SENIOR CYCLE CHEMISTRY, BIOLOGY AND PHYSICS: CONCERNS WITH RESEARCH INVESTIGATION COURSEWORK

DR PATRICK O'DONNELL PGDE BSc PhD outlines significant concerns with the proposed additional assessment component for Leaving Cert Physics, Biology and Chemistry.

While it is recognised that the current Leaving Certificate Biology, Chemistry and Physics syllabi need reform and updating, it is important that the new specifications (syllabi) are designed to the best international standards (Hyland, 2014; Hyland and Kennedy, 2023). As a concerned educator, I am writing this article to express my concerns regarding the new specifications for Leaving Certificate Biology, Chemistry and Physics [to be implemented in the 2025/26 school year]. These new specifications, in their current form, pose significant challenges and limitations that will negatively impact both teachers and students. After a review carried out by the Irish Science Teachers' Association (ISTA) (ISTA, 2024), it has become apparent that several aspects of the new specifications raise serious concerns among teachers.

In this paper, I wish to concentrate on the second mode of assessment (the research investigation coursework or "additional assessment component") and outline the concerns I have with this component.

40% project work is excessive

Implementing a 40% project work component in the curriculum will pose challenges. While project work is beneficial for practical understanding and skill development, allocating such a significant portion could potentially overshadow other essential aspects of the subject. Balancing theoretical knowledge and practical skills is crucial for a comprehensive understanding of chemistry. Teachers' views on the percentage allocation to coursework are summarised in **Figure 1**.

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Figure 1: ISTA report on teacher preferred allocation of marks for the additional research investigation assessment component.

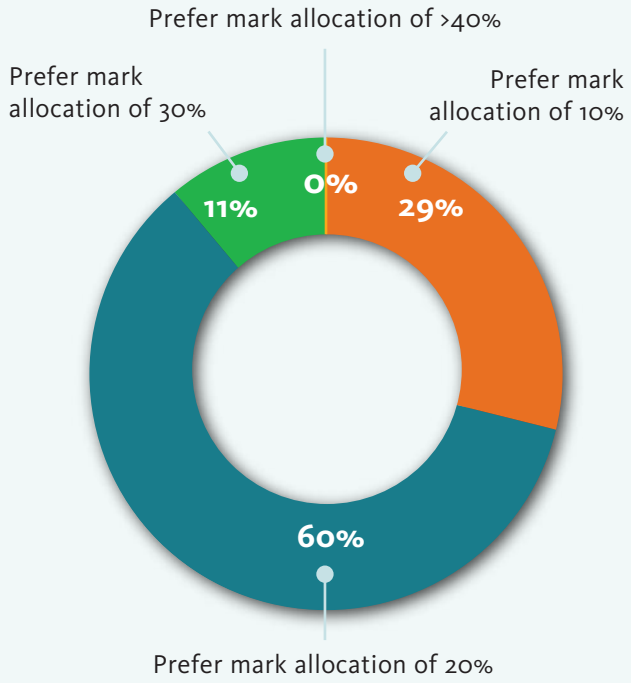
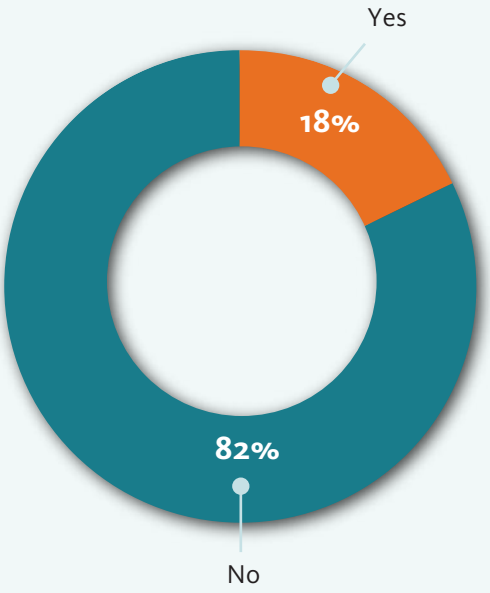


Figure 2: Do you believe that your school laboratories have sufficient resources to support your students in completing to the best of their ability the additional assessment component research investigation?



Lack of clarity

In her address to the 2024 ASTI Convention, the Minister for Education, Norma Foley TD, spoke of Leaving Certificate reform. In that speech she used the word "accelerated" when talking of these reforms. Why is everything in relation to these reforms accelerated? There are a number of issues with this approach:

- no samples of projects/exam papers available,
- when will we get more guidance on the coursework component?
- where is the list of mandatory experiments?
- where are the guidelines for teachers?, and
- no CPD yet!

Are we as teachers of Chemistry, Biology and Physics expected to teach and prepare students for the unknown in September 2025?

Resource implications for laboratory equipment/supplies

Introducing project work demands adequate resources, including laboratory equipment, chemicals and materials. Insufficient resources could hinder effective implementation and limit students' 'hands-on' experiences. The views of teachers regarding laboratory resources (ISTA, 2024) are summarised in **Figure 2**.

It is clear that the vast majority of teachers surveyed feel they do not have sufficient resources to complete the additional research investigation assessment component.

Problems with access to school laboratories

A well-structured timetable for laboratory sessions is essential to ensure that students receive sufficient hands-on laboratory experience. Conflicting schedules or limited lab hours may restrict students' opportunities to engage in practical work related to the research investigations involved in the coursework and undermine the effectiveness of the curriculum.

Added stress on students and teachers

The timing of the deadlines to submit the investigation in sixth year will be an issue for students who are under enormous stress with pre-exams, orals, project work from other subjects, and their coursework.

When writing this article, I spoke to three Leaving Certificate Chemistry students and asked them to outline their assessment workload during the second term of sixth year.

Student A

- Pre-exams: coursework, first two weeks in February
- Chemistry: It is envisaged that the additional assessment component will take up to 20 hours of class time to complete and meet a deadline during term two of sixth year
- Biology: It is envisaged that the additional assessment component will take up to 20 hours of class time to complete and meet a deadline during term two of sixth year
- History: Deadline April 26 (approximately)
- Orals: French and Irish

Student B

- Pre-exams: coursework, first two weeks in February
- Chemistry: It is envisaged that the additional assessment component will take up to 20 hours of class time to complete and meet a deadline during term two of sixth year
- Physics: It is envisaged that the additional assessment component will take up to 20 hours of class time to complete and meet a deadline during term two of sixth year
- Design and Communication Graphics: Deadline in January (approximately)
- Economics: Deadline in January (approximately)
- Orals: German and Irish

It is clear that the vast majority of teachers surveyed feel they do not have sufficient resources to complete the additional research investigation assessment component.

Student C

- Pre-exams: coursework, first two weeks in February
- Chemistry: It is envisaged that the additional assessment component will take up to 20 hours of class time to complete and meet a deadline during term two of sixth year
- PE: Two projects
- Geography: Field trip and project report
- History: Deadline April 26 (approximately)
- Orals: Polish

Increased workload on science teachers

Each student is doing their own research project with their own set of unique glassware and chemicals. The increase in laboratory equipment needed will be massive. The sourcing of this lab material will prove problematic and needs to be addressed. I believe the courses should have been trialled to identify what supports should be in place for teachers.

Lack of lab technician support

The availability of these qualified technicians may vary across educational institutions, impacting the quality of practical instruction. It is the teachers who will be expected to set up and maintain equipment, order chemicals, and make up any solutions needed for these investigations.

Lower uptake of science subjects at Leaving Certificate level

In view of the huge amount of work involved in the research investigation coursework, on top of a lot of subject content for the written paper, I fear that there will be a lower uptake of Chemistry, Biology and Physics subjects. This issue has already been highlighted in Leaving Certificate Agricultural Science, where the student uptake has dropped by 1,040 candidates in three years since the project work was introduced (Gallagher, Cronin and O'Brien, 2023).

Widening of the social divide

Disparities in resources and opportunities may exacerbate existing social divides among students. Schools with limited funding or located in disadvantaged areas will struggle to provide the same level of access to laboratory facilities and project resources compared to more affluent institutions. This has already been pointed out by the Irish University Association (Grenon *et al.*).

Health and safety implications

Maintaining stringent health and safety standards in laboratory settings is paramount. Who has responsibility for carrying out risk assessments associated with every additional research investigation assessment component project? This will add further stress to teachers as they try to cope with the additional workload.

Conclusions

The Irish Universities Association has recommended that an alternative model be developed to give students credit for carrying out laboratory practical work investigations, and that the 40% of marks for the project work be reduced to 20%. I am in complete agreement with these recommendations. I would ask all stakeholders in this process of Leaving Certificate reform to study the points I have outlined in this article and to put pressure on the Minister for Education to listen to the voice of science teachers.

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