Student Engagement and Quality Pedagogy

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Abstract

In this paper we set out research being undertaken to develop measures of learner engagement. Engagement is defined by variables of involvement, wellbeing and thinking. The measures are designed to be sensitive to the effect of alternative pedagogy on students from pre-school to final years of secondary and to be usable across a wide range of learning environments from formal schooling to less formal community based contexts. The paper begins with a discussion of suitable theoretical models and establishes linkages to relevant existing work. The current stage of development of a set of instruments is discussed and the application illustrated in three different measurement contexts. Initial findings for each of these contexts are outlined. While development is continuing, the initial results show that it feasible to measure engagement using both observation and learner self-report and that engagement is an indicator of quality of the learning environment and predicts important learning outcomes.

Key Words: student engagement, wellbeing, observation, self-report, measurement, method,

Word count: 7000

Introduction

This research focuses on understanding how those aspects of education over which educators have most control – school environments, curriculum and pedagogy – impact on learner engagement and outcomes. The work is a part of wider research into the effectiveness of school based reform in the State of South Australia. The cases discussed are South Australia specific, however, an interest in student engagement is increasingly widespread within educational circles (Zyngier, 2004). The research is therefore relevant to an international audience interested in the relationship between engagement and student social and academic learning achievement.

Theresa Akey (2006:6) defines engagement as:

> ...the level of participation and intrinsic interest that a student shows in school. Engagement in schoolwork involves both behaviours (such as persistence, effort, attention) and attitudes (such as motivation, positive learning values, enthusiasm, interest, pride in success). Thus, engaged students seek out activities, inside and outside the classroom, that lead to success or learning. They also display curiosity, a desire to know more, and positive emotional responses to learning and school.

There have been a wide variety of ways developed to measure engagement. The South Australian Department of Education and Children's Services (DECS) approach has proceeded along distinctive lines and it is useful to know what the influences have been before considering the measures

themselves. The South Australian curriculum has a framework called 'Essential learning's'. These relate to social outcomes of education namely: futures, identity, interdependence, thinking and communication. In addition to this, the Departments approach to school reform has combined theory and research input with a bottom up focus on transformation of teaching practice – what Foster refers to as 'learning our way forward' (Foster, 2001). This involves teachers participating in research and experimenting to develop local responses to change that can be sustained. This has led to a recognition that, teachers, parents, school leaders as well as policy advocates, need short cycle evidence of the effect of alternative choices on learners to direct the change process. It was recognition of this that led to an emphasis on engagement. Having teachers focus on how their choices immediately effect learner's involvement, wellbeing and thinking was seen as important; providing both incentive for change and information critical to deciding how to change.

The aim is to develop a set of instruments for measuring engagement across all age groups and which:

1) favours direct measures collected in particular learning contexts to proxies, such as attendance, which link only weakly to learning outcomes;
2) is sensitive to the effect of learning environments and quality of pedagogy; and
3) does not assume that the learning environment involves conventional schooling.

In this paper we firstly set out the conceptual framework we are following and link it to relevant prior research. We briefly describe the stage of development of both a set of observational and self-report instruments with the above characteristics. The use of these is illustrated by outlining their application to three projects within the Department. The first involved pre-schools, the second a case study of two primary schools and the final a trial of self-report instruments in secondary schools. In each of these applications, initial findings are discussed along with the implications of the work for the further development of the measures themselves.

The theoretical Framework

Within the literature it is common to distinguish between engagement measured by: conformance or compliance (e.g. attendance); academic engagement (e.g. commitment to a limited range of academic performance criteria or passing the tests); and intellectual engagement. The former is concerned with whether students conform to the rules of an institution – it has little to say about processes or outcomes of learning. The second concentrates on a very limited sub-set of outcomes of schooling while the latter implies a more complete concern with learning process and outcomes at the whole person level. Our interest was restricted to this final category.

From a measurement perspective Fredricks et al (2004) argue that components of engagement commonly identified include:

- behavioral – participation in school ranging from Involvement in school-based extra-curricula activities (Fullarton, 2002) to attendance at or absenteeism from school (Willms, 2003), also involvement in learning and academic tasks (Fredricks et al., 2004);

- emotional – a sense of belonging (Willms, 2003) and value;

- cognitive – a belief that school is 'for me' (Munns, 2005), an engagement and investment in learning and the school community.

It was decided that a preferred approach would focus on all three of these types of indicators, as only in combination do they provide anything approaching a reasonable insight of the experience of learners. Each, however, presents distinctive measurement challenges.

Behavioral indicators may be readily measured by observation and to some degree by self-report (at least with older learners). They are tangible and subject to less interpretation although they may be subject to cultural bias. They link directly to the phenomena of interest – the demonstrable active

participation in learning that what we most often mean by engagement. By themselves however, behavioral indicators are not sufficient.

Focusing on affect can reveal more about motivation and reasons for the observed behavior. Affect, however, can only be measured indirectly and is more subject to interpretation. One additional difficulty with affect is that emotions/motivations will vary during any learning. Learning involves a willingness to engage in the unknown, this will trigger anxiety as will temporary setback. Both of these experiences are essential to the process of experimentation, letting go of past ideas and generating new ones. Anxiety or apprehension may, however, quickly give way to excitement and satisfaction as a new insight is gained or a problem solved. In learning then, excitement and anxiety go together (Kort & Reilly, n.d). These problems can often be addressed by methodology, averaging scores over time for example, but this complicates data collection.

Cognition is important for revealing what the learner thinks about his/her situation (his/her reasoning and choices) and for providing a focus on how deeply he or she is engaging with the subject of the learning – how much he/she is thinking about it, understanding it and reconciling what is being learned as well as exercising choice about how to learn it. Cognition is even harder to get at than affect. It is only indirectly revealed by behavior and self-report may be limited by student difficulty in finding the words to articulate what they were thinking, or with problems of recall.

Existing work of relevance
Csikszentmihalyi's concept of 'flow' (1975; 1990) has been adopted as the basis for engagement research by several authors (see for example Harmer & Cates, 2004). Flow is defined as the experience of total immersion in an activity because of the *intrinsic* rewards it offers. The learner achieves a balance between the challenge of an unfamiliar task and the skill or experience needed to address it: being in a state of flow signals enjoyment of learning. This approach therefore combines a behavioural component – actions characteristic of deep immersion; and an affective component – enjoyment and a sense of achievement. This combination of deep involvement and psychological satisfaction and wellbeing links to Ferre Laevers' (1994; 1997) theory of Experiential Education.

Laevers argues that involvement and wellbeing are intermediate process variables which reveal the quality of pedagogy through its immediate effect on the learner. Importantly, Laevers defines them in such a way as to make them sensitive to all of the variables known or expected to influence engagement and learning outcomes. Involvement and wellbeing then have been cited as two of the most important and reliable indicators of quality for educational settings and processes essential for children's learning. The two variables indicate how well the environment succeeds in meeting children's learning needs (Laevers, 1999; Pascal, 1999; Raspa et al., 2001; Rogers, 1983; Vygotsky, 1978). The level of children's wellbeing indicates how well the environment is succeeding in helping children develop trust and confidence, a sense of belonging, self-knowledge, and good emotional health, freeing children to participate in their curriculum with vitality and enjoyment. Hence, wellbeing is a prerequisite for involvement (Laevers, 2000) and for successful social functioning (Mayr & Ulich, 1999).

Importantly, a focus on children's involvement and wellbeing places the onus for the outcomes for children on the adults, making a judgement about the context, rather than the child. It gives immediate feedback about the effect of the educators' approach and the environment they establish, providing the opportunity to make immediate adjustments (Laevers, 1999). This is unlike assessing developmental outcomes, which are often long term and dependent upon a range of extraneous variables. Using developmental checklists normed against an average has the potential to distract from seeing the 'whole' child, the integration of learning and development, and the development of enabling dispositions. Having identified an existing framework which incorporates both behavioural and affective indicators, what about cognition?

Few relevant approaches for measuring thinking were identified. Most that do exist are tied to particular learning areas such as science, mathematics or reading (Panaoura & Philippou, n.d; White

& Frederiksen, 1998) or targeted at specific behavior such as approach to exam completion (O'Neil & Abedi, 1996). An exception to this are the instruments being developed by the Finnish Learning to Learn Group (Hautamaki et al., 2002; Hautamaki & Kupiainen, 2002). Also relevant for older learners is some of the work undertaken on how assumptions about knowledge and learning (personal epistemology) shape the choice of shallow or deep learning strategies (Bendixen & Rule, 2004; Pintritch, 2002).

The instrument Set

The following instruments are now at varying stages of development:

- Long and short form observation instruments incorporating Involvement, Wellbeing and Thinking scales (reception to year 12);

- A self-report Involvement questionnaire (year 6-12);

- A self-report Wellbeing questionnaire (year 6-12);

- An observation schedule for assessing the quality of learning environment in terms of active learning (pre-school focus);

- An observation schedule for assessing the quality of relationships established between educators and learners (pre-school focus);

- a set of quality of pedagogy measures for use in primary and secondary schools.

Following consultation with Laevers, the involvement concept was considered to be applicable to all age groups and was incorporated in Laevers original form for the observation instruments. The self-report questionnaire scale for Involvement was developed by designing statements associated with the signals in Laevers' original observation instrument.

Figure one: Concept fan for Laevers latent variable of involvement
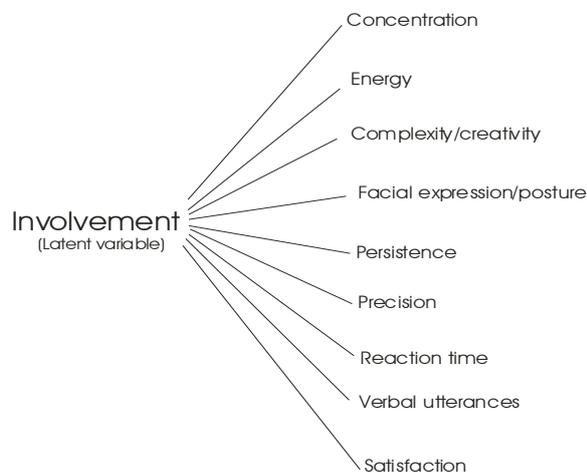
All of the wellbeing measures have built upon original work by Winter who developed a wellbeing scale for use with early years research (Winter, 2003), drawing on factors identified in Mayr and Ulich's and extended using behavioral signals contained within the South Australian Curriculum Framework (SACSA). This resulted in three sub-categories of indicators: happiness and satisfaction, social functioning and learning dispositions.

Figure two: Concept Fan for Winter's latent variable of Wellbeing
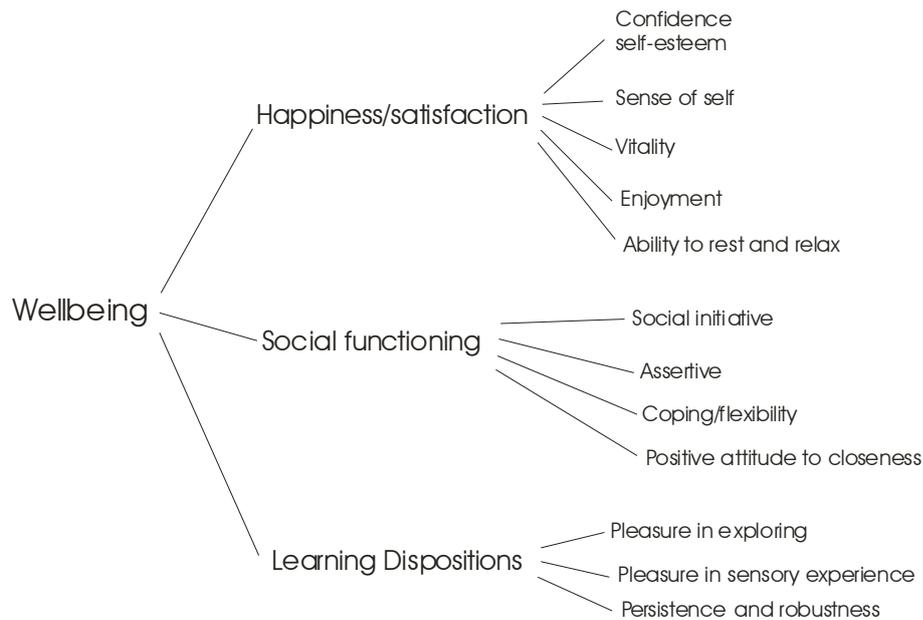
Neither Laevers' nor Winter's approach to engagement include a cognitive component. Thinking has, however, been expressly seen as linked to engagement. From this perspective being 'on task', to the extent that this implies only superficial strategies for learning, would be regarded as low engagement: use of deeper processing strategies, and higher self awareness such as critical self-reflection and regulation of learning and epistemic learning would imply high engagement (Bruner, 1957, 1991). The literature on meta-cognition in learning distinguishes between three levels of thinking:

- meta-cognitive knowledge (knowledge of and ability to apply a range of alternative learning strategies);
- meta-cognitive regulation (ability to take control over his/her approach to learning and monitor effectiveness through self-reflection; and
- epistemic (awareness of own assumptions and capacity to approach a situation using alternative view-points).

The approach adopted was therefore quite experimental. It comprised the development of signals and questions linked to each of the above areas.

These instruments have now been used in a range of different contexts and their application used to further develop and refine both the conceptual underpinnings and the measures themselves. Three examples of the application are now outlined. These have been more fully documented elsewhere so only a summary is offered here.

Study one: The impact of curriculum reform on teaching practice and pre-school children's involvement and wellbeing.

Study purpose

In 2001, all childcare centres in South Australia were provided with the *South Australian Curriculum, Standards & Accountability Framework* (SACSA), as part of a state wide single, cohesive birth to Year 12 curriculum initiative of the Department. A study was undertaken to evaluate the difference that the use of the framework made to the quality of young children's curriculum in childcare. The research was supported by an Australian Research Council grant, DECS and the University of South Australia. It was undertaken, before (Time 1) and after (Time 2) educators engaged with the SACSA

framework. The research design was multifaceted, with extensive gathering of both quantitative and qualitative data over a period of ten months.

Study Design

The theoretical basis for this study is that the key determinants of children's successful outcomes are the pedagogical relationships and practices of educators (Bennett, 2004; Laevers & Heylen, 2003). This was based on beliefs that relationships are of prime importance to young children's learning and that the most supportive pedagogical environment is one which respects young children as active, competent learners and co-constructors of understandings. Additional reasons for making the decision to use curriculum quality rather than using some of the more traditional measures such as the achievement of developmental norms including the following:

• Young children's learning and development are complex and not linear. They are influenced by multiple factors. Scores obtained at one stage of development (that is before the implementation of SACSA at Time 1) may not be correlated to scores at a different stage (ie after engagement with SACSA at Time 2) because of the uneven patterns of development across domains within individuals related extraneous influences. The effects of the multiple factors influencing children's learning and development are amplified through the rapid growth of infants and toddlers.

• Short-term consistency of individual outcomes for very young children is low. Rudner (1996) found that test-retest reliability was extremely low with infants and only increased moderately for toddlers. Growth rates for individual infants and toddlers were found inconsistent and unpredictable.

• Statistically, the typical effect size for quality intervention programs for infants and toddlers was found to be about .25 standard deviations in an examination of 237 effect sizes by Ottenbacher (in Rudner, 1996). With a reliability coefficient factored in, it was unlikely that significant differences would be found.

• It was neither desirable nor possible to isolate, control or quantify the influence of all of the extraneous variables (for example genetic endowment, temperament, gender, family context, cultural context) that impacted on children's development. Chance and extraneous variables could not be controlled. Direct cause and effect relationships would have been difficult to establish.

Measures were therefore developed which focused on a) the quality of pedagogy, and b) the short term effect on learner engagement. The quality of pedagogy measures were grouped under indicators of **Active Learning Environment** (pedagogy based on social constructivism), and **Relationships**. Signals for these were drawn from the first phase (birth–age 3) of SACSA and focused on educators' behaviours. The engagement variables were **Wellbeing** and **Involvement,** as discussed above. These focused on children's behaviours.

Study findings

A strong connection was demonstrated between educators' pedagogy and the relationships they establish with children, and children's engagement in learning. Table one shows that significant correlations was found between educators' relationships with children and children's wellbeing and their involvement in their learning.

Table one: Correlations (Spearman's rho) between Scales at Time 2 (N=9)

	Active Learning	Relationships	Involvement	Wellbeing
Active Learning	-			
Relationships	0.77*	-		
Involvement	0.82**	0.72*	-	
Wellbeing	0.75*	0.73*	0.87**	-

* $p < 0.05$. **$p < 0.01$.

Prerequisites for involvement include stimulating interventions by educators and opportunities for children to make decisions and choices. The strong connection between stimulating interventions by educators and children's involvement and responsiveness found by other researchers (Laevers, 1997; Pascal et al., 1998; Ramsden, 1997; Raspa et al., 2001) were demonstrated clearly in this study. At Time 2, with an increase in the frequency of stimulating pedagogical interventions, there was an increase in the Involvement Scale scores.

The development of children's wellbeing in their learning settings is dependent upon partnerships and mutual understanding with their educators (Goldschmied & Selleck cited in Jarvis & Lamb, 2001). A significantly strong correlation between children's wellbeing and the quality and quantity of educators' pedagogical interventions was demonstrated in the educators' scores on the Active Learning Scale and children's scores on the Wellbeing Scale.

The study found that the level of the participating educators' commitment to embrace a curriculum framework and work towards changes was high. However, the study demonstrated that a curriculum framework alone is not enough to raise children's curriculum to a consistent, optimal quality level. Despite the improvements found, there remained a range of troubling phenomena that hindered educators firstly practising what they said they believed, and more importantly, providing a curriculum that was consistently in the best interests of children.

The data suggested that some of the fundamental factors which were hindering educators from implementing the best possible curriculum included:

- educators' beliefs and pedagogical approaches grounded in personal ideology, training and experience (including the influence of a traditional, positivist heritage and level of/or no qualifications);

- a tension between childcare being a safe haven and a developmentally enriching experience;

- structural factors including children's and educators' unpredictable and casual attendance patterns and large group sizes, making it difficult to maintain strong relationships and fair and meaningful joint attention experiences for all children);

- power relationships (influenced by the industrial, professional and community status of childcare educators and a hegemonic dependence on child development theories leading to control and dependency);

- inadequate professional development related to resourcing (the study found that the most effective professional development is a site based, whole team, reflective model that enables educators to choose the pace and direction of their growth and move forward as a team);

- educator's professional maturity and wellbeing (achieved through education and qualifications, public and industrial recognition, professional experience and support) were found to be compromised by their perceived status in the community and their financial remuneration.

Educators' beliefs and pedagogical approach

It was found that often there was a big difference between what educators said they believed and what was actually done. Educators' actions were frequently inconsistent with the ways they said they thought children best learned and with the aspirations they held for children (such as social conscience, sound self esteem and identity, a sense of agency and interdependence). The areas where at times marked differences were found included:

- stated understandings about how children learn and educators' actual practices;

- stated importance of responsive, meaningful relationships with children and the high number of detached interactions and records of 'no interactions' ;

- the stated importance of partnerships with parents and the minimum input and knowledge of parents about their child's program;

- the importance of considering each child's unique background and experiences, interests and learning and the universal approaches to providing for individuals' learning and development.

Figure three (below) shows the difference between educators espoused theory and observations of their actual practice, especially in their control over children (characterised by behaviourist approaches which were recorded to be 53% of the pedagogical interventions at Time 1 and 27% at Time 2.)

Figure Three
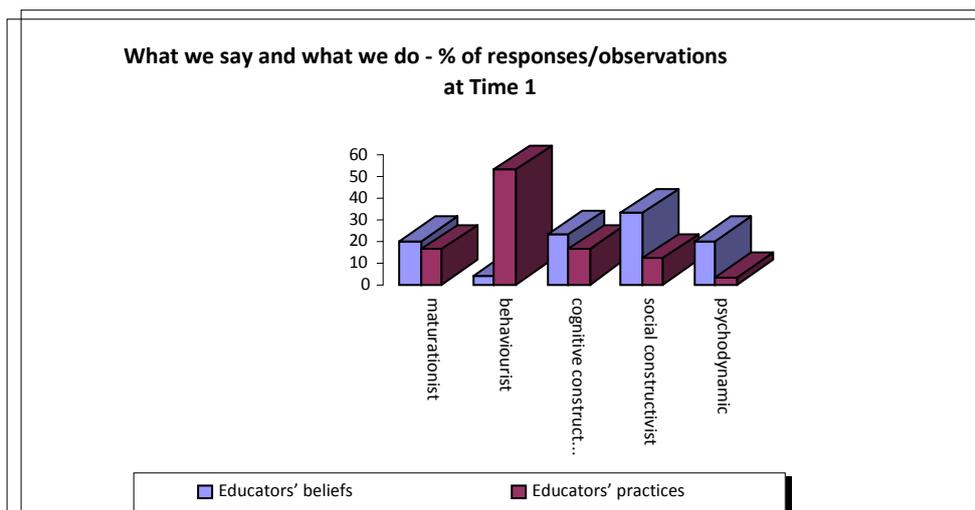
A significant imbalance of power between educators and children was a feature found in many of the observed interactions. The majority of interactions were found to have some characteristics of control. At a very early age, children were experiencing power as a feature of social relations operating to constrain, 'normalise' or direct their actions (Leavitt, 1994). From these early experiences of control, it is likely that the children were constructing understandings about themselves and the level of their agency and capacities to project themselves into their world, to choose, to act and to create (Leavitt, 1994: 49). Leavitt, (1994: 47-49) posited that in exercising their power, educators no doubt intended to make the day easier, more manageable and more efficient for themselves, as well as for the children. Often this worked against the educators, leading to more struggles with children, the imposition of more constraints and the exercise of more control.

However, at Time 2, with the use of SACSA, the quality of children's curriculum had significantly improved. The balance of power began to shift towards the children, the number of positive interactions with their educators increased as did the frequency of episodes of children displaying a sense of agency. This shift in power was reflected in a notable increase in children's overall *social*

functioning score, (moving from 3.3 to 4.1 on the 5-point scale) and a significant improvement in the overall Wellbeing Scale scores.

Study Implications

This study reveals how a focus on measures of learner engagement can reveal the effect of alternative pedagogy and how providing this information to educators can lead to substantial improvements to children's wellbeing and engagement. Findings of the study are being used to inform the approach and content of the Department's professional development program for early childhood educators, with the intention of promoting the development of new understandings and practices to improve the experiences and outcomes of children, families and staff.

The four scales used to measure the quality of educators' pedagogy and relationships with children, and children's wellbeing and involvement in learning experiences have been further developed by in two self-paced professional resources for early childhood educators. Titled '*We Can Make a Difference: learning and developing in childcare (2003)'* and '*Reflect, Respect' Relate: Observation Scales for early years curriculum quality and learning'* (in press) the resources and accompanying professional learning focus on self-assessment, critical reflection and inquiry based curriculum quality and learning improvements. The development of these resources is congruent with directions in several other countries including the UK (Professors Christine Pascal and Tony Bertram, Centre for Research in Early Childhood, Birmingham, and Dr Margy Whalley, Pen Green) and Belgium (Prof. Ferre Laevers, University of Leuven).

Study two: The effect of constructivist pedagogy - A case study of two Primary Schools

Study purpose

This case study focused on the following questions:

1. How do children experience learning differently where a student focused approach is integrated into the school culture and the curriculum adopted is consistent with constructivist assumptions about learning?

2. What are the collective outcomes of such change measured using traditional academic measures, meta-learning criteria and indices of student wellbeing?

Study Design

The cases were two South Australian Primary Schools: One school had undertaken substantial constructivist inspired reform and the other followed traditional practice. Anecdotal evidence as well as existing qualitative and student achievement data indicated that the reform school enjoyed significantly better performance in attendance, retention, discipline, wellbeing and both traditional academic as well as thinking and problem solving outcomes. The reform school in the study will be referred to as River-school Primary and the comparison school is referred to here as Woods-borough. Other than with respect to the reform undertaken, both schools were located in similar geographical areas and had comparable school populations in terms of socio-economic background and ethnicity and were of similar size.

Cohorts of students for inclusion in the study were chosen in each school within the following year bands.

- Early Years (R-2)
- Primary years (3-5)
- Middle schooling (6-7)

The instruments

To gain information about students' experience of learning two questionnaires were developed, one for students and one for teachers. The student questionnaire combined both open and closed questions which asked about the students experience at the time of the data collection. This related to what they were doing, where they were doing it and towards what learning aims (Unger 2003). Also included were questions about how much influence students perceived they had over what and how the learning was being undertaken. They were also asked questions about if they were working alone or with others and how much choice they had in the social arrangements of learning. Finally they were asked if they judged that they had been on task at the time of the survey and if they were interested in what they were doing.

The teacher questionnaire canvassed what the teacher was doing and how they conceived of the role they were performing at the time. The teacher was also asked to rate the level of on-task behaviour evident and to comment on their own level of interest.

For this study Laevers' Involvement scale was used and the observation instruments for wellbeing developed by Winter for the pre-school study described above were modified to accommodate a wider range of student ages. An additional scale was developed to measure thinking skills.

Impact of the change on student achievement was measured using the standard data available from Departmental testing. In addition, the student questionnaire collected data which was coded to form an index of meta-cognitive functioning and students problem solving and logic skills were tested using a test developed by the Finnish Learning to Learn group (Hautamaki et al., 2002; Hautamaki & Kupiainen, 2002).

Time Sample Method

As the aim was to sample actual experience in response to the specific approach to learning within each school, there was a need to collect data which was spread over a wide range of experiences and to collect data as near to the actual experience as possible to avoid problems associated with memory, attribution or rationalisation. The Experience Sampling method was judged the most appropriate (Christensen et al., 2003; Scollon et al., 2003). However, The fully randomised time sampling approach commonly used with Experience Sampling was not used as it would have collected a significant amount of irrelevant (i.e. non learning experience related) data. Instead the school day was divided into 3 time periods. Data was collected twice a week on random days at, or close to, 10am, 12pm and 2:30pm for each level cohort within each school. At the collection time, both adults and students completed the questionnaire about what they were doing prior to the interruption. Each age cohort within each school was sampled over a period of one month. This meant that it included a reasonable sample of a school year and was not subject to short term influences and also minimised intrusion on the normal operations of the schools. Immediately prior to the interruption of learning to collect questionnaires for the experience sample, observers chose two of the participating children at random for observation. The observation collected involvement and wellbeing data. The teacher questionnaire was also administered at this time. This resulted in eight experience samples per cohort. The total number of completed self-report questionnaires collected was therefore 1266. The total number of observation forms returned was 228 while the number of adult forms was 72.

Study Findings
The Experience of Learning

As expected River-school students reported having had 'a lot of choice' on what and how to learn on many more occasions those at Woods-borough. This difference was found to be statistically significant at the p=.0001 level (two tailed). Similarly, at the time they were stopped to complete the questionnaire, students at River-school reported a more varied range of learning strategies. These differences in student choice and pedagogy were found to have an impact on student engagement.

The effect of the school and of these aspects of pedagogy on interest, on-task behaviour and wellbeing are shown in table two as simple correlations.

Table two: Correlations (Pearsons) between School and pedagogy and Engagement variables

	School	Choice in what learn	Choice in how learn	Interest	On-task	Wellbeing	Thinking
School	-						
Choice in what learn	.181*	-					
Choice in how learn	.134*	.467**	-				
Interest	.382**	.319**	.294**	-			
On-task	.282**	.159*	.225**		-		
Wellbeing	.462**	.095	.111	.225**		-	
Thinking	.242**	.014	.029	.092	.077	.630**	-

* p < 0.05. **p < 0.01.

Significant associations were also found between the process quality indicators of wellbeing and thinking and the outcome measures. The simple correlations are shown in table three below. In this table the standard score is the mean score attained on the Departments tests for language and numeracy skill, the Meta cognitive score is an index of meta-cognitive functioning derived from children's responses to a set of questions in the questionnaire and the mean correct score refers to the mean number of questions scored correct in the Finnish problem solving task.

**Table three: Correlations (Pearsons) between Engagement and Outcome Variables**

	School	Wellbeing	Thinking	Interest	On-task	Standard Academic score	Meta-cognitive level	Mean correct on problem solving
School	-							
Wellbeing	.462**	-						
Thinking	.242**	.630**	-					
Interest	.382**	.225**	.092	-				
On-task	.282**	.155	.077		-			
Standard score	.300 **	.301**	.300**	.004	.025	-		
Meta-cognitive	.444**	.183*	.186*	.233**	.162*	.228**	-	
Mean correct	.455**	.494**	.285	.215	.105	.259	.551**	-

* p < 0.05. **p < 0.01. Note that N varies for different scores and is lowest for mean-correct due to this task only being undertaken by the highest age cohort.

These relationships were explored in greater detail and the findings have been documented elsewhere, however, the following structure diagram combines all of the variables anticipated to have an effect on the Meta-cognitive levels of students. The model is in fit according to the CFI measure (>0.95) meaning that the model is somewhat consistent with the relationships found within the data. All included relationships were statistically significant. From this diagram it is apparent that school predicts both degree of choice of *what* and *how* to learn (accounting for 7% of variance on choice of what learn and 4% on how learn). The large co-variance between error terms e4 and e5 suggests that there are variables, independent of schools, which influence the degree of choice. We would expect this to include teacher style. Progressing down the diagram, it is apparent that pedagogy which supports student choice has a significant effect on interest. The degree of choice of *what* to learn at any given time predicts interest with an estimated standardized effect size of r=.23 - this variable alone explains 5% of the total variance in interest. The choice in *how* to learn also predicts interest, but to a lesser degree (r=.18), accounting for a further 3% of variance. The largest

effect size on interest is the school itself (r=.24). This indicates that there is a difference made by school which is not associated with student choice and which accounts for 6% of variance in interest. This is most likely attributable to wider cultural aspects of the school. The effect of climate on student involvement and outcomes is well documented in the literature (see for example Anderson, 1982; Brand et al., 2003). Overall, site based differences account for 24% of variance on interest. Given the importance of interest for learning outcomes established in the literature this is a very significant finding.

Figure four: Structural analysis of relationships effecting metacognitive level.
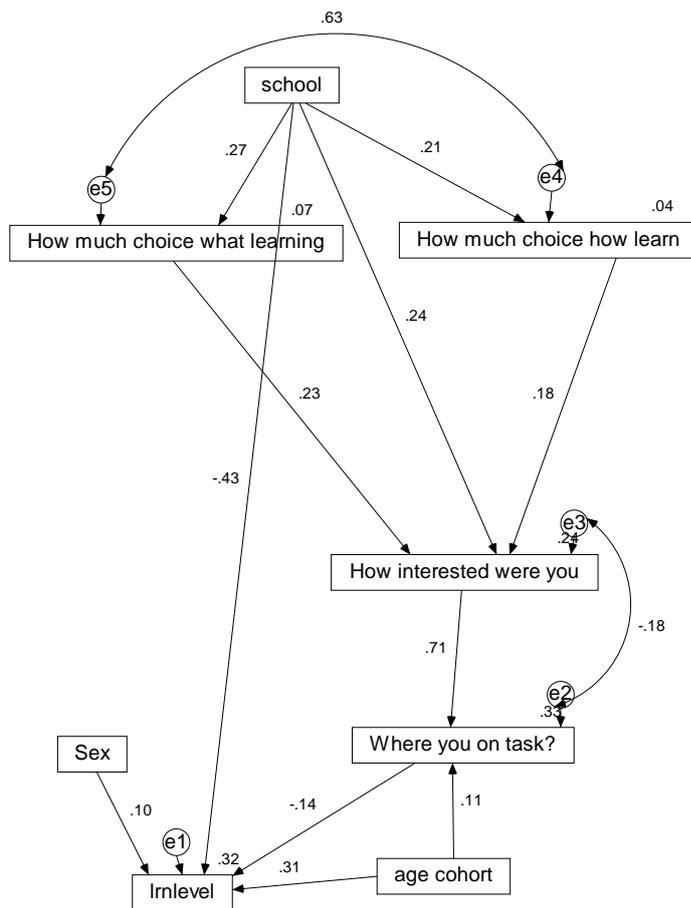
CMIN 102.225, p=.000, df=15; CFI=.961; RMSEA=0.068

The level of interest, in turn predicts 'on task' behaviour to a very large degree (r=.71), accounting for 33% of total variance on that variable. There is some correlated residual error, however, evident in the covariance of 0.18 between error terms e2 and e3. Again this suggests an additional variable which is not in the model. This is likely to be either something associated with teaching (quality pedagogy can generate involvement even in the absence of intrinsic interest) or more likely the individual student (short term distractions, difficulties in concentrating etc as well as individual interest or disinterest which is not influenced by situational factors or has not been stimulated by the pedagogy), or both.

As was to be expected given that the measure is not age relative, age predicts meta-cognitive level and so too does gender. The largest contributor, however, is school with an effect size of r=.43 accounting for a very substantial 18% of variance. This is a very significant figure as it means that the difference made by the school explains almost twice the effect of age (9.6%) in students ability to be articulate about their learning intent. There is a further indirect effect of school via the pathway of interest and on task behaviour. This accounts for a further 2% of variance on the meta-cognitive

variable. The combined effect of age, gender and school related variables account for 32% of total variance in meta-cognitive level. From this we can read that, all other things being equal, the reforms undertaken at River- school explain a very significant increase in the level of student interest, on-task behaviour and meta-cognitive functioning.

Study Implications

The results of the case study confirmed the anecdotal evidence that the adoption of constructivist practice can have a positive effect on students experience of learning and that this can in turn lead to improved social, meta-cognitive and academic outcomes. The findings of the effect are quite large and, while caution is needed in generalising from them they justify further investment in systematic research, including research which can better evaluate the effect of student background variables and alternative school contexts and environments. The school which had undertaken considerable cultural transformation and pedagogical change in a manner consistent with constructivist principles of learning was River-school Primary. Evidence of the change was reflected in the differences students experienced in learning. In particular:

- greater choice in what and how to learn;

- learning was more social;

- learning was less class centred;

These differences, as well as some unmeasured difference in site (possible a culture of regard), contributed to statistically significant:

- higher 'on task' behaviour associated with greater interest and less boredom.

- markedly better overall wellbeing

- better problem solving ability on the assigned task

- higher capability to articulate about learning (meta-cognition); and

- superior performance on standard numeracy and literacy tests

Study 3: 'Measuring What Matters' - Measuring Engagement among Secondary Students.

Study purpose

This study involved the development and trial of self-report instruments to measure engagement to be used in conjunction with the observation schedules discussed above. The study was primarily designed to support the development and testing of these instruments but was also designed to establish the viability of measuring engagement of students who were assessed at greatest risk of early school leaving – those who were currently disaffected by the school system or had been excluded from it.

Study Design

The trial sample was chosen using purposive sampling. Fifteen sites in urban and rural South Australia were chosen, being selected to include a diverse student base and a mix of learning situations (both conventional schooling and special needs and a variety of subjects) between years 7 and 13. Several sites were included from the Innovative Community Action Networks program. ICAN is an extra schooling program designed to meet the needs of students who, for a variety of reasons, have found it difficult to engage with conventional schooling. This ensured that a diverse student base was included, with representation from different socio-economic backgrounds, ethnicity and learning abilities. The target sample for the self-report instruments was 300 and the numbers finally achieved was 240. A sub-sample of each class included in the study was selected for observation. The achieved sample size for observation was 119.

Observation data was collected by experienced educators who were also trained in the use of the observational instruments. Training included an introduction to the concepts and exercises to converge different observers' judgments with respect to the scales. Past experience (Ure, 2004; Winter, 2003) has shown a very good level of inter-rater reliability with the use of these instruments. Observers were drawn from a pool and in general observers were not staff at the school being observed so can be expected to be free of site related bias.

Study Findings

Again the findings for this case have been fully described elsewhere. The results reported here are primarily to do with the key findings of the relationship between wellbeing indicators and the performance of the instruments themselves.

Measured differences in engagement

Twenty three percent of all students observed in this study were observed to have low involvement predominantly displaying signals of aimlessness, absent mindedness, tinkering or dreaming. The self-report scores were very similar with 24% of students rating in the low categories and 40% in the high. Site self-report means ranged from high of 4 to a low of 2.29 (on a 1-5 scale). There was a marked tendency by teachers to confuse conformance with involvement. There was evidence of selective attention by teachers about how their choices impacted on students.

The mean and range of involvement varied markedly across sites as the following chart reveals. This means that the experience of students within the same learning session can vary markedly and that different sessions in different schools also had markedly different effects on student involvement.

Figure five: Involvement Range by Site
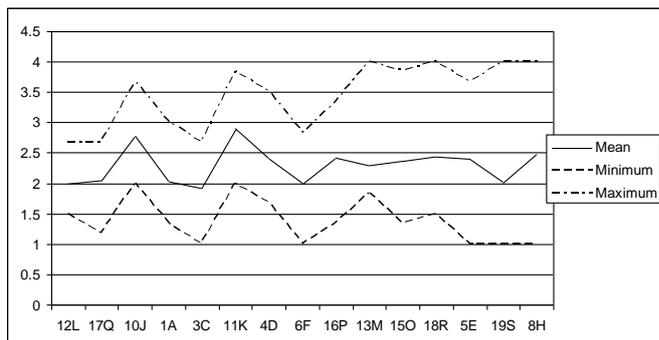
A significant 28% of all students were rated by observers in the low categories for Wellbeing. This means that they seldom displayed enjoyment, were socially disengaged or even destructive and showed little to no interest or learning. Site means varied from a high of 3.88 to a low of 2.2. Self-report Wellbeing scores saw 22% in the low category and 59% in either high (37%) or very high (22%). Site self-observed means ranged from a high of 3.39 to a low of 3.

As with Involvement, overall wellbeing was found to vary markedly both within and across sites. This distribution is shown in figure three.

Figure six: Wellbeing range by site
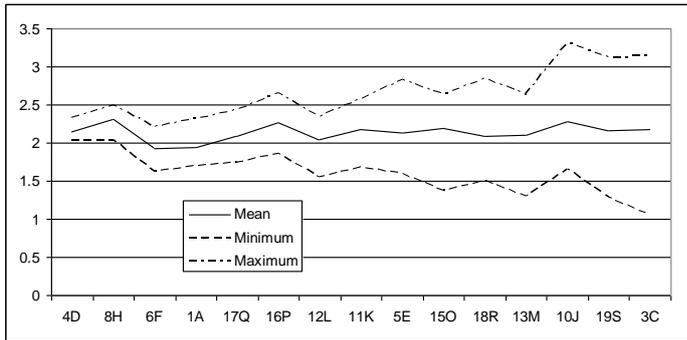
The measurement model

Applied to this older age group, while the observation instruments confirmed the validity of the conceptual framework used for the measures, the self-report data failed to support the inclusion of Dispositions to learning as a part of the wellbeing measure. The following structure diagram shows the best fit model for the self-report data. The findings support those of the previous case in placing student interest as a primary explanatory variable for involvement, and involvement s a significant explanatory variable for wellbeing. Both the happiness and satisfaction and social functioning dimension were supported as significant to the latent variable of wellbeing.

Figure seven: Structure diagram of engagement measurement model fitted to self-report data for years 7-12.
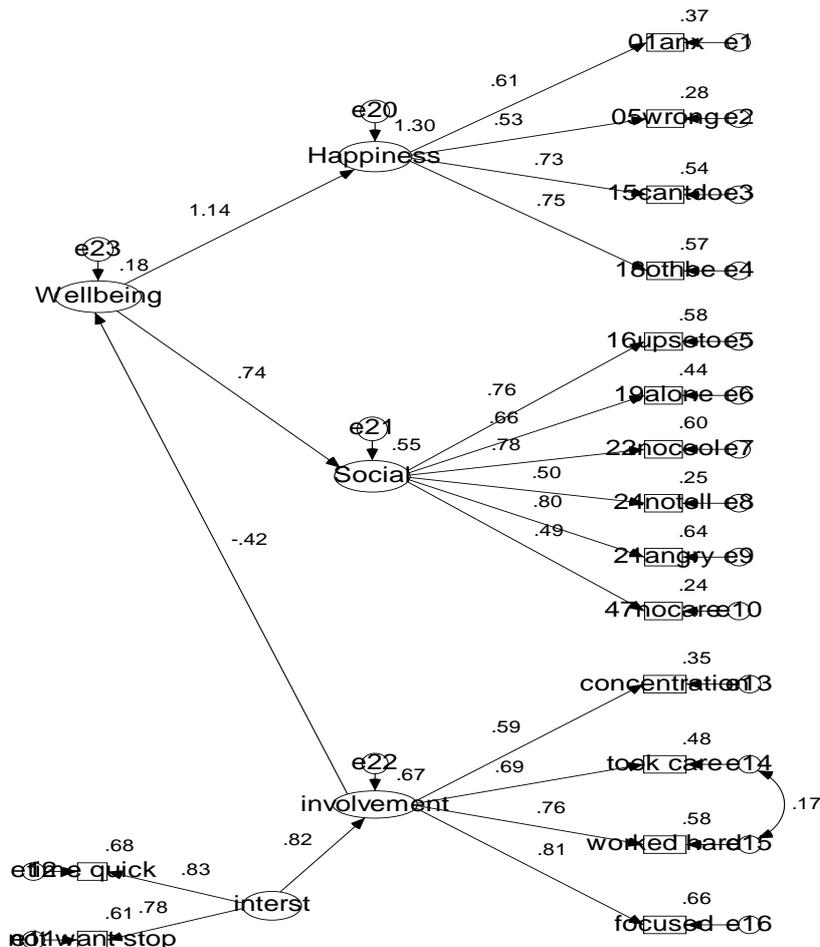
CMIN=179.7 p=.000, df=99; CFI=0.934; RMSEA= 0.058

Method comparisons

Involvement

Table four shows the item to item matches between Involvement as judged by the observers and the score calculated based on student's answers to the questionnaire. There was an exact match in 35% of cases, seventy four percent were within one scale interval and 97% within two scale intervals. Only 2 records were more than 3 scale intervals distant. A single scale interval difference is judged to be satisfactory so there was an acceptable match in 74% of cases.

Figure four: Difference between matched item scores Observer to Self-report

	Difference	*Frequency*	*Valid Percent*	*Cumulative Percent*
Valid	0	30	34.9	34.9
	1	34	39.5	74.4
	2	20	23.3	97.7
	3	2	2.3	100.0
	Total	86	100.0	
Missing	System	33		
Total		119		

Wellbeing

Comparison was also made on the Wellbeing scores measured by observation and self-report. Due to a notable skew in the self-report scores, transformation using the square-root function was performed. In practice, at least with respect to the data set collected for the trial, the wellbeing two methods produce similar results with two notable exceptions.

The first exception is with respect to 'Thinking', where there remain problems for both methods. Thinking proved difficult to observe, particularly where the quality of pedagogy was such that little higher order thinking was required from students. Thinking constructs included in the self-report instruments proved insufficiently distinct from Dispositions to Learning constructs and failed to factor out as a separate scale. In addition the Dispositions to learning showed the greatest discrepancy between observation score and self-report. The self-report dispositions scale had the lowest alpha – indicating that the variance within it has a larger error component.

The following table shows the difference in scores between observational and self-report scores of wellbeing. The dispositions sub-scale was included in both. This will have contributed to a reduction in comparability for reasons discussed above. It can be seen that 36% of all scores for which both records existed matched exactly. A further 39% were within +/- one scale point of one another. This represents 75% within +/- one scale point. This leaves 25% of scores outside of what can be considered a tolerable error range. Eighty five percent of the scores that are in error are on the positive side.

Table five: Difference between Observation scores and self-report scores

	Difference	Frequency	Valid Percent	Cumulative Percent
Valid	-2	1	1.1	1.1
	-1	7	8.0	9.2
	0	31	35.6	44.8
	1	27	31.0	75.9
	2	16	18.4	94.3
	3	5	5.7	100.0
	Total	87	100.0	
Missing	System	223		
Total		310		

Study Implications

Overall levels of engagement in the classes and schools included in this study were low. There was however considerable variance between schools. While the study raised some questions about the validity of including Dispositions to learning in the wellbeing measure, it proved possible to measure engagement using both observational and self-report measures with this age group. The initial instrument design yielded encouraging comparability of measurement outcomes when used with the same students in the same learning context at the same time. Further attention needs to be given to understanding and addressing a pronounced tendency for students to rate their engagement more highly than do trained observers. More attention also needs to be given to development of effective measures for measuring thinking levels as neither observation nor self-report proved satisfactory in this trial.

Overall Conclusions

The results of these three studies suggests that it is possible to define engagement as a complex variable involving three independent dimensions related to behavior, affect and cognition. Trial measures have shown that these variables are responsive to immediate learning context and can be used to provide short term feedback to educators on how their choices impact on learners. A combination of observation schedules and self-report questionnaires have now been trialed and the results of the trials have yielded valuable insights into how the measures may be improved. The instrument set of pre-school children is now at an advanced stage of development while considerably more development is needed for the instruments for older age groups, particularly for the self-report instruments. At the time of writing further work has been scheduled including use of a larger sample to further test a revised version of the self-report instruments and to initiate development of a set of indicators of quality pedagogy applicable to primary and secondary years.

A copy of the SACSA framework can be downloaded from www.sacsa.sa.edu.au

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