SPIDAS 1st PARTNER MEETING

### 11 and 12 December 2017, Exeter, UK

### Baring Court 06, St Luke’s Campus, University of Exeter, Heavitree Road, Exeter

In attendance: Rosa M. Borrell- Feliu, M.Teresa Quintillà Zanuy, Stephen Brown, Manoli Pifarré, Andreea Cujba, Alejandra Cerrillo, Sibel Kazak, Rukiye Gokce, Esra Iymen Ikizoglu, Paula Newton, Stephen Coaker, Ed Horncastle, Felicity Liggins, Ben Neild, Taro Fujita, Nasser Mansour, Yolanda Mateu Dolcet, Jordi Espasa Sancho, David Escolà Agustí, Núria Busom Figueres, Suzie Masterman, Brent Cassidy and Andrew Dean

Apologies: Sue Bayes, Amy Grashoff and Matthew Pitts

**Work Package 2 - Summary**

**1. What we discussed on the first day**

Dr Taro Fujita, University of Exeter led partners through plans for WP2 including:

* Focus for research
* Approach and Methodology for capturing State of the Art
* Share information on known good practice
* Discus Structure for National and Final WP2 Reports
* Agree deadlines
* Discussion

All partners took part in a series of workshop discussions captured by Taro.

ACTIONS and CONCLUSIONS for UNIV of EXETER:

* Taro to write up the results of the workshop and circulate the results to all participants in early 2018
* Taro to send partners details of the agreed methodology and approach for capturing the State of the Art including:
  + Research Questions
  + Draft Report Structure
  + Nature of the input from schools
  + Taro to summarise early thoughts about Toolkit content
  + Ethics!

**2. What data will be available from the MET office?**

From Felicity Liggins, MET office

* There will be regional / global datasets which will cover Spain and Turkey.
* There may also be the possibility that the MET office can point partners to the data available from their local met service.
* Weather, or climate?
* Is it a particular parameter, like rainfall, or is it a wider dataset?
* We have to decide what data we want!

**3. What will the State of Art review look like?**

Idea for the structure:

1. Information from each country (e.g. curriculum, teaching practice, etc.)
2. Statistical literacy / data analytics
3. Society and industry needs
4. Innovative teaching approaches
5. The use of technology in data analytics
6. Information about data from the MET office
7. Underpinning pedagogy for SPIDAS toolkits
8. Industry needs / employment, etc.

Proposed Methodology:

* Literature review of existing knowledge in the teaching and learning of data analytics from research / professional journals (national / international)
* Informal interview to the project partners (From November 2017-February 2018)
* Questionnaires to students what they are interested in?
* Talk to employers
* Online discussion + Shared online working space?
* Blog -> We need to set up a website!
* Links to other EU projects: Previous ERASMUS+ project

**Proposed structure of the state of the art report. These are my notes of what we agreed during Monday meeting with Taro, Sibel & Manoli**

**A. Common aspects:**

1. Clarify definition of Data Analytics (DA). This definition has to include more than statistical skills, it may focus on concepts such as: Statistical thinking, reasoning. Clarify and make clear the relationship between DA and big data

2. Links to other EU projects: previous ERASMUS+ projects…

3. Existing pedagogy research (not only statistics but DA)

4. Technological tools used in DA – Technology used, and how important it is to develop DA. Tinkerplots and other technology

**B. Each country: National context**

**1.** Curriculum related with DA. Learning objectives related with DA.

2. How Learning objectives related with DA are spread across the grade levels

3. Existing pedagogy in teaching journals. Looking for DA teaching projects

4. Existing Web sides (teaching associations, governmental…) to promote DA skills, resources…

5. Technology used in local teaching projects

6. Survey teachers via interview, focus group or questionnaires. Obtain data to compare among SPIDAS partners

**4. What we want from this project & we are interested in?**

4.1. We need to clearly define what 'data analytics' means

* We can start from statistical literacy defined as, for example, Gal (2002) suggested that the requirements are contained in the following two components:

(a) people’s ability to interpret and critically evaluate statistical information, data-related arguments, or stochastic phenomena, which they may encounter in diverse contexts, and when relevant,

(b) their ability to discuss or communicate their reactions to such statistical information, such as their understanding of the meaning of the information, their opinions about the implications of this information, or their concerns regarding the acceptability of given conclusions (p. 2-3)"

We can change 'statistical information' to data?

Data analytics – definition

Picciano, A. G. (2012). The evolution of big data and learning analytics in American higher education. *Journal of Asynchronous Learning Networks*, 16(3), 9-20.

"The generic definition of analytics is similar to data-driven decision making. Essentially it is the science of examining data to draw conclusions and, when used in decision making, to present paths or courses of action. In recent years, the definition of analytics has gone further, however, to incorporate elements of operations research such as decision trees and strategy maps to establish predictive models and to determine probabilities for certain courses of action." (p. 12)

4.2. Difficulties / challenge we are facing

On the first meeting, we discussed what we do in the teaching of data analytics, what difficulties or challenges we are currently facing, and what teaching approaches we want to try.

The table 4.1 below summarises some difficulties or challenging the participants listed in their teaching of data analytics and statistics.

**Table 4.1. Difficulties and Challenges**

|  |  |  |
| --- | --- | --- |
| Group 1 | Group 2 | Group 3 |
| Common issues discussed   * Anxiety * Engaging students * Make data useful / relevant to students * Understanding importance of data to industry / society * Make complex data simple | * Students do not see any relationship with their lives * They don't see the point of data analytics * Lack of experience (Lleida) * Good in procedural aspects of data analytics, but lack of understanding of how to interpret data in a context * No Experience in using technology * Communicating results to others (Turkey) | Common issues discussed  At the moment, students see data analytics as   * Boring * Not in contexts * Not collecting data * Undertaking just procedures   Also   * Not much in depths * Not for understanding * Not knowing for what statistics can be useful * Need more interdisciplinary aspects |

**5. Innovative teaching approach?**

5.1. Innovative teaching approach might include...

* Problem/project based learning
* Use of technology
* Students from different schools work together
* Promotion of specific creative thinking processes and collaborative learning skills.

Problem/Project based learning aims to help students to (Hmelo-Silver, 2004, p. 240):

1) construct an extensive and flexible knowledge base;

2) develop effective problem-solving skills;

3) develop self-directed, lifelong learning skills;

4) become effective collaborators; and

5) become intrinsically motivated to learn.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn?. E*ducational psychology review*, 16(3), 235-266.

The use of technology – TinkerPlots (<https://www.tinkerplots.com/>)

Sibel introduced TinkerPlots to the participants, showing some useful functions.

The promotion of a creative thinking process. Teach and guide students to follow and develop divergent strategies (e.g. brain storming) , exploration strategies (e.g. organize the ideas in a concept map) and convergent strategies (e.g. make a synthesis)

The promotion of collaborative learning skills. Teach and guide students in their group work. We can embed in our pilots strategies as: distributed leadership (e.g. establishment of ground rules; learn to ask key questions) Mutual engagement (e.g. extending arguments, give examples) group reflection and group evaluation.

5.2. Summary from our discussion

In the group discussion, we discussed what our teaching approach would be like. The table 5.1 summarises some initial ideas shared in each group.

**5.1 Initial ideas for teaching approaches or problems for students**

|  |  |  |
| --- | --- | --- |
| Group 1 | Group 2 | Group 3 |
| Common issues discussed   * Relate to other subjects / contents from other subjects * Focus on students' interests * Verbal/visual/written communication – critical thinking – collaborative work – basic maths skills – creativity * Open problems, clear focus, comparing data, context based | Common issues discussed  Purpose of problems   * How to interpret data * Presenting data * Asking questions based on data * Problem solving * Connecting to real life problems in different subjects * Improve statistical modelling approach   Types of problem   * Context based, tourism industry * School based * Environmental * Elections/voting methods * Subject based | Common issues discussed  Problems related to weather and climate, for example:   * Flooding – affect – psychological impact * Temperature * Data reification   Problems are also related to:   * Real world context (what they are doing or for what) * Collecting data, processing data, communicating data * Actions for disseminations using social media or videos |

The above discussion echoes what literature described about the problems for students, in project-based learning (e.g. Hmelo-Silver, 2004):

To foster flexible thinking, problems need to be complex, ill-structured, and open-ended; to support intrinsic motivation, they must also be realistic and resonate with the students’ experiences. A good problem affords feedback that allows students to evaluate the effectiveness of their knowledge, reasoning, and learning strategies. The problems should also promote conjecture and argumentation. (p. 244)

**6. How should our tools look like?**

Table 6.1 summarises some ideas discussed in the group discussion.

**6.1 Initial ideas for SPIDAS toolkit**

|  |  |  |
| --- | --- | --- |
| Group 1 | Group 2 | Group 3 |
| Common issues discussed   * Some training materials: teacher support pack * Conceptual maps to illustrate a progression of data analytics skills and understanding from primary to higher education, from basic concepts to advanced concepts | Common issues discussed   * Related to real-life problems * Teacher support pack e.g. techniques, software, lesson plans, pedagogy, research report * County based examples * Sample data sets to use as examples * Resources for primary/secondary/further education with cross-curricular ideas * Software & IT requirements * Evaluation methods / feedback * Problem examples, e.g. environment, home, geography | Common issues discussed   * Website for providing information for interactive data handling cycle (specify the problem and plan an investigation– collect data – analyse and present data using statistical summaries, charts, graphs- interpret results, make conclusions andcommunicate ) - each phase is clickable and further information is provided * Voice from industry, academia, and research – why data analytics is important * Lesson plans (simple ideas as teachers are likely to look for resources to support existing plans) * How to organise a project, e.g. template * Case studies * Tutorials for tools, links where to find further information |

**7.** **Summary of discussion - Directions for development of innovative teaching approaches**

From the above table (table 4.1) and what was discussed during the group discussions, perhaps we need to try to seek teaching approaches which will give us clear ideas for addressing the following issues:

* Developing students' data analytics literacy, critical thinking, collaborative skills etc.
* Developing not only procedural skills abut also conceptual understanding including importance of data analytics
* Trying to make data analytics relevant and useful for students' everyday life or contexts / exciting so that students are motivated to undertake data analytics
* Make the learning active by posing questions by students themselves, collecting data, interpreting data and presenting their findings in problem/project based approach
* Take creative approaches including visualising data, working with uncertainty, etc.
* Reducing students' anxiety
* Integrating the use of technologies

Thus project-based learning might be an approach we can start. It was also suggested multi-aged project-based learning.

The problems should be The problems should be open ended and in a context related to weather/climate, e.g. flooding-affect-psychological impact (Table 5.1), have clear focus and involve comparing data.

The participants also considered problem for (table 6.1). At this stage, ideas for the toolkits should be open to many, but it seems a website which contains the following information might be crucial for developing effective toolkits for teachers:

* Voice from industry, academia, and research – why data analytics is important
* Information for interactive data handling cycle (specify the problem and plan an investigation– collect data –analyse and present data using statistical summaries, charts, graphs- interpret results, make conclusions and communicate) - each phase is clickable and further information is provided
* A conceptual map to illustrate a progression of data analytics skills and understanding from primary to higher education
* Teacher support pack e.g. techniques, software, lesson plans, pedagogy, suggestions from existing research / How to organise a project, e.g. template
* Resources for primary/secondary/further education with cross-curricular ideas / sample data sets / resources for primary/secondary/further education with cross-curricular ideas
* Software & IT requirements / Tutorials for tools including videos?
* Evaluation methods / feedback
* Case studies from pilot studies

*Taro Fujita, Sibel Kazak, Manoli Pifarre Turmo*