Analysis of Large-Scale Assessment Data

01-02 and 05-09 October 2020

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This workshop aims to communicate both knowledge and hands-on analytical skills in the field of international large-scale assessment (ILSA) data. ILSAs like PIRLS (Progress in International Reading Literacy Study), TIMSS (Trends in International Mathematics and Science Study), or PISA (Programme for International Student Assessment) provide unique opportunities to investigate both substantive and methodological research questions. ILSAs are conducted in recurring cycles and in numerous countries. They assess data on different levels, often including education systems (e.g., curriculum information, quantity of schooling), schools (e.g., school resources, composition), teachers (e.g., qualification for teaching, teaching practices), students (e.g., achievement in standardized tests, learning motivations), or familial backgrounds (e.g., socio-economic status, home support for learning). The aim of the international design of the tests and questionnaires is to make educational inputs, frameworks, and outputs comparable across countries and time. By implication, these studies face numerous methodological challenges and provide a plethora of interesting research opportunities.

This workshop addresses the following ILSA-related topics:

1. Overview and central aims of ILSAs
2. Sampling and data collection
   - Target populations
   - Sampling procedures and representativeness of the data
   - Instrument development
   - Conducting the surveys
   - Quality assurance
3. ILSA data
   - Achievement tests
   - Questionnaire data
   - Comparison of educational systems
   - National extensions
4. Research using ILSA data
   - Consequences of the data structure and sampling design
   - Substantive research questions
   - Methodological research questions

The workshop encompasses lecture and interaction formats, group work, as well as practical exercises in the R environment. After a successful completion of the course, the students

- have a broad knowledge about ILSAs' backgrounds, methods, and scope,
- can critically read and interpret results of ILSA reports and ILSA-based studies,
- can handle methodological peculiarities of ILSA data in own analyses, and
- can develop own ILSA-based research questions and approaches.

The workshop covers seven days (09:00-16:00h). After five days, students are required to hand in an outline of a written assignment. The outlines will be discussed and individual

feedback will be provided. These outlines have to be approved before the students submit the final versions of their assignment papers. The deadline for submitting the papers is 30 November 2020.

Participation in the course requires the formal criteria described on the course page as well as good knowledge about basic statistical methods. The participants are expected to bring laptops with administrator rights on which the newest version of R is installed.

Schedule

	09:00-10:30	10:45-12:00	13:00-14:30	14:45-16:00
Thursday, 01 Oct. 2020	*Isa Steinmann* Introduction and formalities	*Isa Steinmann* Overview and central aims of ILSAs	*Isa Steinmann* Sampling and data collection: target populations	*Diego Gonzalez* Sampling and data collection: sampling and representativeness
Friday, 02 Oct. 2020	*Diego Gonzalez* Sampling and data collection: sampling and representativeness	*Isa Steinmann* Sampling and data collection: instrument development	*Isa Steinmann* Sampling and data collection: conducting the surveys	*Isa Steinmann* Sampling and data collection: quality assurance
Monday, 05 Oct. 2020	*Wangqiong Ye* ILSA data: achievement tests	*Wangqiong Ye* ILSA data: achievement tests	*Jelena Veletić* ILSA data: questionnaire data	*Jelena Veletić* ILSA data: questionnaire data
Tuesday, 06 Oct. 2020	*Jelena Veletić* ILSA data: comparison of educational systems	*Jelena Veletić* ILSA data: comparison of educational systems	*Wangqiong Ye* ILSA data: national extensions	*Isa Steinmann* Methodological challenges and limitations of ILSA data
Wednesday, 07 Oct. 2020	*Diego Gonzalez* Research using ILSA data: consequences of the data structure and sampling design	*Diego Gonzalez* Research using ILSA data: consequences of the data structure and sampling design	*Diego Gonzalez* Research using ILSA data: consequences of the data structure and sampling design	*Isa Steinmann* Research using ILSA data: substantive research questions
	Deadline submission outline of written assignment			
Thursday, 08 Oct. 2020	*Jelena Veletić* Research using ILSA data: substantive research questions	*Wangqiong Ye* Research using ILSA data: substantive research questions	*Isa Steinmann* Discussion and feedback written assignments	*Isa Steinmann* Discussion and feedback written assignments
Friday, 09 Oct. 2020	*Laura Zieger* Research using ILSA data: methodological research questions	*Erika Majoros* Research using ILSA data: methodological research questions	*Isa Steinmann* Research using ILSA data: methodological research questions	*Isa Steinmann* Wrap-up and feedback
Monday, 30 Nov. 2020	Deadline submission written assignment			

Written Assignments

The written assignments are reports on small research projects using data from the international large-scale assessments. The participants are assigned research questions in the beginning of the seminar. They develop analytical strategies and select appropriate dataset(s) themselves. They analyze the dataset(s), report central findings, and interpret their results. The written assignment is passed if the reports fulfill the following criteria:

- Formal criteria:
  - Structure: Title page, introduction, research question, methods including data, results, discussion, literature list (according to APA), and appendix (complete and properly commented R script); inclusion of headings to structure the text
  - Format: According to APA; 1.5 line spacing, font Times New Roman, font size 11, 3cm margins to all sides
  - Length: 4-7 pages (only counting the parts introduction, research question, methods including data, results, and discussion)
  - File format: PDF
  - Deadline: 30 November 2020
- Quality criteria:
  - The research question is motivated in the introduction briefly but clearly.
  - The dataset(s) is/are chosen in accordance with the research question.
  - The methods are appropriate for the research question and described in sufficient detail.
  - The results include relevant descriptive and inferential statistics for the research question.
  - The results are described clearly and accompanied by appropriate tables and/or figures.
  - The findings are interpreted with appropriate scientific caution regarding the research question in the discussion.
  - Central limitations of the study are clearly stated.

Reading List

Texts on international large-scale assessments (ILSAs) in general:

1. Strietholt, R., Bos, W., Gustafsson, J.-E., & Rosén, M. (Eds.) (2014). Educational Policy Evaluation through International Comparative Assessments. Münster, New York: Waxmann. Available in free preview in Google Books: https://books.google.de/books?id=yhmPAwAAQBAJ&printsec=frontcover&hl=de&source=gbs_atb#v=onepage&q&f=false
   - Chapter A1 (Strietholt, R., Gustafsson, J.-E., Rosén, M., & Bos, W.): Outcomes and Causal Inference in International Comparative Assessments (~ 10 pages)
   - Chapter A2 (Gustafsson, J.-E. & Rosén, M.): Quality and Credibility of International Studies (~ 14 pages)

Texts on the example of the Progress in International Reading Literacy Study (PIRLS) [please note that there is no need to read long repetitive tables in detail]:

2. Mullis, I. V. S., & Martin, M. O. (Eds.). (2015). PIRLS 2016 Assessment Framework (2nd ed.). Available from Boston College, TIMSS & PIRLS International Study Center website: https://timssandpirls.bc.edu/pirls2016/downloads/P16_Framework_2ndEd.pdf
   – Chapter 1 (Mullis, I. V. S., Martin, M. O., & Sainsbury, M.): PIRLS 2016 Reading Framework (~ 20 pages)
   – Chapter 2 (Hooper, M., Mullis, I. V. S., & Martin, M. O.): PIRLS 2016 Context Questionnaire Framework (~ 24 pages)
3. Martin, M. O., Mullis, I. V. S., & Hooper, M. (Eds.). (2017). Methods and Procedures in PIRLS 2016. Available from Boston College, TIMSS & PIRLS International Study Center website: https://timssandpirls.bc.edu/publications/pirls/2016-methods/P16_Methods_and_Procedures.pdf
   – Chapter 3 (LaRoche, S., Joncas, M., & Foy, P.): Sample Design in PIRLS 2016 (~ 25 pages) (+ 2-3 example countries in Appendix 3A)
   – Chapter 4 (Foy, P. & LaRoche, S.): Estimating Standard Errors in the PIRLS 2016 Results (~ 8 pages)
   – Chapter 5 (LaRoche, S. & Foy, P.): Sample Implementation in PIRLS 2016 (~ 28 pages) (+ 2-3 example countries in Appendix 5A)
   – Chapter 11: PIRLS 2016 Achievement Scaling Methodology (~ 8 pages)
   – Chapter 12 (Foy, P. & Yin, L.): Scaling the PIRLS 2016 Achievement Data (~ 21 pages)
   – Chapter 14 (Martin, M. O., Mullis, I. V. S., Hooper, M., Yin, L., Foy, P., Fishbein, B., & Liu, J.): Creating and Interpreting the PIRLS 2016 Context Questionnaire Scales (~ 15 pages)
4. Mullis, I. V. S., Martin, M. O., Goh, S., & Prendergast, C. (Eds.). (2017). PIRLS 2016 Encyclopedia: Education Policy and Curriculum in Reading. Available from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/pirls2016/encyclopedia/download-center/#
   – Chapter 1 (Mullis, I. V. S.): Encyclopedia Introduction (~ 9 pages)
   – 1-2 example countries in Chapter 3: Country Chapters
5. Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (Eds.). (2017). PIRLS 2016 International Results in Reading. Available from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/pirls2016/international-results/wp-content/uploads/structure/CompletePDF/P16-PIRLS-International-Results-in-Reading.pdf
   – Introduction: What Makes a Good Reader: International Findings from PIRLS 2016 (~ 4 pages)

Recommended reading on ILSA methodology:

6. Rutkowski, L., Rutkowski, D., & von Davier, M. (Eds.) (2014). Handbook of International Large-Scale Assessment. Background, Technical Issues, and Methods of Data Analysis. New York: CRC Press. Available online in UiO library: https://bibsys-almaprimo.hosted.exlibrisgroup.com/permalink/f/7c2dl2/BIBSYS_ILS71524774710002201
   – Chapter 4 (Rutkowski, L., Gonzalez, E., von Davier, M., & Zhou, Y.): Assessment Design for International Large-Scale Assessments (~ 22 pages)
   – Chapter 17 (Stapleton, L. M.): Incorporating Sampling Weights into Single- and Multilevel Analyses (~ 25 pages)