The Scottish Mathematical Council

SMC Statement on Recent PISA Results

Introduction

The Programme for International Student Assessment (PISA) is a worldwide study conducted by the Organisation for Economic Co-operation and Development (OECD) [1]. It is intended to evaluate educational systems and provide comparable data with a view to enabling countries to improve their education policies and outcomes. To evaluate, the PISA test assesses the mathematics, science, and reading literacy skills of 15-year-olds (typically S4 pupils in Scotland). It captures a wide range of cognitive, social and emotional student outcomes and indicators about schools. Running for the first time in 2000, the programme normally runs every three years across all OECD members and a variety of partner countries (around 690,000 pupils across eighty-one countries in the 2022 programme). However, the recent assessment (which had its main focus on mathematics) was delayed due to the Covid-19 pandemic.

Results from the most recent PISA assessment were released in December 2023. Scotland's mean score for the assessment in mathematics was 471. Despite being similar to the OECD average, performance against it (i.e. against countries such as France, Germany, Spain, and Italy) has declined over each successive assessment since our first participation in 2003. Compared with the last assessment, the scores in mathematics fell by eighteen points (note: OECD considers twenty points to equate to a year of learning).

The PISA results attracted criticism within the media in Scotland [2-7]. Indeed, some opposition politicians employed them as a weapon against the Scottish Government [8, 9]. A recurring theme was that Scottish education's reputation fell well below England's standards. This short response offers readers an insight into other factors impacting performance, enabling a more balanced view.

Covid-19 Pandemic

The impact of the pandemic has been cited as a possible factor in the poor Scottish results [10]. There is no doubt that the pandemic has had a profound impact on our young people [11]. It is certainly worth noting that Scotland's early and lengthy lockdowns have negatively affected the educational experience at all levels. It has been reported that Scottish pupils lost more teaching time during lockdown than pupils in England [12]. It is also worth noting the wide range in impact of the pandemic, and associated governmental responses, across the world [13].

Apparently, the learning of mathematics, with its reliance on strong foundations, is perceived to have been more negatively affected than reading and writing by online/remote/hybrid learning and/or missed school time [14,15].

Curriculum for Excellence

Some have used the PISA results to suggest that the Curriculum for Excellence (CfE) is failing our learners. However, Shapira and Priestley [16] have adopted a broader perspective, arguing that "While CfE undoubtedly has many problems related to its structure and coherence, lack of attention to knowledge and its implementation, and badly needs reform, we do not believe that CfE is the sole or even the primary issue affecting the PISA results." It can be argued that our national curriculum is not solely based on generating academic success. We pride ourselves on producing individuals who can engage with people from different cultures and act for collective well-being and sustainable development. Our values are underpinned by the need to be more compassionate and better communicators and to continue to learn regularly throughout life. In fact, whilst the recent PISA scores evidenced that Scottish pupils were below average in **formulating** and **employing**, they were amongst the top five nations in **interpreting** and **reasoning**. According to Professor Gordon Stobart, CfE continues to be viewed internationally as "an inspiring example equated with good curriculum practice" [17].

The CfE has provided a great deal of opportunity for variation in teaching methods. We know that local authorities can have differences in how some fundamentals of mathematics and numeracy are taught [18]. For example, some still place a great

emphasis on mental calculations and quick recall of times tables and number bonds, whereas a significant number of pupils will routinely “double, double and double again” rather than multiply by 8. Variations in learning and teaching approaches such as these should be considered alongside the PISA headline results. The important point to note is that issues such as these have already been identified and the community is working to address them.

Classroom Environment

Since the creation of CfE, Scotland has seen a rapidly changing classroom environment with huge advances in technology, an explosion of social media usage and resourcing difficulties. With regard to technology, we have such a wide and varied social (and physical) landscape, with a vast disparity of access to technology across schools in Scotland. More can be done to ‘level the playing field’ to give every learner in Scotland the opportunity to succeed. The explosion of social media has caused difficulties for educators. The almost constant need for “notification checking” negatively affects concentration and learning. Here, families must be tasked with working with schools on common ground on the rules pertaining to mobile phones and laptops in the classroom. The boom in social media has, unfortunately, gone hand in hand with a new wave of bullying, which is only ever going to negatively affect our learners. Of course, these issues are not unique to Scotland. Finally, and as mentioned in the previous SMC PISA paper [19], there is an obvious correlation between resourcing and PISA performance. While correlation of course does not imply causation, the resourcing of education and educators in Scotland is a worry at all levels and the current financial climate is not helping to facilitate happy and successful classrooms.

Accountability

In Scotland, there is no direct accountability for schools, teachers, and pupils for PISA results and subsequent action. Involvement is voluntary, and individual participants are not notified of their performance. Such conditions do not encourage enthusiasm within our Scottish schooling culture and teachers do not prioritise the PISA assessment. In contrast, other nations have used campaigns and provided resources to pupils and teachers to enhance performance [20, 21]. Others have aligned their syllabuses towards

the test [22]. It has been reported that a country can rise up to 15 places in the PISA rankings if pupils take the assessment seriously [23]. Care must be taken when comparing nations with such a drastic difference in feeling towards this assessment.

Non-Participation

It is essential to consider the methodologies employed to recruit the sample of schools and participants, as selection bias will impact the validity of the PISA results. Indeed, this was an issue after the UK was excluded from the results of the 2003 assessment due to failing to meet the rigorous sampling criteria for the study. Scotland did, however, take part as an independent National Centre, meaning that it participated fully in all PISA activities as though it were a full country including separate quality monitoring and adjudication of test administration.

Recent findings presented at the Joint Mathematics Council (https://www.jmc.org.uk) have illustrated a disparity even between the constituent countries of the United Kingdom.

Conclusions

It is well known that concerns exist for the robustness of the mechanism that supports the claim that PISA provides truly representative international comparable data [19]. Media and political entities will attempt to shape the conversation and personal bias may affect the outlook of the PISA results. As educators, we must rely on the evidence and interpret the data cautiously, given that the assessment has layers of dimensions which do not compare 'like with like.' It is important that we do not make snap judgements on these recent results, whilst still recognising the downward trend of the PISA scores since its inception. It is clear that the Scottish education community is trying to improve and provide the best for all involved, and we should take on board any lessons that PISA can provide.

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