Iris Eireannach An
OIDEACHAIS
The Irish Journal of
EDUCATION

The Leaving Certificate Examination - A Target for Unfair Criticism?

Patricia McGrath

Independent Researcher

Abstract

The Irish Leaving Certificate Examination is subject to ongoing scrutiny. Recent criticisms are that there is too much emphasis on rote learning or lower-order questions; an over-reliance on final examinations leading to increased stress for final-year students; and inadequate preparation for life after school. The extent to which the criticisms are justified is explored in this paper drawing on various data sources. Using Bloom's (revised) taxonomy of educational objectives, Leaving Certificate higher-level papers in 2018 were analysed in nine subjects. Results showed that examination papers in the selected subjects do not consist mainly of lower-order questions, whilst a review of all higher-level examination subjects indicated that the extent to which students must rely on marks awarded in the final examination varies, depending on subject choice. Following a review of research, evidence is presented that stress associated with the Leaving Certificate Examination is an ongoing issue for students and also that some dissatisfaction exists among students in their transition to further study and/or life after school. The need for more timely and appropriate guidance is indicated along with the promotion of career pathways that include, but are not limited to, the traditional third-level routes.

Keywords: Irish Leaving Certificate Examination, Revised Bloom's Taxonomy, Third Level, Apprenticeships

Author Note

Patricia McGrath can be contacted at patriciamc_grath@hotmail.com.

Please cite as: McGrath, P. (2021). The Leaving Certificate Examination - A Target for Unfair Criticism? *Irish Journal of Education, 44* (5), 1-23. www.erc.ie/ije.

The education system in Ireland is generally seen to be robust and is internationally well-regarded. Recent comparative data on participation rates and achievement underline some of its strengths. In 2018, all three to five-year-olds were enrolled in early childhood education, compared to 88% on average across the Organisation for Economic Cooperation and Development (OECD) countries (OECD, 2021). In the Progress in International Reading Literacy Study (PIRLS) 2016, Ireland was ranked in fourth place in Reading (Eivers, et al., 2017). PIRLS assesses the reading achievement of fourth-class pupils, and 50 countries and 11 benchmark regions (subnational entities) took part in 2016. In Trends in International Mathematics and Science Study (TIMSS) 2019, in which 64 countries and 8 benchmark regions participated, Ireland's primary school fourth-class pupils were ranked in 9th place in Mathematics, and in 18th place in Science (Perkins & Clerkin, 2020). Second year post-primary students were ranked in 7th place for Mathematics and 10th place in Science (Perkins & Clerkin, 2020). In the Programme for International Student Assessment (PISA) 2018, Irish second-level students were ranked fourth of 36 OECD countries for reading literacy (McKeown et al., 2019). In 2019, 70% of 25-34 year olds held a tertiary degree in Ireland, compared to 45% on average across OECD countries, and all seven Irish universities are ranked in the top 3% of institutions worldwide according to the Irish Universities Association (IUA, para. 2). The Leaving Certificate is a two-year senior cycle of non-compulsory education and consists of the established Leaving Certificate, and the Leaving Certificate Vocational Programme (LCVP). With the established Leaving Certificate, students study five or more subjects from a variety of subjects on offer. LCVP was introduced in 1994 to respond to the changing business environment. It includes vocational elements and is offered to students who are taking vocational subjects, modern languages and other subjects (Professional Development Service for Teachers, n.d.). Both of these qualifications lead to a Level 5 award within the National Framework of Qualifications (NFQ). In 2018, these programmes were completed by 55,255 students, or 95% of the students who remained in school (State Examinations Commission, 2018a). Following on from these programmes, students can start work or apply for further study across a range of fields. The remaining 5%, 2,744 students, took the Leaving Certificate Applied – a Level 4 NFQ award that emphasises vocational and personal skills. It is estimated that 5% of students, who were eligible to complete the Leaving Certificate in 2018, were early school leavers (CSO, 2018, Table 6.2). It is the established Leaving Certificate that is under scrutiny and the focus of this paper. The main criticisms addressed are: 1) a tendency of the Leaving Certificate to promote rote learning (Burns et al., 2018), 2) excessive examination pressure on students throughout the two-year senior cycle including the 15-day examination period in June (Banks et al., 2018), and 3) inadequate preparation of students for third-level or the working world when they leave school (O'Leary & Scully, 2018). These three issues are discussed in turn in order to assess if, and to what extent, such criticisms are justified.

Criticisms of the Leaving Certificate Examination

The Leaving Certificate is Based on Rote Learning

The first criticism considered in this paper is that students are encouraged to rote learn and that preparation for the Leaving Certificate Examination consists predominantly of this type of learning. Rote learning is the memorisation of information based on repetition such as that used in memorising lines of poetry, the periodic table in Chemistry and basic formulae in Science. Factual information is important in many subjects but such foundational knowledge may be lost if it is largely replaced with higher-order skills (observing, inferring, predicting, questioning, constructing hypotheses, designing experiments, applying concepts and communicating). Whilst some see rote learning as a necessary first step in learning – it can be used to aid recall of facts and foundational knowledge to prepare for tests or examinations – it may not lead to a deeper understanding of a subject as little or no connection is made between new and previous knowledge (Oxford Learning, 2017). Rote learning or surface learning is different from deep learning, in which students search actively for meaning in the material (Biggs, 2003; Shepard et al., 2005). To understand a subject on a deeper level, meaningful learning is required. This may involve, for example, an understanding of how all the parts of a concept fit together. Such learning may be remembered by a student for life. It involves retention – the ability to recall at a later date (though not necessarily verbatim) – and also transfer of prior knowledge to solve new problems. Deep learning can take longer to achieve than rote learning and some have argued that it may not be attainable for all students. Lujan and DiCarlo (2005) argued that a packed curriculum leaves little time for deep student understanding. Tobias (1994) stated that prior knowledge is the most important factor for student learning and achievement. If students lack prior knowledge or have misconceptions, this may lead to surface or rote learning as students cannot relate the new knowledge to their existing knowledge. Other types of learning that may overlap with deep learning include associative learning that evolves from reinforcing ideas and linking ideas with other ideas, and active learning in which students construct new knowledge through engaging in activities such as reading for specific purposes or performing an experiment with limited assistance.

In order to ascertain if the Leaving Certificate Examination is based on knowledge that relies on rote learning, nine higher-level subjects were analysed to examine the types of questions included in the 2018 examination papers: A core subject (English), science subjects (Biology, Chemistry and Physics), humanities (History and Geography), vocational subjects (Economics and Business) and a practical subject (Home Economics). The analysis was based on Bloom's taxonomy of educational objectives which provides a framework for categorising the thinking skills of students beginning with the basic skill of recalling information up to and including the

advanced skill of judging information. Bloom and his team identified six levels of cognitive performance – knowledge, comprehension, application, analysis, synthesis and evaluation – to encourage teachers to devise instructions that ask students to think in more complex ways and to advise teachers about the order in which they teach so that students can be helped to succeed in higher-level thinking (Bloom, 1956). A key assumption of the taxonomy is that education is about more than knowing facts though students generally must master lower levels of learning before they can attempt more complicated tasks — basic knowledge and understanding are required before knowledge can be applied. Used as an aid to teaching and learning, the taxonomy can help teachers identify the intellectual level at which students are capable of working, and help students reflect on their own learning in the classroom, thereby promoting an important life skill.

Researchers vary in their support for Bloom's taxonomy. Watanabe-Crockett (2018) stated that critical thinking skills are challenging to teach and deliver effectively, and advises adopting Bloom's taxonomy as a method of delivery. Soozandehfar and Adeli (2016) argued that the world has changed radically since Bloom originally set out his taxonomy and, though they agree that a structure around teaching is better than no structure, they believe that new theories and ideas about ways of learning are superior to the framework offered in Bloom's taxonomy. These more recent theories include constructivism (the idea that students create knowledge when they are involved with meaningful learning), meta-cognitive skills (involving self-awareness and higher-order thinking skills) and self-regulated learning. Soozandehfar and Adeli also believe that Bloom's taxonomy is not always applied correctly as there is sometimes a mistaken view that some skills (such as those required for higher-order thinking) are more important than others (such as the acquisition of foundational knowledge) or are more suitable for some students than for others. In their view, educators tend to believe that lower-order skills are more appropriate for introductory college courses while higher-order skills are more appropriate for advanced students and graduate-level courses. Despite such criticisms, both Bloom's original (1956) taxonomy and Anderson and Krathwohl's (2001) subsequent revised version (which is the one applied in this study) are used in schools across the country in Ireland, and are supported by the Professional Development Service for Teachers (n.d.) and by universities in Ireland (Kennedy, 2006).

Bloom's revised taxonomy is presented as a table with a list of action verbs that can be described as lower-order thinking (rote learning or remembering), intermediate-order thinking (understanding and application) and higher-order thinking (analysis, evaluation and creation) – see Table A1 (Anderson & Krathwohl, 2001). It differs from the original taxonomy table in that nouns are replaced by verbs; Remembering replaced Knowledge, Understanding replaced Comprehension, Applying replaced Application, Analysing replaced Analysis, Evaluating replaced Synthesis and Creating replaced Evaluation. The revised table took into account Bloom's own concerns and criticisms of the original taxonomy table (Wilson, 2016).

For the analysis described in this paper, the verbs used in the examination questions were compared with Bloom's revised taxonomy in order to ascertain if the verb in each question indicated a lower-, intermediate- or higher-order question. Some verbs (choose, relate, select, compare, contrast, explain, interpret, construct, develop and select) are included in more than one category in Bloom's revised table, so the context of the examination question was taken into account in this paper, when applying the taxonomy. This also applied if the verb in the examination question indicated a different order question to that indicated in Bloom's revised table. Take for example in the History paper, the question 'What was the contribution to Irish nationalism of the Young Ireland movement and/or Fenianism?' (State Examinations Commission, 2018b, p. 4) was deemed to indicate an intermediate-order question, though Bloom's taxonomy assigns a lower-order classification to questions beginning with 'what' (Table A1). When the verb in the examination paper differed from, or was not included in, Bloom's taxonomy, the nearest alternative was chosen. The extent of differences between the taxonomy and the examination papers in relation to the verbs used varied across subjects. In both (higher-level) English papers, 24% of verbs used differed from those in Bloom's table. The corresponding percentages for each of the other subjects examined are: Physics 54%, Chemistry 38%, Business 37%, Economics 31%, Biology 29%, Geography 22%, and History 14 percent. Though sometimes used in Leaving Certificate examination questions, the action verb 'state' is not included in Bloom's table. It was classified as a lower-order question in the present study as the information required to address such questions relates to remembering. In the 2018 examinations, the action verb 'state' did not feature in English or History papers but was used to some extent in each of the other higher-level papers considered in this study, the proportion ranging from 5% or less of questions in Business (2%), Economics (3%), Physics (4%) and Biology (5%) to at least 10% in Chemistry (10%), Geography (10%) and Home Economics (11%).

For each of the nine higher-level subjects from 2018 analysed in this study, the percentage of questions that were classified as lower, intermediate, and higher order using Bloom's revised taxonomy of educational objectives, is shown in Table 1.

TABLE 1

Percentage of 2018 Leaving Certificate Higher-Level Examination Papers Based on Lower, Intermediate and Higher Questions in Selected Subjects

Subject	Lower Order Rote learning	Intermediate Order Understanding and application	Higher Order Analysis, evaluation and creation
	%	%	%
English	1	7	92
Economics	8	49	43
Home Economics	37	27	36
Geography	14	51	35
Business	8	64	28
History	0	76	24
Chemistry	47	41	12
Physics	26	66	8
Biology	54	42	4
Total	195	423	282
% Grand Total (N=900)	22	47	31

Note. See Tables A2 and A3 for information on action verbs used in the 2018 Leaving Certificate higher-level History and Physics examinations. Information on the additional examination subjects discussed in this paper is available from the author, on request.

The results in Table 1 show that higher-level papers in three examination subjects, Biology, Chemistry and Home Economics, contained relatively high proportions of lower-order questions – 54%, 47% and 37% respectively. Cullinane and Liston's study (2016) of Biology questions in Leaving Certificate papers over a ten-year period (1999-2008) also showed a reliance on lower-order questions and they suggest a mixed form of assessment rather than reliance on a final examination. Similarly, Burns (2018), in a study of the Leaving Certificate Examination over six years from 2005 to 2010, showed a reliance on memory and recall skills in Biology. In the current study, English, History, Economics and Business were found to have few lower-order questions, at 1%, 0%, 8% and 8% respectively. A high percentage of higher-order questions featured in English, and in Economics and Home Economics to a lesser extent – 92%, 43% and 36% respectively. On average across the nine subjects examined, 22% of questions were asked at the lower order, 47% at the intermediate order and 31% at the higher order (Table 1). The criticism that the Leaving Certificate consists of lower-order questions is not supported here. Attention could focus on examination papers in Biology and Chemistry, which in the analysis conducted for this paper, were found to contain relatively high proportions of lower-order questions.

An Over-Dependence on Examination Performance in the Leaving Certificate is Unnecessarily Stressful for Students

The Commission on the Points System (1999) stated that the advantages of the Leaving Certificate are its transparency, impartiality and efficiency – arguably essential characteristics of any high-stakes examinations that filter access to higher education. Notwithstanding such advantages, however, studies have shown that students report experiencing considerable stress during the Leaving Certificate cycle. Based on analysis of a post-primary longitudinal study of 900 students in 12 schools, Banks & Smyth (2015) identified the Leaving Certificate workload, the examinations and the results as sources of stress, particularly for girls. Students placed considerable weight on the Leaving Certificate examinations and saw them as a one-off opportunity to achieve their academic goals. Over 50% of girls reported feeling under constant strain and/or indicated the need to reduce time spent on leisure activities. They reported being under pressure to keep up with schoolwork – from teachers who emphasised the importance of the examinations and from themselves because of their own academic ambitions – and also expressed concern about how their peers would view their results. Of this cohort of senior-cycle students, the most ambitious and high-achieving reported feeling the most pressure. Students whose teachers gave positive feedback and praise, and students who continued with social and sporting activities, tended to report lower stress levels. In contrast, those students who believed they had chosen incorrect subjects for the Leaving Certificate, had low academic self-image and/or did not have a clear career pathway, reported higher levels of stress.

External factors may also be critical to attainment. With rising numbers competing for higher education places (over 60% of school leavers) in Ireland (O'Brien, 2018), there is an increased focus on Leaving Certificate results. Pressure to secure a third-level place was not as great in the past as relatively more of the cohort leaving school entered the workplace directly.

The annual Leaving Certificate Examination takes place over 15 days in June. Examinations are held in 36 subjects, with students generally taking between seven and eight subjects. Typically four or more subjects are timetabled within the first week including two papers in English, Irish and Mathematics. This provides for a very condensed or tight examination schedule. In contrast, the timetable for A-level qualifications in the United Kingdom (UK) (except Scotland) is dispersed over a much longer period. The A-levels take place over 40 days (Rosebury School, 2018) with students generally sitting examinations in three or four subjects (Study in UK, n.d.). An important feature of the Leaving Certificate, however, which also exists in the UK system but to a much lesser extent, is the opportunity it provides for assessment of coursework, oral and practical components. While such forms of assessment are not without additional stresses and pressure points, they may help to offset the particular kinds of pressures associated with examinations. Twenty-one of the 36 Leaving

Certificate examination subjects taken at higher level (58.3%) have a coursework/oral/practical component which, depending on the subject, is worth between 20 and 60% of the overall marks awarded and must be completed by the end of May in advance of the final examinations. There are similar provisions at ordinary level for coursework/oral/practical components for 21 of the 36 subjects (58.3%), though modern languages allocate 20% at ordinary level compared to 25% at higher level, apart from Japanese which has a 25% allocation at both higher and ordinary levels.

TABLE 2

Leaving Certificate Subjects (Higher-Level) by Percentage of Marks Allocated to Non-Examination Assessment

	Coursework/ Oral/ Practical		Coursework/ Oral/ Practical
Subject	%	Subject	%
Link Modules[a]	60	Russian	25
Art	50	Spanish	25
Music	50	Agricultural Economics	20
Technology	50	Geography	20
Design & Communication Graphics	40	History	20
Irish	40	Home Economics	20
Agricultural Science	25	Politics and Society	20
Construction	25	Religious Education	20
Engineering	25		
French	25		
German	25		
Japanese	25		
Italian	25		

Note. Adapted from State Examinations Commission https://www.examinations.ie/?l=en&mc=ex&sc=he#ARTEN

[a] Link Modules - Preparation for the World of Work and Enterprise Education are two units of study in Link Modules taken by LCVP (Leaving Certificate Vocational Programme) students.

As shown in Table 2, an allocation of 60% for coursework is given in Link Modules, and 50% is allowed for Art, Music, and Technology. Irish and Design and Communications Graphics are each allocated 40 percent. Agricultural Science, Construction Studies, Engineering and Modern Languages have a coursework/oral/practical allocation of 25%, whilst six subjects (Agricultural Economics, Geography, History, Home Economics, Politics and Society, Religious Education) have 20% of the overall mark allocated to coursework. Further, the Link Modules examination is taken on the first Wednesday in May whilst the deadline for coursework is mid-March, so that all assessment for this subject is completed before the main block of examinations in June.

Smyth et al. (2019, p. iv) reported that "students, parents and teachers all favoured spreading out assessment over the course of the senior cycle and using a wider variety of approaches to assess student performance (such as project work, portfolios and presentations)". To some degree, this is already in place in the Leaving Certificate as coursework can begin at the start of, and extend over, the two-year senior cycle. Looking at the 21 subjects presented in Table 2, there is considerable scope to achieve outside of examinations. Whilst 15 additional subjects have examinations that count for 100% of overall marks (Accounting, Ancient Greek, Applied Mathematics, Arabic, Biology, Business, Chemistry, Classical Studies, Economics, English, Hebrew Studies, Latin, Mathematics, Physics, Physics and Chemistry), several of these are taken by relatively small numbers of students.

Nevertheless, the criticism that there is too much dependence on examination performance is relevant to subjects that rely totally on a final examination mark subject choice. These include the core subjects of English and Mathematics for all students as well as Biology, Chemistry and Physics for many high-achieving students. Such students may find that all or nearly all of their results are dependent on examination performance. Those opting for high-points courses including Veterinary Science, Medicine or Dentistry, who may be required to take science subjects in the Leaving Certificate Examination, will find that they are faced with a one-off opportunity to perform in order to meet university entry requirements. For other groups of students, however, depending on their subject choice, reliance on examination performance may be relatively low.

The Leaving Certificate Course Does not Prepare Students Adequately for Third Level, for the Working World or for Life After School

Research studies conducted in Ireland have indicated a degree of dissatisfaction among students in their transition from school to further study and/or life after school, with regard to the nature and extent of advice and support that impacted that transition. In a study involving 900 students in 12 case-study schools, Smyth et al. (2011) reported that students from middle-class backgrounds tend to consult their parents, especially their mothers, in relation to post-school careers. They also found that some students felt they had received career guidance too late, after having chosen their Leaving Certificate subjects. Others were of the opinion that higher education had been over-emphasised, whilst Post Leaving Certificate (PLC) courses, employment and apprenticeships were not highlighted. Smyth and Hannan (2007) analysed the individual and school factors which influenced the decision for students to enter higher education. Their study, which covered 4,400 students in 108 secondary schools, revealed that some schools, more than others, had a strong historical orientation towards higher education. This was found to have impacted on students' aspirations and to have surpassed the effects of

family background and prior ability. They also reported that students were more likely to apply for third-level places when provision had been made for both sufficient time to select Leaving Certificate subjects and ample access to career guidance. According to McCoy et al. (2014), students from working-class backgrounds were more likely to rely on school guidance for information on pathways after school and were more likely to report regrets over pathways chosen, three to four years after leaving school.

In 2018, about one in seven students (14%) did not progress to the second year of their chosen course at third level (Liston et al., May 2018), a figure that is not inconsistent with the lack of timely and appropriate career guidance reported by students in the research outlined above. The feedback from students that choices other than further study such as apprenticeships, employment and PLC courses had tended to be overlooked, in the shadow of the higher status attached to third-level provision, also warrants further attention from schools, parents, employers and course providers. Whilst the apprenticeship scheme in Ireland has had limited appeal, recent developments in the sector may help to attract a broader range of participants than has traditionally been the case. Only 2% of apprenticeships were taken up by women, according to a 2019 Oireachtas report of the Joint Committee on Business, Enterprise and Innovation, though this increased to 5% by the end of 2020 (Department of Further and Higher Education, Research, Innovation and Science, p. 30). Currently there are 56 apprenticeships in Ireland (SOLAS, n.d.) covering a broad range including Arboriculture, Biopharma, Construction, Electrical, Engineering, Finance, Hairdressing, Healthcare, Hospitality and Food, ICT, Insurance, Logistics, Motor, Property Services, Recruitment, and Sales, which should have wider appeal. For those involved in developing broader pathways from school to work, apprenticeships need to be marketed positively in schools, at career fairs and across the different media platforms.

In addition to finding the right career path, school leavers who secure third-level places face many challenges. Gibney et al. (2011) found that college students, especially those pursuing Bachelor of Arts degree courses with a less rigid timetable, had time-management issues. Difficulties in managing self-directed learning and meeting deadlines also featured in the feedback from students who took part in McCoy et al.'s (2014) longitudinal study. O'Leary and Scully's (2018) study found that 84% of 304 undergraduate students at the end of their first year of college did not believe that the Leaving Certificate was good preparation for third-level education with respect to several aspects of learning. These included using technology to improve learning, identifying and critically evaluating sources of information, exploring ideas from a number of different perspectives, and using a range of research strategies to investigate a problem. Their findings support previous research findings on the school-college transition in Ireland (Baird et al., 2015; Burns, 2018) and elsewhere (Liu et al., 2014). More generally, students reported inadequate preparation for third level in terms of independent learning, being able to manage academic workload or being aware of standards expected of them (McCoy et al., 2014). They also identified skills

such as learning to drive, completing a tax return and work experience as omissions in their preparation for life after school (Smyth et al., 2019).

In Clerkin's (2019b) study, over 5,000 Transition Year (TY) students from 20 schools participated and almost half of them said that they felt better prepared for the Leaving Certificate as a result of TY. Students felt more confident, made better choices for Leaving Certificate subjects, learned new skills, had increased knowledge regarding future careers and had increased organisational, collaborative and self-management skills (pp. vi-viii). Clerkin's (2019a) study showed that students were more self-reliant after TY. In a review of senior-cycle education which began in 2016, The National Council for Curriculum and Assessment (NCCA, 2019) reported that students had mixed feelings about the most suitable length of time they should spend at senior cycle. This ranged from two to three years, though the option of leaving school after one year with a future return date to school or further education was open to them. Students also suggested having flexibility and options to study some subjects for one or two years. Some felt that the current range of subjects at Leaving Certificate level was too influenced by requirements for third-level entry. There was a range of areas they wished to cover at Leaving Certificate including digital and financial literacy, work experience, social, personal and health education, citizenship and political education, sustainability and climate change education, culture and multiculturalism and opportunities for interdisciplinary learning (NCCA, 2019). The challenges they faced included lack of access to technical, vocational, creative and professional learning. There was an over-emphasis on progressing to third level and a lack of pathways for students who studied Level 1 and Level 2 Learning Programmes at Junior Certificate. The Level 1 Learning Programme (L1LP) was developed for students with learning disabilities in the 'low, moderate to severe, and profound' range (NCCA, n. d. (a), p.6). The Level 2 Learning Programme (L2LP) targets students with 'general learning disabilities in the higher-functioning moderate and low-functioning mild categories' (NCCA, n. d. (b), para. 2). Students also felt that there was not enough support for students progressing to apprenticeships and work, and that all students needed help to develop the knowledge, skills and qualities they needed for adult life regardless of career choice (NCCA, 2019).

The criticism that the Leaving Certificate does not prepare students for life after school appears to be upheld to some degree based on the studies reviewed for this paper. Students commented that necessary practical life skills were absent from Leaving Certificate courses, that they were uninformed regarding university standards and had difficulty with learning independently. They expressed concern about the degree of emphasis on higher education and the resultant neglect of focus on alternative routes from school to work and called for timely career guidance to help them make better subject choices and to reduce the possibility of choosing a career pathway that would not suit them.

Discussion and Conclusion

The first part of this paper examined the criticism that the Leaving Certificate Examination is based on rote learning or lower-order questions. Using Bloom's revised taxonomy of educational objectives, nine higher-level papers from the 2018 Leaving Certificate Examination were analysed to determine the proportions of lower-, intermediate-, and higher-order questions in each paper. For teachers, the taxonomy has proved to be a useful teaching tool, highlighting a range of learning strategies and outcomes associated with different types of questioning. As a research tool for the analysis undertaken for this paper, the taxonomy provided a useful means of conducting a comparative content analysis across subjects. Depending on the extent to which a match was found between the language used in the examination questions and that contained in Bloom's table, the taxonomy was more easily applied to some subjects (History, Geography, English, Biology, and Economics to a lesser extent) than to others (Physics, Chemistry, Business and Home Economics). This led to some subjectivity on the part of the author and in order to counter this, future studies could use multiple raters and obtain measures of inter-rater reliability.

Results of the analysis indicated that Biology, Chemistry, Home Economics and Physics had relatively large proportions of lower-order questions (54%, 47%, 37% and 26% respectively) that relied on memory as the main learning strategy. Other subjects such as English, History, Economics, Business and Geography had fewer than 15% of lower-order questions. In total, just over one fifth of the questions in all nine papers were classified as lower-order (mainly relying on memory). Nearly half were classified as intermediate order (involving understanding and application) and almost one third as higher order (based on analysis, evaluation and creation). Given these findings, the rote learning/reliance on memory criticism of the Leaving Certificate is not substantiated overall. However, the distribution of questions involving different thought processes across subjects is somewhat unbalanced. The findings of this relatively limited analysis, based on only one year and on nine subjects, suggest that a closer look at this aspect of the Leaving Certificate Examination is warranted. Further research covering a wider range of subjects, at both higher level and ordinary level, over a longer period, could generate useful results for policymakers and curriculum developers as well as for teachers and students. The weighting assigned to questions in the marking scheme, and the percentage of questions, could also be examined in future studies, to increase understanding of the proportion of an examination paper involving the different categories of skill types.

The second criticism of the Leaving Certificate Examination considered in this paper relates to the assertion that there is too much dependence on examination performance which is unnecessarily stressful for students**.** To examine the validity of this assertion, a review was carried out to identify the extent to which examination

subjects can be awarded marks that are not allocated in the examination papers. A key finding of the review is that as many as 21 of the 36 higher-level and ordinary-level Leaving Certificate examination subjects (58.3%) have a coursework, oral, or practical component which, depending on the subject, accounts for between 20 and 60% of the overall marks awarded and is completed in advance of the final examinations. The criticism that there is too much dependence on examination performance is relevant to subjects that rely totally on marks allocated to examination papers. These include the core subjects of English and Mathematics for all students as well as Biology, Chemistry and Physics – subjects required for university entry that tend to be taken by students aiming for high-points third-level courses. There are several other subjects, however, that students can choose that do not rely entirely on marks awarded in the final examination. Whether there is sufficient allocation to the non-examination marks within such subjects and within the examination in its entirety is a matter for further inquiry and deliberation. A related issue is the variation in student performance on oral and practical components, and the precise role this has in the final allocation of marks. For example, if large proportions of students achieve at or near ceiling (full marks) on a practical or oral component, the written component of the examination becomes more important as a discriminator of achievement, relative to the oral or practical component, regardless of the proportion of marks available for the latter.

Regardless of subject choice at senior cycle, the studies reviewed for this paper underline 'the extent to which high-achieving students, and girls in particular, reported feeling under stress in anticipation of the Leaving Certificate Examination. Further research on the impact of particular subject choices on students' well-being would be a useful aid to understanding more about this issue. However, since stress is associated with examinations, there is no examination system that can remove it completely. Further, it can be argued that students need to develop some level of resilience which they will need at third level, in employment and generally for life. A study on achievement of difficult objectives indicated that attaining such objectives requires talent along with sustained and focused application over time or, as the authors put it in the title of a paper based on their study, 'Grit: perseverance and passion for long-term goals' (Duckworth et al., 2007). Perkins-Gough (2013) stated that resilience is related to grit as being gritty means being resilient when challenges present. Duckworth and Seligman (2005) showed that grit, perseverance and self-discipline are better predictors of college success than test scores. Dweck (2006) stated that students with a growth mindset tend to be grittier. It is clear from issues discussed in this paper that the Leaving Certificate Examination could be improved to help reduce stress. A limited extension of the examination timetable is worth considering whilst also taking into account any constraints that might adversely affect the time available for marking and the needs of third-level providers. This would help to offset some of the pressure and writing fatigue that can beset students during examinations. Another option is to introduce more coursework into each subject to reduce or further reduce

the emphasis on the final examination. Different assessment methods could be used, such as project work, portfolios and presentations to provide a minimum allocation of between 40 to 50% of marks – similar to some third-level courses, in which various assessment methods are applied during at least two assessment periods per year. A modular approach could be introduced in Fifth year with tests at the end of each module, examined by the State Examinations Commission, and opportunities to retake tests if students are dissatisfied with results. Finally, consideration could be given to how continuous assessment in Transition Year, with its emphasis on work experience and important life skills, might count towards Leaving Certificate grades.

The third criticism of the Leaving Certificate Examination addressed in this paper relates to the argument that it inadequately prepares students for life after school. The research studies reviewed indicate a degree of dissatisfaction among students in their transition from school to further study and/or life after school, particularly with regard to the nature and extent of advice and support that impacted these transitions. Recurring themes that emerged from the review include insufficient emphasis on practical life skills such as time management and self-directed learning; an absence of timely school-based career guidance regarding subject choice, (especially critical for students from working-class backgrounds who tend not to have access to such guidance or information resources at home); regret about career choices attributed to poor subject choice; and an over-emphasis on higher education as a career path in some schools at the expense of focus on PLCs, apprenticeships and employment. Providing sufficient time for making subject choices well in advance of the Leaving Certificate Examination and a focus on career guidance that is open to the full spectrum of post-school options for all students should lead to better further educational course choices and career pathways.

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Appendix

TABLE A1

*Revised Bloom's Taxonomy Action Verbs**

Lower Order	Intermediate Order		Higher Order		
Remembering	Understanding	Applying	Analysing	Evaluating	Creating
Choose	Classify	Apply	Analyse	Agree	Adapt
Define	Compare	Build	Assume	Appraise	Build
Find	Contrast	Choose	Categorise	Assess	Change
How	Demonstrate	Construct	Classify	Award	Choose
Label	Explain	Develop	Compare	Choose	Combine
List	Extend	Experiment with	Conclusion	Compare	Compile
Match	Illustrate	Identify	Contrast	Conclude	Compose
Name	Infer	Interview	Discover	Criteria	Construct
Omit	Interpret	Make use of	Dissect	Criticise	Create
Recall	Outline	Model	Distinguish	Decide	Delete
Relate	Relate	Organise	Divide	Deduct	Design
Select	Rephrase	Plan	Examine	Defend	Develop
Show	Show	Select	Function	Determine	Discuss
Spell	Summarise	Solve	Inference	Disprove	Elaborate
Tell	Translate	Utilise	Inspect	Estimate	Estimate
What			List	Evaluate	Formulate
When			Motive	Explain	Happen
Where			Relationships	Importance	Imagine
Which			Simplify	Influence	Improve
Who			Survey	Interpret	Invent
Why			Take part in	Judge	Make up
			Test for	Justify	Maximise
			Theme	Mark	Minimise
				Measure	Modify
				Opinion	Original
				Perceive	Originate
				Prioritise	Plan
				Prove	Predict
				Rate	Propose
				Recommend	Solution
				Rule on	Solve
				Select	Suppose
				Support	Test
				Value	Theory

*Anderson and Krathwohl (2001).

Note: The body of Table A1 is as presented in Bloom's revised taxonomy, see https://www.apu.edu/live_data/files/333/blooms_taxonomy_action_verbs.pdf

TABLE A2

Leaving Certificate Higher-Level Paper in Physics (2018) by Lower-, Intermediate- and Higher-Order Action Verbs

Question	Lower	Intermediate	Higher
1	State	Draw How Calculate Use Calculate	What
2		Describe Draw Label Draw Use	What
3		Draw Label Describe Calculate Describe Determine	Justify What
4		Draw Draw Calculate Calculate	
5 a)		Draw Label	
5 b)	What State	Calculate Calculate Calculate Explain Calculate Draw	Distinguish Write

Question	Lower	Intermediate	Higher
6 a i)			Derive
6 a ii)		Calculate	
6 a iii)		Calculate	
6 b i)		Calculate	
6 b ii)		Calculate	
6 c i)	State		
6 c ii)		What	
6 c iii)		What	
6 c iv)		Draw	
7	What	Describe	
7 i)		Calculate	
7 ii)	Define	Calculate Draw	
7 iii)		Describe	
7 iv)		Describe	
8	What How	Explain Calculate Calculate Explain Give	Write

TABLE A2 (CONTD.)

Leaving Certificate Higher-Level Paper in Physics (2018) by Lower-, Intermediate- and Higher- Order Action Verbs

	Lower	Intermediate	Higher
Question			
9 i)	List Name		
9 ii)	What		
9 iii)	Label	Draw	
9 iv)	Label State What Where List	Draw Describe	
10 a)	Name Why Why List List	Explain Calculate	Write
10 b)	Name	Draw Sketch Draw Describe Draw Describe	

	Lower	Intermediate	Higher
Question			
11 a)		Calculate	
11 b)		Draw	
11 c)		Explain	
11 d)		Calculate	
11 e)	Where		Justify
11 f)		Draw	
11 g)		Calculate	
11 h)	Name How		
12 a)	When What	Explain	
12 a i)		Calculate	
12 a ii)		Calculate	
12 b)	What	Draw Use Calculate	
12 c)		Define Calculate What Calculate Draw	
12 d)	What	Outline Calculate	

TABLE A3

Leaving Certificate Higher-Level Paper in History Later Modern (2018) by Lower-, Intermediate- and Higher-Order Action Verbs

Question	Lower	Intermediate	Higher
Section 1			
1 a)		What	
1 b)		What	
1 c)		What	
1 d)		What	
2 a)		What Explain	
2 b)		Do they Explain	
3 a)		Do	Give reasons
3 b)		Do	Explain
4			To what extent
Section 2			
1.1		How	
1.2		What	
1.3		What	
1.4			What
2.1			What
2.2		Would Explain	
2.3			What
2.4		What	
3.1		How	
3.2		Why	
3.3			How
3.4			How
4.1		Why	
4.2			To what extent

Question	Lower	Intermediate	Higher
Section 2 (contd)			
4.3		What	
4.4			How
5.1			What
5.2		Would Argue	
5.3		How	
5.4		How	
Section 3			
1.1		What	
1.2		Who Argue	
1.3		What	
1.4		What	
2.1		What	
2.2			How
2.3		How	
2.4		How	
3.1		How	
3.2		What To what extent	
3.3			How
3.4		What	
4.1		Why	
4.2		What What How	
4.3		Why	
4.4		How	
5.1		What	
5.2		What	
5.3		How	

TABLE A3 (CONTD.)

Leaving Certificate Higher-Level Paper in History Later Modern (2018) by Lower-, Intermediate- and Higher-Order Action Verbs

	Lower	Intermediate	Higher		Lower	Intermediate	Higher
Question				Question			
Section 3 (contd)				Section 3 (contd)			
5.4		What		6.3		What	
6.1		How		6.4		What	
6.2		What					