Technology-Based Assessment in 21st Century Education

Samuel Greiff [iD] [1]

Abstract: This extended summary of a keynote given at the DELFI 2020 conference highlights current innovations in the field of educational assessment. It discusses three areas of rapid development: (1) the switch to technology in educational large-scale assessments; (2) the integration of assessment and learning in formal and informal learning contexts; (3) the role that new methods such as educational data mining and artificial intelligence play in educational assessment.

Keywords: Technology-Based Assessment; Large-Scale Assessment; Formative Assessment; Learning Analytics; Educational Data Mining; Artificial Intelligence

1   Educational Assessment: Recent Developments

Over the last years, educational assessments have undergone substantial changes. Several decades ago, educational tests were almost exclusively used in a summative way to evaluate the state of knowledge or proficiency that learners had acquired. With the advent of technology and with a broader conceptual understanding of assessment, the landscape has changed dramatically [IG19]. Whereas summative assessments remain an important part of testing, many assessment approaches are moving away from simple paper-pencil based assessments to integrated learning-assessment environments. This has had strong implications for students, teachers, institutions, and entire educational systems. On the basis of simulated assessment environments, news about student rankings, under- and overperforming countries, and novel ideas on how to improve educational systems are prominently featured in the media. While the scientific quality of these headlines vary considerably, there are interesting scientific, political, and practical developments and challenges happening in the field of educational assessment.

These developments are mostly driven by two concurrent pathways: (1) The development of quickly emerging technologies that allow for new measures related to the assessment of various skills such as analyses of process data and (2) through international large-scale assessments such as the Programme for International Student Assessment (PISA) commenced by the OECD [O09] that allow for empirically motivated comparisons of educational systems in a globalized world.

[1] University of Luxembourg, Department of Behavioural and Cognitive Sciences, 4366 Esch-sur-Alzette, samuel.greiff@uni.lu, [iD] https://orcid.org/0000-0003-2900-37340000

2   Areas of Current Innovation

Three areas in educational assessment are particularly vibrant and likely to be associated with innovation in the near future: (1) the comprehensive switch to technology in educational large-scale assessments; (2) the integration of assessment and learning in formal and informal learning contexts; (3) the role that new methods such as educational data mining and artificial intelligence play in educational assessment.

With regard to (1), PISA that tests 15-year old students in over 70 countries worldwide was among the first large-scale assessments that began administering assessments through the computer in a large-scale setting. This has led to the availability of log-file data that introduces a new layer of understanding beyond the mere question whether an item was answered correctly or incorrectly by providing the chance to look at the actual behaviors underlying test-performance both on an individual student level but also on the level of entire educational systems [GWA15]. With regard to (2), assessment is nowadays increasingly understood as a learning experience that should provide an added value to the student who is being tested as well. Formative assessment is sometimes used to contrast summative assessment or, in a similar manner, assessment for learning is the new term that is contrasted with assessment of learning [Sh16]. With regard to (3) and closely associated with the previous point, new methods and even entirely new research areas such as the field of educational data mining are emerging that make use of algorithms in education. These algorithms often stem from computer science and are used to discover fuzzy relationships in large educational data sets to increase the understanding of learning.

As the field of educational assessment moves ahead along with the digital revolution, there will be many implications for educational policy and educational practice. Interdisciplinary research has a unique opportunity to contribute to these developments.

Bibliography

[GWA15]   Greiff, S.; Wüstenberg, S.; Avvisati, F.: Computer-generated log-file analyses as a window into students' minds? A showcase study based on the PISA 2012 assessment of problem solving. Computers & Education, 91, 92-105, 2015.

[IG19]   Iliescu, D.; Greiff, S.: The impact of technology on psychological testing in practice and policy. European Journal of Psychological Assessment, 35, 151-155, 2019.

[O09]   OECD: Programme for international student assessment: An overview. Paris: OECD, 2009.

[Sh16]   Shute, V. J. et al.:: Advances in the science of assessment. Educational Assessment, 21, 1-27, 2016.