



Understanding Year 9 Students: A Theoretical Perspective

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FOREWORD

A key priority of the *Blueprint for Government Schools* is the provision of educational services to address the diverse needs of all students. It is within this context that I am pleased to present the two reports on Year 9 students: *Understanding Year 9 Students – A Theoretical Perspective* and *Understanding Year 9 Students – Implications for Policy and Practice*. While the focus of the papers is on Year 9 students, the issues covered are also applicable to students experiencing developmental changes associated with adolescence.

Engaging and motivating Year 9 students and meeting their educational needs are critical in ensuring that these students will stay in school. Victoria is currently performing relatively better than the national average in terms of school retention; nonetheless, progress needs to be made in order to meet the challenging target in *Growing Victoria Together: A Vision for Victoria to 2010 and beyond* that 90 per cent of young people in Victoria complete Year 12 or its equivalent by 2010.

Following the Organisation for Economic Co-operation Development's *Learning Sciences and Brain Research* project, these reports provide a comprehensive account of the characteristics and developmental needs of Year 9 students. The emerging neuroscience research is generating great interest in the education sector, both at the local level and internationally. Teachers worldwide are eager to explore how such research may contribute to new brain-based pedagogy.

I would like to acknowledge Ballarat High School, Hampton Park Secondary College, Mansfield Secondary College, Stawell Secondary College, the City Centre and the Alpine School and Education Foundation for sharing their innovative and imaginative ways in responding to the learning needs of Year 9 students. I would also like to thank Bruce Armstrong, Principal, Balwyn High School for his invaluable feedback and suggestions on the reports.

I trust that you will find these reports a useful resource for generating school community discussions and enhance knowledge-building in this critical phase of adolescent growth and development.

Dahle Suggett

Deputy Secretary

Office of Learning and Teaching

A PRINCIPAL'S REFLECTION

Those involved in the education of students in the middle years and in particular Year 9 would not be surprised to read that it “is a very difficult year for teachers and students and that the traditional models of learning and teaching are not successfully engaging the majority of Year 9 students and meeting their learning needs” (Bissett, unpublished).

This paper provides a succinct and useful overview of a wide body of research drawn from a range of disciplines and studies. It draws together in a coherent format the essential findings about effective approaches to support students in this important phase of their development.

The challenges to engage, motivate and promote deep understanding for year 9 students are significant. The paper does not underestimate the scope of this transformational task but through a combination of relevant research and case studies drawn from school communities in Victoria it provides signposts on the journey to providing a rich and personalised learning experience for the diverse needs of year 9 learners.

Bruce Armstrong
Principal
Balwyn High School

CONTENTS

Executive summary	1
Chapter 1 – Introduction	2
Background	2
Educational participation	2
Chapter 2 – Brain development and learning	4
The adolescent brain	4
Gender differences	6
Adolescent behaviour	6
Risk taking behaviour	6
Emotional response	7
Social interaction skills	7
Sleeping patterns	7
The impact of brain development on learning	8
Year 9 students and brain development	9
Brain research and educational practices	9
Chapter 3 – Learning and teaching	10
Victorian Essential Learning Standards	10
Learning sciences	10
Student motivation and engagement	12
Student resilience	14
The learning and teaching environment	15
Classroom design	15
Chapter 4 – Advocated teaching and learning practices	18
International research on middle years schooling	18
Middle years schooling in Australia	19
Beyond the middle	19
Developing Lifelong Learners in the Middle Years of Schooling	20
Victoria’s Middle Years Research and Development (MYRAD)	21
References	23

Executive summary

The paper titled *Understanding Year 9 Students – A Theoretical Perspective* is the first of two papers on the learning needs of Year 9 students. The paper aims to improve understanding of the learning characteristics and environment of these students from multi-disciplinary fields of study. Additionally, the paper identifies teaching and learning practices advocated in national and international research projects. The goal is to build a sound foundation of evidence to advance specific suggestions about ways to make young people's schooling at Year 9 more challenging, engaging and rewarding.

Brain development and learning

- Adolescent brain development occurring primarily in the prefrontal cortex may provide explanations for adolescents' tendency to respond with emotion or engage in risky-behaviour.
- The experiences or activities that adolescents are exposed to significantly influence the development of the brain.
- There has been increased understanding of the links between brain mechanisms and learning; however, it is too early to derive educational practices based on the current findings. Brain research findings provide a critical viewpoint that should be incorporated with the knowledge gained from other disciplines.

Learning and teaching characteristics

- School activities are less likely to arouse curiosity and engage Years 9 and 10 students than students in earlier years.
- Student's motivation and engagement is influenced by tasks, context and classroom matters which have a significant impact on learning outcomes.
- Student academic achievement improves with improved facilities, particularly with facilities design that create environments conducive to learning.

Advocated teaching and learning practices

- Curriculum should be challenging, integrative, and exploratory.
- Vary teaching and learning approaches.
- Give students choices and control over their learning.
- Develop lessons that students can relate to meaningful life events, experiences, and questions that are of concern to them.
- School leaders and teachers believe that they have a responsibility for sustaining motivation and improving skills of students and teachers respectively.
- Schools and their communities recognise that there is a need for change.

Chapter 1 – Introduction

In an effort to gain a better understanding of the learning needs of Year 9 students and to identify strategies that optimise the learning opportunity for this group of students, the Research and Development Branch, Office of Learning and Teaching has undertaken detailed analysis of the learning characteristics and learning environments of these students. The paper titled '*Understanding Year 9 Students – A Theoretical Perspective*' represents the first of two papers on the topic. In this paper, the emphasis is on the research conducted on adolescent brain development and its impact on adolescent behaviour. The paper also focuses on teaching and learning practices and environment as well as the essential skills acquired during this stage of development. Additionally, the paper presents an overview of the teaching and learning practices advocated in Australian and international research projects and the implications for policy and practice based on the research findings.

Background

Students approaching Year 9 experience profound physical, social, emotional and intellectual changes associated with the gradual period of transition from childhood to adulthood. During this time, Year 9 students who are 14-15 years of age are gaining independence from their parents and teachers whilst developing more supportive relationships with their peers (Muss, 1975). These students become more complex thinkers and are able to apply logical reasoning processes. They are more flexible and have the capacity to regulate their learning and to expand and organise their thinking in more complex ways (Bellhouse, 2004).

Reports on the characteristics and developmental needs of Year 9 students give the overriding message that these students form a very diverse group. The developmental changes are not experienced consistently within and between gender groups, nor are they managed equally well. Adolescents make many false starts on the transition from dependence to independence and need to be supported through these times of not only potential and promise but also frustration and uncertainty.

In relation to learning environments, Year 9 students have been identified as unique in terms of learning needs. Indeed, the identification of Year 9 as a distinct phase in schooling arose from concerns that schooling arrangements did not give sufficient attention to the needs of these students. In 2004, the Victorian Schools Innovation Commission (VSIC) received an overwhelming message from schools and others working in education that Year 9 in Victoria is a very difficult year for teachers and students and that the traditional models of learning and teaching are not successfully engaging the majority of Year 9 students and meeting their learning needs (Bissett, unpublished).

Educational participation

The [School Management Benchmarks](#) report revealed that Year 9 students are more likely to be absent from school compared to students from other grades. In 2004, on average, Year 9

students missed almost four weeks of schooling and teenage boys have the highest number of school absenteeism days (School Improvement and Accountability, 2006).

Engaging Year 9 students and meeting their educational needs is critical in ensuring that these students will stay in school. Findings from the [Longitudinal Surveys of Australian Youth](#) (LSAY) showed that while social and educational factors are important in Year 12 completion, there is a stronger association of psychological factors such as school engagement, self-concept of ability and students' aspirations with Year 12 participation (Marks et al, 2000). More recently, it was shown that there is a strong correlation in the relationship between intentions at Year 9 to complete Year 12, and participation to complete Year 12. Eighty-seven per cent of students who intended to complete Year 12 did so, while 79 per cent who indicated that they intended to leave school before Year 12 did so (Khoo & Ainley, 2005). The Organisation for Economic Co-operation and Development (OECD) also supports the finding that successful learning occurs when the learner has high levels of confidence and self-esteem, is strongly motivated to learn and is able to learn in an environment characterised by 'high challenge' coupled with 'low threat' (OECD, 2002).

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Year 9 students...

- ❖ experience profound physical, social, emotional and intellectual changes associated with adolescence
- ❖ are unique in educational needs
- ❖ on average, missed four weeks of schooling in 2004
- ❖ who are not engaged in learning tend to have poor performance outcomes
- ❖ with educational aspirations or plans tend to complete Year 12.

The Organisation for Economic Co-operation and Development (OECD) also supports the finding that successful learning occurs when the learner has high levels of confidence and self-esteem, is strongly motivated to learn and is able to learn in an environment characterised by 'high challenge' coupled with 'low threat' (OECD, 2002).

In terms of school retention, Victoria is currently performing relatively better than the national average. Nonetheless, progress needs to be made to improve the percentage of young people completing Year 12 or its equivalent. More specifically, in order to meet the target of 90 per cent of young people in Victoria completing Year 12 or its equivalent by 2010 (DE&T, 2004), the characteristics and developmental needs of Year 9 students need be considered.

Chapter 2 – Brain development and learning

Over the last 25 years, the advent of new imaging techniques such as functional magnetic resonance imaging (fMRI) has allowed researchers to make great discoveries about the organisation and function of the brain. The findings emerging from recent work give rise to many debates about the validity of the ‘first years of life’ concept and emphasise the importance of brain development during adolescence and throughout life.

The abovementioned OECD report suggests that cognitive neuroscience has an important role in the understanding of learning and the practice of teaching; however, it will take many years before the findings from this field can be safely and readily applied in education (OECD, 2002). Similarly, a review of research on brain function and development, and the impact of those on learning concluded that while educationalists are increasingly looking into the findings of neuroscience for insights on how to improve their practice, it is still premature and deriving a learning theory based on the current findings may prove to be misguided (Hall, 2005).

The adolescent brain

To put it simply, the brain is developed in two processes of over-production and pruning or elimination. Following a vast over-production of cells and connections, there is fierce competition resulting in only a small percentage of cells and connections that survive. This process is affected by various growth factors and nutrients and has been known to occur in the womb and perhaps the first 18 months of life. Until recently, it was thought that this is the only time the brain undergoes such dramatic development and that early childhood development is vital for brain development since the brain of a six year old child is 95 per cent of the size of an adult brain. More recently, new technologies have aided in the detection of a second wave of over-production and elimination. The second wave of growth occurs predominantly in the frontal lobes and is manifested by the thickening of the grey matter or the thinking part of the brain. The thickening of grey matter reaches its peak at about age 11 in girls and 12 in boys. This process is immediately followed by a pruning process as excess connections are eliminated and the white matter (myelin) wraps around the connections to stabilise and strengthen them (PBS, 2002).

Figure 1 illustrates the changes observed in an adolescent brain. Most noteworthy is the development of the frontal lobes, the part of the brain that is primarily responsible for high order cognitive functions. There is increasing evidence suggesting that the development of the frontal lobe is shaped by the everyday experiences of adolescents.

It is interesting to note that in the 0-4 age group, the approach of those around the child is intensely supportive, forgiving of mistakes, encouraging, praising etc. Just look at those close to a child learning to walk - we are less tolerant of the 'second wave' of growth in students in this developmental phase-particularly when they 'fall down'.

Bruce Armstrong,
Principal,
Balwyn High School.

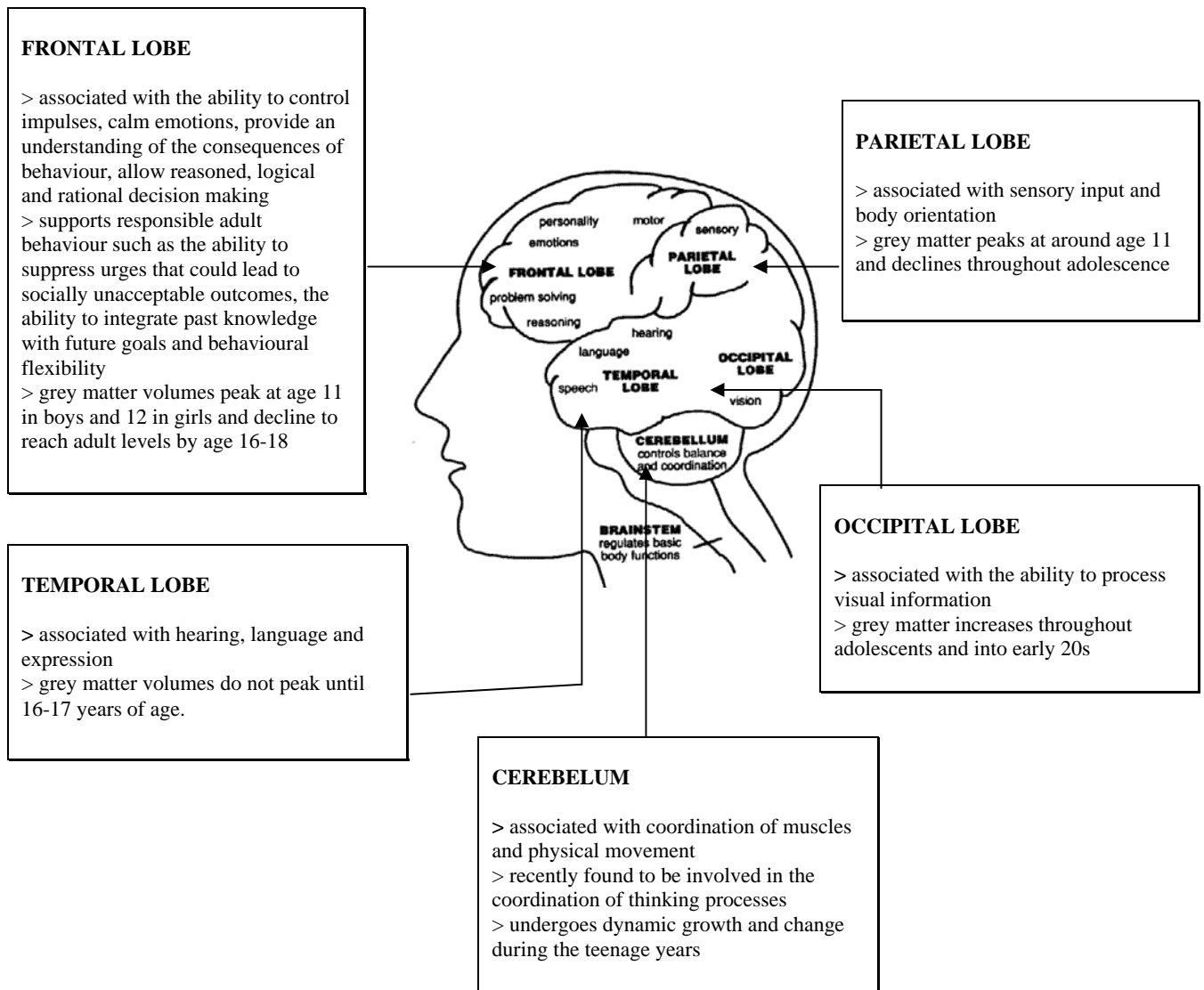
Geidd and colleagues (1999), who are responsible for the discovery of the second wave of overproduction, hypothesised a ‘*Use it or lose it*’ principle to explain the pruning-down process. According to Geidd, the cells and connections that are used are those that will survive and flourish, while those that are not used will die. If this principle holds true, then the environment and the types of activities that adolescents engage in may have a significant impact on how the brain develops during this stage.

Use it or lose it principle

If a teen is doing music, sports, or academics, those are the cells and connections that will be hard-wired. If they are lying on the couch or playing video games or MTV, those are the cells and connections that are going [to] survive.

J. Geidd, 2005
Neuroscientist,
National Institute of Mental Health

Figure 1: Adolescent Brain Development



Source: Giedd, J. N., Blumenthal, J., Jeffries, N. O., Castellanos, F. X., Liu, H., Zijdenbos, A., Paus, T., Evans, A. C. and Rapoport, J. L. (1999). Brain development during childhood and adolescence: a longitudinal MRI study *Nature neuroscience* 2(10): 861-863.

Gender differences

Although girls and boys generally possess similar Intelligent Quotients (IQs), they differ in their brain structure and developmental path and girls' brains tend to mature earlier than boys' brains.

The male brain is about 10 per cent larger than the female brain across all stages of development from three to 20. However, the basal ganglia, which help the frontal lobe perform executive functioning, are larger in females. The larger basal ganglia may protect girls from childhood illnesses and may explain why it is more common for boys, who tend to have smaller basal ganglia, to be diagnosed with autism, dyslexia, learning disabilities, ADHD and Tourette's syndrome (PBS, 2002).

Adolescent behaviour

Recent reviews of adolescent brain development suggest a relationship between development of brain physiology and developmental changes in adolescent behaviour (Nelson et al, 2005). It is believed that behavioural features common among adolescents may have evolved to assist adolescents to develop the skills necessary for independence (Spear, 2000). In fact, the continuing development of key areas of the brain during adolescence suggests that adolescence is a particularly important and malleable period for establishing patterns of behaviour (Nelson et al, 2005).

Risk taking behaviour

Relative to individuals at other ages, adolescents as a group exhibit a disproportionate amount of reckless behaviour, sensation seeking and risk taking (Overman et al, 2004). This behaviour may have some benefits. Risk taking may allow the adolescents to explore adult behaviour and privileges, to accomplish normal developmental tasks, and to develop and express mastery of challenges associated with certain risky behaviours. Risk taking has sometimes been linked to gains in self-esteem, perhaps via the reinforcement provided for such behaviour among peers engaged in similar activities. Individuals who engage in risk taking may do so to attain the positive feelings produced by the novelty, complexity, change or intensity of the experience (Spear, 2000).

For some adolescents, risk taking may not reflect the seeking of positive outcomes from novel or intense stimuli, but a means of reducing depression or coping with stress (Spear, 2000). Adolescent experimentation may involve health-damaging behaviours including substance use, precocious or risky sexual behaviour, risky vehicle use, eating disorders, homicidal and suicidal behaviour. Though not all adolescents engage in risk-taking behaviours, those who do engage in risky behaviour have increased probability of engaging in additional risky behaviours (Overman et al, 2004), and in some instances, risk taking escalates into a lifestyle that is characterised by continued involvement in criminal activities and problem behaviours in adulthood (Spear, 2000).

Recent developments in brain research suggest that the risk taking behaviour observed in adolescents could be caused partly by the immature frontal cortex. As shown in Figure 1, the prefrontal cortex is responsible for a number of functions associated with cognitive functions. It is believed that as the prefrontal cortex matures, adolescents will have better reasoning ability, understand the consequences of their behaviour and are able to have more control over impulses (PBS, 2002).

Emotional response

Parents, teachers or those who are familiar with adolescent behaviour, such as being happy one moment and absolutely miserable the next, tend to associate this type of behaviour with hormonal changes as the child enters puberty. However, the discovery of brain developments in recent years suggests that the observed behaviour could be attributed to the immature frontal lobe. In addition to being responsible for cognitive flexibility such as planning behaviour or devising strategies, the frontal lobe has also been found to have a regulation function of the seat of emotion that is situated deep in the brain. Since this area is still being developed during adolescence, the regulation function is immature and it is only with age that this function improves. This finding may provide an explanation for the inclination of adolescents to respond with emotion and for why these types of behaviour tend to level out a year or two post-puberty (PBS, 2002).

Social interaction skills

Adolescence is often marked by an increase in conflict between an adolescent and his/her parents. Social interaction and affiliation with peers take on particular importance and provide a significant source of positive experiences.

The miscommunication between adolescents and adults could be caused by the way in which the adolescent brain is wired to respond to the outside world. Adolescents have been found to be unable to correctly read all the feelings in the adult face. For example, adolescents may see anger when there is no anger or sadness when there is no sadness (Yurgelen-Todd, 1998). Thus, when adolescents are relating to their parents, teachers or other adults, they may be misperceiving or misunderstanding some of the feelings that adults take as the norm.

Brain research suggests that...

- ❖ adolescents' everyday experiences play a prominent role in shaping the development of the brain
- ❖ adolescence is a critical stage for development of the frontal lobes - i.e. the ability to control impulses, calm emotions, provide an understanding of the consequences of behaviour, allow reasoned, logical and rational decision making
- ❖ there is a relationship between development of brain physiology and developmental changes in adolescent behaviour, particularly, the tendency to engage in risk-taking behaviour and respond with emotion.

Sleeping patterns

Adolescent brain developments associated with the rise in the hormone melatonin level manifest a biological shift in sleeping patterns. As adolescents mature, the onset of melatonin

secretion occurs later in the night and switches off later in the morning, thus providing explanations for adolescents' preference for going to sleep later in the evening and waking up later. While this is happening, adolescents actually need more sleep, as much as nine and a quarter hours during this dynamic period of growth and development (Carskadon, 1999).

Sleep deprivation impairs memory formation, which subsequently leads to learning impairment. By using fMRI, Horne (2000) demonstrated that the pre-frontal cortex is responsible for the formation of memory. In a controlled laboratory environment, Horne showed that sleep deprived subjects did not receive the cortical activity necessary for memory formation and the free-recall ability of these individuals was reduced by half (Miller, 2006). Furthermore, since the pre-frontal cortex that is sensitive to sleep is responsible for high cognitive skills, sleep deprivation greatly impairs the ability to focus and engage in logic and abstract thinking. The inability to comprehend and learn new information greatly impairs learning (Dahl, 1999).

Sleep deprivation has also been found to cause irritability in adolescents. Sleep deprived adolescents are more likely to become angry when faced with frustration and have less control over emotional responses. Graham (2000) suggested that the pre-frontal cortex that is being developed in adolescents and is responsible for the regulation function of emotion is sensitive to sleep. As adolescents are getting fewer hours of sleep, the development of this region of the brain may be hindered. Consequently, sleep deprived adolescents may find it difficult to set aside their emotions in order to undertake important tasks with long term goals like preparing for a test.

The impact of brain development on learning

Findings from neuroscience and cognitive science on human learning suggest that learning changes the physical structure of the brain, learning organises and reorganises the brain and different parts of the brain may be ready to learn at different times (National Research Council, 2000). The brain development occurring during adolescence indicates that techniques used to engage adolescents may significantly differ from those used with either adults or younger children. More specifically, teachers could encourage the development of the frontal lobes in adolescents by employing the following activities (Geake, 2003):

- Sustaining attention: solving maze puzzles.
- Integrating and organising information: cross-word puzzles.
- Planning: organising a school excursion or fund raising.
- Meta-analysis: reading a play or novel for sub-text.
- Meta-cognition: keeping a reflective diary.

Successful learning occurs when students are motivated and engaged in their learning. Ainley and Reeve (2005) suggested that students' engagement with learning depends on their interest in learning activities, their belief in their own ability, the perceived value of the task and their own achievement goals. More specifically, the following factors should be considered:

- Level of curiosity and interest.
- Interest in learning activities can be triggered by features of the task itself and/or it can be based on students' personal interests.
- Concept of ability.
- Importance or value attached to specific activities or experiences.
- Degree of focus on achievement.

Additionally, two key ways to hold attention in young adolescents are:

- Inquiry or problem based learning: tapping into students' particular interests and increased independence.
- Sensorimotor experience: the use of music, smell, touch and emotion to focus students' attention when learning, which exploits the increased use of the amygdala during adolescence (Bellhouse, 2004).

If the 'Use it or lose it' principle holds true, then the experiences that adolescents are exposed to are crucial for their brain development. As much as adolescents try to resist being influenced, it is vital that adolescents have proper guidance from parents and teachers. For instance, adults can teach adolescents to understand the consequences of their behaviour and to realise that what they do now will have a major impact on their adulthood (PBS, 2002).

Year 9 students and brain development

Students in Year 9 who are well into adolescence are not unique in their developmental stage. Many students in the years below and above Year 9 may also share common experiences as students in the middle years tend to move through the adolescence phase over several years. Nonetheless, given that grey matter volumes peak at roughly 10 to 13 years of age, then decline to reach adult levels by ages 16 to 18, Year 9 students are at a critical stage of brain development. The experiences or activities these students are exposed to will significantly influence the pruning process and hard wiring of certain brain cells and connections.

Brain research and educational practices

Adolescent brains are works in progress. While much adolescent behaviour can be attributed to the immature frontal lobes, the development of educational practices with an emphasis on this area of development alone will be inefficient and fail to optimise the learning capacity and opportunity for these students. A review of recent research on brain function, development, and the impact on learning, concluded that the cognitive neurosciences cannot currently offer any 'grand theory' of learning (Hall, 2005). However, the findings emerging from brain research do hold implications and applications for educational practices and provide an additional critical viewpoint that should be incorporated with the knowledge gained from other disciplines to achieve a comprehensive understanding of human learning.

Brain research findings ...

- ❖ do not provide a 'grand theory' of learning, however they do hold implications and applications for educational practices
- ❖ should be incorporated with the knowledge gained from other disciplines to achieve a comprehensive understanding of human learning

Chapter 3 – Learning and teaching

Theories of human learning and their implications for teaching have been explored extensively in the Office of Learning and Teaching (OLT) [Research eLert](#) newsletters. The papers concluded that an understanding of current and emerging human learning theories is vital in guiding the principles of pedagogy aimed at improving the learning outcomes of students (Mahar & Harford, 2004). Additionally, in order to equip all students with the knowledge, skills and behaviours needed to prosper in the global knowledge economy, a renewed focus on teaching and learning approaches that involve deep theoretical knowledge and understanding as well as cognitive and affective aspects is needed (Charlton et al., 2005).

In an effort to transform the quality of outcomes for all students in government schools through a system-wide focus on effective teaching and learning, the Victorian Government introduced the [Blueprint for Government Schools](#) in November 2003 (DE&T, 2003). Central to the Blueprint are the Victorian Essential Learning Standards, a new approach to curriculum from Prep to Year 10 for all Victorian schools. The standards are designed to encourage a deeper understanding of essential knowledge, skills and behaviours.

Victorian Essential Learning Standards

In 2004, the [Victorian Curriculum and Assessment Authority](#) (VCAA) commissioned a discussion paper, *Social, emotional and cognitive development and its relationship to learning in school – Prep to Year 10* to inform the development of the Victorian Essential Learning Standards. In the paper, Bellhouse and colleagues (2004) found that brain research concurs with predominant theories about learning and that knowledge is constructed and cumulative. Further, learning occurs when students build on previous experience, and what is learned before going to school is fundamental to future learning. The paper also concluded that students must understand the learning process, be supported and reflect on their learning to distinguish between accurate and inaccurate information (Bellhouse, 2004).

Table 1 provides a summary of the essential skills accumulated through the stages of development. These skills need to be monitored and improved at each stage of development and the skills developed at one stage are to be built on at subsequent stages of development.

Learning sciences

In another effort to inform the Victorian Essential Learning Standards, a discussion paper on ‘Learner characteristics’ prepared by Reeve and Ainley (2004) assessed the recent advances from the emerging multidisciplinary field of study known as Learning Sciences. The learning sciences field of study comprises contributions from a number of academic disciplines such as education, cognitive and social development psychology, cognitive science and the cognitive neurosciences. In this paper, Ainley and Reeve reported that the cognitive competencies which are vital in the acquisition of knowledge and skills differ for students across the ages.

Table 1: Essential learning skills accumulated through the stages of development

	Early Years	Middle Years	Years 9 and 10
Communication skills	<ul style="list-style-type: none"> ▪ Reading, writing, speaking and listening skills ▪ Recognising and responding to own and other's emotions ▪ Asking and answering questions (as a basis for learning) 	<ul style="list-style-type: none"> ▪ Self efficacy ▪ Help seeking ▪ Public speaking 	<ul style="list-style-type: none"> ▪ Responsiveness ▪ Reciprocity ▪ Assertiveness ▪ Fine motor skills ▪ Technological skills
Thinking skills	<ul style="list-style-type: none"> ▪ Internal locus of control ▪ Focusing and concentrating ▪ Self motivate ▪ Monitor learning ▪ Discriminate between information ▪ Assimilate and accommodate ▪ Problem solve ▪ Multiple intelligences 	<ul style="list-style-type: none"> ▪ Logical reasoning ▪ Regulate own learning ▪ Apply a variety of strategies ▪ Construct and deconstruct concrete ideas ▪ Organise information (e.g. cause and effect, concept map) ▪ Reflect and evaluate ▪ Application 	<ul style="list-style-type: none"> ▪ Plan and set goals ▪ Construct and deconstruct conceptual ideas ▪ Employ a variety of perspectives ▪ Question assumptions ▪ Evaluate thinking processes, learning and ideas ▪ Study skills
Social skills	<ul style="list-style-type: none"> ▪ Supportive relationships ▪ Friendly behaviour ▪ Negotiation ▪ Resilience 	<ul style="list-style-type: none"> ▪ Cooperative learning ▪ Conflict resolution ▪ Emotional regulation ▪ Assertiveness ▪ Problem solving ▪ Empathy ▪ Group decision making 	<ul style="list-style-type: none"> ▪ Predicting consequences ▪ Considering motivations ▪ Peer resistance ▪ Universal values and ethical conduct ▪ Coping skills
Employment and life skills	<ul style="list-style-type: none"> ▪ School behaviour habits (e.g. organisation of materials) ▪ Aggression management ▪ Positive conduct ▪ Participate in activities ▪ Persistence 	<ul style="list-style-type: none"> ▪ Team building ▪ Outcome-focused habits and routines ▪ Leadership 	<ul style="list-style-type: none"> ▪ Personal attributes (responsibility, motivation) ▪ Sense of purpose ▪ Business skills (management, innovation, enterprise) ▪ Personal skills ▪ Civics

Bellhouse, R., Johnston, G., Fuller, A. and Deed, C. (2004) *'Social, emotional and cognitive development and its relationship to learning school – Prep to Year 10'*, Victorian Curriculum and Assessment Authority.

From the developmental perspective, there are large individual differences within groups of Years 9 and 10 students. Thus, while many are able to engage in planning, problem-solving and deliberate memory strategies during this stage of development, not all students are guaranteed to possess these skills.

Table 2 provides a summary of the overarching concepts in learning sciences and how they relate to the development of students in Years 9 and 10. According to the authors, schools need to foster meta-cognitive and self-regulatory practices across the curriculum during the formal stage of schooling to ensure that all students achieve the desirable skills (Reeve & Ainley, 2004). That is, students need to be exposed to activities that engage strategies such as predicting outcomes, planning ahead and self-explanation to improve understanding.

Learning and teaching...

- ❖ An understanding of current and emerging human learning theories is vital in guiding the principles of pedagogy.
- ❖ *The Blueprint for Government Schools* aims to transform the quality of outcomes for all students in government schools through a system-wide focus on effective teaching and learning.
- ❖ Students must understand the learning process, be supported and reflect on their learning.
- ❖ Cognitive competencies which are vital in the acquisition of knowledge and skills differ for students across the ages.

Student motivation and engagement

In the paper, Ainley and Reeve (2004) reported that students in Years 9 and 10 are intrinsically less motivated in learning activities than children in Prep to Year 4. In this instance, it does not imply that adolescents are unmotivated individuals but rather the learning activities at school are less likely to arouse curiosity and engage adolescents than students in earlier years. This lack of engagement and motivation in learning can have a significant impact on the learning outcomes for these students. A recently released [Schooling Issues Digest](#) on *Student Motivation and Engagement* (Frydenberg et al, 2005), suggested that students' patterns of motivation and engagement are reflected in the strategies they use for learning. That is, students who aim to understand and master tasks tend to use elaborate strategies and perform better. Those whose aims are to impress others employ more superficial memorisation strategies. The motivation and engagement of students should be the core objective of a successful teaching and learning model in order for students to have a depth of understanding that is beyond the knowledge about 'facts' and to allow them to apply their learning across disciplines.

Table 2: The development of Years 9 & 10 students

Some generic competencies	Years 9 & 10
<p>Knowledge Informal-formal transition</p> <p>Knowledge base knowledge acquisition, organising, representing, interpreting</p> <p>Expertise</p> <p>Transfer recognising the when and how of knowledge generalisation</p>	<p>Capable of representing knowledge using abstract formal concepts and systems</p> <p>Growth and consolidation of knowledge base, supporting expertise.</p> <p>Awareness of problem feature that may support learning transfer</p>
<p>Memory Deliberate memory strategies</p> <p>Context & structure</p>	<p>Repertoire of intentional strategies</p> <p>Competent construction of context to support learning</p>
<p>Problem solving and learning Identifying problem meaning</p> <p>Application of problem analysis</p>	<p>Competent extraction of problem meaning</p> <p>Capable of self-initiated analysis of problems.</p>
SELF – AS – A – LEARNER	
<p>Curiosity and interest</p>	<p>Response to new knowledge and learning experiences more dependent on personal interests, e.g. boys and literacy</p>
<p>Conception of ability</p>	<p>Differentiated concept of ability; the more effort required to achieve a given level of performance, the lower the person’s ability level.</p>
<p>Task value</p>	<p>Differentiation between learners whose learning is:</p> <ul style="list-style-type: none"> ▪ Internally regulated (knowledge, skills and understanding are important, often linked to personal future) ▪ Externally regulated (learning experiences not valued, not personally important)
<p>Achievement goals</p>	<p>Further consolidation of achievement goal orientations differentiated into:</p> <ul style="list-style-type: none"> ▪ Mastery and understanding ▪ Performance – approach ▪ Performance – avoidance ▪ Work avoidance
<p>Self-concept and self-perception</p> <ul style="list-style-type: none"> ▪ Self-efficacy ▪ Self-competence ▪ Agency or control beliefs attribution 	<p>Differentiated concept of ability: the more effort that is required to achieve a certain result, the lower the student’s level of ability</p> <ul style="list-style-type: none"> ▪ Self perception of competence high – generally associated adaptive learning outcomes ▪ Self-perception of competence low-associated with maladaptive outcomes e.g. ‘learned helplessness’

Reeve, R. and Ainley, M. (2004) ‘*Learner Characteristics*’, Victorian Curriculum and Assessment Authority.

Additionally, there are a number of school factors that influence engagement, including:

- *Tasks matters*: are part of a cohesive approach to curriculum, pedagogy and assessment that should be interesting, challenging and important
- *Context matters*: concern the culture of relationships and the culture of learning since students are acute observers of their teachers, of what goes on in the classroom, of their own reactions and of what helps or hinders their learning
- *Classroom matters*: involve teacher responsiveness, their mode of teaching and collaborative classroom environment

Peer group norms and values have also been identified as important elements of the classroom environment. Students who belong to a highly engaged group tend to have positive behavioural engagement at the individual level. Likewise, students belonging to a peer group that have negative feelings towards learning tend to exhibit similar behaviour. The relationship between learning, engagement and peer group acceptance is particularly important for adolescents who are more likely than other students to seek peer group approval. Ainley and Reeve (2004) suggested that teachers need to have a clear role in establishing the mode of peer interaction in the classroom and encourage students to take part in making choices and decisions about curriculum tasks and assessment.

Learning characteristics...

- ❖ Years 9 and 10 students are intrinsically less motivated in learning activities than children in Prep to Year 4.
- ❖ Students' motivation and engagement in learning have a significant impact on learning outcomes.
- ❖ Students' motivation and engagement are influenced by tasks, context and classroom matters.
- ❖ Resilience declines in Year 9 as these students become more aware of the limitations of their academic abilities.
- ❖ Adolescents tend to employ a productive coping style.
- ❖ There is a need to intervene in the education of adolescents at about Year 9 level to capture students' attention.

Student resilience

The report published by the Queensland Department of Education, *Developing Lifelong Learners in the Middle Years of Schooling* provided findings collected from a survey on Australian students' own perceptions of their school and their resilience. In the report, resilience is defined as a personal factor affecting students' ability and willingness to maintain intelligent engagement with uncertainties (Pendergast et al, 2005) and is determined by the Middle Years Resilience Scale (MYRES) – including academic self-efficacy; willingness to engage with peers; communicate self-efficacy; and meta-knowledge of academic strategies. The findings indicate that resilience levels declined significantly from Years 5-6 to Year 9. The authors suggest that the low resilience score observed during the middle years could be attributed to Year 9 students becoming more aware of the limitations of their academic abilities.

Adolescents who are already experiencing profound physiological and emotional changes have to rely on their problem solving skills to deal with challenges such as establishing new peer networks and the development of abstract thinking. If adolescents are not effective in

dealing with stress or using their problem solving abilities, they may develop mental health problems such as depression or anxiety that will subsequently lead to negative outcomes such as academic underachievement or social skills deficit. The findings from a study on adolescent coping style suggested that adolescents tend to employ a productive coping style – referring to a style that involves working on a problem and remaining optimistic (Frydenberg, 1993). It is suggested that if adolescents are taught these coping skills, then their beliefs about their capacity to cope and their positive emotional experiences during problem solving might be enhanced (Andrews, 2004). Frydenberg (1997) suggested that the post-compulsory years of schooling are a key developmental point to improve coping skills and that there is a need to intervene in the education of adolescents at about Year 9 level to capture students' attention (Bellhouse, 2004).

As part of the strategy to provide mental health promotion resources for secondary schools, the [Curriculum Corporation](#) produced a booklet on enhancing resilience for use with classes in middle to senior secondary schools. The booklet provides schools with guidance on how to create a positive school culture by employing a whole school approach to assist students to develop abilities to cope with change and challenge.

The Centre for Adolescent Health is currently implementing the [Gatehouse Project](#) with Victorian Government schools to promote adolescent emotional wellbeing and prevent adverse health outcomes. The Gatehouse Project provides schools with strategies to increase the connectedness of students to schools and increase students skills and knowledge for dealing with everyday life challenges.

Whole school approach to enhancing resilience:

- ❖ A shift from a focus on 'fixing' individuals, to that of creating healthy systems.
- ❖ A shift from problems-based needs assessment to a belief in human potential for development, learning and wellbeing.
- ❖ An acknowledgement that the 'health of the helper is critical'.
Benard, 'A framework for Practice: Tapping innate Resilience', in *Resiliency in Action*, 1997.

The learning and teaching environment

Classroom design

Reviews of research studies on the causal linkages between building design and student outcomes suggest that student academic achievement improves with improved building conditions and that structural and cosmetic factors (refer to Table 3) have a significant impact on student performance and behaviour (Fisher, 2001).

More recently, in a report titled *Linking pedagogy and space*, Fisher (2005) demonstrated that the physical learning environment is linked to pedagogical and curriculum design. According to Fisher, the curriculum context including the teaching and learning principles, the essential learning strands and domains, and key pedagogical approaches are linked to the learning setting principles. The learning setting principles are in turn linked to the planning principles that allow the creation of various learning models or hubs. Diagram 2 illustrates clusters and affinities recommended for students in Grades 7–9 (Fisher, 2005).

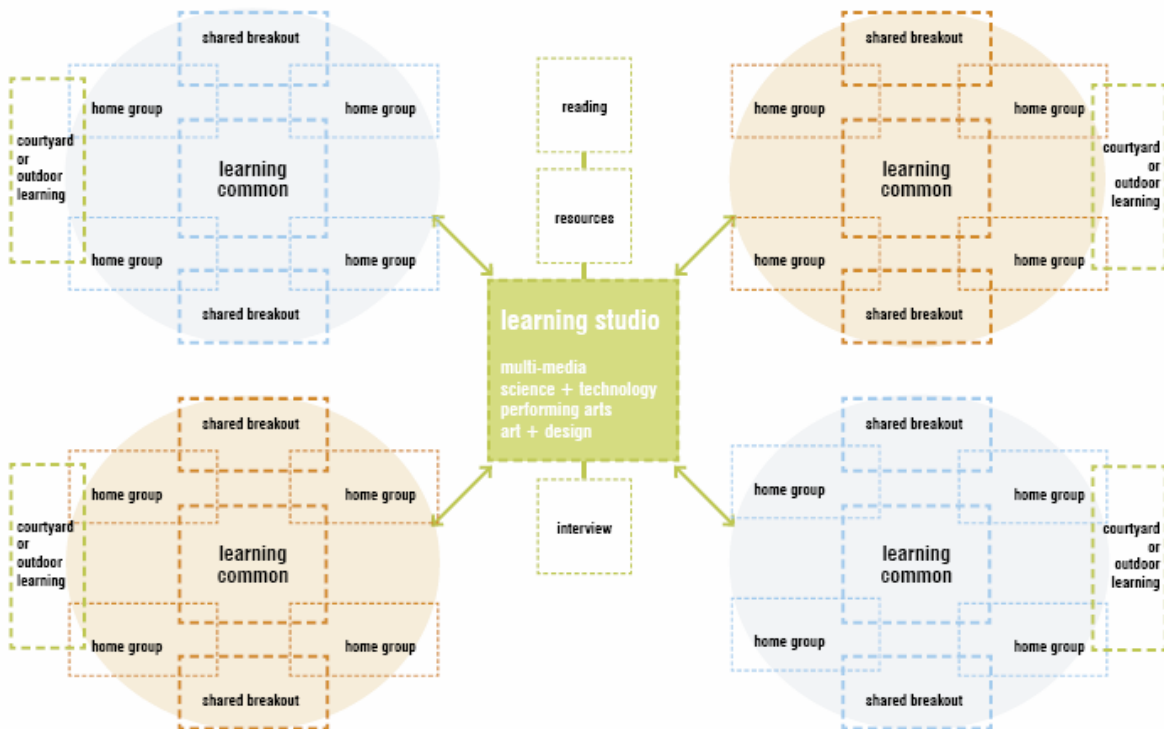
Table 3: Structural and cosmetic factors which influence learning

Structural factors	Cosmetic factors
Building age	Interior painting
Windows	Exterior painting
Flooring	Exterior painting cycle
Heating	Floors swept
Air-conditioning	Floors mopped
Roof leaks	Graffiti
Adjacent facilities	Graffiti removal
Locker conditions	Furniture
Ceiling material	School grounds
Science laboratory equipment	Landscaping
Science laboratory age	
Lighting	
Colour	
Noise	
Student density (m ² /student)	
Site acreage	

Diagram 2: Suggested clusters and affinities for students in Grades 7 – 9

clusters and affinities [7-9]

... clustered learning settings are able to access shared learning studios



Source: Fisher, K. (2005) 'linking pedagogy and space' Department of Education and Training, Victoria

International design expert, [Prakash Nair](#) indicated that one of the future trends in learning is that *‘each student will receive a personalised education, learning different things at different times, in different places in different ways from different people’*. According to Nair, seven elements of educational facilities best practice are to:

1. enhance physical comfort and well being
2. support 21st century teaching and learning principles
3. demonstrate environmental responsibility and school as 3-d textbook
4. serve the educational needs of the larger community
5. incorporate design principles that make buildings work better, last longer, cost less to build, be more inspiring, and adapt to changing needs
6. apply open, transparent and collaborative processes
7. be accountable through meaningful, measurable results.

Additionally, design features that are incorporated to enhance learning include:

- a variety of spaces and sizes to reflect different learning modalities
- enhanced flexibility (operable walls, internal glass and inter-connectivity of adjacent spaces)
- provision of project learning areas
- maximising use of natural light and ventilation and acoustic control
- incorporation of individual space ‘ownership’ to promote more personalised and independent learning, for example a workstation for each student in Grades 9 and 10, including a secure ‘locker’ that they will ‘own’ for the year
- an innovative information resource centre incorporating online learning and vocational education and further education resource information
- full service school offices and a community access entrance
- community access facilities, for example a performing arts/catering complex,
- innovative furniture and equipment
- seamless information communication and technology (ICT) provision supporting the notion of ‘anywhere/anytime learning’.

Chapter 4 – Advocated teaching and learning practices

The following section provides an overview of the teaching and learning practices advocated in Australian and international research projects. A thorough understanding of these practices, in addition to the knowledge gained from other disciplines such as brain research and learning sciences, provides a sound foundation to advance more specific suggestions about ways to make young people's schooling experience at Year 9 more challenging, engaging and rewarding.

International research on middle years schooling

A report written in the early 1980s in the USA (NMSA, 1982) suggested that to be truly in tune with the needs of young adolescents, middle schools should be staffed by teachers who are knowledgeable about and committed to young adolescents and should adopt varied organisational arrangements and instructional strategies. It also indicated that the curriculum should be balanced, include a full exploratory program, and that evaluation procedures should be compatible with the nature of young adolescents. The report listed ten characteristics that became a commonly cited standard for defining a middle school.

In the late 1980s another landmark report (Carnegie Council on Adolescent Development, 1989) concluded that to improve the education of young adolescents schools needed to:

- create small communities for learning
- teach a core academic program
- ensure success for all students
- empower teachers and administrators to make decisions about the experiences of middle grade students
- staff middle grade schools with teachers who are expert at teaching young adolescents
- improve academic performance through fostering the health and fitness of young adolescents
- reengage families in the education of young adolescents
- connect schools with communities.

The sentiments expressed by these previous reports were extended by a further report (NMSA, 1995) issued a decade ago that 're-visioned' the early 1980s report and delineated a vision of what developmentally responsive middle schools could be and should be. It suggested that to be successful middle schools needed:

- educators committed to young adolescents
- a shared vision of middle level education

- high expectations for all students
- an adult advocate for every student's academic and personal development
- family and community partnerships
- a positive school climate.

It also concluded that the middle level program components should be built around:

- curriculum that is challenging, integrative, and exploratory
- varied teaching and learning approaches
- assessment and evaluation that promote learning
- flexible organizational structures
- programs and policies that foster health, wellness, and safety
- comprehensive guidance and support services.

In relation to the curriculum for young adolescents, Roeser et al. state that the point has been made (Manning, 2000) that the curriculum should be unique and diverse, not just a little more difficult than that in previous years of school or a little less difficult than that in the senior secondary years. It has also been suggested that the extent to which adolescents engage with the curriculum depends on whether they feel they can meet the academic challenges, see value and purpose in the activities, and feel cared for and safe. In order to build greater engagement with learning it has been suggested that teachers need to:

- give students choices and control over their learning
- develop lessons that students can relate to meaningful life events, experiences, and questions that are of concern to them
- create smaller learning environments and work in teams
- take action to eliminate discrimination practices that may be disenfranchising certain groups of students (Roeser et al, 2000).

Discussions of the benefits of having inter-disciplinary teaching teams to work with young adolescents include the observation that teachers working in this way can more easily bond with students and develop rules, rituals, and boundaries that result in students developing a stronger attachment to schooling and a higher commitment to learning (Erb, 1997).

Middle years schooling in Australia

Beyond the middle

To investigate the perceived efficacy of middle years programs in improving the quality of teaching, learning and student outcomes across all States and Territories, the Department of Education, Science and Training (DEST) commissioned the School of Education, University

of Queensland to undertake a research project ‘Beyond the middle’ (Luke et al, 2003). The project was to assess the key policy, practical and professional issues and the overall school reform issues around middle years. The emphasis of the research was on whole-school priorities in literacy and numeracy for target groups of students from lower socio-economic communities, Aboriginal and Torres Strait Islander (Indigenous) communities, students with a Language Background Other than English (LBOTE), rural and remote students, and students struggling with the transition from middle/upper primary to the junior secondary years (DEST, 2003).

The findings suggested that the greatest current and potential value for middle years schooling is the ‘structural’ rather than ‘adjunct’ approach. That is, middle years schooling is a distinctive and core area for specific educational focus and intervention activities. However, there is a need for a new generation on middle years theorising, research, development and practice. Particular emphases included the need to:

- develop a new generation of middle years conceptualisation and research on student pathways
- establish multi-partner professional development strategy on middle years school innovation
- focus systemic activities on renewing mainstream pedagogy in middle years schooling
- align school-based innovations in middle years pedagogy and assessment to focus on student outcomes
- integrate and align approaches to assessing and reporting on social and academic students outcomes
- commission research into patterns of school leadership for the middle years that sustain improved student outcomes
- provide support and research distinctive middle years teacher education programs and career pathways.

Developing Lifelong Learners in the Middle Years of Schooling

Developing Lifelong Learners in the Middle Years of Schooling, a recent Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) research project, managed by the Queensland Government drew on wide-ranging national and international research on middle years schooling (Pendergast, 2005).

Additionally, 25 schools, Australia-wide, were selected to participate in the study which examined ‘What practices, processes, strategies and structures best promote “lifelong learning” and the development of “lifelong learners” in the middle years of schooling?’ School case studies and student interviews were integral to the research.

The project identified key factors influencing the development of lifelong learning in the middle years of schooling including:

- recognition of individual learning styles
- promotion of student self-assessment
- focus on student centred learning
- challenging teaching focused on a problem-based approach
- promotes reflection on learning and curriculum which is based on integration of key areas and explicitly develops social practices.

At a broader level, aspects of schooling which contribute to the development of lifelong learners in the middle years stress: the alignment of curriculum, pedagogy and assessment, heterogenous, flexible student groupings, team teaching, time to explore authentic tasks, access to knowledge and research, community-oriented student learning through negotiated with teachers. These research findings align well with the findings of other current research on how to create a successful learning environment for adolescents.

The research concludes that empowering schools to support their middle years' students to become lifelong learners is a lengthy and broad-ranging process, but one which participating schools deemed worthwhile.

Victoria's Middle Years Research and Development (MYRAD)

Relatively recent local research (Russell, 2003) has also added new dimensions to the perspectives derived from overseas research. It suggests that as we learn more about the changing nature of work and the changing nature of communities what becomes apparent is that whilst many schooling practices are designed to give our young people the kinds of learning experiences that will best equip them for these changes, many are not. Indeed research (Hill 1996; Hill, 1998) reveals that:

- the growth of student learning in basic skills (literacy and numeracy) flattens markedly, on average, from Year 5 through to Year 8
- student perceptions of self-regulation, reflectiveness, self-correction and depth of learning decline from Years 5-9
- student attitudes to school and engagement in learning decline between Years 5-9 and this decline varies markedly between schools
- student views of the quality of teacher-student relationships decline in Years 8-9
- student satisfaction with learning and schoolwork declines in Years 8-9.

It has also been suggested (Centre for Applied Educational Research, 2001) that schools have been constrained in their delivery of effective conditions for learning in the middle years by:

- a curriculum framework that pursues breadth rather than depth of understanding

- school organisational arrangements that make close teacher-student relationships difficult
- a culture that is competitive and ability focused rather than cooperative and effort focused
- a drive to complete curriculum tasks as opposed to a drive to promote real understanding and a sense of control over one's learning.

The Victoria's Middle Years Research and Development (MYRAD) project has shown (Russell, 2003) that in respect to the middle years, positive advances in student learning levels are made when:

- schools and their communities recognise that there is a need for change
- school leaders and teachers believe that they have a responsibility for sustaining motivation and improving skills of students and teachers respectively
- primary and secondary schools collaborate through clusters to build curriculum consistency and facilitate student transition
- professional learning teams are established to support teachers to plan, implement and evaluate school change
- reforms are supported by targeted increases in resources
- data-driven, evidence-based approaches to school improvement are adopted
- three-year action plans and targets are established and tested against data.

These findings have significant implications for policy and practice in the educational provision for students in year 9. The transformation of curriculum, pedagogy and assessment to support improved learning outcomes at this important stage of schooling will require courageous leadership and a partnership across all levels of the school system at central and, regional levels and networks and schools.

Suggested activities for schools:

1. Research on brain development and learning:

Establish a learning circle to discuss how the research around gender differences, risk-taking behaviour, emotional responses, sleeping patterns and social interaction skills could be used to inform and guide school policy and practice.

2. Learning and teaching

Discuss the issues related to student motivation, engagement, student resilience and the learning and teaching environment considerations that are pertinent to your school.

3. Advocated teaching and learning practices

Discuss how the teaching and learning practices that are underpinned by middle years research are currently being implemented in your school.

Identify what is working well, where the gaps might be and actions that can be put in place to bridge the gaps.

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