Activated or Deactivated?

The Relationship between Grade Predictions and the Optimal State of Self- Other Trust in Year 10 Students in their Lessons

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Abstract

This study reviews data collected from cohorts of yr 10 students in the UK, across four different, independent learning environments, to identify potential correlations between learner-environment state and academic performance. The data was collected between December 2012 and December 2013 at four UK secondary schools. 496 Yr 10 students took part and more than 2,500 subject lesson assessments were made.

Learner-environment state data was collected using Footprints assessment technology, which was developed on the basis of Human Ecology Theory. This assesses and models the learning strategies that a learner is deploying across their varied learning environments. The data provides the potential to understand the difference between what Walker calls 'optimal and sub-optimal learner-environment states'.

This study provides evidence that set in yr 10 relates to the optimality of the learning posture adopted by students. High performing students in Maths and Science adopt a learning posture of low trust of self and high trust of others. Low performing students adopt a learning posture of high trust of self and high trust of others. This throws light onto the nature of knowledge acquisition and internalisation.

The study also provides evidence that perceived grade prediction can have either an activating or deactivating effect on learner state.

Finally, the study offers intriguing evidence, which requires further investigation, that Arts and Science subjects have different optimal learner-environment states.

Introduction: theories of learner potential, motivation and learner-environment state

Intrinsic theories of learner motivation have tended to emphasise the state of the learner toward the learning task. Since Barndura's model of self-efficacy (Bandura 1977) a stream of research has focused upon the internal motivation of the student toward learning (Bandura 1977; Linnenbrink, Pintrich 2003; Pajares 1996; Schunk 1990). For example Dweck (2006) talks of the intrinsic growth or fixed mindset of the student. In such models the learner is regarded as the agent who may be actively or passively engaging in the learning task. Claxton's Learning Power model (Claxton 2002) focuses on the intrinsic abilities of the learner to overcome obstacles to learning.

Hattie (2011) has conducted a meta-survey of research studies on factors that accelerate learning. He concludes that the statistically most significant indicator of a student's progress is their *existing* self perception of their academic level. Existing extrinsic levels or summative grades, reinforce a student's self perception either positively or negatively and are more significant than any other factor. The acceptance that summative assessment, when provided in the form of a comparison with peers, has a decisive positive or negative impact on academic motivation (Black, Wiliam 1998; Marsh et al. 1995)

Walker's Human Ecology Theory (2009) offers a framework to unify the environmental and individual components of learner motivation. Human Ecology Theory regards learner motivation as an interaction between the learner and the learning environment (Walker 2009, 2013). Both the learner and the learning environment (constituted by peers, teacher, classroom etc) are active co-creating agents in the learning process. The cognitive strategies the learner deploys, refines and habituates must be understood as a situational response to the environmental opportunities and conditions within which he is engaged in learning.

In this study I look to find evidence for the interaction of the student's 'learner-environment state' and their academic performance, as well as the influence of extrinsic environmental factors. I also look at whether a student's perception of their ability may have an impact on their motivation for motivation.

Assessing learner-environment state

The Footprints assessment technology, developed on the basis of Human Ecology Theory, seeks to assess and model the learning state that a learner adopts within their varied learning environments. The resulting data is understood then as the 'state that exists between the learner and their environment'.

The data provides the potential to understand the difference between what Walker calls 'optimal and sub-optimal learner-environment states'. Walker (2013) claims evidence that this technology can assess and model the relative cognitive adaptation of a learner to their learning environment. Additionally, this can be correlated with a proposed optimal cognitive strategy for the specific learning environment, resulting in an ability to rank the optimality of the learner's cognitive adaptation.

In this study, Walker reviews data collected from larger cohorts of yr 10 students from three UK secondary schools (B, E and H) across a number of independent learning environments, to identify correlations between learner-environment state and academic performance.

Method

Assessment method

The Footprints assessment requires candidates to complete an online computer-based imagination exercise. The exercise involves a series of verbal instructions, listened to through headphones, which invite the candidate to imagine a space in their own imagination. See appendix for further explanation. The instructions enable the candidate to form the dimensions, shape, features and activities of a space they imagine in their mind. Having created their space, the candidate is then invited to score a set of multiple choice statements about their space. These answers give a baseline score of the candidate's *actual imagined cognitive self-operation*.

Measuring student *actual imagined cognitive self-operation* in learning contexts

Having established the individual's baseline scores for *imagined cognitive self-operation*, the Footprints assessment instrument then leads the candidate through three sets of further enquiries about their space. Specifically, the candidate is invited to imagine, in turn, a particular learning context taking place within their space; for example, their maths lesson, or their science lesson.

The chosen learning context is one which the candidate experiences in reality within school. For example, if they are in maths set one in school, then in the Footprints imagination exercise, they imagine maths set one as the learning context within their space. The candidate is cued up by verbal cues to imagine how their space might be changed by each of the learning context taking place within their space and how their activity might change.

The candidate then scores a comparative set of statements to the first baseline statement which identifies their scores in relation to *imagined cognitive self-operation* when participating in each learning context in their imagined space. By this method, the Footprints assessments obtain four comparative sets of data about each candidate; their *imagined cognitive self-operations* as baseline and then their *imagined cognitive self-operation* when participating in three specific learning contexts.

Data collection

Four cohorts of a total of 403 yr 10 students from three different schools undertook the Footprints assessments. Students undertook their baseline assessments within the context of an ICT session, and then a minimum of three further subject assessments including Maths, Science and English. Some 50% of students undertook additional assessments for further subjects beyond the required three.

Comparing Footprints data of yr 10s with existing ranking according to set

Finally, the ranked Footprints scores were then correlated against the existing class setting of the student cohort into ability sets for Maths, English and Sciences. In one school Cognitive Ability Test (CAT) score data was also available and additional correlations with these scores were possible.

Data Model

The data model used in the study is composed of seven factors or elements involved in a model of cognition proposed by Walker 2009.

The Footprints assessment looks at seven factors which compose a student's cognition. The seven factors of data collected for each student are:

1. *Trust of my self- how much I trust my own ideas, qualities and opinions in this lesson*
2. *Trust of others- how much I trust other's ideas, qualities and opinions in this lesson*
3. *Pace- how much pace, risk and change do I like in this lesson*
4. *Disclosure- how willing am I share to share thoughts, ideas, opinions and questions in this lesson*
5. *Perspective- whether I see things from a detached or personal perspective in this lesson*
6. *Processing- whether I focus on making connections or following step by step in this lesson*
7. *Planning- whether I focus on the learning outcome or am open ended in this lesson*

Walker identifies these seven factors as forming two clusters:

Cluster one Learning posture (factors 1-4) which are social and emotional strategies:

1. *Trust of my self- how much I trust my own ideas, qualities and opinions in this lesson*
2. *Trust of other's- how much I trust other's ideas, qualities and opinions in this lesson*
3. *Pace- how much pace, risk and change do I like in this lesson*
4. *Disclosure- how willing am I share to share thoughts, ideas, opinions and questions in this lesson*

Cluster Two Thinking strategy (5-7), which are cognitive strategies:

1. *Perspective- whether I see things from a detached or personal perspective in this lesson*
2. *Processing- whether I focus on making connections or following step by step in this lesson*
3. *Planning- whether I focus on the learning outcome or am open ended in this lesson*

Results

A one-way ANOVA was used to test for the relationship of trust of self and trust of others against set in school B, the largest sample size. The relationship between trust of others and trust of self differed significantly across the seven sets, F (6, 485) = 2.566, p = .0186.

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Set 1	117	214	1.82906	0.780872
Set 2	78	168	2.153846	0.729271
Set 3	57	106	1.859649	0.72995
Set 4	81	149	1.839506	0.78642
Set 5	81	177	2.185185	0.652778
Set 6	41	83	2.02439	0.67439
Set 7	37	77	2.081081	0.743243

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	11.31634	6	1.886057	2.566025	0.018619	2.117263
Within Groups	356.4804	485	0.735011			
Total	367.7967	491				

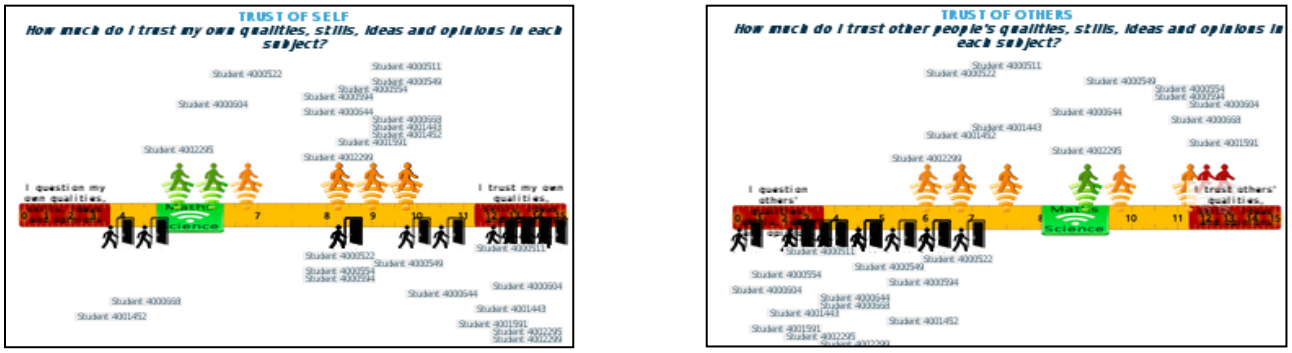


Chart 1 Set 6and 7 Maths (school B) showing a skew toward high trust self (left) and high trust others (right) above the red/amber scale.

Chart 2 Set 1and 2 Maths (school B) showing a skew toward low trust self (left) BUT high trust others (right) above the red/amber scale.

Data across all three schools B, H and E show a clear difference in the learner-environment state between academically higher Maths sets and lower Maths sets. The difference is found in regard to the learning posture, and specifically the combination of factors 1 (Trust of own ideas, opinions etc) and factor 2 (Trust and others ideas, opinions etc.).

In the higher sets, there is a high incidence of learners adopting a low trust of themselves but a high trust of others. In the lower sets, there is a high incidence of learners adopting a high trust of themselves and a high trust of others. In other words, whilst trust of others remains high in both cohorts, trust of self is low in the higher sets and high in the lower sets.

We can represent the data from all three schools as a composite chart (Chart 3), combining trust of self with trust of others to give four categories or *kinds* of learning posture.

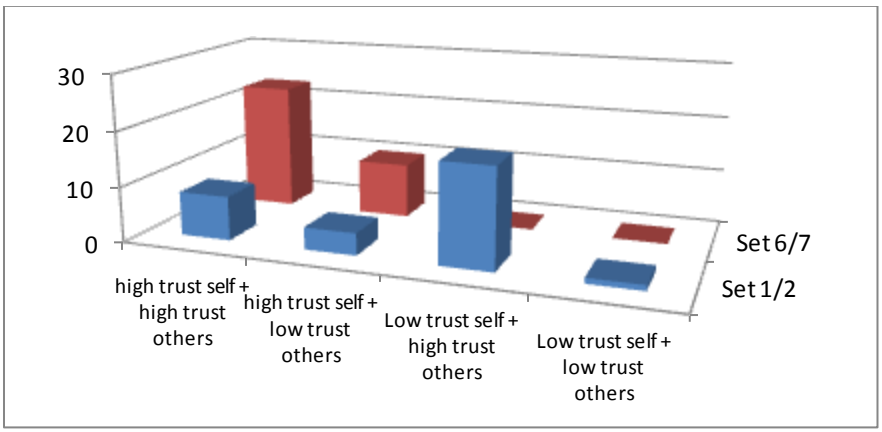


Chart 3 High sets (1/2) and low sets (6/7) for Maths showing the number of students in schools H, B and E adopting each of the four different composite student learning postures

The composite Chart 3 shows that low Maths set correlates with a learning posture characterised by a high trust of self and a high trust of others. Behaviourally, this typically manifests in complacency, a reluctance to struggle, a belief that others will solve their problems for them and a lack of personal responsibility.

By contrast, higher set Maths students show a higher incidence of low trust in themselves but a high trust in others. Behaviourally, this composite learning posture manifests in conscientiousness, eagerness to please, openness to other's ideas and a high degree of personal responsibility.

A difference in English compared to Science and Maths in one school (M)

In schools B, E and H scores for factors 1 and 2 from across *all* the three different subjects (from Maths, English and Sciences) showed that higher performing students showed roughly the same levels of trust in their own opinions. In addition, lower performing students showed different levels of trust in their own opinions from higher performing students, but again, these levels of trust were consistent across *all* their subjects i.e. not subject specific.

In school M data suggests whilst in Science and Maths, the patterns of trust of self/trust of others follows that found in Maths and Science in schools B, E and H, in *English* the pattern appears to be reversed. Students in higher sets show a high trust in themselves and a low trust in others, whilst those in lower sets show a low trust in themselves but a high trust in others.

Wider data gathered from Footprints assessments of other arts subjects in both yr 10 and yr 13 in school M supports the evidence that higher academic ranking in English and arts subjects correlates with high trust in self and low trust in others. This is in contra-distinction to Science and Maths subjects where the pattern is the opposite.

There is not a statistically large enough group to avoid errors of variance. Therefore, this observation should be treated heuristically only.

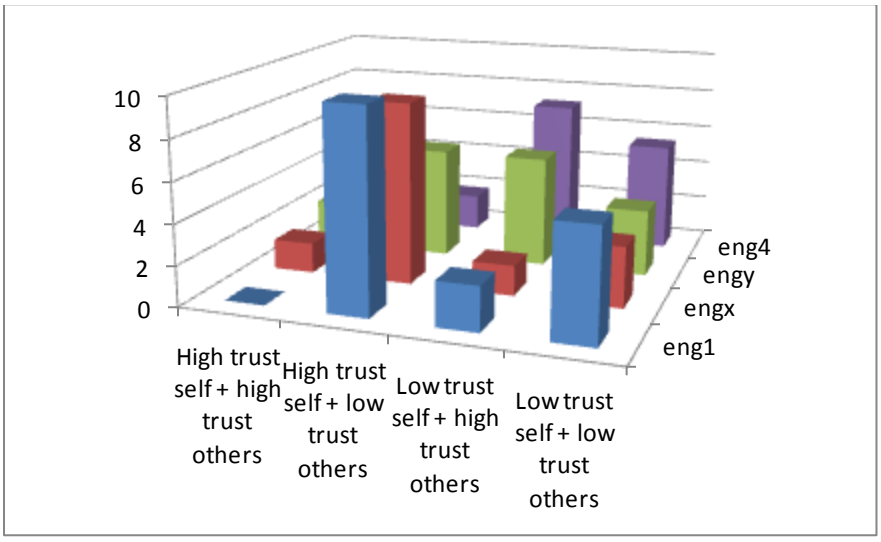


Chart 4. School M English sets plotted against learning posture showing the distinctive 'reversed' pattern of trust of self/trust of others compared to Science and Maths subjects (chart 3)

Predicted D grades have a different impact from E, F, G grades

The data suggests that the student *perception* of their predicted grades has an impact on the learning posture of those students. In school H, data on predicted grades in Maths, Science and English for yr 10 students was also collected.

Comparison between students predicted D and students predicted E/F/G on grade scale

A	B	C	D	E	F/G

A one-way ANOVA was used to test for the relationship of trust of self and trust of others against grade prediction.
The relationship between 'trust of others' and 'trust of self' differed significantly between students predicted D and E/F/G grades, F (1, 238) = 13.51, p = .000294.

Groups	*Count*	*Sum*	*Average*	*Variance*
Column 1	190	411	2.163158	0.71927
Column 2	50	84	1.68	0.548571

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	9.240395	1	9.240395	13.50685	0.000294	3.880827
Within Groups	162.8221	238	0.684126			
Total	172.0625	239				

Comparison between students predicted D and students predicted C on grade scale

A	B	C	D	E	F/G

The relationship between 'trust of others' and 'trust of self' differed significantly between students predicted D and C grades when data was transformed to equalise sample sizes,
F (1, 368) = 10.18, p = .001538.

Groups	*Count*	*Sum*	*Average*	*Variance*
Column 1	185	347	1.875676	0.555112
Column 2	185	396	2.140541	0.719271

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6.489189	1	6.489189	10.18405	0.001538	3.866852
Within Groups	234.4865	368	0.637192			
Total	240.9757	369				

Comparison between students predicted C and students predicted E/F/G on grade scale

A	B	C	D	E	F/G

The relationship between trust of others and trust of self did not differ significantly between students predicted C and E/F/G grades when data was transformed to equalise sample sizes, F (1, 233) = 2.71, p = .1004.

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Column 1	185	347	1.875676	0.555112
Column 2	50	84	1.68	0.548571

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.507119	1	1.507119	2.721727	0.100338	3.881678
Within Groups	129.0205	233	0.553736			
Total	130.5277	234				

Discussion

These findings contribute to the discussion about the impact of set and grade predictions on the learning posture of students.

The data suggests that higher set in Maths and Science correlates with lower trust of one's own ideas, opinions and thoughts, whilst lower set in Maths and Science correlates with higher trust in one's own ideas, opinions and thoughts.

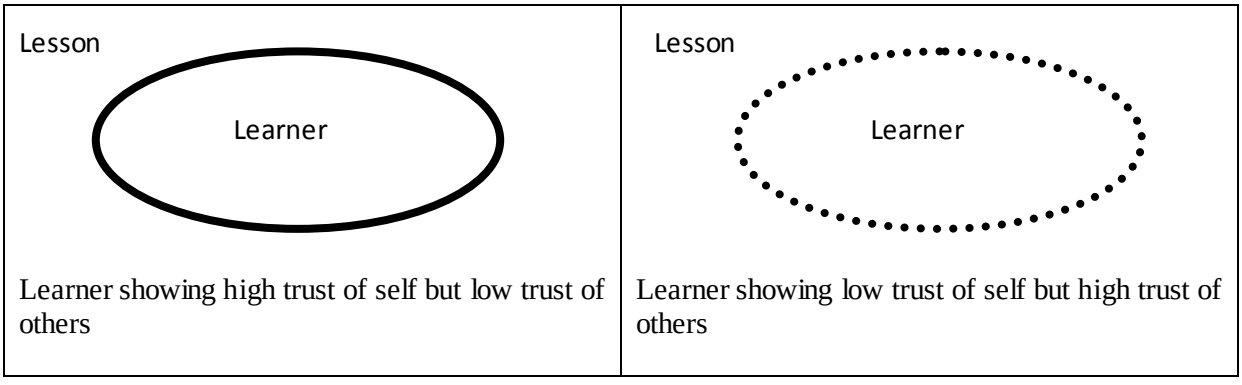
At face value this appears to be a surprising outcome. Instinct suggests that students with a higher trust in themselves would be better equipped for learning than those with lower trust in themselves. However, the notion of trust in oneself must be understood within the wider model of self-concept in Walker's Human Ecology Theory, from which the construct is drawn. Walker asserts that trust of oneself is a function of a person's individuated boundary to their surrounding environment (Walker 2009,11). A person has a sense of distinctiveness from the wider world, including the identities of other people; the greater the sense of distinctiveness from the wider world the higher self-trust that person can be said to have; such a person regards their own self as defined and formed, rather like a well boundaried and defined physical space. They do not allow for wider influences to determine the features of their self. As such they typically trust their existing ideas, thoughts and opinions rather than questionning them.

By contrast, a person who has a greater sense of *continuity* with the wider world, a lower degree of distinctiveness, can be said to have a lower trust of them self. Such a person regards their own self as open and less fixed in its formation, with a less distinct boundary between them self and the wider world. As such, they typically question their own ideas, thoughts and opinions rather than trusting them.

The Footprints assessment assesses the distinctiveness from or continuity with the wider world the candidate has as a person. The appendix explains the technical mechanism which elicits such information. The candidate's scores for these question items compose the factor of 'trust of self'.

This technical lexicon of Human Ecology Theory illuminates the data from this study. Students who show a lower trust of themselves in their Maths and Science lessons have a more open, or permeable boundary to the inputs of the teacher and their peers. They are more able to receive, accept and internalise other people's ideas and quicker to question, review and revise their own existing ideas. Students who, on the other hand, show a higher trust of themselves in their Maths and Science lessons has a more closed, impermeable boundary to the inputs of their teacher and their peers. They are less willing to question, review and revise their own existing ideas.

This study suggests that students who have a more closed, impermeable boundary around themselves in their Maths and Science lessons are less successful as learners, whilst those with a more open, permeable boundary are more successful (Figure 1).



Learner showing high trust of self but low trust of others

Learner showing low trust of self but high trust of others

Figure 1. Trust of self : trust of others is assessed by the Footprints technology in terms of the learner's perception of the boundary between them and their immediate learning environment

This model could be viewed as evidence for the optimal state of 'trust of self' between the learner and their environment. One can recognise that this 'state' comes into being within the interactive context of the lesson. Charts 1 and 2 indicate that, outside the context of the lesson, students may have a different sense of boundary around themselves. Their trust of them self, in other words, is context-specific and not absolute. Students adjust their trust of themselves as they enter and engage in the various lessons; hey also adjust their trust of others. The study suggests that, regardless of their 'outside-lesson' trust of themselves, students who adjust their trust of them self to be more open and unboundaried (a low trust of self score) when engaging in Maths and Science lessons tend to be more successful as learners than those who fail to do so.

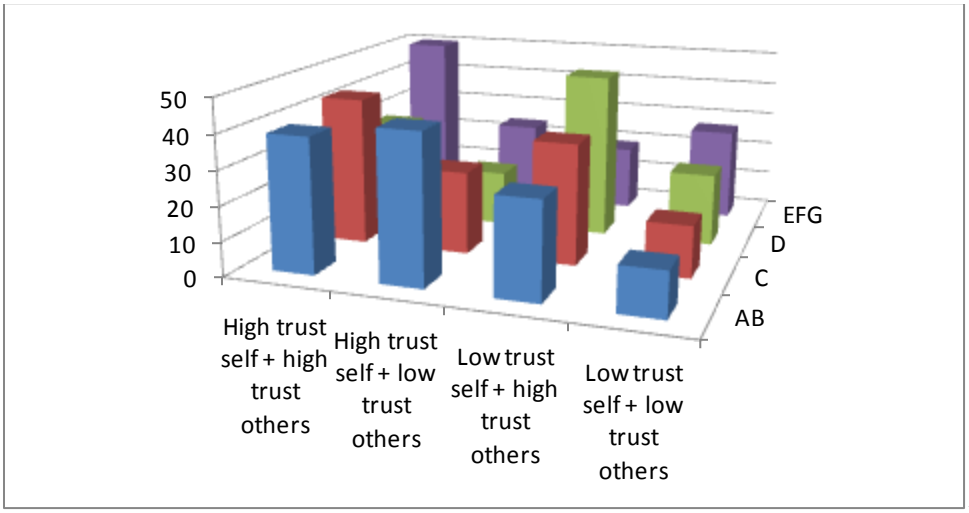
Impact of grade perception

Chart 5 shows the pattern of trust of self with trust of others for students predicted C, D or E/F/G grades in Maths, Science and English in school H. In each of the subjects, students who are predicted D grades exhibit the highest proportion of the low trust of self/ high trust of others learning posture. By contrast, the proportion of C and E/F/G grade predicted students who exhibit this posture is consistently lower than those exhibiting a high trust in themselves/high trust in others.

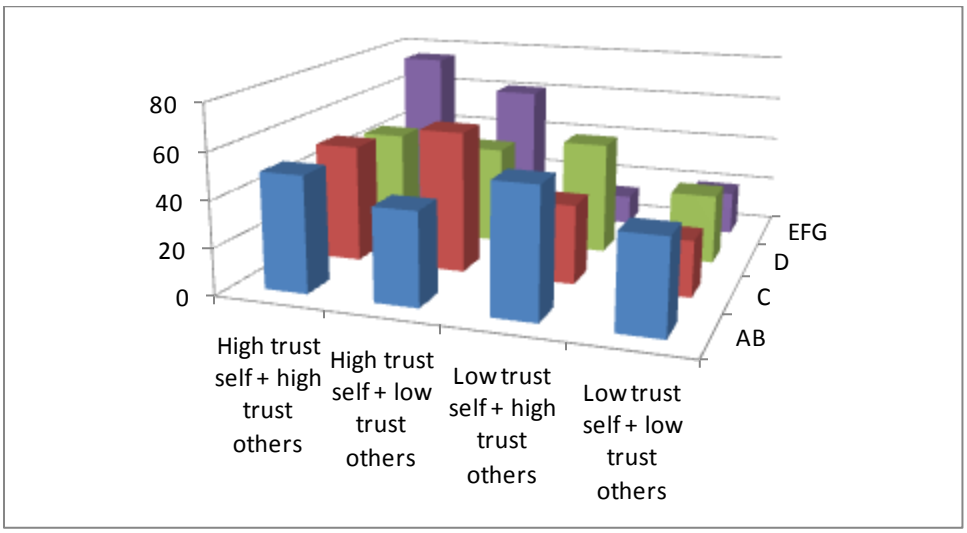
The data suggests that D predicted grade students exhibit disproportionately high learning posture of conscientiousness, compliance and eagerness to please and to learn. By contrast E/F/G students show a consistently high incidence of students exhibiting a learning posture of complacency and disengagement. Surprisingly, perhaps, C grade predicted students also show a high incidence of complacency as well a self-confidence or self assertiveness (high confidence in self/ low confidence in others).

The data, whilst a relatively small sample size and from one school only, suggests that D grade predicted students show a different attitude toward effort, learning and achievement than E/F/G predicted grade students who become indifferent and disengaged, and C grade students who may become complacent and self confident.

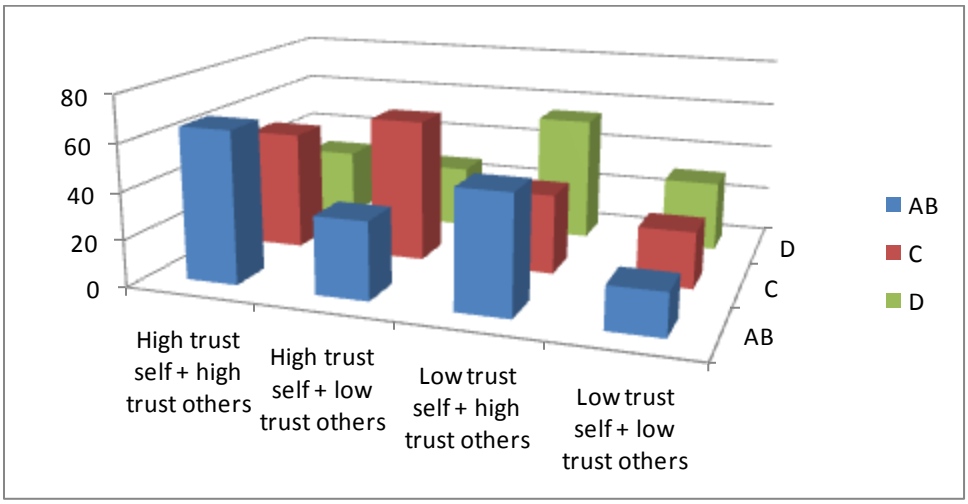
97.5% of students have one or more different grade predictions across these three subjects. The cohort of students, then, with predicted C grades in science is significantly different from the cohort of students predicted a C grade in Maths or English, with only 2.5% of each grade predicted group belonging to the same grade predicted group of both the other two subjects. The groups are not identical and therefore the pattern of learning postures should be seen as relating to the single common factor of predicted grade rather than identity of students.



Maths school H



Science school H



English school H

Chart 5 showing the number of students in school H with C, D, or EFG Maths, Science and English predicted GCSE grades plotted against trust of self and trust of others (no students were predicted E/F/G grades in English which explains why there is no EFG row for English).

The result suggests that the optimal state for the learner-environment (where the learner has a low trust of self and a high trust of others) is high amongst A/B grade predicted students but consistently peaks highest amongst D grade predicted students. By contrast, it is slumps in C grade and E/F/G grade predicted students on either side of the D grade (Chart 6).

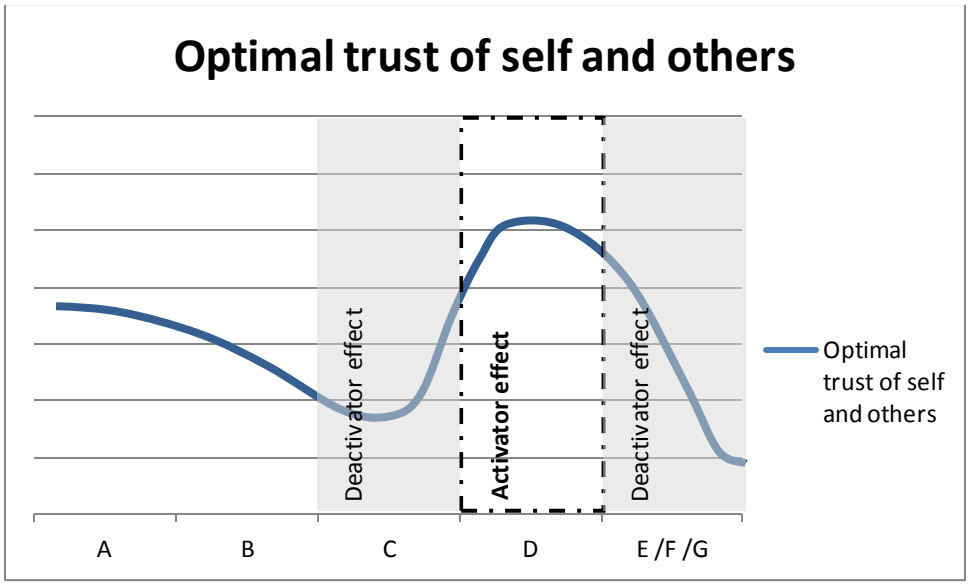


Chart 6. Grades D shows an 'activator effect' on student trust of self/trust of others. By contrast, Grade c and e/f/g predictions show a 'deactivator effect' on student trust of self/trust of others

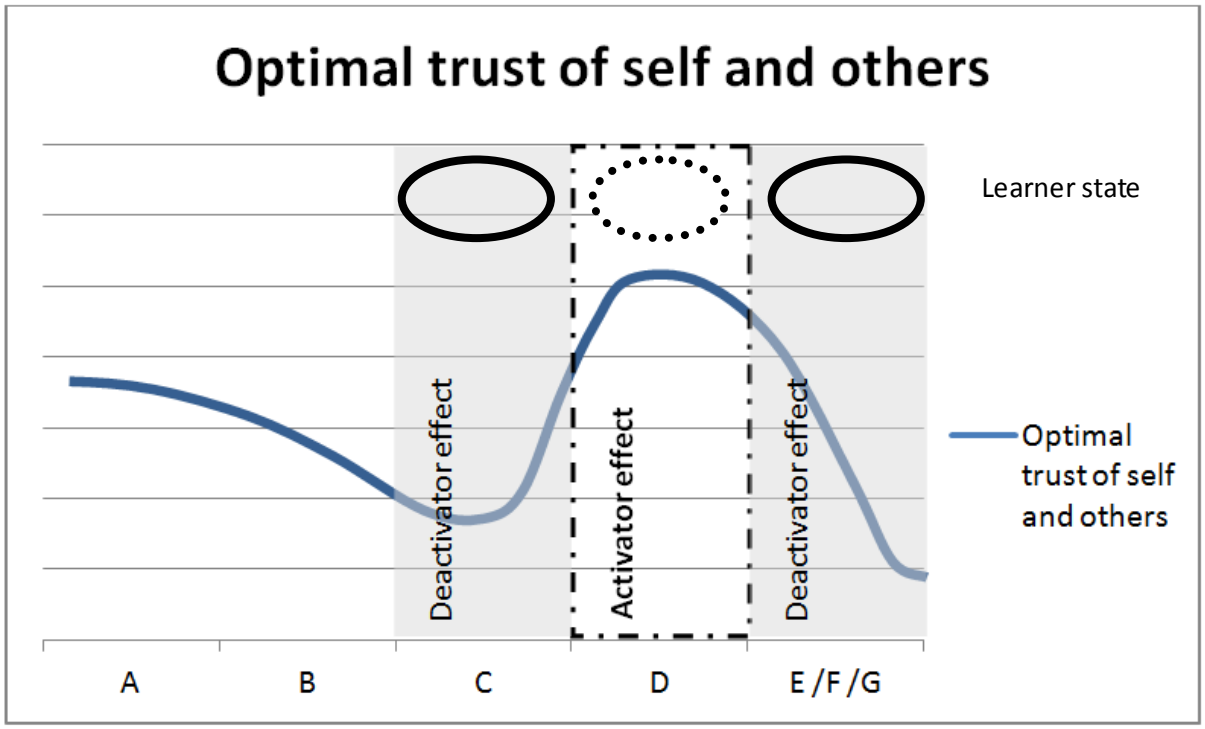


Chart 7. Optimal 'trust of self/trust of others' learning states found in differentially activated and de-activated zones of the predicated GCSE grade scale

Grade C is the pass/fail threshold for GCSE. It is a motivational goal for students to reach. This data suggests that students who are one grade short of a C grade have the highest incentive to learn and achieve. The aspirational grade, nearly within their grasp, acts as a kind of activator for their learner state when engaging in their Maths lessons. The D grade activator effect appears to drive students to be more willing to question, review and revise their ideas than students who have either a lower or a higher grade prediction.

By contrast, students with an E/F/G grade prediction appear to be de-activated in their learner state when engaging in their Maths lessons. They become more trusting of their own opinions, less willing to question, review and revise their ideas. Presumably, this de-activated state reduces the likelihood of them making significant progress. Whilst the C grade has become a magnet for D grade students pulling them up, it appears to have become a repelling magnet for E/F/G grade students pushing them further away.

It is also possible that the teaching environment around D grade students has an influence upon student learner state. Schools are ranked on the number of C grade and above examination results. As such there is considerable additional strategic focus on supporting D grade students to reach a C grade. It is possible that this additional focus, which enriches the environment of the student, creates a positive feedback effect, leading to students responding with greater openness to learning. There is also evidence from this data that students who are *already* predicted a C grade may lose some of the activated state of either the A/B or D grade predicted students.

This data contributes to our understanding of the impact upon learners of summative assessments. This evidence suggests that a summative assessment threshold may have both an activating and de-activating effect on the surrounding learners. Those who are just beneath the threshold may be activated by it; those who are just passed it, or too far below it, may be de-activated by it.

There is abundant evidence of this kind that summative assessments create ceilings and floors for learners (Hattie 2009). In this study we see this effect from the perspective of the learner's openness to new learning. Intrinsic theories of learner motivation emphasise the individual agency that a student has to create the will and beliefs to be open to new learning; this study suggests that a contributory factor in the ability of students to do so is the realistic prospect of achieving a meaningful goal. If that goal is too far away, or has already been exceeded, then learners are much less able to activate their own learning posture.

This suggests that schools should consider carefully how dynamic and achievable goals can be put in front of students at all times such they remain in a state of activated learner posture.

Subject specific differences in optimal learner-environment state: Optimal state when engaging with scientific vs arts knowledge

Chart 4 highlights some indication that arts and science/maths subjects may have a different optimal learning state. Taken at face value, this suggests that in English and the Arts, a learning posture of high trust of self and low trust of others is a more optimal learner-environment state than a low trust of self and a high trust of others.

One explanation as to why the optimal learner-environment state for English is the opposite for Maths and Sciences is the nature of the subject context itself. Science and Maths deals in empirical and evidential truths which are either true or false (at GCSE level). Learners must 'bend' themselves to these truths and be willing to revise and correct erroneous ideas and notions in the light of new evidence.

By contrast, English and the Arts deal in subjective knowledge, assertion, argument and opinion. In these subjects learners must be confident enough to assert their own ideas and opinions; the knowledge pattern does not impose itself on the learners; rather the (better) learners assert and argue for a particular and convincing knowledge pattern that they impose.

Looked at through this lens of the relative epistemologies of Science and Arts, one can see one possible reason why the optimal learner-environment state for each are the opposite of one another. It would require a larger study to further test this hypothesis. If this were the case, it would support the case for schools being explicit with students about the kind of knowledge they are engaging with across different parts of the curriculum. An understanding of the relative pliability or impliability of knowledge as the appropriate learning posture in which to engage with it would be .

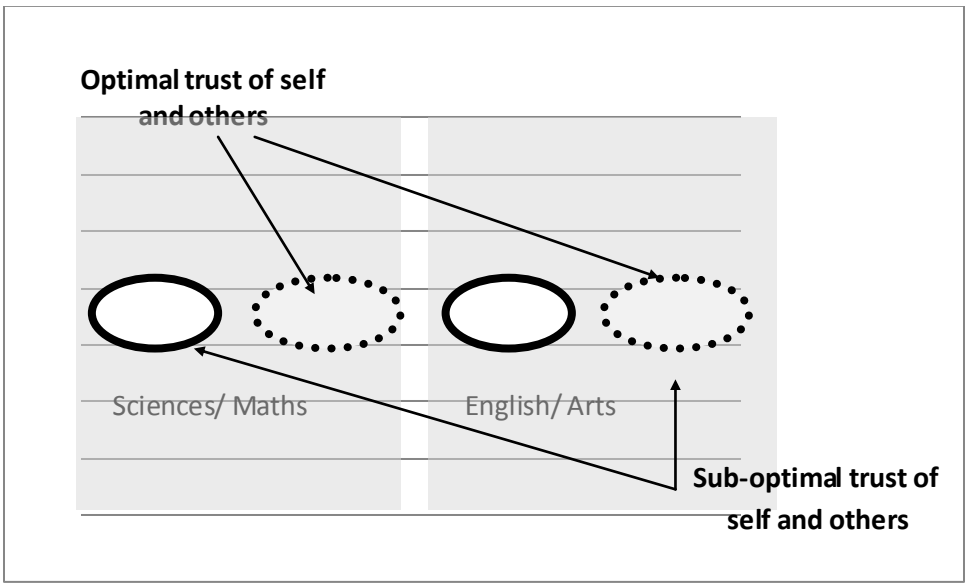


Figure 2. Optimal trust of self/others differs for Sciences/Maths and for English/Arts subjects

<u>School environment can suppress student adaptation of state of trust of self/trust of others</u>

This result was only found in school M and not supported in school B (there was insufficient data in schools E and H). There may be reasons why this result was found in school M but not found in school B. In schools B and E the variance across students showed remarkable consistency between factors 1 and 2, and the other three Footprints factors (0.0292) (Chart 7).

By contrast in schools M and H (combined as a group M,H) the variance differed between the five factors (0.3144). In comparing the variance of the two groups using a one-tailed t-test, F (10.769) is greater than F Critical one-tail (3.179) therefore the variance between the populations of B,E and H,M is different.

In comparing the variance of the two groups, F (10.769) is greater than F Critical one-tail (3.179) therefore the variance between the populations of B,E and H,M is different. A comparison between the means of the five factors in schools B, E compared schools M, H shows that B, E (mean = 2.255) is lower than M, H (mean = 2.715).

	Factors				
School	**1. Trust of own**	**2. Trust of others'**	**5. Perspective**	**6. Processing**	**7. Planning**
B	2.381710076	2.381710076	1.831910477	2.381710076	2.381710076
E	2.269772088	2.269772088	2.118256575	2.269772088	2.269772088
M	2.434070803	3.36460499	2.924944595	1.945600599	2.767648307
H	2.68798987	3.820562646	2.082040292	2.664719901	2.461684021

Chart 7. The variances in schools B, E, M and H for factor 1 (Trust of own ideas), and factor 2 (Trust of others' ideas).

This data suggests that a dominant pedagogic culture flattens the differences between the expected pedagogic approach across the curriculum, creating a uniformity learner-state across Maths, Science and English. In school M there is a diversity of pedagogic approaches across the curriculum, determined less by school policy and more by the department and individual subject specialist teacher. One would expect, then, for the learner-environment state in school M to be *subject-specific*. Left to their own devices, in the absence of being directed by an overall school pedagogy, better students will instinctively adapt their state in their Arts and Science lessons to the optimal, whilst weaker students will fail to do so.

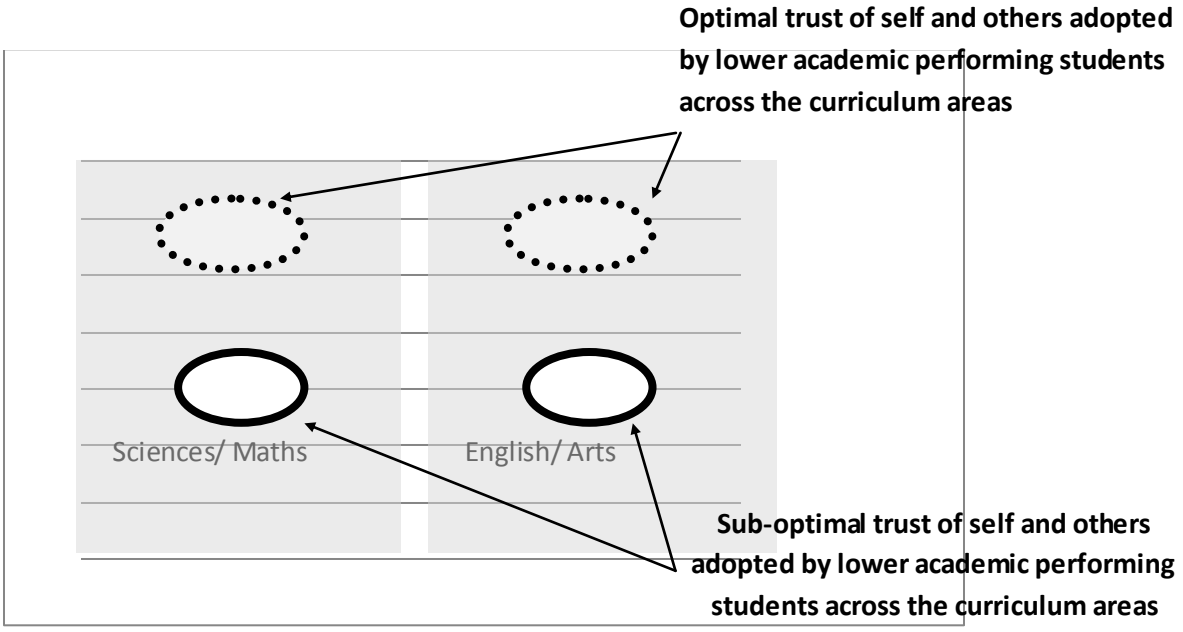


Figure 3. In a dominant pedagogic culture (such as school B) inter-subject differences in optimal state can be suppressed. There is no difference between Sciences/Maths and English/Arts

By contrast, one would expect school B to be subject-*insensitive* when it comes to optimisation; one would expect to see a certain universal kind of (more optimal) learner-environment state in high sets across the curriculum from Arts to Sciences, and a second universal (sub-optimal) learner – environment state in low sets across the curriculum. This is indeed what one sees (Figure 3)..

Conclusions

This study provides evidence that set in yr 10 relates to the optimality of the learning posture adopted by students. High performing students in Maths and Science adopt a learning posture of low trust of self and high trust of others. Low performing students adopt a learning posture of high trust of self and high trust others. There are behavioural implications of both which support the logic of this conclusion. Moreover, understood within Walker's model of Human Ecology Theory, as with fidelity to the actual data collection mechanism, this throws insight onto the nature of knowledge acquisition and internalisation as a process of incorporating new ideas and revising one's own existing ideas.

The study also provides evidence that perceived grade prediction can have either an activating or deactivating impact on learner state. It suggests that schools must consider how to provide such appropriate goals if they are to avoid grade-perception slumps.

Finally, the student offers some intriguing evidence, which requires further investigation, that Arts and Science subjects have different optimal learning postures.

This was a relatively small study. Some conclusions were drawn from smaller cohorts and should be regarded heuristically only, in particular the subject-specific optimal trust of self/trust of others state. Future studies should enlarge the sample cohort and ensure greater consistency of measure of academic performance.

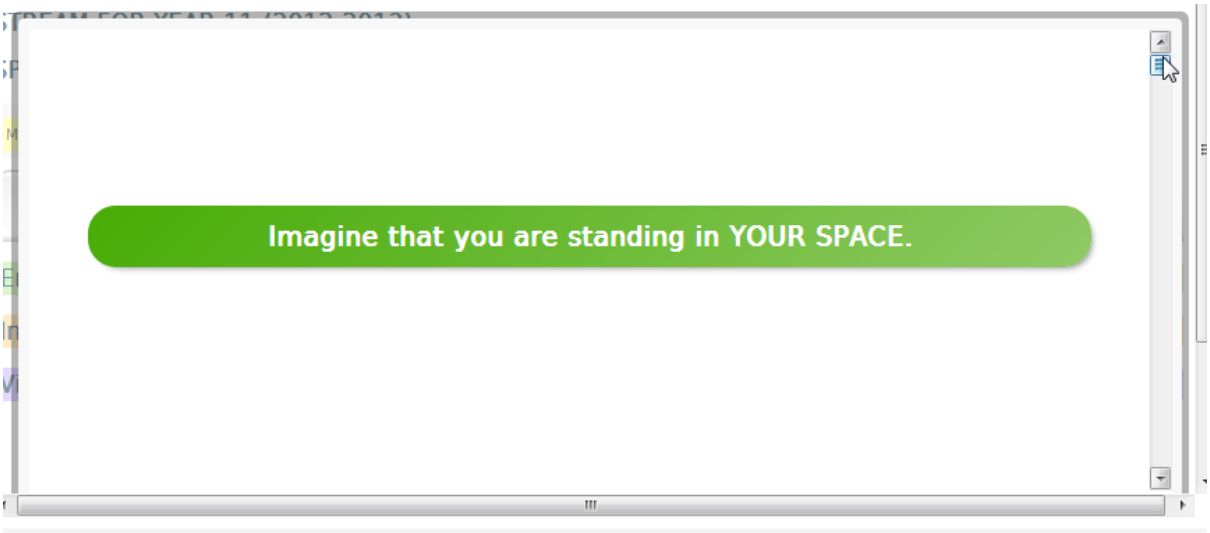
Disclosure

The author acknowledges a conflict of interest through a commercial relationship with the manufacturers of the Footprints Assessment.

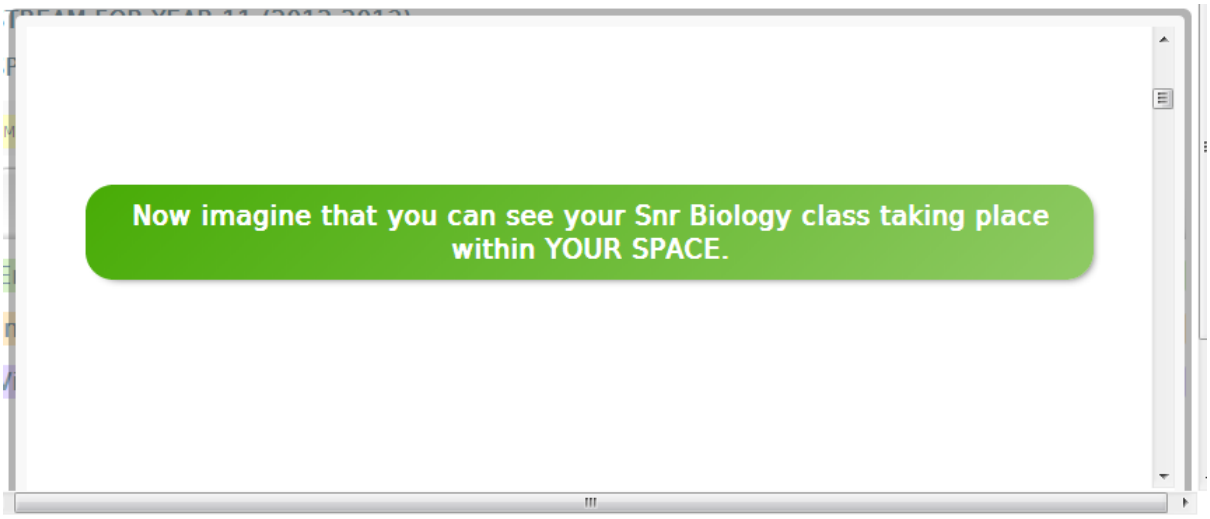
Appendix

The Footprints Technology: Measuring imagined cognitive self-operation

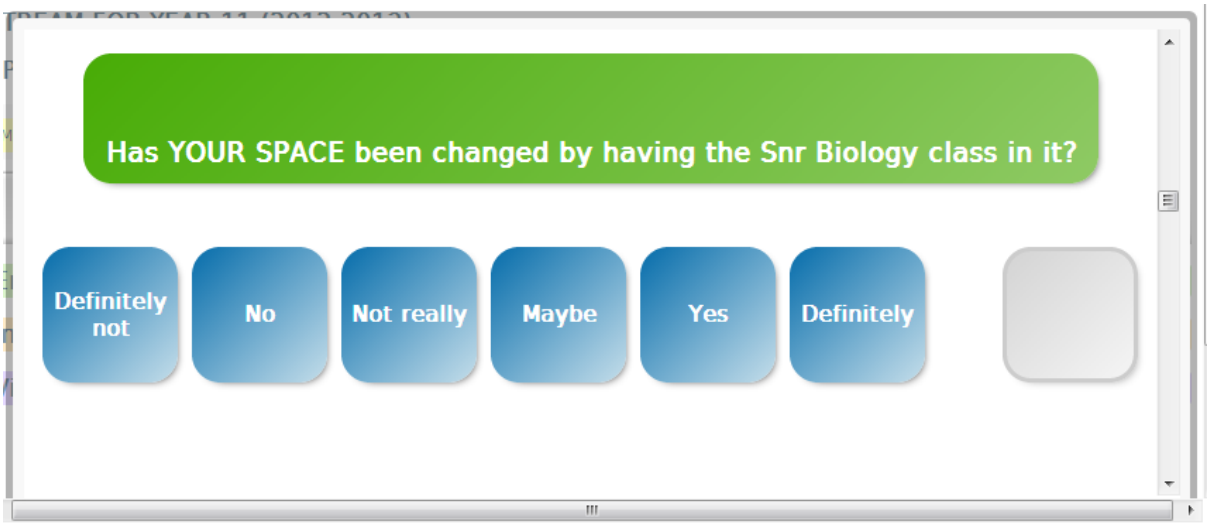
The Footprints assessment is a derivation of a projective test called the Personal Ecology Profile (Walker 2009). The psychological process involves triggering the imagination of the candidate to create a 'space' which they want to call their own through a series of neutral cues. The clean language of the assessment is important to allow the candidate to project their own, independent meaning and shape onto the cues.



Further verbal cues develop the imagined focus of the candidate on their previously created space, their imagined self-perception and self-operations



Further verbal cues then develop and explore the candidates' imagined self-perception and operation with the learning context present. A series of 28 statements then appear and are scored by the candidate. These relate to seven factors stated in the data model.



Data Model

This study used Walker's conceptual model of Human Ecology Theory (Walker 2009) to define the cognitive self-operation. In the Footprints assessment four items score each factor. Each item is scored on a six point Likert scale as above. This results in twenty eight items measuring *cognitive self-operation* within a single learning environment.

The multiple learning contexts assessed therefore multiplies the number of times each item is scored.

A sample of three of the items is given below.

- *Do you need to know what is going to happen in YOUR SPACE when the keyword is with you?*
- *Does it help your learning in keyword when you can relate it to your own life?*
- *You need to make something in YOUR SPACE. Do you get lots of ideas popping into your head as you go along?*

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Centre for Human Ecology Theory, UK

www.humanecology.webede.co.uk

The Centre for Human Ecology Theory was launched in 2013 and aims to develop insight into human behaviour using Walker's Human Ecology Theory as its major tool through its research projects. The Centre aims to bring together a community of practitioners from around the world committed to developing understanding of human behaviour and how to engender more humane, sustainable living through application of these ideas.

Walker's Human Ecology Theory was developed over a decade, from 2000-2010, by the author through his work initially carried out whilst doing postgraduate studies at Oxford University in the UK. Encompassing areas of human behaviour from personality theory, through to leadership, organisational dynamics, teaching and learning, coaching and market cycles, Walker's Human Ecology Theory claims to be a comprehensive human systems paradigm.

Resume of the researcher: Simon P Walker

Simon Walker taught at Wycliffe Hall, Oxford University between 2002-2009. He worked as a consultant to the corporate world from 2002 and founded in 2004 The Leadership Community, an alumni of graduates from his Undefended Leader course that grew to around five hundred over the next five years.

In 2011 he announced a refocus on the area of education and schools, with a commitment to develop a curriculum for social, emotional and cognitive development. Walker co-authored with Jo Walker, also his wife, the Footprints schools programme, a version of the Human Ecology Approach for children. He became a Coach in Residence at Monkton Combe School in 2012.

Walker is the author of several ideas about human behaviour including a distinctive theory which he calls 'Human Ecology Theory', described in a monograph 'A Brief Introduction To The Theory of Human Ecology.'

From his Human Ecology Theory Walker has developed a number of other ideas in the areas of leadership, learning and coaching. He published the idea of 'undefended leadership' in a trilogy of books launched at the Oxford Literary Festival. His ideas have had an influence on writers in the area of Christian leadership (MODEM) school leadership (Seldon) and power in leadership (Preece).

Walker has also set out a basis for being 'undefended' upon Christian spirituality which he calls the Undefended Life and has taught the principles of Undefended Life in Africa, Norway, India and Australia. This has stimulated numerous responses from other commentators in the church.

Over the years, Walker has developed and commercialised several proprietary psychological technologies and instruments to analyse and develop people using a Human Ecology Approach. These including the Personal Ecology Profile, Leadership Signatures, Footprints Assessments and Coaching Signatures. He has collaborated with Meredith Belbin on several projects.

Prior to his wider adult education career, Walker was ordained as an Anglican vicar in 1997 and served his curacy in Abingdon, Oxfordshire. He has bachelor degrees in Biology and Theology from Oxford, an MPhil in Applied Theology from Oxford. He has just submitted his DProf by Public Works at Winchester University in 2014, a review of his contribution to the adult education between 1997-2014. He is an accredited member of The Association of Executive Coaching and Supervision.

References at http://humanecology.webeden.co.uk/#/who-is-simon-p-Walker/4575814295