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The Future of STEM in Irish Education – a commentary on the Report of The Joint Oireachtas Committee on Education, Further and Higher Education, Research, Innovation and Science (JOCEFHERIS), July 2023.

(Article submitted by Áine Hyland for the autumn 2023 edition of Chemistry in Action).

An important report on *The Future of Science, Technology, Engineering and Maths (STEM) in Irish Education* was published by the Joint Oireachtas Committee on Education, Further and Higher Education, Research, Innovation and Science (JOCEFHERIS) in July 2023 https://www.oireachtas.ie/en/committees/33/education/ . The report is comprehensive and detailed, containing no fewer than 305 pages (including appendices). It is written in a clear, accessible and inclusive style. Its recommendations are based on submissions and evidence from relevant, experienced and interested stakeholders from both within and outside the Irish education system.

The JOCEFHERIS is one of a number of Select Committees set up by the Oireachtas to consider matters of expenditure, administration and policy connected with government departments. All the main political parties as well as some Independents are represented on Joint Committees. They play an important role in ensuring that government departments (and associated public bodies) are accountable and seen to be accountable to the Oireachtas. According to its website, JOCEFHERIS "shadows the Department of Education and DFHERIS. It seeks to provide a meaningful input into legislation and policy so that Irelan's education system benefits all of society and is recognized internationally as a world class system in terms of research, innovation and science".

The Joint Committee on Education has fourteen members, nine of whom are T.Ds and five are Senators, representing Fianna Fáil, Fine Gael, the Green Party, Sinn Féin and the Labour Party, as well as three Independents. It is chaired by Paul Kehoe T.D., Fine Gael. The other members are Deputies Sorca Clarke, Cathal Crowe, Mairéad Farrell, Carol Nolan, Jim O'Callaghan, Marc Ó Cathasaigh, Padraig O'Sullivan, Aodhán Ó Ríordáin and Senators Aisling Dolan, Eileen Flynn, Rónán Mullen, Fiona O'Loughlin and Pauline O'Reilly .

JOCEFHERIS takes its role very seriously and has published a number of reports since it was set up at the beginning of the life of the 33rd Dáil. In addition to the report on *The Future of STEM Education*, it has published a report *on Leaving Cert Reform* (May 2022); *School Bullying and Mental Health* (August 2021); and *The Impact of Covid 19 on Primary and Secondary Education* (Jan 2021). It has also scrutinised and commented on recent educational legislation including the *Research and Innovation Bill* 2023. Members of the Committee have also visited Mountjoy and Dóchas Prison Education centres and education centres in Cork and Limerick.

Its recent report on STEM in Irish education is a particularly good example of the inclusive and transparent way in which the Joint Committee on Education approaches its work. It initially invites written submissions from relevant stakeholders at all levels of education and then hosts a series of workshops and meetings at which it interrogates the submissions and

provides an opportunity for debate and discussion. These meetings are public meetings and are streamed on the Oireachtas television channel. They are subsequently accessible as podcasts. All submissions are publicly available during the deliberations of the committee and are published as appendices to the final report.

It is worth reading the report in full, as it provides an excellent flavour of the current state of thinking about STEM at all levels of education. The recommendations of the report are evidence-based and are grounded in the submissions from stakeholders and the roundtable discussions. Each chapter of the report is self-explanatory and includes quotations from stakeholders leading to coherent and logical conclusions and recommendations.

The following paragraphs provide a summary of the report and a précis of its ten key recommendations.

Summary of the Report on the Future of STEM in Irish Education:

There was a consensus among all the stakeholders that early childhood is the ideal time to introduce STEM concepts as young children are naturally curious and inquisitive. Since introducing STEM at this age requires a structured pedagogical approach, Early Childhood Education should be the responsibility of the Minister for Education.

As regards teacher education, a mandatory module on integrated STEM Education should be provided in all Initial Teacher Education (ITE) courses, and to all Early Years Education, Primary Teachers as part of their continuous professional development (CPD).

The National Children's Science Centre, in gestation for many years, should be opened as a matter of urgent national priority. It will send out a message that Ireland is very serious about science education for Primary and Post Primary students.

The Department of Education should publish revised specifications for Physics, Chemistry and Biology at Senior Cycle by the end of 2023. A key priority should be that the revised syllabus for each subject is far more detailed with comprehensive instructions for teachers.

Recruitment and retention of qualified teachers is a matter of critical concern. An Expert Working Group on Teacher Supply for STEM Subjects and Computer Science should be established by the Department of Education.

Evidence shows that talented and gifted students are not supported enough. The Department of Education should develop a National Programme for High Performing Students in Primary in and Post Primary Schools to enable them to reach their full potential.

An Expert Working Group on Pathways from Further Education to Higher Education should be established to ensure that all citizens are given the opportunity to progress in their lives and fulfil their true potential. Apprenticeships are now seen as gateways to exciting and fulfilling careers.

Funding must be provided to the Technological Universities (TU)s to ensure there is sufficient physical capacity and lecturer capability to deliver on the increased numbers of Craft and New Generation Apprentices. In a spirit of genuine partnership and joined up thinking an

Expert Working Group on STEM Subjects and Increased Female Participation should be established by the Department of Education.

Digital learning has become fundamentally important in all our lives. The Department of Education should publish an Implementation Plan so that the excellent Digital Strategy for Schools to 2027 becomes a reality.

The other recommendations in the report are also very important in terms of driving the STEM agenda forward and making a real difference in creating a Whole STEM Culture throughout the Irish education system.

The TEN KEY RECOMMENDATIONS of the Report on the Future of STEM in Irish Education.

Below are the ten key recommendations of the report, listed by order in which they appear in the main body of the Report. They are of equal value.

1. Responsibility for all Early Years Education should be transferred from the Minister for Children, Equality, Disability, Integration and Youth to the Minister for Education to ensure, inter alia, that STEM education is an integral part of the Early Childhood Care and Education programme (ECCE).

2. A mandatory module on integrated STEM Education should be provided in all initial teacher education (ITE) courses, and to all Early Years Education, Primary Teachers as part of their continuous professional development (CPD) These models should be geared towards teaching and learning that supports inquiry, experimentation and higher-order thinking and skills in the STEM areas.

3. The National Children's Science Centre should receive the full support of Government with a view to an early launch in Q4 2023. Once opened, it is recommended:

- The Centre receives ring fenced funding on a multi annual basis from the Department of Education to ensure it is adequately resourced to fulfil its mandate.
- The Centre liaises with the Department of Education Inspectorate so that it can play a central role in supporting STEM in the Primary and Post Primary School Curriculum.
- The Department of Education issues a circular to all Primary and Post Primary Principals with a view to ensuring students visit the Centre as part of the STEM Curriculum.

4. The Department of Education should publish revised specifications for Physics, Chemistry and Biology at Senior Cycle by the end of 2023. A key priority should be that the revised syllabus for each subject is far more detailed with comprehensive instructions for teachers. The Committee recommends that the National Council for Curriculum and Assessment (NCCA) reviews the proposed design of the new specifications to ensure teachers are properly supported and students are taught to the highest professional standards.

5. An Expert Working Group on Teacher Supply for STEM Subjects and Computer Science should be established by the Department of Education in Quarter 4, 2023. The Group should be chaired by an external expert and comprise teachers, the National Council for Curriculum and Assessment (NCCA), Relevant Teacher Training Institutions, Subject Matter Experts and

senior officials from the Departments of Education and Further and Higher Education, Research, Innovation and Science.

6. The Department of Education should develop a National Programme for High Performing Students in Primary and Post Primary Schools to enable them to reach their full potential. The Department should liaise with the Centre for Talented Youth (CTYI) in Ireland at Dublin City University (DCU) in this regard with a view to agreeing on a Service Level Agreement (SLA) that would include, inter alia, Training for Teachers in Programme Delivery. The Programme should be rolled out nationwide so that all relevant students have equal access to it.

7. An Expert Working Group on Pathways from Further Education to Higher Education should be established by the Minister for Further and Higher Education, Research, Innovation and Science. The Group should be chaired by an external expert and be comprised of senior Department and Higher Education Authority (HEA) Officials, the Irish Universities Association (IUA), the Union of Students in Ireland (USI), the Technological Higher Education Association (THEA), SOLAS, Industry Representatives and Staff Unions. The Group should identify current opportunities and barriers to progression from Further to Higher Education and establish how to develop links between both sectors that allow for more seamless progression.

8. The Higher Education Authority (HEA) should provide ring fenced funding to the Technological Universities (TU)s, as necessary, to ensure there is sufficient physical capacity and lecturer capability to deliver on the increased numbers of Craft and New Generation Apprentices. To this end:

• The Department of Further and Higher Education, Research, Innovation and Science Emergency should provide Short Term Funding to bridge the gap.

• From 2023, the Department should provide multi annual funding through a new Apprenticeship Fund.

• The Higher Education Authority (HEA) should commence a review of the Craft and New Generation Apprenticeship Building Requirements by Q3, 2022, with the aim of delivering the buildings required to ensure apprentices are educated to the highest international standards within a 3-year period.

9. The Department of Further and Higher Education, Research, Innovation and Science Education should establish a consolidated system for the compilation of disaggregate data collation and measurement on the researchers to include gender, disability, ethnic minority and economic status. The data should also record the nature of individual research being undertaken and the proposed outcomes. This data should be used to inform the development of educational policy on an ongoing basis.

10. The Department of Education should publish an Action Plan to implement the Digital Strategy for Schools to 2027 by Q4 2023.

Conclusion

It is heartening and encouraging to read a report which presents and summarises so clearly the challenges facing STEM in the Irish education system in the coming years and also comes up with practical and implementable solutions. Its recommendations are realistic and achievable. The report gives a voice to students, teachers and other stakeholders who highlighted issues relating to STEM in the education system that need to be addressed.

For example, recommendation four, which states that "revised specifications for Physics, Chemistry and Biology at Senior Cycle should be far more detailed than is proposed, with comprehensive instructions for teachers" has been widely welcomed by science teachers and students. The Committee's recommendation that "the National Council for Curriculum and Assessment (NCCA) review the proposed design of the new specifications to ensure teachers are properly supported and students are taught to the highest professional standards" could not be clearer. A similar recommendation was made in the committee's May 2022 *Report on Senior Cycle Reform,* which stated that "a key priority for the Department of Education must be that the revised syllabus for each subject is far more detailed with comprehensive instructions for teachers". Unfortunately, that recommendation has not been implemented in the revised senior cycle subject specifications which have been released to date. Given the all-party support for this recommendation, it is important that the NCCA heeds and implements it.

Finally, the author of this article is particularly pleased that the Joint Oireachtas Committee recommended that the setting up of the proposed National Children's Science Centre be prioritised by government. The Centre, which is being driven by a voluntary board of individuals committed to science education, will be a joint venture between the board and government. The Office of Public Works has prepared impressive plans for the centre in the currently unoccupied North Wing of the National Concert Hall building on Earlsfort Terrace. Planning permission has been granted by Dublin City Council and a decision on an appeal is expected shortly from An Bord Pleanála. The proposed Science Centre will have three floors of immersive, interactive exhibits and a state-of-the-art planetarium. It will also house a modern science laboratory for students and teachers and will provide outreach support to schools and education centres. Given the oft-stated commitment by successive government to STEM education, it is extraordinary that Ireland remains the only country of the OECD that does not have a National Children's Science Centre. We look forward to this gap being filled in the near future – and we thank the Joint Oireachtas Committee for their support and endorsement.

END.