A Theory-driven Approach to Subject Design in Teacher Education

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Abstract : The intent of this study was to examine how a theoretically-designed subject in an undergraduate teacher education course impacted on the learning and confidence of pre-service teachers in catering for the needs of students with diverse needs. The subject design utilised theoretical principles of self-organisation that were incorporated with the teaching and application of three evidence-based pedagogies of inclusion: explicit teaching, cooperative learning and collaborative practice. The study examined how the principles were enacted throughout the delivery of the subject and sought pre-service teacher reflections after completion. Initial findings suggest that embedding these principles and incorporating practical application throughout the subject assisted pre-service teachers with their learning, the completion of assessment and enhanced their confidence in being able to meet the needs of students with diverse needs.

Introduction

Evidence-based practice is commonly utilised in the inclusive education field (Boe, Shin & Cook, 2007; Carroll, Forlin & Jobling, 2003; Carter, Stephenson & Hopper, 2015). What is often missing is a theoretical base that combines these evidence-based practices with a process that utilises continual feedback and an expectation of improvement (Lancaster & Bain, 2010; Zundans-Fraser, 2014). The intent of this study was to design an undergraduate subject using a theoretically-based design process, implement the design throughout subject delivery and then examine the feedback provided by pre-service teachers about their learning and mastery of content. The subject happened to be in inclusive education although the focus was on the use of theory to underpin the subject design process and to demonstrate how elements of the theory could also be embedded within subject content and delivery in an authentic manner. The approach used in this study was based on theoretical work in complexity and self-organisation (Kauffman, 1995; Prigogine & Stengers, 1984; Waldrop, 1992) and utilised three evidence-based pedagogies – explicit teaching, cooperative learning and collaborative practice. It is recognised that more approaches exist than those used and that what constitutes as evidence-based practice varies (O'Neill & Stephenson, 2014). These pedagogies were selected as only three could realistically be addressed within the constraints of the teaching session and the instructors were particularly interested in the practical application of these approaches.

Researchers have recognised the need for curriculum reform and development to be theorised beyond curriculum content (Kezar & Lester, 2009; Sabri, 2010). This requires utilising theory in a manner that links the design process to substantive and sustainable curriculum development (Zundans-Fraser & Bain, 2016). This type of theory looks at the way an organisation is structured for learning and teaching, as well as the content and processes

specifically related to the design of curricula (Bain & Zundans-Fraser, 2016; Hora, 2012; Zundans-Fraser, 2014). Research that has identified the need for theory in higher education focuses on the impact of a lack of an evidence or research base for work being done in this context. Solutions suggested include the need for theoretical frameworks and evidence-based practice to guide work (Campos, Freitas & Grabovschi, 2013; Stierer & Antoniou, 2004). In the study reported in this paper, a single subject has been used as the focus for design.

Evidence-based Pedagogies

For some time now, educational jurisdictions have begun to focus their attention on classroom practices that have some evidence within research as being effective (e.g. Centre for Education Statistics and Evaluation, 2014). The failure of many teacher education courses to encompass evidence-based course and subject design can be attributed to factors such as vague conceptions, minimal consideration of the structure and ideology behind a subject and how it fits within a course, little thought given to impact on external relationships and end-users and little consideration of the specific knowledges and skill base required (Bain & Zundans-Fraser, 2016; Koster & Dengerink, 2008; Zundans-Fraser, 2014). This lack of theory subsequently impacts other areas such as engagement with collaborative practice, the need to address the theory-to-practice gap in teacher education and the ability for the field to train and maintain quality educators. The Teacher Education Ministerial Advisory Group report (2015) indicates that "the accreditation of courses is currently not sufficiently rigorous or evidence-based" (p. 4). There is also recognition of the need for graduates to have the skills to authentically cater for the diverse learning needs of students (Dempsey & Dally, 2014). Explicit engagement with teacher education course design and evidence-based theory would allow areas that are overlooked or that need to be developed to come to the fore through purposeful design and an embedded structure.

For teachers to be effective in meeting the needs of increasingly diverse student representation within classrooms, they need to display proficiency with a variety of such evidence based practices and pedagogies (Arthur-Kelly & Neilands, 2014; Ashman & Elkins, 2012). Additionally, they need to be aware of how to differentiate instruction using these pedagogies and working collaboratively to ensure that the needs of all students are addressed (Mastropieri & Scruggs, 2013). Two instructional strategies identified by Hattie (2009) as being effective for all learners, but also able to be differentiated for diverse learning needs are Explicit Teaching and Co-operative Learning, with a focus in this study on Jigsaw II.

Explicit Teaching (ET) is a pedagogical approach which is "an unambiguous and direct approach to teaching that includes both instructional design and delivery procedures" (Archer & Hughes, 2011, p.1). While various researchers have identified what they perceive as the important steps or stages required to deliver ET effectively, and with integrity (Christenson, Ysseldyke & Thurlow, 1989; Rosenshine, 1987, 2012), there are some differences between these descriptions. Commonly among these, however, are explicit learning outcomes (made clear to pre-service teachers), modelling through small steps with a variety of scaffolds, guided and independent practice with constant monitoring and the provision of feedback. Rosenshine's (1987) description of explicit teaching was used as the basis for the subject design in this instance, where he describes it as "a systematic method of teaching with emphasis on proceeding in small steps, checking for student understanding, and achieving active and successful participation by all students" (p. 34).

Cooperative Learning (CL) has been described as a set of methods where students work in small mixed ability teams (Slavin, 1994). McMaster and Fuchs (cited in Lancaster, 2014, p. 230) identified at least seven different approaches to CL. Even with this variation

there are a number of key features that contribute to its effectiveness including: task structure, group goals, positive interdependence, individual accountability and group rewards.

All approaches to CL involve students being both responsible for their own learning as well as taking some responsibility for helping their peers to learn. In cooperative learning, students are interdependent, working together for mutual rewards, as opposed to more traditional approaches where individual students compete for 'limited rewards', such as attaining first place in a class. Johnson and Johnson (1991) have described the importance of this positive interdependence, saying that students must believe that they sink or swim together for the cooperation to work. Cooperative learning, too, has a number of variations.

The value of working collaboratively has been recognised by many researchers and is linked with programs of high quality (Friend & Cook, 2013; Kezar & Lester, 2009; Lyons, 2014). The use of collaborative processes allows for the sharing of knowledge, the use of collective intelligence, and the opportunity for deeper engagement (Zundans-Fraser & Bain, 2015). Ideally, teacher education programs should model and provide pre-service teachers the opportunity to experience, observe and critique the teaching and learning approaches being advocated (Reid, 2011). If an expectation of a subject is that students learn how to work collaboratively, then this should be demonstrated by the educators involved in the delivery of the subject (Zundans-Fraser, 2014). Without this explicit connection to practice, students become sceptical about the more theoretical aspects of their program and are unable to see the practical connections and relationships (Hobson et al., 2008). This subject was designed in a manner that explicitly addressed this theory-to-practice gap.

Numerous researchers (Bain, Lancaster & Zundans, 2009; Bain, Lancaster, Zundans & Parkes, 2009; Darling Hammond, 2006; Metzler & Blankenship, 2008) suggest that education systems, including institutions of higher education and schools, need to work together on a reform agenda using evidence-based practice, as many issues are similar across these interest groups. The argument is that focusing on shared problems would increase political power, develop the learning capacity of the "system" as a larger entity and that, ultimately, the needs of schools would directly impact and be addressed by teacher education practices within institutions. Teacher education requires a more integrated and dynamic approach to designing courses and subjects that is currently evident (Zundans-Fraser, 2014).

The Use of Theory in Program Design and Development

The use of complexity theory has emerged from the study of chaotic, nonlinear and dynamic behaviour of systems, although its use and application in the field of education is a relatively new phenomenon. Complexity theory is used to explain the behaviour of systems that are emergent, and constantly changing through a process of self-organisation. It is well applied in this instance as the nature of teaching requires the application of a design that allows for practice that is emergent, adaptive and self-organising. Within this theoretical framework, an agent is any stakeholder within the system.

The implementation of four theoretical principles of self-organisation is informed by prior application of theory and research in self-organisation to subject and program design. This is based upon a model of organisational design first implemented and researched in a K-12 setting (Bain, 2007) and then adapted and extended to other school settings and the higher education sector (Bain, Walker & Chan, 2011; Bain & Weston, 2012; Lancaster & Auhl, 2013; Zundans-Fraser, 2014; Zundans-Fraser & Lancaster, 2012). The four principles used in this study included: embedded design, feedback, dispersed control and common schema.

The principle of embedded design "creates self-repeating patterns by expressing simple rules in design and by embedding these design features in all others" (Zundans-Fraser

& Lancaster, 2012, p. 2). This design principle involves thinking about and acting upon the ways the simple rules in design can be enacted. It involves developing the systems, tools and strategies that complete a theory based approach to design (Kuhn, 1996). The principle of embedded design also creates a level of predictability between the various components within a system. In an educational context this ensures a sound relationship between learning and teaching. In the context described in this paper, this can involve creating the conditions for sharing feedback, or designing a process where evidence-based practices are embedded in subject design and delivery (Zundans-Fraser & Lancaster, 2012). Embedded design means making operational those things that faculty members are committed to by using elements in some way through day-to-day activities, building capacity and familiarity to ensure self-reinforcement.

Feedback is the way a complex system talks to itself (Pascale, Milleman & Gioja, 2000). A system that can feed back and forward as part of a network of regular exchange between individuals and groups can create emergent change in the organisation. In a self-organising system, feedback is gathered about those things the organisation is committed to. Organisations are examples of feedback systems as "every time two humans interact with each other, the actions of one person have consequences for the other" (Stacey, 2006, p. 80). The way an individual reacts will have consequences that will require another response and so on. In the context described in this study, the integrity of collaborative process, the feedback pre-service teachers gave peers about the quality of lesson design, or the extent to which peers participated in cooperative learning provided feedback sources. Most important, the feedback emerged from the normal work of being a faculty member teaching the subject and a pre-service teacher participating in the subject.

Dispersed control (Holland, 1998) is about empowering those with agency in the system. In this study it was important to build the capacity of pre-service teachers in the process in order to give them this agency. Shared understandings, feedback and embedded design meant that all pre-service teachers had a stake in the way the subject was delivered. As faculty members doing the actual work of subject design and delivery, we had pivotal agency in the system. In an educational context, dispersed control of an activity allows for immediate feedback and for educators to be engaged in continual formal and informal professional communication. The additional benefits of dispersed control are "that ownership and innovation are shared, collective intelligence is highly valued" (Bain & Zundans-Fraser, 2016, p. 18).   and the whole system is viewed as a professional body rather than all 'ownership' being directed towards those delivering the subject. The system is bottom-up in structure and relies on the interaction of all agents (faculty members and pre-service teachers), so effective communication systems are essential. As collective intelligence is so highly valued within this process, dispersed control is a natural progression and an acknowledgement of each agent's professionalism (Bain & Zundans-Fraser, 2016).

The three previous principles identified are designed to function interactively to create a common schema. For example, dispersed control happens when the organisation shares a schema and its agents are able to engage in self-organising behaviour (Gell-Mann, 1994). A schema is a conceptual framework that characterizes one's interaction with the world (Bain et al., 2011; Marshall, 1995) and helps individuals to work together to complete their unique roles within the system (Bain et al., 2011; Gell-Mann, 1994). While the initial cornerstones of the schema may not be autogenetic (Kauffman, 1995), the idea is that the design cornerstones are subject to dynamic and ongoing adaptation and evolution as agents engage with the process. The schema is dynamic and negotiated and subject to change based upon feedback.

University teacher education programs have been criticised as not adequately preparing graduates for the complex task of classroom teaching. The development of the skills and knowledges necessary for this task can be built by construction of well sequenced

programs, where skills are introduced at a fundamental level and scaffolded to higher levels by repeated exposure in a developmental approach (Marshall, 1995). Using a theory base from which to support course design in teacher education programs allows for a more disciplined approach to schema building than the sometimes haphazard approach for which such programs are sometimes criticised (Darling-Hammond, 2006).

The four principles described were applied in the instructional design of the pedagogies and through the structuring of the subject into a series of self-repeating cycles described later in the paper. These cycles reflected an embedded design approach, created opportunities for emergent feedback, dispersed control from the faculty member to the pre-service teacher cohort and helped contribute to the development of a common schema for practice. This built on prior studies completed in subject and program design utilising principles of self-organisation (Bain, 2007; Bain, Walker & Chan, 2011; Lancaster & Auhl, 2013; Zundans-Fraser & Lancaster, 2012). In this study the intent was to extend on this earlier work with a focus on subject design and pre-service teacher experiences.

Research Questions

The research questions investigated were:
1. What aspects, if any, of the subject design or delivery did pre-service teachers feel impacted on their learning, including their self-reported mastery of the pedagogies in which they were instructed?
2. Did completion of the subject enhance pre-service teacher confidence in their ability to meet the learning needs of students with diverse needs?

Method

The following section provides details about the study participants, setting, details of the teaching cycle, an overview of the subject content and assessment, and an explanation of the strategy of inquiry used for analysis of the data collected throughout the study. Ethics approval was obtained from the institutional ethics committee to undertake this research and participants provided informed consent to take part in the study.

Participants

A total of 60 pre-service teachers participated in this study, all of whom were third year students enrolled in a primary teacher education program in an Australian regional university. Of the total, 37 were females and 23 were males. This cohort comprised of pre-service teachers who had come directly from secondary school settings, to those for whom teaching was a career change. Within this group the spread of ages ranged from 20 to early 50s.

Setting

The delivery of the 14-week subject took place in two key settings. The lectures were held in a tiered lecture theatre while workshops were delivered in a flexible teaching space. Each workshop had 30 pre-service teachers. The teaching team responsible for subject

delivery comprised of three people. Two of these were faculty members who had been practitioners involved with education programs for students with diverse needs within school settings for significant times, including having held leadership positions. The third team member was a Deputy Principal in a local School for Specific Purposes (SSP – in the Australian context this is a segregated setting for students with disabilities requiring high levels of support) and delivered both workshops.

Subject Content and Assessment

The approach taken to content delivery in the inclusive education field at the focus institution has shifted over the past ten years. With acknowledgement of the vast range of disabilities and the diversity within each disability itself, the team recognised that it was impossible to cover all disabilities within the 14 weeks of delivery. A conscious decision was made to move away from the historical use of medical models or deficit models in inclusive education to being strategic about the instructional approaches used. Evidence-based practices were utilised to underpin the content delivered to pre-service teachers. These were modelled in workshops as the content for the week was delivered using the focus approach. The topics covered over the duration of the subject included an introduction to inclusion in the Australian context, legislation and policy, writing learner outcomes, curriculum adaptation, effective learning and teaching strategies, differentiation and communication skills. After covering foundational content as an introduction to the subject, the major focus throughout was the ability of pre-service teachers to use the three pedagogies of inclusion embedded within it – explicit teaching, cooperative learning and collaborative practice. Lectures were utilised to present the theoretical underpinnings of these pedagogies and their application to the focus topic of the week, whereas in workshops pre-service teachers were required to demonstrate their ability to create lessons using the pedagogies of inclusion.

Workshops were led by a practitioner who had day to day knowledge of students with disabilities. This knowledge added to the ability of pre-service teachers to identify with authentic scenarios, as multiple case studies of both students and classes were drawn upon to explicate the content. This access to first-hand knowledge was valued by students and seen to help in application of the theory of pedagogical approaches to practical situations.

Two different types of assessment were embedded throughout the subject - lesson designs and a weekly quiz. The quizzes required pre-service teachers to keep up to date with their readings and respond to questions that examined their understanding of the theory and the evidence-base for inclusive practices. The content of each quiz was sourced from weekly pre-readings and related lecture material. The quizzes were a mixture of multiple choice and short answer questions. This allowed for pre-service teachers to demonstrate the application of some of the concepts covered, rather than being a pure memory task.

Teaching Cycle

The theoretical principles underpinning the subject design were expressed in the instructional processes used to teach each of the pedagogies described earlier. As each pedagogy was introduced for its three week cycle, the set subject readings were targeted at the focus pedagogy. These readings provided background information about the pedagogy and included at least one evidence-based study in which the pedagogy had been used. Pre-service teachers were asked to read these in preparation for the pedagogy cycle. Lectures were designed with the understanding that pre-service teachers already had the background

knowledge obtained through the readings and targeted the application of concepts and ideas addressed in the readings. The quiz questions focused on the material covered in readings and lecture content.

The workshops were the vehicle for pre-service teachers to actively experience the subject design principles and implement the concepts they had learnt about. In these weekly two-hour skill-building workshops, pre-service teachers learnt about the focus pedagogy, used the key concepts to build a lesson using the pedagogy and then differentiated their design for an inclusive setting. The focus teaching approach to be addressed in the workshop was used to teach the workshop as a reinforcement method where faculty members were 'using the pedagogies to teach the pedagogies'. For example, explicit teaching was taught using an approach that implemented the major characteristics identified in the literature to model the practice within a 'lecture' situation. Workshop sessions were used to allow for guided and independent practice to occur, building toward the submission of the required assessment lesson design.

As a part of the cycle, pre-service teachers were required to supply copies of their evolving lesson design to a small group of peers as well as to the faculty member. Feedback was provided on each design by both peers and the instructor as to the degree to which the design was consistent with the structure of the pedagogy. This feedback allowed individuals to adjust their work, prior to submission, as they moved toward mastery of the pedagogy. These feedback processes also had the effect of dispersing control away from being totally vested with the faculty member, to the wider group of peers. A further consequence was the development of a common schema about the pedagogy developing within the cohort. The same approach was further applied to the structure, organisation and implementation of workshops on collaborative practice and cooperative learning, with two of the three pedagogical approaches selected for formal assessment. Embedding shared understandings and the use of feedback throughout the subject meant that all pre-service teachers had a stake in the way the subject was delivered and experienced.

Data Collection

As with most tertiary institutions, a variety of information is required at the conclusion of each session of study. This consists of formalised institutional student satisfaction surveys as well as subject specific information obtained from students by delving more deeply into their perspectives of their experience. The data to be discussed here emerged from a process where pre-service teacher reflections were gathered about the inclusive education subject as part of an end of session evaluation instigated by the authors of the paper. Apart from formal institution based data, participants were asked to respond to two open-ended questions which provided the basis for analysis.
1. Were there any aspects in the lectures and/or tutorials that you feel have contributed to you feeling more confidence teaching students with special needs in inclusive settings?
2. Describe how you think any of these aspects have been useful in contributing to your knowledge, skills and practice.

Data Analysis

This study implemented Yin's (2011) approach to analysing qualitative data. Yin's (2011) approach suggests five phases of analysis, implemented in a cyclic manner and

comprised of an assembly phase; disassembly; reassembly; interpretation of the data and drawing conclusions.

In the beginning stage of this approach, the data from respondents was coded and collated allowing an overall picture of responses to be developed. This assembly (Yin, 2011) allowed for "patterns, themes and categories" (Patton, 1990, p.390) to be initially identified that were indicators of the experiences reported by pre-service teachers in engaging with the subject. These patterns, themes and categories were then checked in an iterative cycle of continually examining the data against the emergent categories to ensure the consistency and credibility of the themes. This approach to analysis was used to examine subject delivery, learning and determine the role of the subject in preparing pre-service teachers for teaching in inclusive classrooms.

Yin's (2011) disassembly phase involved the identification of individual "meaning statements" that represent "statements…that have particular relevance to the phenomenon being studied" (Johnson & Christensen, 2010, p. 387). These meaning statements consist of smaller segments from the data set, such as individual phrases or sentences, allowing for further coding and analysis. Again, an iterative process of examination of these meaning statements within their original context was undertaken to continue to inform the veracity of the process and to ensure consistency with the original responses (Stake, 2006). On exhausting the identification of any new meaning statements, determination of themes, patterns and categories continued. In the process of reassembly (Yin, 2011) a detailed search was undertaken for any data that may be considered to be contradictory to the categories determined and consideration was given to possible alternatives, a process which Yin (2011) suggests will help to ensure the strength of those chosen and which will add to the integrity of the analysis (Lincoln & Guba, 1985).

In the final stage of analysis, lexical analysis was conducted on pre-service teacher reflections using Leximancer as a tool to confirm the themes and concepts developed using Yin's (2011) approach. The themes and concepts emerging from this approach are described in detail within the results. Leximancer is a software tool designed to assist in the analysis of data that is in language/text form. Analysis is presented through a number of forms, but predominantly through a 'mapping' process where themes and concepts are presented visually. Within the Leximancer output, a theme is a group of related concepts that are represented in close proximity by a circular region on the map. These circles represent ideas or trends involving multiple concepts, where the size of the circle indicates relative importance. The theme name is the most prominent concept. Concepts cluster into these themes due to their repeated proximity within the text, suggesting a relationship between them. A concept within leximancer is a group of related words that are identified as existing regularly within the text.

Results

Application of Yin's (2011) approach resulted in the identification of four major themes evident in pre-service teacher reflections, with some overlap and decision making as to the placement of a number of comments. These themes were identified as: teaching students with diverse needs, subject related commentary, learning, and experience. Analysis of the data using leximancer resulted in a similar outcome with Yin's approach and was used to confirm the major themes identified. This confirmatory analysis was undertaken to help ensure the accuracy of the thematic approach used and to assist in the minimization of any potential researcher bias impacting on the data. The themes identified by the software as being of major importance are represented in the central section of Figure 1.
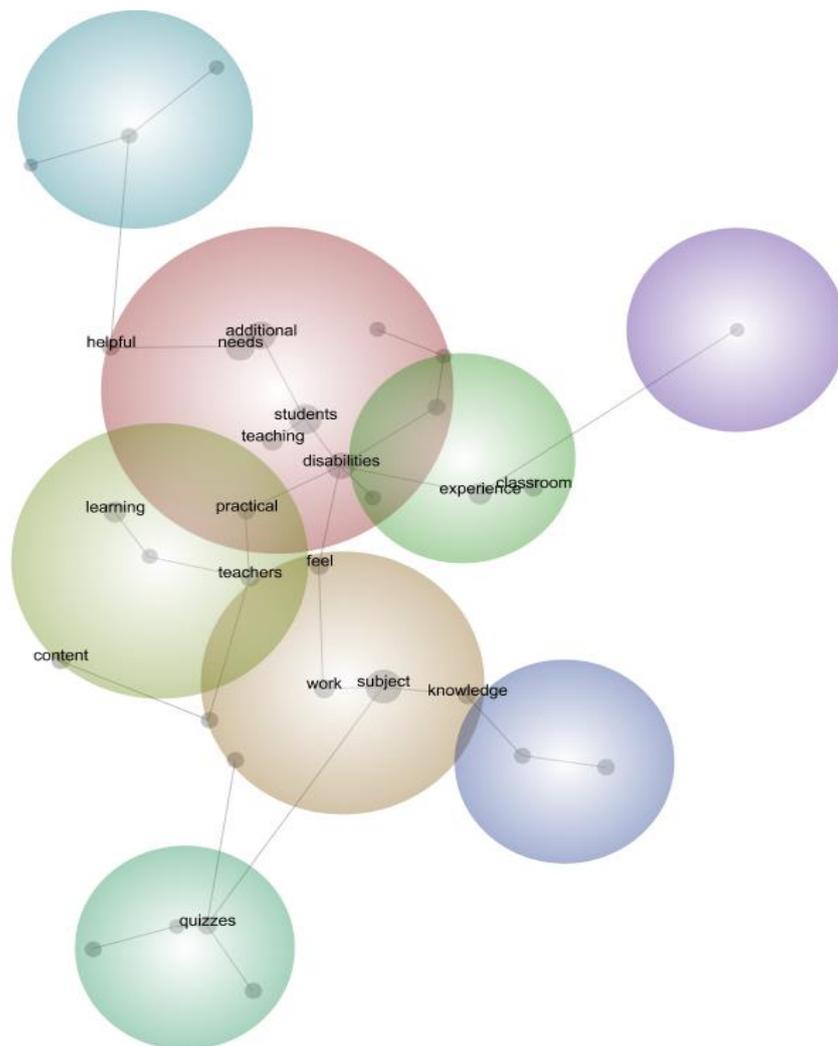
Figure 1: Map of themes and concepts arising from pre-service teacher reflections on their subject experience

The four central themes identified by this lexical analysis were: students with disabilities/additional needs, subject (with relation to knowledge and work), learning (in particular concepts of the practical aspects of teaching and the instructors (teachers) involved) and experience (related to experience within the classroom). While the colours or shades in the diagram have no particular meaning, the size of the spheres, as discussed above, does. The largest sphere, is centred on students (the largest dot, thus the most important concept), however there are also important concepts evident related to students with disabilities or additional needs and how to approach teaching them in mainstream classes. Lines connect related concepts, both within a sphere, and externally. Concepts or themes that are minor generally have no label.

A number of other themes were identified by leximancer. *Tutorials* and *quizzes* were identified as separate themes. Within the original analysis, these themes had been included within subject related commentary. *Inclusive* was also identified by the software as a separate theme, where the thematic analysis had included this within the category of 'teaching students'. Finally, leximancer identified as a separate theme the name of one of the instructors with whom a number of pre-service teachers clearly felt a connection. The four

major themes identified through the thematic analysis and confirmed by the lexical analysis are discussed in the following section.

Teaching Students with Diverse Needs

The comments here concerned a variety of aspects of both teaching practice and teaching students with diverse needs. These included the benefits of learning about specific instructional strategies and the practical nature of their learning:

Useful strategies to provide an effective inclusive environment

hands on insites (*sic*) have helped to make me more confident to teach in an inclusive education environment.

Some pre-service teachers reported an enhanced confidence in being able to meet the needs of students with diverse needs and having a much more positive mindset:

This has allowed me to evaluate my own feelings towards these students and consider teaching children with additional needs from a more positive mindset rather than a perspective of negativity or fear.

This subject has re-affirmed my aim to work in special education in the future.

Pre-service teachers reported appreciating the practical nature of the major assessment tasks in terms of both helping them develop skills in evidence based practice, but also in promoting using the pedagogies adopted as a means of differentiating within the classroom context. These comments aligned strongly with the subject related commentary presented in the following section.

Subject Related Commentary

The majority of comments about the subject were positive, although some advice as to future areas for development was forthcoming. Again, the practical nature of the subject was affirmed, with the syllabus seen as interesting and informative, although the subject was seen as taking significant work to complete. The approach to tutorials as a 'workshop' for skill development was also seen as having been beneficial, particularly the practical nature of the work completed.

I like that the assignments relate directly to teaching additional needs students.

During this subject I have learnt to appreciate those students with a disability. I have gained knowledge on what types of disabilities these are and practical information on how to deal with it.

This has been the best subject I have studied out of ALL the subjects so far. I feel so much more supported and confident in teaching students with disabilities.

Lecture tutorials and activities all aligned well with the assessments and activities.

> We knew what to expect from the subject. There was a clear pattern connecting lecture, tutorial and assessment that was repeated consistently

The quizzes built into the assessment schedule had a somewhat mixed reception.

> The weekly quizzes were a fantastic method for assessing learning as opposed to a big exam at the conclusion of the semester.

> Weekly quizzes have helped to stay on top of the content and readings, good idea.

> Some Q's were ridiculous. There was so much rote learning required to be successfully in the test which is something we as teachers are told to steer clear of.

> The quizzes were too short (10mins?)

> Having the tests encouraged us to make sure we learnt the content.

While some pre-service teachers saw the weekly quiz as a useful way to master a large amount of knowledge, others saw the quiz approach as problematic in terms of the time allocated for completion of the quizzes as well as the perceived nature of 'rote' learning. This perception was something we had been conscious of and had tried to avoid at the design stage.

Learning

As would be anticipated, this theme had some considerable overlap with previous themes. This integrated approach of learning about the material in the subject coupled with learning how to apply the concepts encountered in practical ways was seen as beneficial.

> The assessment (3) was very practical and allowed me to see that I had already differentiated in my pracs and had skills to build on instead of learning completely new skills.

> ...using real examples are the best ways of learning and understanding.

This was particularly so in terms of learning how to adjust lessons for diverse learners.

> Liked learning about how to adjust lessons.

> When you enjoy doing something I believe you learn more, you allocate more time and motivation towards the subject.

The structure of the workshops were also seen as being useful in helping pre-service teachers to gain mastery of both skills and concepts, particularly in obtaining both written and oral feedback from the small group discussions.

> ...getting feedback from others in our group as well as the tutor helped us understand the strategies we were using in our lesson plans

> Working in groups meant that there was more than one source of information in the tutorial room.

A number of pre-service teachers expressed the thought that being able to practise the skills in an authentic setting would have enhanced their experience and their learning. This element is discussed in more detail as part of the following theme.

Experience

This theme had a dual nature, including both the experience of the faculty members (seen as a positive aspect) as well as the desire for more hands on experience by the pre-service teachers. The experience of the teaching team was seen as adding further credibility to the delivery of the subject:

> Having tutors/lecturers who are actively involved with students who have disabilities adds a degree of enthusiasm to the subject. The lessons involve real-life scenarios and cases which help all students, not just those with disabilities.

> Having lecturers and tutors who have relevant experience and knowledge on what they are teaching us really has made me feel confident. It didn't feel like they were just reading out of a text book – Each one has personal, real life experience so I could take on board what they are saying as true and correct.

The desire for practical, hands on experience in an SSP or support unit was also expressed by a number of pre-service teachers.

> Practical experience would have been great.

> I think a mandatory day in an ED classroom...will provide all pre-service teachers with more confidence and experience.

> I think a visit to a special education school or an inclusion class would benefit future students of this subject. A lot of us have not had much experience with students with disabilities.

Pre-service teachers were keen to have firsthand experience with students with diverse needs and the opportunity to practise skills and apply knowledge. Based on this feedback, the incorporation of experience in a SSP was built into the subject the following year.

Discussion

From the perspective of each of the design principles outlined earlier, each can be identified within the data obtained. These are further explicated below.

Embedded Design

While not explicitly identified by pre-service teachers as 'embedded design', the cyclic nature of the subject, with its inherent repeated patterns was clearly a factor appreciated by the cohort. The use of (for example) co-operative learning within workshops to teach the pedagogy, after the theoretical anchors had been explored within the lecture, then building into assessment with the use of authentic exemplars (Boud & Falchikov, 2006), within the cycles is reflected in both the subject related commentary, as well as that on learning. Further, the alignment of all aspects of the subject, such as lecture materials and tutorial activities with each other (and particularly with the assessments) was a significant point of comment and reflects research in the area of constructive alignment (Biggs, 2003). The approach to tutorials as a 'workshop' for skill development was seen as having been beneficial, particularly the practical nature of the work completed.

Feedback and Dispersed Control

Pre-service teachers both giving and receiving feedback has been seen as one of the most powerful sources of improvement to learning across all levels of education (Auhl & Daniel, 2014; Hattie, 2012). The pre-service teachers identified both feedback and its sources as being important aspects of the subject structure and beneficial to their learning. While Hattie (2009) found that feedback to teachers in secondary contexts had a powerful effect size with respect to student learning, pre-service teachers in this study reported that having both numerous sources of feedback, as well as responsibility for that learning being vested in both instructors and their peers, contributed to their learning. This finding reinforces the use of the theoretical principles of feedback and dispersed control when designing subjects.

Common Schema

Using the principles described above can help to contribute toward an effective schema for practice in any professional field (Bain & Weston, 2012). This developing schema for practice was clearly evident throughout the responses of pre-service teachers in this study. Marshall (1995) describes the contribution of regular exposure to the type of cyclic approach adopted in this study as being an important aspect of schema development. Regular references to authenticity of experiences, gaining knowledge on aspects of disability and how to cater for these in the context of the mainstream, are indicators that the approach to subject design has made some contribution to these pre-service teachers having a schema for practice in this area.

Consideration of the findings in terms of the research questions provided some crucial insights for the future development of this subject, and potentially others. Pre-service teachers reported value in an approach to subject design where tutorials allowed skills to be workshopped. The practical nature of the pedagogies chosen by the instructors and their relationship to teaching a diversity of learners in the mainstream was clearly seen within responses as a positive, as was the clear alignment of activities that were a part of the overall subject structure. Although the design and delivery of the quizzes was seen as a contentious element, overall the quizzes were considered an important part of the learning design.

In relation to the second research question focused on confidence, the subject was also seen as having a positive impact. Comments throughout the data indicated that, while still perhaps somewhat fearful of the realities of contemporary inclusive classrooms, this cohort of pre-service teachers felt more confident and believed that they had been equipped with some

approaches that would allow them to engage positively with their work. That the subject was presented by instructors actively involved in the education of students with diverse needs added to this perception by pre-service teachers. While recognising that confidence does not necessarily equate to competence, the results of this study indicate that both were enhanced.

Conclusion

We hypothesised that embedding theoretical principles of self-organisation and research-based pedagogies in the design and delivery of an inclusive education subject would translate into a more explicit connection between theory and practice for pre-service teachers and lead to additional confidence in teaching students with diverse needs. Feedback indicated that the completion of the subject increased the confidence of pre-service teachers in teaching students with diverse needs. This feedback from pre-service teachers described how the structure and the alignment within the subject, as well as the practical, authentic nature of the assessment approaches implemented, assisted their learning. Pre-service teachers also highlighted the benefits of being taught by faculty members who were active in the field of inclusive education.

The impact of the four theoretical principles focused on throughout the subject design and delivery was apparent in the results. Evidence based practices were embedded in subject design and delivery. This built pre-service teacher capacity in working with inclusive pedagogies and familiarity with differentiation for students with diverse needs. The benefits of embedded design were evident in pre-service teachers responses presented in the results under *subject related commentary* and *learning*. Feedback processes embedded in the workshops meant that their work was continually revised and improved as shown in the *learning* results. Control was dispersed as pre-service teacher understanding and knowledge increased and confidence levels grew. This meant that their schema in the area of inclusive education was constantly altering and adapting. These structures, driven by the principles of the underpinning theory, contributed to a clarity of purpose entrenched within the subject where pre-service teachers "knew what to expect". This clarity was able to be implemented through using an embedded design approach to develop cycles of instruction and dispersing control to develop wide feedback mechanisms and subsequently, facilitating the development within the cohort of a common schema around teaching students with diverse needs.

Conclusions made must be considered in light of the limitations identified. This study was undertaken in one setting, during one teaching session and examined pre-service teacher experiences in one subject. The study undertaken sought to represent the experiences of a single case. Future studies could use a research design that includes a control group that experiences a differently designed subject. This could be done through the intended scaling of the study across multiple subjects and programs and aligning the subject with a practicum experience. Findings generated from pre-service teacher reflections are difficult to generalise without additional data sources to support the findings. Within the structure of the research design, there is no room to speculate about the long-term effects of the use of theory on subject design and none were made. Data such as direct observation and pre-service teacher practicum reports would add to the richness of data and further support conclusions made as well as look at the transference of the pedagogies used in the subject in practice. These initial findings suggest that embedding evidence-based practices in the design and delivery of a subject increased the confidence of pre-service teachers in working with students with diverse needs.

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