October 3, 2020

ETS understands that the Department of Education, henceforth "the Department," in Ireland established a system of Calculated Grades to provide calculated results to students who had expected to sit for the Leaving Certificate Examinations in June 2020.

ETS understands that the development and delivery of the system of Calculated Grades was undertaken by staff of the Department's Calculated Grades Executive Office working with a Canadian contractor, Polymetrika International Corporation under the auspices of the National Standardisation Group comprised of experts in evaluation and assessment. ETS is aware that Polymetrika was responsible for the development of the approach to the statistical moderation of teacher estimated marks and the development of the statistical estimation system which included the coding to operationalize the standardization process.

ETS also understands that the results from the Calculated Grades system were issued as grades to students. Subsequent to the issue of Calculated Grades to students, ETS further understands that two errors were discovered by the Department and Polymetrika in the coding created by Polymetrika. ETS understands that both errors were found in the code associated with the analysis of Junior Cycle data. ETS also understands that these errors have been corrected by Polymetrika and checks have been undertaken within the Calculated Grades Executive Office and Polymetrika to ensure that the code is now operating as intended.

On September 25, 2020, the Department contacted and later contracted with ETS to provide an independent expert opinion on the adequacy of the coding underpinning the standardization process, so as to provide a level of reassurance that students' results are as intended by the standardization process.

ETS, a non-profit organization based in Princeton, NJ, USA, and founded in 1947, advances quality and equity in education for people worldwide by creating assessments based on rigorous research. ETS serves individuals, educational institutions, and government agencies by providing customized solutions for teacher certification, English language learning, and elementary, secondary and postsecondary education, and by conducting education research, analysis and policy studies. The organization develops, administers and scores more than 50 million tests annually — including the TOEFL® and TOEIC® tests, the GRE® tests and The Praxis Series® assessments — in more than 180 countries, at over 9,000 locations worldwide.

In the context of this contracted work, the Department and ETS recognized that this task was to be completed in a very short timeframe, and necessarily involve an audit of a sampling of the coding rather than a full audit of the entire coding. In sampling the coding, the Department and ETS agree that certain areas of coding should be prioritized within the available timeframe.

In sampling the coding, ETS prioritized key parts of the algorithm, including the code for extracting analysis data from the data base, the linear regression and associated factor extraction procedures, the clustering algorithm, as well as others. ETS was provided with access to the full coding and the databases used to run the standardization process. The Department, Polymetrika staff, and other resources were provided and fully cooperated with ETS in order to review existing documentation and coding for the standardization process.

Based on ETS's review of the analysis code two issues were identified:

- Data for students missing junior level results for one of Maths, English, or Irish was incorrectly replaced with the highest test score on any other subject test. The issue has been corrected.

- The algorithm used to treat extreme/outlier students in each school does not exactly match what is described in the Report from the Standardisation Group to the Independent Steering Committee and the Program Board. Appendix G of the report states that outlier detection uses an EM algorithm built to optimize the likelihood of a mixture of three Guassian distributions. While the optimization criterion is very closely related to what is described in the Report it is not exactly equivalent.

The first issue noted above has been addressed by Polymetrika and the Calculated Grades Executive Office. ETS evaluated the correction made and determined that the data extraction works as described in the technical document. It is the professional and expert opinion of ETS that the revision is now correct.

Further, it is the professional and expert opinion of ETS that the second issue would not have a meaningful impact on results (i.e., no student could receive a lower grade as a result of the second issue) because: (a) the implemented optimization criterion and what is described in the Report are nearly equivalent (Spearman rank correlation .97 in simulations); (b) both optimization criteria are justifiable criteria for the outlier treatment algorithm; and (c) the outlier treatment algorithm affects only extremely high (i.e., those students who scored a 99% or a 100%) or extremely low rated students (i.e., those students who scored a 0% or a 1%) within each school and in some schools may affect no students at all.

In conclusion, it is the professional and expert opinion of ETS that other than the two issues identified, the other parts of the complex algorithm reviewed by ETS match the procedures described in the Report from the Standardisation Group to the Independent Steering Committee and the Program Board and are producing scores in accordance with the methodology described in the Report.