

Expanding on the evidence of Higher Order Thinking Skills in first year undergraduates

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Abstract

All students enter university with a 'virtual uni bag' containing their previous life experience as well as their existing knowledge and skills. If the teachers in the academy know what they bring and what will engage them, they could use that knowledge, when designing curriculum and assessment, to improve pedagogy to enhance the transition process for vulnerable students. This paper reports on innovative research into the Higher Order Thinking Skills present in a sample of pre-service education students' writing in the genre of critical comparative analysis. Interviews were also conducted and analysed. Using analytical descriptors derived from the work of Marzano (2001) and focussing on the two 'top' levels of skills the Self-system and Metacognition it was found that these aspects of the students' skills were well represented. The paper ends with tentative suggestions for the use of this research in planning pedagogical approaches for first year courses.

Introduction

In this paper evidence based on written and oral data, will be presented, that identifies some of the Higher Order Thinking Skills first-year university students applied when they wrote their first major assignment in a comparative critical analysis essay in a literacy course in Education. The essays and interviews were analysed in a case study designed to discover what Higher Order Thinking Skills newly enrolled students might have. These are not obvious to their teachers because they are not explicit in the marking rubric and are not usually sought. Marzano (2001); Marzano & Kendall (2007, 2008) and Costa (2008) have defined higher order thinking skills, and their descriptors have been adapted and used in the analysis of the data, this is a new and unusual approach. Gaining a clearer understanding of such students' existing skills at the start of tertiary programs could support the retention agenda among first year university students in Australia. This knowledge could also promote constructivist pedagogy and better enable curriculum planners and designers to plan for scaffolding within their courses. The findings are informed by the concept of 'engagement' as described in the Transition Pedagogy literature (Kift, 2008, Kift, Nelson, & Clarke, 2010; Nelson & Kift, 2005; Nelson, Kift, Humphreys, & Harper, 2006; Tinto, 2009).

Literature Review

Transition pedagogy is an important part of the higher education retention agenda. All new first year students are in transition. Many of these students fail their first assignment and many of them then drop out of university. There is a range of reasons for this dropout rate and for their failure to do well in their first assignment (Coates, 2008, 2010; Coates & Ransom, 2011; Haggis, 2006; Nelson, 2014; Whitehead, 2012). There is cogent argument that student engagement with the learning process is a *sine qua non* for academic success (Nelson, 2014; Tinto, 2009; Weimer, 2013), among others. The argument in this paper is that if the curriculum considered their existing skills and knowledge in a more explicit and tailored manner when

they join the academy then, following constructivist principles, they could be scaffolded more productively into a process that would capitalise on the contents of their *virtual uni bags* (Thomson & Hall, 2008) and enhance their chances of academic success. This research makes a contribution towards revealing the contents of students' *virtual uni bags*.

The descriptors used to analyse the essays were adapted from Marzano & Kendall (2007). They have further developed Bloom's Taxonomy and have used it to create a taxonomy that "is arguably friendlier to teachers in terms of its translation to classroom practice" (Marzano & Kendall, 2007, p. 10). Using the dimensions of knowledge and mental processing they argue that "educators can design objectives for specific knowledge components involving specific mental processes" (Marzano & Kendall, 2008, p. 24). In this study, their definitions of such "specific mental processes" were used and adapted to analyse the data.

The new 'top'-level skill they have introduced is *Self-system thinking*. They saw this as the first step in a learning process and the most important because it summarises the abilities present in a self-regulated learner. In Marzano (2001), the Self-system was described as containing a network of interrelated beliefs and goals that are used to make judgments about the advisability of engaging in a new task. The Self-system consists of four components: a 'sense of importance', a 'sense of efficacy', an 'emotional response' to the knowledge being acquired, and 'overall motivation'. The first three together equal *Overall motivation*. They all need to be in place for a full sense of motivation to be present. A 'sense of importance' is a prime determiner of the motivation brought to the task. The first issue for a learner when faced with a new learning task is to decide if the task is important for them. This seems to put the onus on the student to find their own motivation but the institution could also take some responsibility for making tasks feel important.

O'Neill & Geoghegan (2012), in their study of first-year students in a literacy course/unit, showed that an institution can engage students and that the students will appreciate the importance of the learning tasks required of them. They created this sense of importance through classroom experiences and practicums that linked the tasks with students' chosen profession. There is a strong inference in the article that the content of the course/unit satisfied the students' need to experience modelling of explicit teaching and other constructivist-based pedagogies. There is also evidence in the article of the students' sense of efficacy as well as being positively disposed to their course content. Similarly, Gibson (2011) engaged her students in designing their course and assessment, which also demonstrates how institutions could provide engaging tasks that would assist students in developing a sense of the importance of a task. Among other results, her absenteeism rates decreased. Zepke (2013), and Zepke & Leach (2010), have made suggestions for improving student engagement and they assume that the institution will take responsibility for developing the students' sense of the importance of the task, thus engaging them in the process.

Transition pedagogy needs to enable new students to engage with their studies and their institutions. The question still being asked is how to do this better? The hypothesis here is that if curriculum developers and course designers are aware of what the students can already do when they join the academy they can build on that and develop pedagogical support around what is difficult for them.

Method

A case study was designed involving eighteen self-selected first year pre-service teachers studying a course/unit on the foundations of literacy. Higher Order Thinking Skills were

identified in their writing, as well as in follow-up interviews, as defined by descriptors derived from the work of Costa (2008), Marzano (2001), Marzano and Kendall, (2007; 2008). Coding in NVivo was performed and the results are presented in tabular form. Bricolage was selected as a research methodology because this allowed a range of research methods to be employed to arrive at an understanding of what it is that these first year students could do at the start of their university careers. The student essays that were analysed were written in the genre of comparative critical analysis and this assessment item was designed for students to demonstrate their understanding of the critical concepts taught in the course, which had introduced them to literacy pedagogy. The analysis and descriptors that were used to reveal students' Higher Order Thinking Skills for the purposes of the research reported here are confined to the top two levels of thinking skills the Self-system and Metacognition, as described by Marzano (2001), Marzano & Kendall (2007, 2008) and Costa (2008). The reason for this was the need to focus on those Higher Order Thinking skills deemed to be most relevant to the objectives of this research which is breaking new ground in the field of Transition Pedagogy.

Results and Discussion

This section has the analysis and discussion of the essays and interviews; each skill has a results chart with the oral data results represented in italics. This is followed by discussion. The Self-system, the 'top' level skill, consists of examining importance, examining efficacy, examining emotional response and then examining overall motivation (Marzano 2001 p.50). Costa's descriptors are included next (Costa 2008 p.23) and then the other top level skill, Metacognition. It consists of goal specification, process monitoring, monitoring clarity and monitoring accuracy. (Marzano 2001 p. 57)

Self-system Thinking

Components of the Self-System	Sources (Students who showed evidence of this skill)	References (Total number of times this was coded in NVivo.)
Examining Importance	7 + 4	9+7
Examining Efficacy	10 + 4	15+8
Examining Emotional Response	2+1	3+2
Examining Motivation	1+2	1+3

It was difficult to identify the self-system in the essays because it focusses on the students' inner senses of importance and efficacy and their emotional response to their studies, together constituting their overall motivation. What follows is how it was adapted for this research.

Examining Importance

If a student writer realised the importance of literacy learning for children as well as aspects of teacher talk and behaviour they were coded on this node. Student 18 commented on the theory around the Scaffolding Interaction Cycle and the Initiate Respond Evaluate sequence¹

That has come up quite a bit again, in the other courses I have done. I can see now how that was important. Because it was at the start of my uni journey, I didn't really see how to apply it but now I can really see 'o yeah that makes sense', especially now that I have been on prac I can really see

¹ The Scaffolding Interaction cycle (SIC) and the Initiate Respond Evaluate (IRE) sequence are terms for ways in which teachers can interact verbally with children in the classroom. They are theoretical constructs that were taught in the course/unit referred to in this paper.

how the teacher talk affects the children and what you are trying to teach them. Questioning as well. At the time, I didn't really think it was important but now I do.

This text demonstrates the student writer's sense of the importance of what she was learning and how it would apply to her as a teacher when she enters the profession. In an example taken from the essays, Student Writer 13 refers to the first extract, "Basic literacy skills are crucial traits in which a child must possess, therefore being taught in schools and encouraged in home environments are important."² (The errors are retained for authenticity.) She has well understood the importance of literacy learning.

Examining efficacy

Marzano and Kendall (2007) explain that 'examining efficacy' is about the student believing that they can improve their competence or understanding, relative to a specific type of knowledge. The written data were coded as demonstrating this skill when the student writer recognised that the teacher or parent was doing something that was going to add to the competence or skill of the children. Fourteen out of the seventeen student writers' essays were coded on this descriptor in terms of their understanding of what it meant in the school classroom and teaching.

A typical quote from student writers in this respect is this one from Student Writer 3

... the social-cultural discourse established within Sarah's home enables her to engage in literacy learning. Sarah's mother and aunty thoughtfully construct experiences through everyday activities, placing Sarah at the center, so that literacy learning occurs within a meaningful context.

Evidence of 'efficacy' also occurred in the interview data. All the student writers/interviewees demonstrated a sense of their own efficacy except for Student Writer 4 who was a confident student in terms of being able to write essays but appeared to have a low sense of self efficacy. She had a problem with a need to be supported through the writing of her assignments and her response suggested a low sense of self efficacy.

In the first assignment I felt pretty confident because I had [the tutor] there and he checked my work and I had my other friend who was able to tell me if I was on the right track. ... Less confident with the other one ... I was on prac and missed some tutes... So I wasn't feeling too good about that one.

At the time of the interview, she had decided to drop out of university for a while and was not sure what direction she would take. She could be described as a typical traditional student who, despite being prepared for university by her school, had not settled into the university curriculum.

Emotional response

Marzano et al. (2008) use this descriptor where the learner examines their own emotional responses to learning tasks. However, in this analysis, if the student writer showed sensitivity to the children's emotional response, it was coded on this descriptor. For example, Student Writer 16 wrote, "Mrs Green also commends and praises Sarah when she answer (sic) a question correctly, "Yes you're right. Well done!" (Line 16); this also gives Sarah confidence and encourages her to finish the task she has been set." Only four of the essays were coded on

² The assignment involved a comparative critical analysis of two extracts of instructional talk. Students were required to compare them in terms of the literacy learning theory that had been taught in the course.

this descriptor and it was decided to explore the issue further in the interviews to discover their own emotional responses to their learning in this course.

Student 18 had enrolled in another university course, which she had subsequently dropped.

Then I did a TESOL diploma which took me to Vietnam and I taught in a school there for about 3 months; then I came back to Australia and enrolled in the Bachelor of Education. And while I was in Vietnam I realised that was what I really wanted to do, that sparked my passion ...

She had positive emotional responses to her studies, which together with her sense of importance and efficacy combined to establish her strong sense of overall motivation.

Overall Motivation

Student 1's comment on her motivation was also typical of those interviewed: "I guess my motivation is a double thing, wanting to be a good teacher and wanting to do well in the assignment...In general I want to get the answers and do well." If Tickell and Smyrnios's (2005, p. 240) contention that students' motivation is a predictor of potential success is correct then Student 1 is on her way to being a successful student and teacher.

The content of her interview provided evidence of Student 16's clear sense of the importance of motivation for pedagogical purposes, and she commented a number of times on the dangers of allowing children to lose motivation for learning. Student 10, on the other hand, did not remember any details of the second assignment six weeks after she had completed it, so although she expressed emotional reactions to the fact that she was stressed about not getting an extension for her assignment, her emotions were not engaged in the course content. When examining the 'trinity' of factors composing 'motivation', this student did not find what she was doing 'important', but she had an adequate sense of her own 'efficacy' and not much in the way of 'emotional responses'. Her 'self-system thinking' in this context was not evident. However, it is important to note that in another context this student might have shown much stronger 'self-system thinking', for example if she had been studying a course that she had found engaging.

Student 3 was passionate about what she was doing, but she had found the new language she encountered when she joined the academy confusing and daunting. However, she was jubilant about her achievement of getting her degree in four years, and ambitious about studying further. She was careful to control her emotional responses to issues in her workplace and sounded like a mature, emotionally intelligent person.

To do an online degree you have got to be internally driven. Highly motivated, got to be – doing it for me and without that knowledge wouldn't be able to be at home when others having fun etc... motivation intrinsically driven...

Lizzio and Wilson (2013) include 'motivation' or *will* in their predictors of success. Collier and Morgan cite Tinto (1975, 1993) and his model of student success in which he describes what new students bring with them in what has been referred to here as their *virtual uni bag*.

... new students start with pre-enrolment packages of individual attributes, previous schooling, and family support. These have a direct effect on the students' desire to complete a degree, which Tinto refers to as "academic integration." These variables also affect the students' desire to get a degree at a particular institution, or what Tinto calls "social integration." (Collier & Morgan, 2008, p. 426)

If the idea of “desire” is related to Marzano’s descriptor of ‘motivation, then Student 10 appears to have little motivation and, in Tinto’s terms, would not be expected to persist with her degree. A case like this, where the student has no lack of a sense of efficacy, but lacks a sense of ‘importance’, as her emotional responses are not directed towards the knowledge to be gained at university, the Marzano descriptors appear to be accurate and relevant.

To complete the commentary on the ‘self-system’ it was decided to include Costa’s work. He worked closely with Marzano.

Empathy according to Costa (2008)

Learning to listen with understanding and empathy may be one of the least taught skills in school, yet it is one of the most powerful skills of intelligent problem solvers (Steil & Bommelje, 2007) (cited in Costa 2008 p. 23).

Costa’s descriptors	Sources	References
Empathising	10 + 4	24 + 7
Summarising and Paraphrasing	15	45
Setting aside personal judgements	4	4

This is arguably part of the ‘self-system’ and data related to these descriptors were drawn from written and oral data. Costa’s emphasis is more on the ability to understand how someone else was thinking and this was therefore given a separate category within the ‘self-system’. Fourteen student writers were coded in this category under ‘empathy’. They noted the positive approach shown by the mother and aunty in the first extract of instructional talk in the assessment task, and the negative results of the teacher’s behaviour in the second extract. They all showed similar sensitivity in the interviews except for Student 10. Student 18 worked in a hospital cancer clinic and considered that this work enhanced her skills in dealing with people and would be valuable when “dealing with little people in school.” Student 1 had not had a lot of classroom experience but when asked to comment on the teacher’s troubles in Extract 2, she shared this insight:

...it is easy to get distracted at times. But I think I’m very conscious of not berating kids; I don’t like to do anything like that in front of the class sort of thing; that’s my personal sort of thing; I might have a chat afterwards. That’s why my behaviour management can get all over the place at times....

Student 16 showed an understanding of the problems experienced by the children in Extract 2:

I’d analysed the way the teachers spoke and because he didn’t speak the best he could’ve spoken, there could have been implications for the child and for their learning. He could have confused them and their motivation could have been lost

She understood very well that the teacher’s talk and management was not effectively engaging the children because of his lack of empathy and understanding of how they were thinking.

There were also interesting responses to putting aside autobiographical responses. All, except Student 10, claimed that they were readily able to do this. In summary, of the five students interviewed four showed clear evidence of having ‘self-system thinking skills’. However, if the results of the analysis of the written data are factored into this claim the situation is less hopeful, especially if ‘motivation’ can only be considered if all three components are in place. Nevertheless, fifteen of the seventeen student writers showed evidence of ‘efficacy’ and the

results for ‘empathy’ and ‘paraphrasing’ were predictably strong as this is a teacher education course and empathy can be expected to be part of most students’ emotional make-up.

It seems that the weak areas in the ‘self-system’ are the sense of ‘importance’ and the emotional response to their studies, while ‘efficacy’ is not that strong in the written data either. This therefore suggests that curriculum developers and course designers need to develop pedagogical strategies to enhance the students’ sense of importance which could increase their emotional response to their learning and would thus increase their sense of efficacy, all of which adds up to motivation. This would have to be programme-based but it would need to be related to their classroom experience, whether the classroom is a physical room in a building or online. The next level after the ‘self-system’ is ‘metacognition’, and the following table represents the results of the analysis of the data in terms of descriptors that relate to ‘metacognition’.

Metacognition

Components of Metacognition	Sources	References
Specifying goals	14 + 5	16 + 1
Process Monitoring	8 + 2	17 + 3
<i>Monitoring Clarity</i>	4	4
<i>Monitoring Accuracy</i>	17+5	17+6

According to Marzano (2001, p. 12), the metacognitive system is engaged once the ‘self-system’ has decided to embark on the task. Its role is to set goals and devise strategies to accomplish the goals set in the given task. According to Marzano (2001, p. 49) the metacognitive system has responsibility for the “executive control” of all other forms of thinking; *viz.* goal specification, process monitoring, monitoring clarity and monitoring accuracy.

Specifying goals

Whenever the student writers clearly stated the goals and the intended shape of their essays, they were assumed to have set their goals and were coded according to this descriptor. It was not explored further in the interviews where the focus was more on the areas that could not be found in the essays. Nevertheless, evidence of this skill did appear.

Process Monitoring

Where the student writers identified processes in relation to the teachers and children in the assessment task extracts and commented on their effectiveness, they were coded on this descriptor, which was then further explored in the interviews. For example, as the interview with Student 18 unfolded it became clear that much of what was being said related to process, i.e. to Student 18’s awareness of her own processes in writing and dealing with her subject, and much of that sense of her process in turn related to her level of engagement. Engagement is a core issue in a great deal of the Transition Pedagogy literature (e.g. James, Krause, & Jennings, 2010; Kift, 2008; Kift et al., 2010; Krause & Coates, 2008), and the First Year Experience literature (e.g. Exeter et al., 2010; Gibson, 2011; Laird, Chen, & Kuh, 2008; Nelson, Quinn, Marrington, & Clarke, 2012; Tinto, 2006-2007,2009; and Weimer, 2013). Student 18 indicated clearly that she had not engaged in the issues of the second assignment and that she thought this was because it was written before she had had any classroom teaching experience. “I was just writing what, ... I had been taught in the course materials to get the right answer and get the right marks”, before acknowledging: “I don’t think I engaged with it enough.”

Students 1 and 16 were both conscious of their own processes, and Student 3 spoke strongly about how she followed the rubric and course materials provided to get the best mark possible. By contrast, Student 10 expressed little interest or awareness of her personal writing process and was satisfied that she did not need to expand her consciousness of it.

Monitoring Accuracy and Clarity

All the student interviewees were conscious of the need for clarity and accuracy and described different ways in which they monitored these behaviours in themselves. For accuracy, they all realised that providing appropriate references was necessary. Only Student 18 found the need to provide references frustrating:

Yes, I know it is important to back up everything and that your ideas have to be supported by the academic literature. That is what really annoyed me about uni in general, um, I haven't got across the whole referencing thing.

Student 1 has not fully embraced the persona of university student yet. According to Bye et al. (2007, p. 145), she is still in the identity forming stage of her development and because she is a younger student might therefore be more motivated by extrinsic factors. There was substantial evidence of the student writers monitoring their accuracy in the ways they used references to support their statements and comments. Overall, this evidence suggests that the students' metacognitive systems are in place. They specified their goals clearly and how they planned to achieve them. They could have been more conscious of their processes, and of process in general, this could be another aspect that could be addressed in first year curricula.

Conclusion

This paper has reported on a case study, which involved relatively small numbers of students. Nevertheless, the results of the analysis in terms of the descriptors of the 'Self-system' suggest a real need for the curriculum to include pedagogical practices that will engage students in the classroom and provide them with a sense of the importance and relevance of the knowledge they are acquiring. O'Neill and Geoghegan (2012) indicated that the students in their course/unit generally appreciated the importance of the course content. A sense of 'efficacy' was not lacking overall in this sample, and in the interviews 'motivation' also scored well, as did a sense of 'importance'. However, an emotional connection to their work needs development, and is potentially a crucial factor in whether they are engaged or whether they persist, or not. The 'Metacognition' descriptors and Costa's descriptors relating to empathy were all coded high. In conclusion, it is suggested that there is a need for curriculum planners and course designers to consider ways in which students can develop their 'self-system' skills and be scaffolded within their learning programmes. Further research on ways to apply these descriptors to classroom pedagogy, and experimentation to achieve this, possibly using Marzano (2008)'s methods, would enhance first year students' classroom learning experiences with engaging programmes, thus supporting retention agendas and enhancing the students transition experience.

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