

INTERNATIONAL CONFERENCE

**TURNING
DATA
INTO
KNOWLEDGE
NEW
OPPORTUNITIES
FOR
STATISTICS
EDUCATION**

PORTUGAL, LISBON — 2015, JUNE 22-23
Instituto de Educação da Universidade de Lisboa

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PROCEEDINGS



PROCEEDINGS OF THE INTERNATIONAL CONFERENCE TURNING DATA
INTO KNOWLEDGE: NEW OPPORTUNITIES FOR STATISTICS EDUCATION

22-23 JUNE, 2015

Institute of Education of the University of Lisbon
Portugal

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Proceedings of the International Conference Turning data into knowledge: New opportunities for statistics education

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INTRODUCTION

WELCOME TO LISBON, WELCOME TO THE CONFERENCE

“Over seven hills, which are as many points of observation whence the most magnificent panoramas may be enjoyed, the vast irregular and many-coloured mass of houses that constitute Lisbon is scattered. For the traveler who comes in from the sea, Lisbon, even from afar, rises like a fair vision in a dream, clear-cut against a bright blue sky which the sun gladdens with its gold. And the domes, the monuments, the old castles jut up above the mass of houses, like far-off heralds of this delightful seat, of this blessed region. The tourist’s wonder begins when the ship approaches the bar, and, after passing the Bugio lighthouse – that little guardian-tower at the mouth of the river built three centuries ago on the plan of Friar João Turriano –, the castled Torre de Belém appears, a magnificent specimen of sixteenth century military architecture, in the Romantic-Gothic-Moorish style. As the ship moves forward the river grows narrower, soon to widen again, forming one of the largest natural harbours in the world with ample anchorage for the greatest of fleets. Then, on the left, the masses of houses cluster brightly over the hills. That is Lisbon.

Fernando Pessoa in “Lisbon, what the tourist should see”
(1925) <http://lisbon.pessoa.free.fr/InteractiveBook.php>

Lisbon’s description by the famous Portuguese poet Fernando Pessoa introduces you to some of the many beautiful types of scenery in this city, with the almost constant presence of sunshine and the River Tagus. It is a city whose history spans back thousands of years, which you can discover walking through its seven hills. There are innumerable experiences that can be lived in Lisbon: walking through characteristic neighborhoods, visiting streets filled with heritage monuments and museums, relaxing in one of the many gardens, belvederes and esplanades, and enjoying the pleasure of its gastronomy.

We are delighted to welcome you to Lisbon and particularly to the International Conference *Turning data into knowledge: New opportunities for statistics education*, being held at the University of Lisbon. This public university has eighteen faculties and institutes throughout the city of Lisbon and surrounding municipalities. It was the first university created in Portugal, in 1288. The university was later transferred to the Portuguese city of Coimbra, in 1537. In the late eighteenth century, it was reestablished in Lisbon. Recently, in 2013, the University of Lisbon merged with the Technical University of Lisbon, forming the ULisboa that is now the largest university in Portugal with more than 48 000 students.

This conference has been an initiative of the Portuguese research project DSL – *Developing statistical literacy: Student learning and teacher education* – involving the Institute of Education of the University of Lisbon and the University of Évora,

and supported by a group of leading international researchers in statistics education who took part in the Scientific Committee to whom we are deeply grateful.

The Conference was sought to be an opportunity to gather researchers, teacher educators and teachers interested in statistics education, to exchange experiences, and to present and discuss recent research and current projects. Therefore we invite all participants to contribute actively to the debate throughout the conference sessions and to meet different people at the lunch and coffee breaks to share ideas and experiences.

The Scientific Programme

Currently, statistics education takes place in a new social and cultural context and faces a global challenge of meeting the calls for statistically literate and informed citizens who are able to **turn data into knowledge**. Such a challenge provides new opportunities to rethink both what statistics we teach and how we teach statistics. Doing so is imperative in order to develop students’ ability to reason about data and to use them effectively and critically, in their daily life, for prediction and decision-making.

It is well known by both researchers and practitioners in school that statistical literacy and reasoning, which call for critical, investigative and communicative skills, prove to be difficult to students. Thus, current international curriculum recommendations suggest data-orientated approaches for teaching statistics, at all levels of schooling, using real data and taking advantage of available technology. Furthermore, to develop their statistical literacy and reasoning, students are expected to deal with data in significant and authentic contexts. This conference addresses these challenges and opportunities for statistics education, for all school levels.

Two strands have been defined for the conference – Statistical literacy and Statistical reasoning – and these are the broad themes of the two Plenary Talks, presented by Janet Ainley and Dani Ben-Zvi, respectively. These two strands encompass a diversity of topics of research and projects, such as technology-enhanced learning and teaching practice with technology, as well as research in teacher education and in professional development, namely teachers’ systematic research about their own practice. More broadly the programme also intends to add to the discussion about statistics education, namely in what concerns its aims and diverse curriculum issues through the Plenary Panel that will take place in the last part of the conference.

This 2-day Conference includes also other types of sessions: Research Papers, Short Oral Communications, Posters presentations and Workshops. All the received contributions as Research Papers (RP), Short Oral Communications (SO) and Posters were submitted to a blind review process and the final contributions are now collected on these proceedings. We would like to thank the reviewers, whose names

you can find at the final section of these proceedings, for their valuable contribution to the scientific quality of the conference.

The organization received originally 12 RP, 19 SO and 14 Posters. Through the review process some of these have been suggested to be resubmitted as SO or Poster. Unfortunately, a few colleagues whose proposals had been accepted did not obtain the support they needed to attend the conference. Finally, we have a total of 8 RP, 19 SO and 14 Posters in these proceedings that will be presented in the conference. The scope and diversity of the proposals' themes are a clear evidence of the richness of the field of statistics education, nowadays.

Additionally, two workshops in Portuguese also will take place during the conference, targeting teachers who teach in elementary and secondary levels. We are thankful to Cláudia Oliveira, Marisa Gregório (Workshop 1 – *Promoting statistical reasoning with the TinkerPlots*), Rosa Tomás Ferreira and Sandra Quintas (Workshop 2 – *Promoting statistical investigations in the classroom*) who were responsible for organizing and conducting the workshops in connection with Ana Henriques and myself. More than 30 Portuguese teachers and teacher educators have registered to attend these two workshops.

The conference also provides the opportunity to share part of the work that has been developed by the project DSL, and that is presented in a Plenary Panel, as well as in different RP, SO and Posters by several of its members. We thank you for coming and hope you will enjoy Lisbon and the conference.

Hélia Oliveira, Conference co-chair

PLENARY TALKS

TEACHING STATISTICS IN INDIGENOUS SCHOOLS

Sérgia Oliveira, Liliane Carvalho, Carlos Monteiro

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ABSTRACT

Indigenous Education, as defined by Brazilian law, should be specific and differentiated from the socio-cultural expressions of each people. Authors have emphasized the importance of Statistics to support social practices of citizens (Cazorla & Santana, 2010). In teaching and learning of mathematics content, individual and cultural characteristics of the subjects should be valued in order to provide an education based on critical and reflective aspects (Skovsmose, 2000). Despite the national curriculum for Indigenous Education (Brazil, 1998) considers mathematics primordial for intercultural development of indigenous people, the aforementioned curriculum does not include statistical topics (Barbosa & Magina, 2014). This study aims to analyze the Statistic Education developed at Indigenous schools of the Xukuru of Ororubá people. The methodology is collaborative with interaction between participants and researchers at all stages of the study. The research data started being collected by means of observations, semi-structured interviews, visits to the indigenous villages and encounters with teachers. Three teachers are joining the research to develop a teaching intervention about topics of Statistics. Preliminary results show that teachers receive little guidance for the work with Statistics. In addition, usually they give priority to teaching topics related to numbers and operations in the classroom. As a result of this study, it is expected that Statistics teaching and learning processes are encouraged and combined with the reality experienced at the Indigenous villages, to make possible the legitimation and strengthening of the Xukuru of Ororubá culture.

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REFLECTION ON PRACTICES AS TEACHER EDUCATORS IN STATISTICS

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ABSTRACT

In this presentation we reflect upon our practices as teacher educators revisiting a study we developed (Barros, Martins, & Pires, 2009). The aim was (i) to identify which statistic knowledge future educators and teachers possessed when starting their training, and (ii) to assess the influence of the work undertaken in the curricular unit *Numbers and Statistics* in the progression of this knowledge. The study states that the development of the curricular unit has allowed students to deepen, change or consolidate their statistic's knowledge, mainly regarding what concerns understanding concepts. But what are the reasons for this "success"? Which aspects of our practices have contributed to a real improvement of students' learnings?

Teaching practices in Statistics

The analysis of the study has allowed us to highlight some dimensions of our practices that seem to provide more meaningful learnings.

- a) *Consideration of students' needs and difficulties*, given that their identification was the starting point of the study undertaken and has determined teaching practices concerning statistics.
- b) *Valuing the nature of tasks and their diversification*, performing tasks of a more closed nature as well as more open ones having been foreseen, involving the clarification and application of concepts, or completing a project.
- c) *Discussion about understanding of concepts*, their comprehension having been reached through the questioning of the meaning of results.
- d) *Integration and diversification of evaluation within the teaching learning process*, the different meanings of evaluation (diagnostic, formative, summative) having been valued, allowing for the reformulation of teaching strategies and practices.
- e) *Empowerment of participants*, assuming (i) the teacher as a guide and moderator, proposing tasks, questioning or clarifying ideas, and (ii) the student as the builder of her knowledge, bestowing shape and meaning on her learning, within a context of active participation in the negotiation of the different meanings.

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