Non-Cognitive Factors and High School Learning Outcomes (2014)

Denis Hazbic (MOrgPsych, MAPS), David Holzworth (MOrgPsych, MAPS), Bianca Berry (PhD Clin, MOrgPsych)

NEUROMITE RESEARCH

Background

Non-cognitive factors are a person's emotional, psychological, and social attributes, attitudes and habits. These factors are distinct from a person's intellect or cognitive abilities but significantly influence it, and combined cognitive and non-cognitive abilities, are a good predictor of a student's future success and stability (Heckman, 2008). Given the vastness of research on non-cognitive factors, it can be challenging to separate between individual traits (i.e. intrapersonal or interpersonal) as there is a great deal of interconnectedness and influence among them, reinforcing the impact such traits have on one another, both positive and negative. However, there are particular non-cognitive traits which have received particular attention from researchers. Broadly speaking they tend to sit under the umbrellas of (1) Confidence (e.g. self-efficacy and positive self-regard), (2) Conscientiousness (e.g. goal orientation and setting, self control and effort), (3) Resilience (e.g. perseverance and emotional control and recovery), (4) Mindset (growth mindset vs fixed, effort belief) and (5) Self-determination (motivational self-regulation).

Why is this important? A large number of meta-analyses on student social and emotional learning and positive psychology interventions, reveal that the training and development of these non-cognitive factors leads to the following positive outcomes: (a) an increase in pro-social behaviours and decreased conduct problems, (b) improved academic performance, (c) improved attitudes about the self and satisfaction within school community, (d) decreased emotional distress, and (e) helps close the attainment gap between advantaged and disadvantaged students.

Objectives

The current research is exploratory in nature and aims to determine:

(1) The criticality of various non-cognitive factors and the effect that they have on academic achievement.

(2) Implications for teachers and the role they play in optimising and supporting the development of non-cognitive factors in their teaching process.

Methods

Forty nine secondary school students from a Boy's College in Brisbane undertook a 15 minute paper and pencil assessment of their various non-cognitive factors. Their scores on non-cognitive factors were compared against a number of their academic performance measures. Correlation and regression analyses were conducted for results purposes.

Measures

Non cognitive factors measurements include: (1) **Academic Efficacy,** (2) **Personal Achievement Goal Orientation**, (3) **Persistence**, (4) **Emotion Control**, (5) **Effort**, (6) **Effort Belief**, (7) **Learning Goals**, (8) **Self-Theories of Intelligence** (Growth vs Fixed Mindset), and (9) **Academic Self-Regulation Questionnaire** (adolescents).

Academic Performance was measured using the following data: (1) **GPA** (global score across all subjects), (2) **NAPLAN – Reading**, (3) **NAPLAN – Writing**, (4), **NAPLAN – Spelling**, (5) **NAPLAN – Grammar**, (6) **NAPLAN – Numeracy**, (7) **ICAS** (International Competitions and Assessments for Schools) **– English**, and (8) **ICAS – Science**.

Results

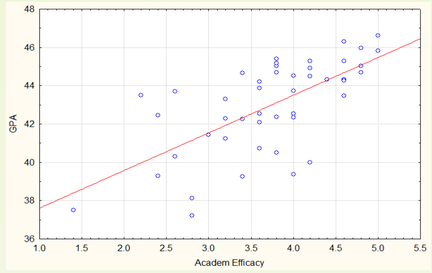
A number of different multiple regression analyses were conducted to test whether the non-cognitive factors significantly predict academic school performance, across multiple measures. It has been found that non-cognitive factors **significantly** explain/predict ALL academic achievement measures - excluding NAPLAN-Numeracy. Specifically, non-cognitive factors account for:

a) **62% of the variance in GPA** (R^2=.62, F(14,29)=3.38, p<.01),
b) **50% of the variance in NAPLAN-Reading** (R^2=.50, F(14,29)=2.08, p<.05),
c) **51% of the variance in NAPLAN-Spelling** (R^2=.51, F(14,29)=2.18, p<.05),
d) **63% of the variance in NAPLAN-Grammar** (R^2=.63, F(14,29)=3.52, p<.01),
e) **68% of the variance in NAPLAN-Writing** (R^2=.68, F(14,29)=4.27, p<.05),
f) **48% of the variance in NAPLAN-Numeracy** – non significant
g) **54% of the variance in ICAS-Science** (R^2=.54, F(14,29)=2.40, p<.05),
h) **70% of the variance in ICAS-English** (R^2=.70, F(14,29)=4.00, p<.01)

Results

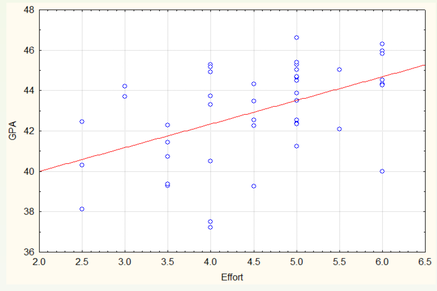
Confidence – Academic Self-efficacy (individual's belief that they can successfully achieve at a designated level on an academic task or attain a specific academic goal)

Academic self-efficacy was found to be the **strongest** predictor of ALL academic measures. The graph below demonstrates a correlation (R = 0.68) between GPA and Academic self-efficacy.



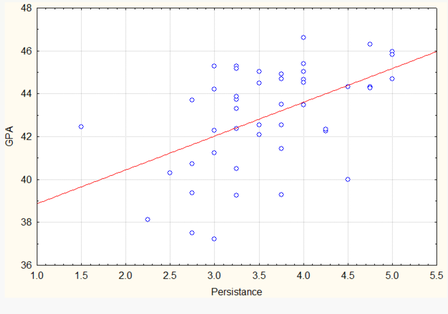
Conscientiousness – Effort (willingness of a student to exert themselves and work hard toward academic goal attainment.)

The graph below demonstrates a *positive* and *significant* correlation between GPA and Effort R= 0.48



Resilience – Persistence (capacity to recover and persevere with academic endeavors and tasks when beset by problems or challenges)

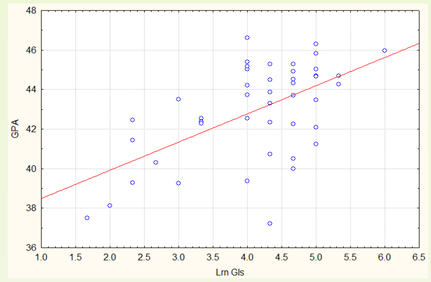
The graph below demonstrates a *positive* and *significant* correlation between GPA and Persistence R= 0.56



Results

Mindset – Learning Goals (student's primary purpose or goal is to develop their competence. Learning is perceived as inherently interesting, an end in itself. Attention is focused on the task.)

The graph below demonstrates a *positive* and *significant* correlation between GPA and Learning Goals R= 0.64



Conclusion & Discussion

The study clearly demonstrates the criticality and a strong contribution that various non-cognitive (i.e., confidence, conscientiousness, resilience, mindset and motivation) factors play in a student's academic success. Student's perception of their ability, their expectations of future success and the extent to which they value an activity, influence their motivation and persistence, leading to improved academic outcomes.

Academic efficacy, intrinsic motivation and mastery goal orientation are the most closely linked non-cognitive factors with academic success. That is teachers should focus on promoting these three key factors in schools. For example:

Academic efficacy – break down difficult tasks into smaller easier steps to ensure success and use positive verbal messaging (e.g. praise) and feedback that increases confidence.

Intrinsic motivation – set tasks that student's will find purposeful and inherently enjoyable. Avoid reward, punishment or compliant based behaviour management as an ongoing strategy.

Mastery GO – set goals and learning that is oriented toward knowledge and competence acquisition, as opposed to competition or fear of failure.

References

Heckman, J.J., (2008). "Schools, Skills and Synapses". *Economic Inquiry, Western Economic Association International*, 46: 289-324.