aAn analysis of the current Leaving Certificate points system and A New Leaving Certificate Points System

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Abstract: This paper provides a technical assement of the current Leaving Certificate points system that shows it to have serious flaws. These include using random selection despite significant differences in student marks and giving about 20,000 students the same subject points as others who achieve 9 out of 100 fewer subject marks.
An alternative system is proposed that provides a fairer merit order. This system allows valid comparison of student performances across subjects and years, is not affected by grade inflation or deflation between years, and greatly reduces the need for random selection.
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Introduction:

The Leaving Certificate Examination is taken at the end of second level studies by over 55,000 students each year. More than forty subjects are involved with most students taking from six to eight subjects at Ordinary or Higher levels. The State Examinations Commission manages the creation of the examination papers, the running of the examinations, the marking of the resulting scripts, and the distribution of the results. From an administrative perspective the examination is one of the great success stories of the Irish Public Service, while from an educational viewpoint various concerns are sometimes raised, including student stress and the possibility that rote learning rather than real understanding is rewarded.

The examinations's primary purpose is to certify the standard reached by a student in each subject studied. A secondary use is to put students in merit order in the competition for third level places. For some years now this secondary use has come to overshadow the primary purpose of the examination.

The standard reached by a student in each Leaving Certificate (LC) subject is in use for many years in relation to the academic standards required for entry to various employments and for admission to third level. In the latter case the aim is to try to ensure that students are adequately prepared for their chosen third level studies with the examination being used by third level colleges as their matriculation examination. An important factor for these uses is that the relation between a subject mark or grade and actual subject competence and academic standard be stable year on year.

The need for a merit order arose when the numbers of applicants for third level places came to exceed the places available, bringing a need to compare student performances so as to determine the allocation of places. The LC examination was already long established, using it to derive merit order 'points' was an obvious extension. Such points could be calculated for a subject to give a student's merit order in the subject and then combined for say a student's best six subjects to give a value indicating the student's overall merit order. An important factor for this use is that points should reflect the relative performance of a student compared to other students, something quite distinct from the academic standard reached.

The present system fails to make this distinction with points based directly on examination results rather than on relative performance. This approach would work if all students sat the same unique examination, the grade or mark would then directly indicate the merit order. Once different examinations are involved this no longer holds, a mark or grade from one examination does not correspond to the merit order in a different examination, whether for a different subject or in different years. The present sytem further distorts the results by basing points on grades rather than on the marks themselves. Student marks range from 0 to 100% but with no more than eight different grades per examination many students are given the same subject points and are then subject to random selection despite having significantly different marks. These and other serious defects are described below.

A new method to arrive at the student merit order and the associated 'points' is proposed here. It fully uses the information provided by the subject mark and is not affected by different marking distributions between subjects or by grade inflation or deflation between years. It is fair and allows valid comparisons of student performances across different subjects and years.

The need for a points system, new or otherwise, could of course be avoided if sufficient places were available on third level courses to accomodate all applicants who reached the required academic standard. Removing the competitive element in this way would be a major step forward but demand from qualified applicants seems likely to continue to exceed the supply of places on many courses. The problem is not unique to Ireland and in other countries is addressed in various ways (Hyland 2011). In the Netherlands random selection from all qualified applicants is used with probabilities weighted to favour those with higher marks, in the U.S.A. admissions are linked to a scholastic aptitude test (SAT) designed for that purpose, in France admission to a Grande École involves a competitive entrance examination, in England many courses at Oxford require a specific admissions test that is used to rank applicants, and variations on all these occur in other countries. Basing merit order on a single test or examination avoids the problems involved in combining different subjects examinations but other tests may be needed to ensure matriculation standards are reached and a difficulty remains in comparing merit orders from different years. The two problems, trying to ensure that an applicant has reached an appropriate academic standard and trying to place students in an appropriate merit order, seem ubiquituous.

It is worth noting also that there are other aspects of admission to third level that are important and cannot be addressed using the Leaving Certificate examination mark alone. One such aspect is that while all students are treated equally by the examination itself, the footing on which they stand can be very unequal, whether due to differences in type of school attended, subject availability, ability to pay for additional teaching, family circumstances, student health, or other factors. To arrive at a really correct student merit order would involve taking into account not only the height the student has reached but also the footing on which the student was standing, and neither the existing nor proposed new system address this important issue, depending as they do purely on the examination mark. The proposed system however does provide a framework that facilitates addressing such issues in the future as the standarised mark from which it derives the subject merit order can be based not only on the examination level and mark but also on other factors once appropriate quantitative allowances have been agreed. Once in place these could also be applied in identifying the students with the best chance of success if admitted to third level.

Both the existing and proposed new merit order systems allow appropriate minimum standards for selected subjects be set for admission to a third level course, with merit order only coming into use if these minimum standards are reached. The proposed new merit order is not based on academic grades and maintains a clear distinction between the academic grade required for admission and the merit order of those who have reached this grade.

In both the current and the proposed systems the merit order points are ultimately based on subject marks, so before proceeding further it is worth considering the marks themselves.

The Subject Mark

It is probably impossible to assess a person's knowledge or understanding of a subject precisely. No form of assessment or examination is likely to cover a subject fully, and the results are subject to such effects as candidates spotting likely questions and 'gaming' the assessment system. The very existence of an assessment distorts the way in which a subject is studied, moving the focus of attention towards the topics thought likely to come up in the assessment and away from achieving a full grasp of the subject.

These difficulties are well understood by those who set the Leaving Certificate examinations, and efforts to deal with them are made when drawing up and reviewing questions and providing appropriate marking schemes.

Despite these efforts some residual errors in assessing a student's knowledge are inevitable, due to the basic limitations of any assessment process. This is true even when the assessment marking is completely free from error. An accurate mark is just an accurate indication of performance in the assessment and no more than an estimate of subject knowledge or understanding.

The marking process of course is unlikely to be completely error free. A subject mark in an examination is arrived at by totalling marks from a number of questions, with each question mark arrived at by totalling the marks from the different parts of the question. Simple errors in using the marking scheme or in the additions involved are probably inevitable.

Less simple errors arise when the marking scheme fails to lock down the criteria for awarding a particular mark for a particular part of an assessment and leaves room for different interpretations. Different markers may then be more or less generous in their interpretations, and the same marker may even be more or less generous on different days or at different times of the day. This possibility is well known and considerable effort is made to reduce the scope for such variations, with checks being carried out also on the work done by the markers. Such errors however probably cannot be eliminated completely.

A factor in such variation between markers in the present system is the importance of grade boundaries. A difference of just one mark at a boundary can move a result to a higher grade, and in the present system gain as many as 34 additional points, though more usually from 8 to 12 additional points. When a mark is just below a grade boundary there then is an understandable tendency for markers to try to find an extra mark or two to bring a student up to the next grade. Some markers are more likely than others to do this, and doing so is against the rules, which explicitly state that closeness to grade boundaries should not be taken into account. That some but not all markers are being influenced by proximity to grade boundaries is shown below by examining the marks themselves.

All of these factors are well known and every effort made to mitigate their effects and provide a subject mark which is as accurate as possible an indication of the student's performance in the assessment. As with virtually any measurement process, some residual error is likely to be present in the mark, but the mark can be relied upon as the output of a highly developed process of which the State Examinations Commission can be justifiably proud.

Taking the various sources of errors into account, the mark indicating a student's assessment performance can be thought of as a random variable drawn from a distribution that is centered at the notional correct mark for the student with a variance caused by such factors as those mentioned above.

It is important to realise that no measure of a student's performance in a subject that is based solely on this mark can achieve a greater precision than this variance. Grouping marks for different students into bands does not compensate for errors or make results more precise, instead it loses precision and in effect adds further noise to the process.

This seems to not be understood in the current system, where the mark is converted to a grade based on mark bands of 10/100, with only the grade then being used as the basis for reporting results and for calculating points rather than use being made of the mark.

Using these grades throws away much of the precision available from the mark, and introduces a further serious error of its own by ignoring a difference of up to 9/100 between students, a mark difference that clearly should not be ignored. Related problems resulting from the use of grades, including amplification of marking errors near grade boundaries, are discusssed later below.

The new system described below uses the subject mark rather than the grade to arrive at subject points that are a more accurate reflection of a student's merit order in the cohort who took the subject, and that can be meaningfully combined for a student's six best subjects.

Analysis of the current Points System

The current points system was introduced in 2017. Subject points are awarded based on which of eight grades has been achieved and on the examination level. Per subject seven different point values occur at Ordinary Level, eight different values at Higher Level, with six of these values being different for those who pass Higher Level Mathematics.

Marks %	100-90	89-80	79-70	69-60	59-50	49-40	39-30	29-0
Grade	1	2	3	4	5	6	7	8
HL Maths	125	113	102	91	81	71	37	0
HL other	100	88	77	66	56	46	37	0
OL	56	46	37	28	20	12	0	0
Foundation	20	12	0	0	0	0	0	0

Table 1: Marks, Grades, Points: Higher Level Mathematics and other Levels

For each subject except Mathematics, just 11 different points values are awarded across the whole range of levels (Higher, Ordinary and Foundation), with these having the same values for all of these subjects. For Mathematics 13 different points values are used across all levels.

The system has a number of serious flaws that result in students being given an incorrect merit order. These can be described under three main headings:

1. Failure to take different marking distributions into account
2. Use of grades based on wide 10/100 mark bands as a basis for points
3. Allocating subject points to subject grades in an invalid way

These different problems in the current system are described below. Taken singly, any one of them would result in unfairness to students and in unnecessary use of random selection. In combination they result in a system that is unfit for purpose.

1. *Failure to take different marking distributions into account:*

It should be clear that a student's merit order in a subject, how well the student has done compared to others in the cohort who took the subject, is not the same as the academic standard the student has reached.

The academic standard is indicated by the mark but this in itself says nothing about merit order. All other students may have a higher mark, or all have a lower mark, or some have the same mark, some lower, and some higher.

This would not matter and the subject mark might be used as the merit order points if just one subject and one sitting of an examination were involved.

When this is not the case the subject mark or grade is not a suitable indicator of merit order as the relationship between subject mark and subject merit order differs from subject to subject and from year to year.

This can be seen from the examples in Tables 2-5, derived from the Leaving Certificate statistics for 2016, 2019, 2021 and 2022. Eight subjects have been selected to illustrate the variations that occur between subjects and between years.

The tables show the proportion of students who took a subject at any level who achieved less than Higher Level 80/100, 70/100 and 60/100. As all Ordinary or Foundation level points in the current system are lower than for 60/100 at Higher Level this proportion indicates the student's basic subject merit order across all levels. (The new subject merit order points defined below would increase these values based on half the percentage of the cohort whose marks equalled 80, 70 or 60 respectively, a number unlikely to reach 1% of the cohort.)

Subject	Maths	Irish	English	History	Chem.	App.M.	Music	Russian
Students	54,225	47,211	53,708	12,381	9,089	2,089	6,597	333
<HL80/100	94.9%	89.4%	90.5%	84.2%	75.1%	73.8%	69.4%	13.2%
<HL70/100	89.6%	78.2%	76.0%	67.8%	59.7%	51.5%	38.8%	6.6%
<HL60/100	83.1%	67.9%	57.4%	51.3%	46.8%	34.1%	18.3%	1.5%

Table 2: Mark distribution example (L.C. 2016, old points system)

Subject	Maths	Irish	English	History	Chem.	App.M.	Music	Russian
Students	55,094	48,334	54,694	11,743	9,506	2,104	6,659	470
<HL80/100	94.4%	88.8%	90.5%	82.9%	73.0%	65.8%	66.3%	21.1%
<HL70/100	88.8%	78.0%	75.5%	66.4%	58.5%	48.1%	32.8%	10.8%
<HL60/100	81.3%	67.0%	55.2%	49.1%	45.8%	34.1%	15.3%	6.4%

Table 3: Mark distribution example (L.C. 2019, current points system)

Subject	Maths	Irish	English	History	Chem.	App.M.	Music	Russian
Students	57,303	49,971	57,065	12.551	9,651	2,316	6,860	474
<HL80/100	87.0%	82.7%	80.5%	66.8%	59.0%	36.6%	46.2%	12.9%
<HL70/100	78.7%	68.6%	59.5%	48.3%	41.3%	21.0%	20.5%	5.9%
<HL60/100	70.6%	57.0%	39.7%	33.7%	27.5%	11.5%	10.5%	1.5%

Table 4: Mark distribution example (L.C. 2021, current points system, Covid)

Subject	Maths	Irish	English	History	Chem.	App.M.	Music	Russian
Students	57,347	49,894	57,241	12,064	9,679	2,122	6,719	419
<HL80/100	86.2%	83.5%	81.2%	68.5%	67.5%	51.1%	37.5%	17.4%
<HL70/100	77.8%	71.8%	59.2%	51.1%	53.6%	34.1%	17.0%	10.1%
<HL60/100	70.1%	61.1%	38.4%	37.9%	41.4%	22.4%	9.6%	6.7%

Table 5: Mark distribution example (L.C. 2022, current points system, post Covid)

The tables can be used to compare the performances of students each of whom has taken just one subject. A difficulty then arises when the subjects are not the same.

Using the figures for 2022, a situation when Máire achieves a Higher Level mark of 70/100 in Irish, Seán the same mark in History, and Mary a mark of 80/100 in Chemistry illustrates the main issue involved.

The basic merit orders of the students in their subjects are clear: Máire has done better than 71.8% of those who took her subject, Seán better than 51.1%, and Mary better than 67.5%.

Basing points on grades, since Máire and Sean have H3 they are given the same points despite the significant difference in their merit orders (71.8% vs. 51.1%), while Máire (H3) is given fewer points than Mary (H2) despite having a better merit order (71.8% vs. 67.5%).

The present system in effect puts the three students in the merit order

1. Mary (H2) 2. (jointly) Máire and Seán (H3)

when the correct merit order based on how they have performed compared to others is

1. Máire (71.8%) 2. Mary (67.5%) 3. Seán (51.1%)

This type of unfair result can be found in many other instances, including others readily visible for the subjects and years shown in the above Tables. It is an inevitable consequence of failing to distinguish between the academic standard and the merit order.

The grade inflation brought about by the need to deal with Covid is also clearly visible. To get a H3 and the corresponding points in Irish in 2021 it was only necessary to perform better than 68.6% of the subject cohort, whereas in 2019 it was necessary to outperform 78% of the cohort. It might have been expected that the 2022 figure would have been around the 78% of 2016 and 2019, but at 71.8% some Covid related adjustments seem to linger still.

Clearly the current approach to subject points is not suitable for comparing subject performances even when students take only one subject, as in the above example. It also is not suitable for comparing performances in the same subject in different years if there is any grade inflation or deflation in the subject between the years.

The problem becomes worse when the objective is to get an overall merit order or points for a student's best six subjects. Simply adding subject points based on marks or grades in subjects that have different marking distributions is comparable to adding apples and oranges and cannot give a correct overall merit order.

This is true whether points are based directly on marks or directly on grades. The insistence on using grades adds further serious problems in the current points system.

2. Use of grades based on wide 10/100 mark bands as a basis for points

It should be noted that Leaving Certificate subject grades are determined directly from the subject mark with no further individual checks or modifications. If an anomaly is detected in the overall results for a subject some overall adjustment may be possible but this is not usual.

A student is notified of the subject grade and not of the subject mark, and within a limited time may appeal the grade. In the event of an appeal the script is made available to the student who can examine how it was marked and ask for a review. A student can find out the actual mark awarded in this way.

The grade alone is sufficient for the original Leacing Certificate purpose of certifying the standard reached. Having at least reached a certain grade is the typical requirement for an employment or for matriculation, the mark within a grade usually is not considered.

The situation is very different when determining student merit order. Students on the same grade may have very different positions within the grade, the wider the band of marks used for each grade the more important it is to take this into account. The mark boundaries for each grade amplify marking errors in nearby marks by turning them into grading errors, the less accurate the marking the more important it is to take this into account.

In general errors in marking are not reduced or made of less significance by grouping marks into grades. The Leaving Certificate situation is very different to that which arises in scientific and other areas where grouping measurements can be a help.

Such measurements generally all refer to the same thing and combining them can be used to reduce errors or noise. Taking an average gives an estimate of the underlying value that is more precise than any individual measurement.

The case here is quite different as the marks refer to different students and there is no one underlying value to be estimated. Grouping such marks into a band and assigning all students in the band the same mark adds a further error to whatever error was present in the original student mark. Accuracy is degraded rather than improved.

This degradation is most pronounced for marks near grade boundaries. A small marking error can result in a higher or lower grade than should have been obtained. With grade bands

of 10/100 an error of 1/100 in a mark at a grade boundary is in effect amplified to an error of 10/100.

A further aspect is the serious unfairness caused by disregarding significant differences in marks between students on the same grade.

With grade bands of 10/100 two students whose subject marks differ by as much as 9/100 can be given the same grade. Such a difference is universally regarded as significant and not to be thrown away in comparing performances.

The impact of doing so can be estimated by considering the number of students who get a mark that ends in the digit '9', and therefore have been given the same points as a fellow student of the subject who receives nine fewer marks. For example, two students with marks of 50 and 59 are given the same subject points in the current system.

The number likely to be affected can be estimated from the marks for 2015 and 2016. Counting how many of a student's subjects carried a percentage mark of 99, 89, 79, 69, 59, 49, or 39 (at Higher Level only) gives the following results:

Count of Subjects	1	2	3	4	5	6	Total
2015	16,147 30.3%	3,585 6.7%	442 0.8%	28 0.1%	3 0.0%	0	20,205 37.9%
2016	16,355 30.2%	3,544 6.5%	425 0.8%	30 0.1%	0	0	20,354 37.5%
Binomial(6, p=0.075)	30.5%	6.2%	0.7%	0.04%			

Table 6: Number of students and count of subjects with mark ending in '9'

From this, it can be expected that about 20,000 students are disadvantaged each year by getting the same points as a student whose subject marks were lower by 9/100.

The position is worse when subject points are combined. The 30 students in 2016 disadvantaged in this way in four subjects clearly suffer badly, as do the 3 students in 2015 disadvantaged in five subjects. Unfairness also results from ignoring mark differences of 8/100, 7/100 or fewer marks.

The unfairness involved in ignoring significant mark differences is all the more unacceptable when a difference of just one mark can result in a different grade. Just one mark can result in a difference of from 8 to 12 points, and in the case of Higher Level Mathematics in a difference of 34 points.

Not only is this pattern of awarding points inconsistent but the difference in two students' points now depends not only on the difference in their marks but also on the proximity of the marks to grade boundaries. This proximity is irrelevant to the difference in the performances and introduces an additional effectively random component to the comparison.

These undesirable results from using grades as the basis for points are present whether the underlying marks are totally error free or include an error component.

In the latter case if both the erroneous mark and the corresponding notionally correct mark fall in the same grade band the error component does not affect the grade awarded, but otherwise the grading process will amplify the marking error to 10/100. It then becomes possible for two students who should be given the same grade to differ by not one but two grades with a major difference in their points as a result of two seperate one mark errors.

A further but different type of error problem is caused by the emphasis and importance given to grades, in particular due to the importance of grades in determining points.

Although marks are supposed to be based exclusively on the marking scheme, when a mark is just below a grade boundary there is an understandable tendency for the marker to try to find an extra mark or two to bring the student up to the next grade. That some but not all markers are being influenced in this way can be seen in the marks themselves in Table 6.

The Table 6 marks for 2015 and for 2016 show a smaller proportion of marks that fall just one mark below a grade boundary than might be expected. Such marks end in the digit '9', and given that a mark is obtained by adding marks for many question parts that typically each involve an element of interpretation it seems reasonable to expect that this ending should occur as often as any other digit. This is not the case, as can be seen from Table 6.

As shown in Table 6 a simple binomial distribution for N=6 and P(success)=0.075 estimated from the data gives an approximation to the observed subject counts, suggesting that the probability of getting a mark that ends in '9' is about 0.075 rather than the expected 0.1. It seems clear that some marking is being distorted away from the marking scheme by proximity to a grade boundary.

In summary, using grades as at present introduces serious errors in the merit order due to.

1. The loss of precision involved in disregarding mark differences of up to 9/100
2. The oversensitivity involved in giving higher points because of a difference of 1/100
3. The associated dependence on the effectively random proximity to a grade boundary
4. Amplification of marking errors, particularly near grade boundaries
5. The effect on markers of mark proximity to grade boundaries

Because of these problems, even were only one subject involved it clearly would not be correct to base subject merit order points on grades.

Further problems are caused by the manner in which points are associated with grades.

3. Allocating subject points to subject grades in an invalid way

Before 2017 grades were based on bands of 5/100 marks except for one 10/100 mark band. Points were allocated correspondingly, with a move from one grade to the next corresponding to an increase of 5 points, or 10 points in the latter case. With this approach all possible total points were multiples of five marks, so up to 126 different values were possible for the total points, from 0 to 625 in steps of 5.

With grades now based on 10/100 mark bands the same approach in allocating points would give no more than 63 possible points totals, and so an increased number of students sharing the same total points and increased need to use random selection.

In order to avoid this, different points increments are used, with the step from one grade to the next now giving from 8 to 12 additional points, and in one case 34 additional points, even though all grades correspond to the same 10/100 mark bands. (The current correspondence between subject grades and subject points can be seen in Table 1 above.)

Done purely to increase the range of possible points totals, and not for educational reasons or to give a more accurate measurement, this further variation is clearly questionable. It is similar to adding noise to a set of measurements in order to increase the variety in their totals.

The range of possible points totals that results depends on whether Mathematics is one of a student's best six subjects. If not, the notional total points range is 0 to 600, of which 497 totals can occur. If Ordinary Level Mathematics is in the best six the notional points range is 0 to 556 of which 474 totals can occur, and for those who have Higher Level Mathematics as one of their six best subjects the notional range is 0 to 625 of which 525 values can occur.

While overall the range has increased at the high end only a small number of different points totals are possible. These possible high points totals are:
No Maths: total ≥ 550 => (552,553,554,556,564,565,566,576,577,588,600)
OL Maths: total ≥ 530 => (532,533,534,537,544,546,556)
HL Maths: total ≥ 570 => (571,577,578,579,581,589,590,591,601,602,613,625)

If Mathematics is not in the top six, only 11 of the 51 notionally available totals from 550 to 600 can occur, with Ordinary Level Mathematics only 7 of the 27 notionally possible totals from 530 to 556 can occur (points above 556 also cannot occur), and with Higher Level Mathematics just 12 of the 56 notionally possible totals from 570 to 625 can occur.

These relatively small ranges of possible total points may not be equally distributed. At the top end of the scale, say 580 points and upwards, undesirable bunching of students on certain totals is possible.

This can be seen using the results for 2015 and 2016 to calculate the points in two ways, the old system based on 5 mark grade bands, and the current system with 10 mark bands and variable points increments between grades.

Points	*580*	*585*	*590*	*595*	*600*	*605*	*610*	*615*	*625*
2015	205	185	152	143	108	170	60	152	182
2016	193	184	155	164	97	146	35	169	130

Table 7: Students obtaining each possible old points total in range 580 to 625

Points	*581*	*588**	*589*	*590*	*591*	*600**	*601*	*602*	*613*	*625*
2015	0	16	223	85	9	2	253	44	212	182
2016	0	5	251	95	5	3	223	33	204	130

Table 8: Students obtaining each possible current points total in range 580 to 625
(* indicates only possible if Mathematics not in top six subjects)

Although ten different total current points are now possible above 580 the current system concentrates the students in just four points totals (589, 601, 613 and 625), with only two other points totals achieved by over twenty students (590, 602).

At the high end of the points range it is clear that the current points systems causes an increased need for random selection at high points levels not only by restricting the number of possible high totals but also by causing bunching among the totals that can occur.

The marks for 2015 or 2016 can also be used to compare the overall total points distribution for the current system and for the pre-2017 system:

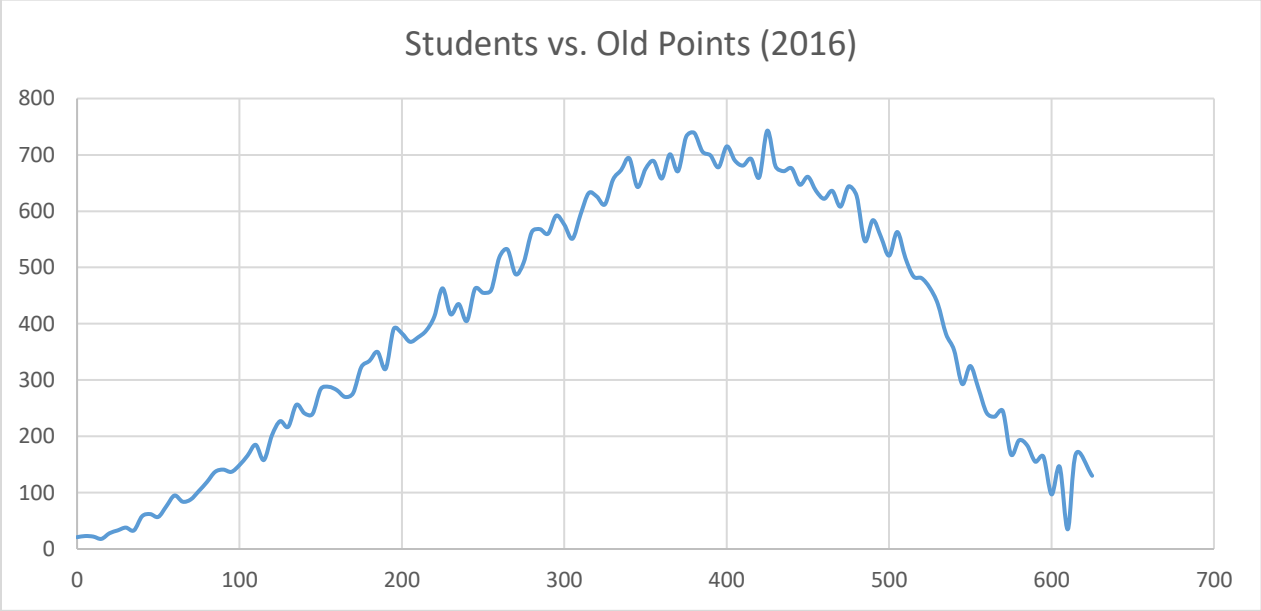

Chart 1: Number of students for each old points value (based on 2016 marks)

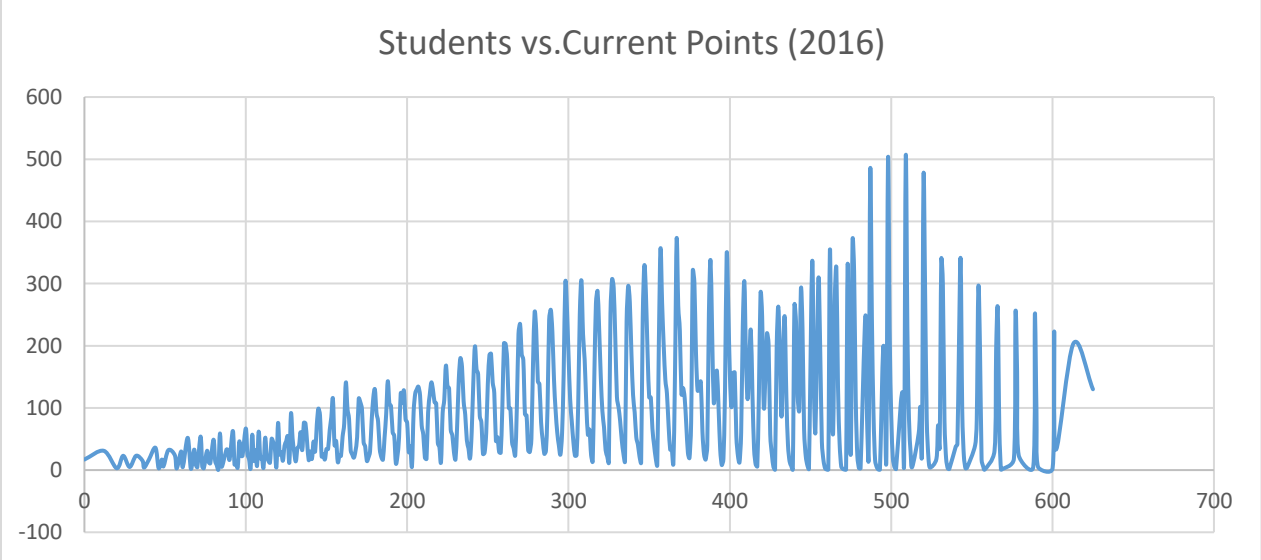

Chart 2: Number of students for each current points value (based on 2016 marks)

The distribution for the old system is as might be expected, roughly bell shaped with a tail towards lower points. The distribution for the current system can probably best be described as bizarre. It is difficult to believe that both points distributions are based on the same marks.

The current system fluctuates wildly, a minor change in points leading to a major swing in student numbers and associated bunching of students on certain values. Looking in more detail and taking the range from 400 to 410 as an example the fluctuations can again be seen:

Points	400	401	402	403	404	405	406	407	408	409	410
#Students	153	101	156	157	56	23	13	60	231	303	176

Table 9: Student numbers for current points from 400 to 410 (based on 2016 marks)

These fluctuations indicate that it is not only at the high end of points totals that inappropriate bunching of students is taking places, but that it is happening across the whole range of possible total points values, with some total values although possible unlikely to occur, leading to a greater need for random selection than might be expected.

A glance at Chart 2 shows a further problem. If the fluctuations are ignored the distribution can be seen to be bi-modal with two major peaks, one around 350 points, the other around 500 points. This compares very unfavourably with Chart1, which is unimodal as might be expected.

It is clear that at the high end of the points range the current points system causes an increased need for random selection, doing so not only by restricting the number of possible possible totals but also by making certain possible totals unlikely to occur.

Combined with its bizarre distribution and bi-modal nature this strongly suggests that the current method being used to associate subject points with subject grades is seriously flawed.

The proposed new points system

It is proposed that subject points be based on a student's merit order in the cohort who took the subject and not on the subject grade as at present. Such points can be combined for a student's best six subjects to give an appropriate and fair overall merit order.

By 'merit order' in a subject is meant how well the student has done compared to others who took the subject. A points value to indicate this can be derived from the examination mark and level in a way that is fair, readily understandable, and simple to calculate.

As the subject cohort is examined at different levels (Higher, Ordinary or Foundation) a standardized subject mark is used for comparison purposes. This is calculated by weighting the subject examination mark according to the level. Similar weights to those in use at present can be applied.

In arriving at the standardized mark it also is possible to take into account factors such as the nature of the school attended, family circumstances, or other factors if appropriate quantitative allowances for these are available.

The merit order points of a student in a subject are then defined as the proportion of the subject cohort that year who received a standardised subject mark lower than or equal to that of the student, with the student regarded as being at the mid-point of the group when a group of students have the same mark.

A simple calculation gives these subject merit order points P as a percentage :

$$P = (L + (S - 1)/2) \times 100/ (T - 1)$$

where L is the number of students with a lower standarized subject mark, S is the number with the same standardized mark, and T is the total number who took the subject at any level.

The calculation involved would not have been feasible before computers were available, but is straightforward with today's technology.

The resulting subject points (P) simply indicate how well a student has done compared to the other students examined in the subject and lie in the range 0 to 100. They are equally valid for subjects that are recently introduced and for subjects that are long established.

These points say nothing about the standard, which is indicated by the mark or grade. They are not affected by differences in marking distributions between subjects, or by grade inflation or deflation between years.

They can be used for meaningful comparisons of individual performances for subjects in the same or different years.

They encourage students to choose the subjects for which they have the greatest natural aptitude and hence are more likely to do well compared to other students rather than opting for subjects that provide more higher grades.

Any errors in marking now have a limited effect. Minor marking errors cause a minor error in the student's merit order, very different from the effect that a one mark error can cause at a grade boundary in the current system.

Subject points calculated in this way can be added to give an overall merit order for a student's best six subjects, with the total points in effect indicating the average merit order of the student in the subjects (the division by six to give the actual average can be omitted).

As well as being fair and easily understandable the proposed system minimises the need for random selection.

The subject cohort is spread over the different subject points, which corresponds to the number of different standarised subject marks that occur. Since the possible range of these is 0 to 100 the subject cohort is likely to be be spread over a wide range of points values, almost certainly more than the 11 or 13 different points values per subject at present.

If the number of different standarised marks that occur for a subject cohort is small (say < 20 different marks) due perhaps to a paucity of students taking that subject or to the examination failing to provide a wide range of marks, the cohort can be extended by including a cognate cohort, perhaps the same subject in a previous year, before applying the formula.

With each subject cohort usually distributed over a much greater number of values than at present, the points totals will also be distributed over a greater range of values and the need for random selection greatly reduced, particularly at higher points levels.

All possible total points values can occur, a major improvement on the present system, where only 8 different total points can occur in the 580-625 range with Higher Level Mathematics

as one of a student's six best subjects, only 7 different total points in the 530-556 range with Ordinary Level Mathematics in the best six, and only 11 different total points in the 550-600 range when the six best subjects do not include Mathematics, leading to use of random selection at high points levels.

As the purpose of the points system is to indicate a student's overall merit order it is appropriate to base it on the subject merit orders. Given the advantages described above it is proposed that this approach be used to replace the current points system.

Conclusion

It is clear from the above analysis that the current system used to allocate points has serious flaws and does not place students in the correct merit order.

A major factor in this is the insistence on basing points on grades, with the use of wide 10/100 mark bands and a small number of possible points for each subject. This leads to a number of serious problems and adds to the effects of any errors in marking rather than reducing them.

When these new grades were proposed it was claimed that "*The new broader grade bands will ease the pressure on students to achieve marginal gains in examinations and encourage more substantial engagement with each subject*". (IUA IOTI 2015)

This claim might be true, at least as regards easing pressure, if the only source of examination pressure were achieving a certain academic standard. Not very long ago there were only three LC grades, Honours, Pass and Fail, and these were quite sufficient for purposes such as college admission or job appointments. All that typically was required was Honours in two or more subjects and if this were attained one was certain of admission. There was of course still pressure, but only that of reaching a broad academic standard.

Today there is an additional pressure not present in those earlier days. As a result of more students applying for third level courses than there are places available a competitive pressure has been added. A student must not only meet the required standard but do better than many other students applying for the same course. Efforts to remove this pressure (Harris, Irish Times Dec. 2022) while welcome seem unlikely to do so for all courses.

The combination of achieving a standard and also succeeding competitively is clearly a great pressure on many students, as is evident in many newspaper reports, stories, and advice columns. Even as early as 2019 one newspaper was reporting that "*Over half Leaving Cert pupils have mental or physical health issues due to exam*" (Irish Times May 2019) and this does not appear to have improved (Harris, Irish Times June 2022). It was probably never realistic to expect that the new system would reduce student stress significantly given the competitive nature of admission to third level. It certainly does not appear to have done so.

The new points system being proposed here will of course not eliminate competitive pressure, but would at least provide a fair system and remove the additional pressure experienced by students who have noticed the intrinisc inconsistencies of the current system. As early as 2019 a student was reported as saying "*I don't really like the 10 brackets percentage, like I feel it's so unfair if you get, if someone gets 70 per cent and then someone else gets 79 per*

cent they get the exact same points (Nore, FG)" (ESRI RS85 Page 31). A better approach is needed as soon as possible, one that does not ignore such significant mark differences. The proposed system takes into account any difference in marks between two students, something that cannot be true of a system based on grades.

It is worth noting also that at present grades and not marks are used to communicate examination results to students. Students no longer receive their marks and to find them must appeal their subject grades on a subject by subject basis. This witholding of marks seems undesirable but may be required when points are based on grades. With approximately 20,000 students who are just one mark below a grade boundary in at least one subject, appeal numbers could be very large if marks were known initially.

The proposed new system avoids these and other problems associated with the current system. It allows students be notified of their marks without generating high levels of appeals as a minor mark change gives rise to a corresponding minor change in points rather than the significant jump associated with a grade change, and thus gives much less incentive to appeal a result. It is fair to the students, allows comparisons between subjects and across years, minimises the need for random selection, and puts students in an understandable merit order in the competition for third level places. It allows students be given their subject marks indicating their academic standard and their subject merit order points indicating their competitive position.

The proposed new system distinguishes clearly between academic standard and competitive merit order, and is solely concerned with the latter. It does not involve any change in the Leaving Certificate itself. This indicates a student's academic standard in a subject and is an extraordinary achievement that compares very favourably with systems used in other countries. It is a system that is taken for granted by the public generally and not properly appreciated. A clear distinction should be made between the Leaving Certificate and the marks it provides and the subsequent use of these marks by the third level sector in arriving at competitive merit order points. It is solely the latter which has been analysed here with an alternative proposed.

It is hoped by the authors that the analysis and proposal provided here will be useful in arriving at a new points system. They themselves are convinced that the current system is not fit for purpose, and hope they have raised at least some concerns about its continued use.

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