects of the SEIS virtual research lab, the SEIS VRL will be set to be operational by the end of the year 2020.

References

Bartling, S. & Friesike, S. (2014). Towards another scientific revolution. Opening Science. Springer International Publishing, pp. 3–15.

Candela, L., Castelli, D., & Pagano, P. (2013). Virtual Research Environments: An Overview and A Research Agenda. Data Science Journal, 12, 175-181.

Carusi, A., & Reimer, T. (2010). Virtual Research Environment Collaborative Landscape Study. A JISC funded project.

Hey, T., Tansley, S. & Tolle, K. (2009). The fFourth Paradigm: Data-Intensive Scientific Discovery. In T. Hey, S. Tansley, and K. Tolle (Eds.). Microsoft Research.

Lave, J. & Wenger, E. (1991) Situated Learning: Legitimate Peripheral Participation. New York, NY: Cambridge University Press.

Llewellyn Smith, C., Borysiewicz, L., Casselton, L., Conway, G., Hassan, M., Leach, M., et al. (2011). Knowledge, Networks and Nations: Global Scientific Collaboration in the 21st Century. The Royal Society. The Royal Society.

Stadtlander, L., Giles, M., & Sickel, A. (2013). The Virtual Research Lab: Research Outcome Expectations, Research Knowledge, and the Graduate Student Experience. Journal of Educational Research and Practice, 3(1), 120-138.

Tichkiewitch, S., Shpitalni, M., & Krause, F-L. (2006). Virtual Research Lab: A New Way To Do Research. Annals of the CIRP Vol. 55/2/2006.