

## SCALING - WHAT, WHY AND HOW

### What is scaling?

Scaling is a mathematical process which adjusts the results students achieve in their various SACE Stage 2 (year 12) subjects so that the students can compete on a fair basis for entry to university and TAFE courses.

### Why is scaling necessary?

#### *Different subjects*

The SACE Board of South Australia decides on the subject content, sets and monitors standards for school assessment and sets and marks exams for Stage 2 (year 12) subjects offered within the South Australian Certificate of Education (SACE). The Board then reports to each student the level of achievement (0-20) they have reached in each subject they sat.

The subject content, the types of skills they measure, the way they are assessed and the range of abilities among the students varies from subject to subject. Because of this, no direct comparison can or should be made between subject achievement scores in one subject with those in another.

Look at the scores below:

Danny	
Subject	Subject Achievement Score
Biology	16
Physical Education	16

Jason	
Subject	Subject Achievement Score
Biology	14
English Studies	14

We can say that Danny did better in Biology than Jason did. But this is all we can say! We cannot say for instance, that Danny did better in Biology than Jason did in English Studies. We cannot even say that Danny did equally well in both Biology and Physical Education. Even more importantly, we cannot say that Danny's 'total' of 32 for his two subjects is 'better' than Jason's 'total' of 28 for his two.

#### *Different combinations of subjects*

Think of the Olympics. As you know, some Olympic sports require athletes to compete in a number of events and points are awarded for the results in each event. In the Pentathlon, for instance, each athlete must compete with all the other pentathletes in five events - running, high jump, long jump, discus and javelin. Now we know that running is very different from high jump, as is high jump from javelin - they measure different things - speed v agility v strength. Some athletes will be better at some events than others. The important thing, however, is that everyone who is competing is doing **the same five** events. So in the Pentathlon, it is perfectly fair to add up their points from each event to give each pentathlete a total score.

But imagine if a pentathlete could choose **any** five events from a list of over 100. It just wouldn't be fair to add up Kylie's points from running, high jump, long jump, discus and javelin and compare them with Sarah's points from running, discus, javelin, swimming and judo because swimming and judo are very different from high jump and long jump. In other words, it's OK to compare totals from different events if the **combination** of events is the same for everyone but it's not OK if the combinations are different.

Now think of the Pentathlon events as SACE Stage 2 subjects. If there were only five SACE Stage 2 subjects available and all year 12 students who wanted to go to university did those same five subjects, it would be perfectly fair to add up the scores they achieved in each subject (as in the Pentathlon) to give them a total score.

But SACE Stage 2 is **not** like the Pentathlon. Unlike a pentathlete, a year 12 student **can** choose subjects from a list of over 100. There are literally hundreds of different combinations of subjects possible and the subjects are as different from one another as swimming is from high jump or weightlifting is from long jump.

We can see, therefore, that simply adding up each student's subject achievement scores and comparing the totals is not fair - scores from different subjects and different combinations of subjects cannot be compared this way.

What we have to do then is to first **scale** the scores from the different subjects ie put them on a common scale, before we can add them together to produce a university aggregate (from a total of five subjects) or a TAFE SA Selection Score (from a total of three subjects). Only totals which have come from **scaled** scores are a fair means of comparing students' performance at year 12 for tertiary selection.

## How is scaling done?

### *The 'equal achievement' principle*

Let's look at the group of students who have done both Biology and English Studies. This group of students is known as the 'common candidature' for this pair of subjects. Students in this group will have a range of abilities including some who are very good at Biology and not so good at English Studies and vice versa. As a whole, though, we would expect this group of students to have the same **average** achievement in each of these two subjects. This does not mean we expect an individual student to do as well in Biology as in English Studies, just the group as a whole. This is called the 'equal achievement' principle and this is the assumption underlying the scaling process.

### *Scaling in practice*

Using the 'equal achievement' principle, scaling compares the results of each group of students (the common candidature) in **every possible pair** of subjects eg Biology with English Studies; English Studies with Physical Education; Biology with Physical Education and so on. Suppose that the group of students who are doing both Biology and English Studies have consistently higher raw scores in Biology than in English Studies. Scaling will adjust the raw scores in both subjects so that the **average** scaled score in Biology is close to the **average** scaled score in English Studies.

The actual mathematics of scaling is quite complex - think of all those different combinations! - but the principle and the basics of the process is the same as described above.

Some important points to note about scaling:

- Scaling is done on the raw scores which are scores out of 200 rather than on the subject achievement scores which are out of 20 - this allows for greater accuracy. It is therefore possible for two students to have the same subject achievement score in a subject but different scaled scores. Say, for example, that Kim gets a raw score of 138 in Biology and Lee gets 144 but both receive a subject achievement score of 14. Kim's raw score of 138 might be scaled to 14 but Lee's raw score of 144 might be scaled to 14.5.
- Scaling has the greatest impact on middle-range scores - very high and very low scores are least affected by scaling.
- The amount by which a subject is scaled depends upon **group** performance, not the performance of an individual.
- Scaling does not change the order of students in a subject. If Tanya's raw score for Biology was higher than Sophie's, then her **scaled** score for Biology will also be higher or at least equal to Sophie's scaled score.

When the scaling process has been completed, the scaled scores are used to calculate a TAFE SA Selection Score and a university aggregate for each eligible student. For university courses, an Australian Tertiary Admission Rank is calculated from the university aggregate. See below under **more information**.

## Monitoring the scaling process

The Scaling and Tertiary Selection Monitoring Committee includes representatives of the Minister of Education, SATAC, The SACE Board of SA, South Australia's three universities, the Department of Education, Training and Employment, the Catholic Education Office, the Independent Schools Board and the Multicultural Education Coordinating Committee. It meets four or five times a year and its main purpose is to ensure that the scaling process is fair and accurate.

## More information

For more detailed information about scaling, including answers to some frequently asked questions, see the booklet *Explaining the Scaling Process* which is published on the SATAC website [www.satac.edu.au](http://www.satac.edu.au).

More detailed information about how scaled scores are used in the calculation of tertiary entrance scores, can be found in SATAC's tertiary entrance booklet, published annually by SATAC and distributed to all SA and NT students in years 10, 11 and 12.

You can contact SATAC about all matters relating to tertiary entrance and selection processes:

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