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**RESEARCH ARTICLE**

**Understanding first year university students: Personal epistemology and learning**

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**Abstract**

Whilst participation in higher education has increased dramatically over the last two decades, many universities are only now beginning to pay more attention to the learning experiences of first year students. It is important for universities to understand how first year students conceive of learning and knowing in order to promote effective approaches to learning. Even though an extensive body of research demonstrates that beliefs about learning and knowing influence student approaches to learning and learning outcomes, there has been no Australian research that has investigated this critical learner characteristic across first year university students. This paper reports on preliminary data from an ongoing longitudinal study designed to investigate first year students' beliefs about knowing and learning (epistemological beliefs). Students from teacher education and creative industry faculties in two Australian universities completed the Epistemological Beliefs Survey (EBS) in the first week of their first semester of study. A series of one-way ANOVA using key demographics as independent variables and the EBS factor scores as dependent variables showed that epistemological beliefs were related to the course of study, previous post-school education experience, family experience at University, gender and age. These data help us to understand students' beliefs about learning and knowing with a view to informing effective learning in higher education.

**Keywords:** personal epistemology; first year experience; epistemological beliefs; teacher education

## **Background**

Universities are becoming increasingly interested in how students learn in higher education (Harvey, Drew & Smith, 2006). The rapidly developing information age in which we live values knowledge as a marketable product (Forrester, 2006) which has direct implications for the goals of higher education. In addition to the generation of knowledge as a product of higher education, the process of knowing is also highly valued. Critical thinking is one of the processes of knowing required by individuals to make informed decisions in their personal and professional lives (Kuhn & Udell, 2001). It is important then that a focus on processes of learning, not just knowledge outcomes, is included in higher education study to equip students in dealing with the ill-defined problems that emerge in our current complex work and living relationships. This study investigates what first year students across teacher education and creative writing courses in two Australian universities believe about learning and knowing, with a view to better understanding how to promote effective learning. In this paper, the term *first year student* refers to any student completing the first year of a course, regardless of previous experience in further or higher education. There has been no research in the Australian higher education context that investigates this construct for first year university students.

Whilst participation in higher education has increased dramatically over the last two decades, many universities, in particular the research-focused institutions, are beginning to pay more attention to the learning experiences of first year students (Asmar, 2002). These universities are now starting to prioritise effective teaching and learning, with the “philosophical premise that students are – or should be – at the centre of their own learning” (Asmar, 2002, p.19). For example, the First Year Experience Project at the University of Sydney has been developed to address difficulties described in students’ evaluations of teaching. Students described their first year learning experience of teaching and assessment as teacher-centred and reproductive in nature. Similarly, the Queensland University of Technology established a First Year Experience Program in 2002 in part as a formal response to concerns about student retention and to raise awareness about transition issues. This

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First Year Experience Program is constructed around elements of perceived student need such as engaging learning experiences and a sense of belonging (Queensland University of Technology, 2007). It is expected that programs such as these may support a change in the underpinning philosophy of teaching and learning at university to one in which teaching is student-centred (Barrie, Ginns & Prosser, 2005).

Attempts have been made to isolate factors that contribute to student withdrawal and how these can be addressed during the first year of study (McInnis, 2001; McInnes & James, 1995; Pitkelthy & Prosser, 2001; Tinto, 1995). Hence, universities have responded by offering “transition” or “orientation” programs either before the beginning of the first semester or during the first few weeks. Although some of these programs follow Tinto’s (1995) recommendations that they be student-centred and address students’ needs early, “the student” is generally situated in the future rather than in a continuum from past to present. Evidence of this stance can be found in instances such as learning strategies being taught in the context of performance on future academic tasks, orientation programs being directed towards becoming familiar with the new university environment and expectations, past high school experience being referred to only in terms of the *differences* in approaches to expectations, tasks and environment, and efficacy of transition programs being determined by their value in the future. A way to view students as “in continuum” from their past learning experience to their first year at university is to ascertain their beliefs about knowing and learning as they make this transition.

First year students’ beliefs about knowing and learning may not only vary enormously between students but may also be at odds with the views held by the university. In particular, students whose beliefs about learning do not promote independent learning may experience difficulty in navigating the higher education terrain. Nelson, Kift, Humphreys and Harper (2006) believe it is the responsibility of universities to explicitly address these conceptions and expectations. The first year of higher education can be a valuable opportunity to help students to reflect on and possibly reconstruct their views about learning and knowing (Chai, Khine, & Teo, 2006; Harvey, Drew &

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Smith, 2006), with a view to supporting this transition into effective learning in higher education. This paper is focussed on identifying what first year teacher education and creative writing students believe about learning and knowing, with a view to informing our understanding of students' learning as they begin their university courses.

## ***Learning and knowing in higher education***

The research on student approaches to learning in higher education has had a long and robust history. Marton (1975) first described beliefs and approaches to learning as deep or surface, with many other researchers noting similar distinctions since then (e.g., Biggs, 1993; Van Rossum & Schenk, 1984; Watkins, 1983). It was found that students who use deep approaches to learning intend to make meaning from the learning task and then use strategies to support this intention. Strategies include linking the new to prior knowledge and evaluating evidence and are related to qualitative conceptions of learning. Conversely, a surface approach to learning involves an intention to simply reproduce information. In this approach, students tend to focus on recall, such as rote learning. These approaches are linked to what are known as quantitative conceptions of learning which focus on aggregation of information. In his 1993 work, Biggs identified a third approach to learning, that of achieving. In the achieving approach, students have the intention to perform well and attain good grades by using strategies that help them to organise their time and content coverage efficiently (Biggs, 1993).

Thompson, Pilgrim, and Oliver (2005) suggest that we now need to think about these approaches to learning in more complex ways. Rather than considering surface, deep and achieving as separate beliefs and strategies, it is more important to see how these are interconnected. It might be easy to think that students who use surface strategies are less capable than those who engage in deep processes (Ramsden 2003 in Thompson et al., 2005). However, Ramsden has described how students use a complex mixture of approaches to learning which are influenced by the learning environment and task demands. From this perspective, approaches to learning can be considered two dimensional in terms of the *how* and *what* of learning: *how* we organise or structure our

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learning and *what* meaning we take from the learning experience. In regard to *how* we organise learning, we can structure our learning in an holistic way in which we see the interconnections between ideas and the overall integrating structure or we can do this in an atomistic way in which different parts are focused upon without an understanding of the whole. In regard to *what* meaning we gain from the experience, we can pay attention to the *deep* meaning of the task or alternatively merely focus on the *surface* level or textual meaning. When both the *how* and the *what* are considered, approaches can then be conceptualised as surface-atomistic or deep-holistic.

It is important in first-year university experiences to promote deep-holistic approaches to learning which focus on both meaning and integrated structures in order to foster independent learning approaches. Ramsden (2003, in Thompson et al., 2005) suggests that it is the role of university teachers to support good choices in strategies by making a range of effective approaches explicit to students. Other research supports the necessity to promote deep approaches to learning because of the impact these strategies have on effective learning outcomes and performance (see e.g., Ellis, 2006). However, a growing body of research related to personal epistemology, indicates that university teachers may need to pay more attention to the beliefs beginning students hold about the nature of knowledge and knowing in order to understand and help them make choices about approaches to learning.

### ***Personal epistemological beliefs***

Individual cognitions about the nature of knowing and knowledge are referred to as personal epistemology. Such cognitions may involve beliefs, reflections, theories and resources that are held by an individual about the nature of knowing and knowledge (Pintrich, 2002). In seminal research in the 1970s, William Perry investigated why Harvard liberal arts students appeared to change their understanding of learning as they progressed through their courses. Rather than a personality change, as was first purported, Perry and his colleagues found that students developed in their beliefs about knowing and knowledge. Over time, these epistemological positions ranged on a continuum from a dualistic view that knowledge is simple and certain and could be transmitted by

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authorities through to a view that knowledge is complex, tentative and needing to be reasoned on the basis of evidence. A more recent developmental trajectory is described by Kuhn and Weinstock (2002). They refer to changes from *absolutism* (reality is replicated, knowledge is absolute and transferable), to *multiplism* (knowledge is based on personal opinions) and then finally to *evaluativism* (judgments involving evidenced-based critique of multiple perspectives). Typically, this progression from absolutism to evaluativism is described as a shift from naïve to sophisticated beliefs. Much of the developmental personal epistemology research indicates that first year university students are likely to hold more naïve beliefs (King & Kitchener, 2002), which are likely to result in surface approaches to learning (Hammer, 2003; Phan, 2008).

Other research has questioned the unidimensional, stage-like characterisation of personal epistemology found in the developmental tradition. Schommer (1993) investigated the nature of epistemological beliefs through a series of studies noting that such beliefs are multidimensional and independent. Five dimensions were initially described as (a) Omniscient Authority (beliefs in the source of knowledge); (b) Certain Knowledge (beliefs in the certainty of knowledge versus construction of knowledge); (c) Simple Knowledge (beliefs in structure/integration of knowledge); (d) Quick Learning (beliefs in the speed of learning); and (e) Innate Ability (beliefs in the stability of knowledge). Schommer found that individuals could hold a combination of sophisticated and naïve beliefs in any one of the 5 dimensions.

Kardash and Wood (2000) have used a revised version of Schommer's epistemological beliefs questionnaire to refine the dimensions. These include:

- beliefs about the structure of knowledge (similar to original *Simple knowledge*);
- speed of knowledge acquisition (similar to original *Quick learning*);
- knowledge construction (learning takes place through a process of constructing personal meaning similar to original *Certain knowledge*);
- attainability of truth (similar to original *Certain knowledge*); and

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- characteristics of student success (similar to original *Innate ability*).

Of these, the dimension described as omniscient authority (beliefs in the source of knowledge) was a factor that was not found to exist in more recent work. However, the remaining dimensions seem to have strong links to learning and are discussed below.

Beliefs about the structure of knowledge acquisition, otherwise known as simple knowledge, have been shown to be related to comprehension and metacognition (e.g., Schommer, Crouse & Rhodes, 1992). When students believe that knowledge is simple and unconnected, information is viewed as categorical. Such understandings hinder thinking across boundaries of knowledge (Schwartz & Wilkinson, 1988). On the other hand, individuals who view knowledge as integrated are more likely to be analytical and evaluative in their thinking because they are not so focused on allocating information to separate information “silos”.

The dimension of quick learning or speed of knowledge acquisition refers to a set of beliefs that learning takes place quickly or not at all. Research suggests that such beliefs can influence motivation in the context of understanding reading tasks (Schommer, 1990). It is not surprising that these beliefs also influenced performance in high school students (Schommer, 1993). For example, beliefs in quick learning for tasks that involve complex processing can result in problems with integrating information into a coherent whole (Schommer, 1990).

Understanding may also be influenced by beliefs about knowledge construction, certain knowledge, and attainability of truth. When students hold beliefs that knowledge is absolute and unchanging, there is a high probability that they will not take responsibility for their own learning and remain passive in the learning process (McDevitt, 1990, cited in Schommer, 1994). Such a lack of active engagement means that students’ understandings are compromised because they are less likely to engage in deep approaches to learning that require links to prior knowledge. Understanding may also be influenced because students with beliefs in the certainty of knowledge will be less likely to analyse information critically (Kardash & Scholes, 1996).



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Beliefs about control of learning evident in the dimension of innate ability/ characteristics of student success may also have an influence on student reasoning and subsequent levels of understanding. In a study by Bendixen, Dunkle and Schraw (1994), students who did not see knowledge as based on innate ability; simple knowledge and quick learning were more likely to engage in higher order reasoning and reflection. The dimension of innate ability was the strongest predictor of reasoning skills. It is possible that beliefs in innate ability reflect helplessness which may result in individuals resisting challenging tasks. Schommer and Walker's study (1997) showed that beliefs in 'innate ability' were related to the perceived significance of education. When ability to learn is based on effort individuals tended to believe that persistence in learning was necessary and that education was worthwhile. Similarly, Schommer and Dunnell (1997) showed that underachieving gifted high school students were more likely to have beliefs in 'innate ability'.

Given the emerging interest within the higher education sector in student-centred learning for first year students, there is a need to increase awareness about students' understandings and approaches to learning. An insight into the personal epistemologies of students entering university can provide a starting point in designing learning experiences that encourage deep-holistic approaches to learning. The purpose of this study was to investigate the epistemological beliefs of first year university students, as a basis for understanding students' learning. In particular, we wanted to provide a snapshot of beliefs across key demographic variables which included age, sex, enrolled course, previous university experience, previous experience in the education sector (e.g., TAFE), and previous university experience of parents.

## **Method**

### *Participants and Context*

First year students from two Australian universities in Queensland and Tasmania were invited to participate in a survey designed to identify their beliefs about knowing and learning. This paper reports on initial data from an ongoing longitudinal study that is intended to investigate students' beliefs as they progress through their respective university studies. Students were selected from

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teacher education and creative writing programs across two Australian universities to provide variation at both the discipline and institutional level,

The data was collected during the first few weeks of the first semester of study. Students gave informed consent on participation and were advised that their participation in the project was voluntary, that they could withdraw from participation at any time during the project without comment or penalty and that their decision to participate (or not) would not affect their current or future participation in their course.

All the first year students from the university in Queensland were completing either a Bachelor of Education Early Childhood ( $n = 194$ ), a Bachelor of Education Primary ( $n = 236$ ) or a Bachelor of Creative Industries, Creative Writing ( $n = 141$ ). The early childhood teacher education students complete a four-year Bachelor of Education (Early Childhood) which prepares students to teach children birth to eight years of age in kindergartens and early years settings in primary (junior) schools. The primary teacher education students also complete a four-year Bachelor of Education which prepares them to teach children in primary school settings (approximately six to thirteen years of age). These Bachelor of Education (Primary) students were located on two of the university's campuses. The creative writing students in this study were drawn from the Bachelor of Creative Industries (Creative Writing) degree. This is a 3 year degree, enabling students to pursue careers in publishing and writing.

Students from the Tasmanian university were completing a Bachelor of Teaching ( $n = 151$ ) or Bachelor of Education ( $n = 193$ ). The Bachelor of Teaching is a two-year graduate-entry pre-service course taken after the completion of a first degree. The Bachelor of Education is an on-campus four-year course offered at two separate campuses. Both degrees prepare students for teaching opportunities in early childhood (kindergarten, prep, grades 1 and 2), and primary (grades 3-6) situations.

***Demographics***

Demographics related to age, sex, enrolled course, previous university experience, previous experience in the education sector (e.g., TAFE), and previous university experience of parents were used to differentiate epistemological beliefs for first year students. Each of these characteristics has been shown to have an influence on epistemological beliefs. For example, increasing levels of higher education (previous university experience and previous university experience of parents) has been shown to be related to more sophisticated epistemological beliefs (King & Kitchener, 2002). Differences in gendered ways of knowing have also been reported by Clinchy (2002). These differences show that females are more likely than males to have connected ways of knowing in which they think with others rather than contest others' views as is often the case in masculine ways of knowing. Further, some research has shown differences in epistemological beliefs according to discipline (related to enrolled course) (Hofer 2004) and age (Baxter Magolda & Terenzini, 2004).

Participants across both universities included both males ( $n = 169$ ) and females ( $n = 708$ )<sup>1</sup> and ranged in age from 14 to 54 years of age with a mean age of 22 years. The 14 year-old student was a visiting secondary school student on special entry. While every effort was made to survey students who were studying in first year units, sometimes students did not follow the usual course progressions and so were completing first year subjects out of step. The majority of students (80%) were in the first year of their current course and Australian – born (89%). However, a large percentage of participants had previous university experience (42%) and a number of students (11%) had experience in the Technical and Further Education (TAFE) sector which provides certificate and diploma courses for child care workers. Students holding a TAFE diploma have advanced standing into Bachelor of Education Early Childhood courses. This means that while the participants in this study are described as first-year students in their respective courses, they are not necessarily novices in terms of their experiences with higher education.

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<sup>1</sup> Note that not all participants recorded their sex on the survey form.

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The parents of over half the student participants (56%) had not studied at university themselves however 24% of students had one parent who had studied at university level and 20% of students indicated that both of their parents had studied at university.

### ***Measure***

In the first week of the semester, students were invited to complete the EBS (Epistemological Beliefs Survey, Kardash & Wood, 2000). The EBS assesses student beliefs about

- the structure of knowledge (e.g., You will just get confused if you try to integrate new ideas in a textbook with knowledge you already have about a topic),
- speed of knowledge acquisition (e.g., If something can be learned, it will be learned immediately),
- knowledge construction (e.g., Forming your own ideas is more important than learning what the textbooks say.),
- characteristics of student success (e.g., Being a good student generally involves memorizing a lot of facts.), and
- attainability of truth (e.g., The only thing that is certain is uncertainty itself.).

Responses are scored on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Following Kardash and Wood, items were summed for each subscale to produce factor scores for Structure, Speed, Knowledge Construction, Success, and Truth. Reliability (Cronbach's alpha) of the subscales ranged from .54 to .74. Higher scores on all factors represent more sophisticated beliefs.

### **Findings**

In this section, comparisons between groups of students are made with respect to the factor scores on the EBS. The overall findings across all participants are presented first followed by group differences with respect to age, sex, enrolled course and other key demographic variables: previous university experience; previous experience in the education sector (e.g., TAFE); and previous university experience of parents. Analyses of Variance (ANOVA,  $p < .05$ ) were used to test for differences between groups. Means and standard deviations on each of the subscales are presented in Table 1. Overall findings indicated that students, as a group, scored highest on Speed and lowest on Structure. These results suggest that students were more likely to believe that knowledge

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consisted of a series of facts rather than an integrated body but that the acquisition of knowledge takes time to develop.

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### *Gender differences*

Using Wilks' lambda statistic, significant differences were found between students with respect to their beliefs about the attainability of truth,  $F(1, 814) = 4.00, p = .046$ , and success,  $F(1, 814) = 48.54, p = .000$ . Examination of group means indicated that females were more likely than males to believe that knowledge was uncertain and that the characteristics of successful students include more than innate ability. No significant differences were found with respect to any other factor.

### *Age Differences*

Age was categorised as 20 years or younger, 21 to 30 years and over 30 years. Using Wilks' lambda statistic, significant differences were found between students with respect to their beliefs about the attainability of truth,  $F(2, 797) = 5.50, p = .004$ , the speed of knowledge acquisition,  $F(2, 795) = 6.09, p = .002$  and the integration of knowledge,  $F(2, 784) = 5.89, p = .003$ . Post hoc analyses using Duncan's multiple range test indicated that older students were more likely than younger students to believe that knowledge was uncertain, that it is acquired over time and that it can be seen as integrated.

### *Course of Study*

Courses studied were differentiated by university, course and campus. For example, although Tasmania offered two education courses, the Bachelor of Education was offered at two different campuses. Thus, these were treated as three courses to allow for any cohort differences across campuses. Similarly, the Bachelor of Education (Primary) in Queensland was offered at the main campus and a satellite campus. Again these were treated as two different courses. Using Wilks' lambda statistic, one-way ANOVAs revealed significant differences between students with respect to course studied on Speed,  $F(8,831) = 4.70, p = .000$ , Structure,  $F(8,83) = 12.39, p = .000$ , and

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Truth,  $F(8, 845) = 4.41, p = .000$ . Post hoc analyses using Duncan's multiple range test indicated that the Bachelor of Teaching students in Tasmania and Creative Industries students scored significantly higher on Speed and Structure than all Bachelor of Education students. However, one cohort of Bachelor of Education students from Tasmania along with the Creative Industries students were more likely than any other students to believe that knowledge was uncertain.

### ***Previous Post-School Education Experience (University or TAFE)***

Using Wilks' lambda statistic, one-way ANOVAs revealed significant differences between students on Speed,  $F(1, 811) = 5.38, p = .021$  and Structure,  $F(1, 801) = 5.47, p = .020$  depending on, whether or not this was their first year in a University course. Examination of group means showed that students who indicated that this was their first year of study scored lower on Speed and Structure than students with prior university experience. Specifically, students with prior university experience believed that knowledge acquisition took time and that knowledge was integrated. With respect to TAFE experience, one-way ANOVAs revealed significant differences between students on the factors of Speed  $F(1, 811) = 4.15, p = .042$  and Truth,  $F(1, 814) = 8.69, p = .003$  depending on whether or not they had previously attended a TAFE institution. An examination of group means indicated that students who held a diploma from TAFE were more likely than students without a diploma from TAFE to believe that knowledge acquisition was quick or not at all and that truth was absolute.

### ***Family Experience at University***

Using Wilks' lambda statistic, one-way ANOVAs revealed significant differences between students on Structure,  $F(2, 797) = 5.52, p = .004$ , and Construction,  $F(2, 801) = 3.29, p = .038$ , depending on whether or not their parents had studied at university. Post hoc tests using Duncan's multiple range test indicated that students who had at least one parent who had studied at university had beliefs that knowledge was more integrated and that learning takes place through the construction of personal meaning than students whose parents had not studied at university.

## **Discussion**

A series of one-way ANOVA using key demographics as independent variables and EBS factor scores as dependent variables revealed significant differences between students for sex, age, course of study, previous post-school education experience (TAFE/University) and parental university experience regarding their epistemological beliefs. The results showed that beliefs about learning and knowing were related to course of study, previous post-school education experience, family experience at University, gender and age.

In relation to course of study, students studying a Bachelor of Teaching in Tasmania and Creative Industries students scored significantly higher on the dimensions of structure and speed of knowledge acquisition than all Bachelor of Education students while Creative Industries students and one cohort of Bachelor of Education students in Tasmania also scored significantly higher on the dimension of truth. Creative Industries students, seeking a degree in creative writing, are likely to be a very different cohort from students embarking on a teaching degree. Creative Industries students may be more likely to be reflective about multiple perspectives as a virtue of their previous experiences. With respect to the Education students, a significant point of contrast in the background of Bachelor of Teaching students is that they already have a degree and are only “first year” in the sense that they are about to embark on a different degree. The average age of this group is also older than the average Bachelor of Education cohort. The fact that they scored higher on the dimensions of structure and speed of knowledge acquisition may indicate that by the end of their degree, students are more likely to perceive knowledge as integrated and to believe that knowledge acquisition takes time compared to when they first start their undergraduate studies. Other research supports this finding (see Schommer, 1998; Baxter Magolda & Terenzini, 2004; Jehng, Johnson & Anderson, 1993). For example, Baxter Magolda and Terenzini noted that older educated individuals are more likely to be reflective about multiple perspectives, develop an individual evidenced-based opinion and remain open to new information that may cause them to reassess their opinions. Such

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beliefs are significant in the context of deep approaches to learning. The planned longitudinal study will further examine how epistemological beliefs develop over time.

The higher scores on the dimension of truth by one cohort of the Bachelor of Education students is less readily explained by background variables although, as a group the students in this cohort were older than all other groups with the exception of the Bachelor of Teaching students. There is some evidence that age has a specific effect on the development of epistemological beliefs. For example, Schommer (1998) found that, with age, individuals were more likely to believe that the ability to learn is not fixed but can be improved through effort. Future longitudinal data will provide the opportunity to investigate the combined and distinctive effects of age and educational experience.

Previous post-school education experience was another variable where significant differences were present between students for the Speed, Truth and Structure scales. Students commencing their first year of university scored lower on both Speed and Structure scales than those students with prior university experience. These students therefore believed knowledge was gained quickly or not at all and that knowledge was not interconnected. With respect to TAFE students, significant differences between students for the Speed and Truth factors were noted. Students who had completed TAFE diplomas were more likely than those who had not completed a TAFE diploma to believe knowledge acquisition happened quickly or not at all and that truth was absolute. Such beliefs regarding speed of knowledge acquisition can be detrimental to students' understanding because students do not persist at complex processing tasks (Schommer, 1990) thus compromising academic performance (Schommer, 1993).

Significant differences were also revealed between students on the Structure and Construction factors depending on their family experience at university. Students who had prior university experience and at least one university educated parent also viewed knowledge as more integrated than students whose parents had not studied at university. Students with university educated parent/s also had higher Construction scale scores and therefore believed learning takes place through the construction of personal meaning. Previous research would lead us to anticipate that



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these students with university educated parents might demonstrate heightened levels of comprehension and metacognition (Schommer, Crouse & Rhodes, 1992). Being able to consider knowledge as interconnected means that students are more likely to think across boundaries and be more evaluative in their thinking because they are not focused on knowledge as absolute and isolated. These sophisticated beliefs regarding the construction of knowledge and learning could possibly be attributed to the positive influence of a parent who is likely to model a view of knowledge as context specific, complex and evidenced-based. Overall this finding is important in the context of the growing numbers of first-year university students who come from non-university educated families (Schirato, 2006).

Females were found to have significantly higher scores on the Truth and Success scales than males. This suggests they were more likely to believe knowledge was uncertain and that successful students rely on more than innate ability to succeed. This could indicate that males have more naïve beliefs regarding certain knowledge and innate ability to learn. These results suggest that males are more likely to believe that knowledge is absolute, unchanging, and able to be transmitted from others. This means that these male university students may remain passive in the learning process because they do not believe that they play a role in constructing knowledge (McDevitt, 1990, cited in Schommer, 1994). When students are not actively involved in the learning process they are less likely to make the explicit links to prior knowledge and thus are less likely to engage in deep approaches to learning (Kardash & Scholes, 1996).

Analysis also revealed that older students scored significantly higher on the Speed, Truth and Structure scales indicating they were more likely to believe knowledge was uncertain, acquired over time and can be seen as integrated. This provides support for the supposition discussed above that age has an effect on the sophistication of students' personal epistemologies. This could also mean that younger students are more likely to remain passive in the learning process, believing they do not play a role in the construction of knowledge. Knowledge is thus viewed as absolute, unchanging

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and able to be transmitted from others. This is ultimately detrimental to the learning process and puts them at risk of being unable to engage in critical thinking in the process of learning.

### **Implications**

Recent research regarding personal epistemology, an individual's beliefs about the processes of learning and knowledge, suggests a focus on the personal beliefs of first-year university students may help to promote better approaches to learning. The findings revealed that the first year students in this study varied substantially in the views they held about the nature of learning and knowing. Some of these students would appear to be more at risk of experiencing difficulties in learning at University. Specifically, the students in this study who had no previous university experience (including parental university education), held TAFE qualifications, were males and younger in age were all more likely to begin their courses with naïve beliefs about learning and knowing which may have an influence on their approaches to learning.

In the current climate of concern for how students navigate their university studies, particularly in their first year experiences, it seems that a focus on student-centred learning is imperative (Barrie, Ginns & Prosser, 2005). While projects such as the First Year Experience Project at the University of Sydney have been devoted to addressing first year difficulties, it seems that a focus on learning beliefs is needed in order to address the pervasive surface approach to learning. This information also provides encouragement for universities to increase their focus on how students learn in higher education as it can be used to improve the support "at risk" students receive by establishing a more student-centred approach to teaching.

The results of this study also provide support for courses that explicitly focus on the nature of learning and knowledge in order to help students to reflect on and possibly reconstruct their beliefs. We are not necessarily advocating for the movement of students along a developmental trajectory. Rather, we need to be promoting a view that in order to function in increasingly complex learning environments, both professional and personal, students need to understand that sometimes it is

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necessary to see knowledge as complex, evolving, effortful, tentative and evidence-based: these epistemological beliefs are at the very core of deep approaches to learning.

A growing body of research supports the idea that in order to promote more sophisticated epistemological beliefs, educators need to encourage university students to actively reflect upon their beliefs and to problematise knowledge (see for example Brownlee & Berthelsen, 2008; Phillips, 2001). This means that educators can promote the development of more sophisticated epistemological beliefs by role modelling knowledge evaluation and supporting students to critique and evaluate knowledge as well as explicitly reflecting on the nature of knowledge (Baxter Magolda & Terenzini, 2004).

First year experience programs which focus on such beliefs may not only support students in their approaches to learning but may also support changes in the underpinning philosophy of teaching and learning at universities to one in which teaching is student-centred (Barrie, Ginns & Prosser, 2005).

Although these findings make a substantial contribution by identifying groups most at risk of learning difficulties, future research to consolidate these conclusions is suggested. It is expected that even more conclusive information regarding the epistemological beliefs of different cohorts and the effect key demographic variables have on them will be revealed in further phases of this longitudinal research.

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