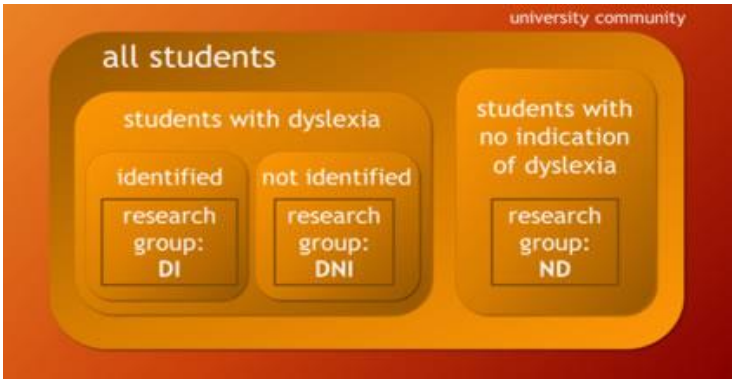
BlogPage: DATA VISUALIZATION PROFILE MAPS – THE 8 METRICS

Data visualization profile maps

The principal research objective is to determine if there is evidence that students who exhibit characteristics of dyslexia but who are otherwise not identified as dyslexic present a significantly higher level of academic (behavioural) confidence (ABC) in comparison to a group of peers who are known to have a dyslexic learning difference, with both groups' ABC measured against a group of peers who exhibit no indications of dyslexia as part of their learning profile.

These three research groups are defined as:

- Research group **ND**: students with no indication of dyslexia;
- Research group **DI**: students with a dyslexic learning difference that has already been identified;
- Research group **DNI**: students with a dyslexic learning difference profile that has NOT previously been identified;



Visualizing the data collected through the main research questionnaire is a key part of the analysis process. This is partly to make each dataset easier to comprehend in a more complete way, but also because it will be by comparing these profile visualizations that it is expected that real contrasts will emerge between profiles associated with high Dyslexia Index respondents and those associated with low Dyslexia Index respondents.

The questionnaire collected personal data on each respondent such as gender and university study status, and also invited respondents to declare any previously identified learning challenges such as dyslexia, ADHD, Aspergers' although the main targets were students with dyslexia and students with no learning challenges.

Likert-style scales were developed to collect quantitative data on each of 8 metrics:

- Academic Behavioural Confidence – using the 24-factor scale originally devised by Sander & Sanders (2006);
- 6 psycho-educational metrics – new scales developed for this research:
    - Learning Related Emotions (LRE);

  - Anxiety regulation and Motivation (ARM);
  - Academic Self-efficacy (ASE);
  - Self-esteem (SE);
  - Learned Helplessness (LH);
  - Academic Procrastination (AP);
- Dyslexia Index – also developed for this research.

The Likert scale items in the research questionnaire presented a continuous-scale slider control which permitted respondents to select a precise value according to their degree of acquiesence with each of the stem statements provided. For the ABC and 6 psychometric scales, the range available was 0 to 100 and for the Dyslexia Index scale, the range was 0 to 1000.

166 datasets have been received from the questionnaire deployment and a data visualization profile has been created for each of them, grouped according to research group. Each set is available to view by selecting the research group from the graphic (above). Each data visualization profile presents a 6-axis radar chart where each axis represents each of the 6 psychometric scales and 3 bullet charts representing Academic Behavioural Confidence and Dyslexia Index respectively. An example of one respondent's data visualization profile is below: *(This respondent is from research group DI; graph-point information on the radar chart and bullet chart information are all available on mouse-rollover; this particular respondent also provided qualitative data too, available to view on the 'this respondent' icon; the mean-value profiles for research groups DI and ND are display for reference; bullet chart colour banding values will be found on the full-set profile pages available from links on the graphic at the top of the page).*

An extensive review of the theory about academic behavioural confidence will be included in the final thesis although brief overviews have already been included in the project webpages and in the project study-blog.

A detailed write-up of the Dyslexia Index metric forms the core of these Transfer Portfolio documents and this is available through the website navigation.

An overview of the 6 psycho-educational metrics is presented below which very briefly outlines their theoretical underpinnings but this will be written up in more detail in the final thesis. Also described is how the data collected for each of them has been manipulated into the research datapool in readiness for deeper analysis later. Each scale comprised 6 Likert scale items and an analysis of the internal consistency reliability of each has been conducted which is presented at the bottom.

LRE – Learning Related Emotions

This term is borrowed from research by Putwain's et al paper (2012) which looked at academic self-efficacy in the context of study skills behaviours in university students, setting the framework of the study into relationships with academic success and **learning related emotions** (LRE). Rooted in seminal research by Bandura in the 1980s which set out the groundwork on self-concept and self-efficacy, LREs draw on Bandura's idea of AFFECTIVE PROCESSES, that is, concerns with the effects that emotions and feelings have in regulating learning behaviour, is one of the four, mediating processes.

The 6 items in this section of the QNR were gauging LREs such as embarrassment, guilt, reflection on others' opinions of the respondent in a study context, feelings of difference and so forth.
The section comprised 4 statements pitched in a broadly negative sense – eg: 'I feel guilty about my learning challenges' – with the remaining 2 presenting a more positive focus – eg: 'I don't think about my learning challenges much'.
Given this more negative bias to the section statements, high scores on this scale imply a respondent's more general alignment with the NEGATIVE attributes being measured. The mean average score for this scale is therefore adjusted so that raw scores for the 4 negatively biased statements are combined with reverse-coded (100-raw) scores for the positively-phrased statements to calculate the mean value.

A high score on the LRE scale would be suggesting that the respondent is embarrassed to ask for help and unlikely to use learning support services due to feelings of 'difference' that outweigh a desire for help; feels guilty about their learning challenges; has a perception that their student-peers think that their difficulties are more likely excuses for laziness or some other generally negative attribute; finds it hard to settle down to their studies when required and often dwells on their own difficulties. In summary, a high score on this scale may be indicating overall feelings of low levels of self-assurance, a generally introspective self-concept that dwells on difficulties and a high level of academic despondency (Rosslyn, 2004).

ARM – Anxiety Regulation and Motivation

Statements on this scale are attempting to gauge the impact of anxiety and anxiety-related emotions as more specific LREs in relation to study efficacy. It is compounded in this section with the idea of motivation because there is a substantial body of literature examining the

relationships between anxiety and motivation in learning contexts (eg: Op't Eynde, 2006, Pekrun, 2006) indicating strong linkages.
The section is attributed a positive bias although with an equal balance of negatively and positively biased statements for respondents to gauge, in later analysis, scores for the negatively-biased statements will be reverse-coded.

A high score on the ARM scale indicates a respondent who is able to concentrate well, who has stable anxiety levels which aren't impacted by learning challenges, who is aware of their learning strengths and uses them positively, who rarely experiences frustration when studying, feels study-confident and well-motivated in the company of their learning peers and may be likely to enjoy studies even more when the work gets more challenging. Generally, a high score is indicating a respondent who is at ease with the challenges of study, is well-motivated and is likely to have an expectation of high achievement.

ASE – Academic Self-Efficacy

A major part of this research project is exploring academic self-efficacy and draws on a wealth of research studies conducted in recent years. Notably, extensive work by Pajares looking at Bandura's legacy to researchers in education in the field of self-efficacy (Pajares, 1997) together with a later study with Schunk (2001) are examples of the theoretical perspective which is a key component of this research project. These researchers are contemporaries of Bandura and together with others who have written in this field, this work on self-efficacy, especially in an education context, forms a major theoretical underpinning of the project. An extensive review of the pertinent features of the theories will be presented in the final thesis which will draw on not only the underlying theory, but also on the results of many studies that have used academic self-efficacy as a construct to explore university learning. However, and in very brief summary, one of Bandura's many points is that [academic] self-efficacy is a situation specific [academic] self-confidence (Bandura, 1986) which is the extent to which an individual believes that they may be competent to effectively tackle a task at hand. One of the most important ideas is that learners who present high levels of academic self-efficacy are more likely to view difficult academic challenges as things to be mastered rather than avoided (Alias & Hafir, 2009)

All 6 statements on this scale take a positive bias so no reverse-coding of data is necessary.

A high score on the ASE scale indicates respondent who

believes that planning and organizing their study processes impacts positively on academic achievement; they recognize their learning strengths and use them to their academic advantage, particularly to help them to be creative; they might pay little regard to the impact of any learning challenges on academic achievement or may consider that they don't have learning challenges (although this wasn't specifically gauged); they approach written work with a high expectation of success; they manage their studies perfectly adequately themselves and rarely request help.

SE – Self-esteem

A substantial body of research exists on the relationship between self-esteem as one of the factors of self-concept and learning, learning performance, learning styles, academic performance, academic achievement and most other attributes that characterize the ways that individuals interact with learning environments. Many researchers exploring the impact of dyslexia on (learning) self-esteem report that dyslexic learners often exhibit lower levels of self-esteem than their non-dyslexic peers although most of the research focuses on school-aged learners. However, as the effects of widening participation initiatives have taken effect on the demography of university learners, many researchers have been re-focusing their interest on dyslexia in university students with the characteristic of self-esteem often featuring strongly in many studies. An early paper by Riddick et al (1999) adopted a largely case study approach to explore self-esteem (and anxiety) in the learning histories of adult dyslexic students but did report that the results of the Culture-free Self-esteem Inventory (Battle, 1992) used with the research group indicated significantly lower self-esteem for the dyslexic group compared with the control group. A much deeper review and analysis of the literature relating to dyslexia, self-esteem and university students will be reported later.

The 6 items on this scale relate to perceptions of (academic) worth and with 3 statements being presented with a negative sense and the other 3, positive, this scale was ascribed overall a positive bias. So scores for negative-bias statements are reverse-coded using the same, 100 – raw score, approach adopted for other scales when combined with the positive-bias statement scores to calculate the mean score for this scale.

A high score on the SE scale indicates a respondent who has a strongly positive sense of their academic WORTH, that they regard themselves as good at studying (perhaps even academically talented), that they can achieve just as much as anyone else, they approach written tasks with

enthusiasm and don't feel a sense of hopelessness when tackling academic work nor did they feel stupid at school and would disagree strongly with the QNR statement: 'MY CONTRIBUTIONS IN CLASS ARE USUALLY RUBBISH, SO GENERALLY I DON'T BOTHER'.

LH – Learned helplessness

The concept of Learned Helplessness (LH) was in vogue amongst researchers some time ago (eg: Brown & Inouye, 1978, Abramson et al, 1978) and has been included in later work that has a specific focus on LH in an academic context, more specifically in relation to dyslexia. Humphrey & Mullins (2002) looked at several factors that influenced the ways that dyslexic children perceived themselves as learners identifying learned helplessness as a significant characteristic. Later work by Burden drew on relationships between learned helplessness and academic self-perception incorporating the characteristic in the development of his 'Myself as a Learner' scale (Burden, 2000) which he used with children with dyslexia (Burden, 2005), which has greatly influenced the QNR used in this project, as has Burden's additional evaluatative tool, the 'Dyslexia Identity Scale' discussed in his thesis on dyslexia and self-concept (ibid). The idea of learned helplessness is rooted in the perception of a lack of control of events or circumstances leading to a resigned acceptance of what is expected as inevitable.

Since all 6 items all phrased negatively, no reverse-coding is necessary and **a high score on the LH scalE** indicates a respondent who feels that they have little active control over their academic academic achievement, are more likely to cite luck rather than any effort on their own part when a good grade is achieved, feel that when starting new topics they will usually be too difficult for them and that however hard they try, their effort makes little difference to the academic results they expect to gain. They also think that they will usually be held back by their learning challenges and that they are generally not surprised when their work attracts low marks.

AP – Academic procrastination

Procrastination has long been recognized as a hindrance to academic achievement although much of the evidence is anecdotal or inconsistent. In their meta-analysis of relevant studies, Kyung and Eun (2015) found that although procrastination appeared to be negatively correlated with academic performance, evaluators and measurements used significantly impacted on the strength of the relationships claimed. Tan et al (2008) looked at academic procrastination and

grade goals with results showing that [academic] self-efficacy was negatively correlated to procrastination. Of particular relevance to this project is a study by Klassen et al (2008) which compared levels of procrastination between students with and without learning differences (LD) which indicated that individuals with LD exhibited significantly higher levels of procrastination together with lower levels of self-regulation and self-efficacy than those without any indication of learning differences.

The 6 items on this scale gauge the respondents' levels of academic procrastination broadly in relation to how they respond to academic deadlines for completing assignments and how enthusiastically they approach new tasks. 2 items were phrased in a positive sense with the remaining 4 taking a negative tone so the scale was assigned overall a negative bias with positive-statement scores being reverse-coded as above, (100 – raw score), to produce the recorded value.

A high score on the AP scale indicates a student frequently puts off getting started on assignments, is often working right up to the deadline or has to regularly ask for additional time, generally agrees that the might achieve higher grades if they didn't have to usually rush to finish assignments and often finds other things to do rather than focusing on the demands of their academic studies.

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