RESEARCH ARTICLES

Concept Mapping to Evaluate an Undergraduate Pharmacy Curriculum

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Objectives. To explore a pharmacy school curriculum for opportunities for student engagement and to determine how these might shape student identity as pharmacists.

Methods. The learning aims and objectives and methods of assessment from the curriculum of a bachelor of pharmacy (BPharm) program were collected and a concept map was generated. The concept map was interpreted using Barnett and Coates' curricular domains of knowing, acting and being.

Results. The key concepts within the intended curriculum that were identified from the concept map were drugs, pharmacy, understanding, practice, and skills. Concepts such as patient and consumer, which would indicate a patient-centered approach to the curriculum, were limited. The main form of assessment used in the curriculum was multiple-choice and short-answer examinations.

Conclusion. There was an emphasis in the curriculum on student acquisition of knowledge and this was reinforced by the use of theoretical examinations. The content of the curriculum was drug-centered rather than patient-centered and the emergence of students' identity as pharmacists may be fragmented as a result.

Keywords: curriculum, curriculum research, undergraduate, bachelor of pharmacy degree, assessment, concept map

INTRODUCTION

The stated purpose of a pharmacy degree program tends to be to provide students with the knowledge and skills they will need to practise as a pharmacist. However, in the face of an explosion of knowledge and rapid changes in healthcare management and treatment, much energy is being expended to ensure that the content is up-to-date and relevant to practice. This process can result in an overcrowding of the curriculum, with each topic deemed to be of critical importance.[1] Further, to ensure that the vast amount of content is covered, pharmacy curricula may rely on delivering the content through lectures where the students tend to remain passive.[2] These lectures are often supported by tutorials or laboratory practicals to give students the opportunity to develop the necessary skills and to apply the knowledge learned.

As the modern world becomes increasingly uncertain and complex, educators can no longer assume that the provision of knowledge and skills will be enough to transform students into pharmacists.[3,4] Educators also must consider: Who are students becoming? What characteristics are they developing? What sort of professionals will they become as a result of their curricular experiences? These sorts of questions point to what has been described in the literature as an *ontological* approach to the curriculum.[3-5] While these theories acknowledge the importance of thinking about the knowledge within the curriculum, they suggest that another dimension for envisioning and developing a curriculum is needed to enable our graduates to cope with the modern world. At the core of these ideas is a new way of considering the curriculum as "an educational vehicle for the student's own journey of becoming, of the student coming into a certain kind of being."[4] In other words, the curriculum is seen as *identity forming*.

Before educators can view their college's or school's curriculum from this perspective, they must first consider what their assumptions about education and learning are. As described above, the existing approach to the curriculum tends to be centered on the acquisition of knowledge and skills, that is, a cognitive view of learning. With this view, learning is seen as an individual process and focuses on the mind. This is evident in colleges' and schools' attempts to make learning outcomes explicit so they can assess whether students demonstrate that they have achieved these learning outcomes.

This cognitive approach to learning tends not to give consideration to the type of persons students are becoming

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as a result of these experiences. The risk of this approach is that the curriculum may not provide opportunities for students to establish their identities as pharmacists. Similarly, Kegan argues that "students can learn cognitive skills, yet not be able to use them to decide what to believe because they have no internal sense of identity."[6] Hence, there is a need for pharmacy educators to think about learning differently. The theory of social learning gives consideration to the type of person students are becoming as a result of their learning experiences.[7] The characteristics and functions of pharmacists have been described through the "seven star pharmacist": caregiver, decision-maker, communicator, manager, life-long learner, teacher, leader, and researcher.[8]

Within this theory, learning is believed to occur through participation in social practice, ie, "the whole person acting in the world."[9] That is, learning occurs through participation in practice and through participation students learn particular ways of doing things, ways of thinking, and ways of acting. Hence, as a result of learning, we think, act, and do things differently. Learning becomes *transformational*.

If educators shift their view of and focus for learning from *cognitive* to *social,* then their way of designing the curriculum will change. Rather than attempting to make students' learning outcomes explicit in the curriculum, the curriculum is seen as *identity forming* and becomes "*an itinerary of transformative experiences of participation*."[7]

These experiences can be fostered in the curriculum through different domains of engagement. Barnett and Coate have described these domains as: *knowing*, *acting* and *being*.[4] Knowing is not simply students having the knowledge that is presented to them, but rather it is an active process in which students personally engage with that knowledge. Acting is seen as the opportunities made available through the curriculum for students to act in their own way and to begin to take on the role of a pharmacist. With being, consideration in the curriculum is given to who students are *becoming* and how their identity as pharmacists is being shaped and formed. These domains provide us with a lens to examine the curriculum as an educational vehicle for *becoming*.

As the School of Pharmacy at The University of Queensland, Australia, approached its quinquennial curriculum review, we took the opportunity to explore our curriculum. Using contemporary educational theory, we considered how our pharmacy curriculum enabled students to form their identities as pharmacists.

The curriculum can be viewed in 3 ways: the intended, the enacted/implemented, and the experienced/attained.[10,11] The *intended* curriculum has been described as the formal or written documentation, such as the learning objectives and assessment, which describes the curriculum's purpose and

its vision. Important insight to the curriculum's ideology can be gained by exploring the intended curriculum.[12] The *implemented* or *enacted* curriculum describes what actually happens when the curriculum comes "alive," whether it is in the lecture theatre, tutorial room, or laboratory, or when a student studies at home. The *experienced* or *attained* curriculum focuses on the learners' experience of the curriculum as perceived by the learners.

This paper reports on a content analysis study to explore the intended curriculum for opportunities and possibilities for engagement and how these might shape student identity as pharmacists. The domains of knowing, acting, and being were used to frame the analysis.

METHODS

The study was designed to follow the 11 steps of content analysis (Table 1).[13] Content analysis allows the researcher to explore documents and make "replicable and valid inferences" from the text.[14] It enables key messages, meanings, and concepts to be gleaned from the text.

The curriculum explored in this study was the learning aims and objectives and methods of assessment. The learning aims and objectives were selected as they communicate the educational intentions of a course and are statements of what the students will achieve.[15,16] In addition, they form the basis for decision making around the curriculum, in that, from the learning objectives, what and how the subject will be taught and assessed are determined. The methods of assessment were collected because students tend to focus on assessment rather than learning objectives (Figure 1).[17] Hence, the unit of analysis for this study was the learning aims, learning objectives, and methods of assessment.[14,18]

The learning aims and objectives and the methods of assessment from 25 courses, which comprised the bachelor of pharmacy degree program at the University of Queensland in 2009, were collected from the University's Web site. These were collated into a single Word document and analyzed using Leximancer, version 3.1. By analyzing the learning objectives and the methods of assessment, conclusions could be made about the nature of the intended curriculum (Figure 2). Further, content analysis was used as a way of assessing the relevance of a pre-existing theory,[19] in this case the curricular domains of *knowing*, *acting*, and *being* (defined above) can be explored in pharmacy's intended curriculum.[4]

Leximancer was used to code text automatically and present findings as a concept map, a tool that has been used extensively to conceptually explore curricula.[20-24] The benefit of using concept maps to examine the curriculum is that "patterns and relationships of ideas" can be seen easily.[20] Concept maps remove existing structures, such as

Table 1. Content Analysis Using Leximancer

Content Analysis[13]	Applied to This Study
1. Define the research questions to be addressed by content analysis	What opportunities and possibilities for student engagement are apparent in the intended curriculum and how will this shape student identity as pharmacists?
2. Define the population from which units of text are to be sampled	The pharmacy undergraduate curriculum at the University of Queensland. This degree currently has 963 students enrolled across four years and has been established since 1960.
3. Define the sample to be included	The sample for this study was purposive. All courses which contribute to the pharmacy degree were included.
4. Define the context of the generation	CN retrieved all of the aims and learning objectives for each course and assessment details, such as method of assessment and contribution to finals marks of the course, from the university's website.
5. Define the units of analysis	As described above, the unit of analysis was the learning aims and objectives which are statements and/or sentences. Assessment details were also included in the unit of analysis.
6. Decide the codes to be used in the analysis	Leximancer automatically identified codes from the text. These were fine tuned by the researcher as it was noted by the researcher during this stage that concepts which relate to patient-centered practice were absent from the keywords. Hence, Leximancer was manually asked to identify the concepts, "patient/s" and "consumer/s". Settings such as the "prose threshold" and "number of concepts" were adjusted to ensure that the analysis was appropriate.[25, 37, 38]
7. Construct the categories for analysis	Leximancer constructs its own dictionary of terms for each document analyzed. From this, it infers concept classes that are contained within the text and develops a thesaurus of terms for each concept.
8. Conduct the coding and categorizing of the data	Leximancer applied concepts to blocks of text.
9. Conduct the data analysis 10. Summarizing	Leximancer generates a concept map, showing the main concepts and their relationship to each other.
11. Making speculative inferences	The researchers then interpreted the concept map generated by Leximancer. This study espouses a social constructivist worldview, in that, understanding and meaning was sought through interpretation of the concept map[39]. The difference in this approach from the traditional approach using concepts maps to explore the curriculum is that rather than using interpretation to develop a concept map, the concept map is interpreted to provide insight to the curriculum.

subjects, imposed on a curriculum and allow it to be viewed holistically.

A concept map generated by Leximancer illustrates the *concepts* and *concept clustering* found within a document. Concepts are *"collections of words that travel together throughout the text."*[25] Concepts are represented as dots on the concept map. The frequency of the concepts within a document is demonstrated by the size of the dot:

large dots represent important concepts within the document, while smaller dots represent less important concepts.

Concept clustering shows how concepts relate to each other within a document, that is, those appearing in a similar context in the text will be clustered closer to each other on the concept map. Related concepts are located close together on the concept map, while unrelated concepts are separated.
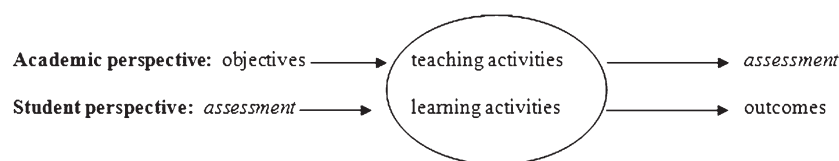

Figure 1. Academic and student perspectives of the learning objectives and assessment (Biggs, 2003)

Figure 2. Overview of study methods.

As described above, students' engagement with the curriculum is mainly influenced by the assessment portion of the curriculum. Hence, a detailed *whole of program* assessment audit was conducted to capture both the content most important to educators (objectives) and that most important to students (assessment). Assessment details for each of the 25 subjects were obtained from the University's Web site. These included the methods of assessment and the extent that they contributed to the overall degree's assessment. Assessment data were collated into an Excel spreadsheet. One hundred fifteen different assessment tasks were identified and each of these were categorized according to the faculty's taxonomy of assessment (Table 2). This taxonomy was developed to categorize different types of assessment and to provide definitions to ensure consistency in the labeling of assessment types.

Table 2. Assessment Categories

Theory Examination
    Multiple choice questions (MCQs)
    MCQs and short answer
    MCQs, short answer and other
    Short answer and problem solving questions
Online Assessment
    Discussion board
    Blogs
    MCQs
Written Assignment
    Case study
    Essay
    Paper
    Reflection
Oral Assessment
    Presentation
    Symposium
Practical Examination
    Laboratory skills demonstration
    Objective structured clinical examination
Practical Assignment
    Laboratory report
Experiential placement
    Reflection
    Clinical log book
Other
    Participation

From the data, the main methods of assessment were identified and the range of assessment methods was obtained. These descriptive statistics were analyzed to determine how they would influence student engagement in term of *knowing*, *acting*, and *being*.

This study explored the intended curriculum and this was represented by the learning aims and objectives and the assessment. Claims were not made around the enactment or the outcomes of the curriculum. We believed that excluding the subject headings from the data enabled us to get a better perspective of how students develop their identities as pharmacists as students need to make sense of the curriculum in its entirety.[4]

One of the key issues when conducting a content analysis is that the coding of a document is consistent.[18] With Leximancer, coding is automated; however, the concept map that is produced must be reproducible.[25] To ensure this, the stability of the map was checked by regenerating it 5 times. In this case, each of the 5 maps generated matched the previous map; therefore, the map produced was considered to be stable and reliable. Ethical approval was not required for this study as all of the data obtained were freely available in the public domain.

RESULTS

The concept map generated by Leximancer is presented in Figure 3. Fifty-two concepts were identified. The concepts patients and *patient* and *consumer* were not identified in the initial analysis and hence they had to be sought manually. The most frequent concepts identified were *drugs*, *pharmacy*, *understanding*, *practice*, and *skills*. These are represented by the large dots on the map and were not closely connected to each other.

The concept map (Figure 3) and the frequency table (Table 3) show that the concept *drugs* is the central concept within the intended curriculum. It is also a concept that a number of other concepts cluster around. This means that these concepts (*understand, treatment, concepts, system, design, processes*) occur frequently together within the intended curriculum. The concept *understanding* also has a number of concepts clustering around it. Despite occurring frequently in the learning objectives, the concept *pharmacy* only has the 3 concepts professional, practice, and skills clustering around it, indicating that only a few
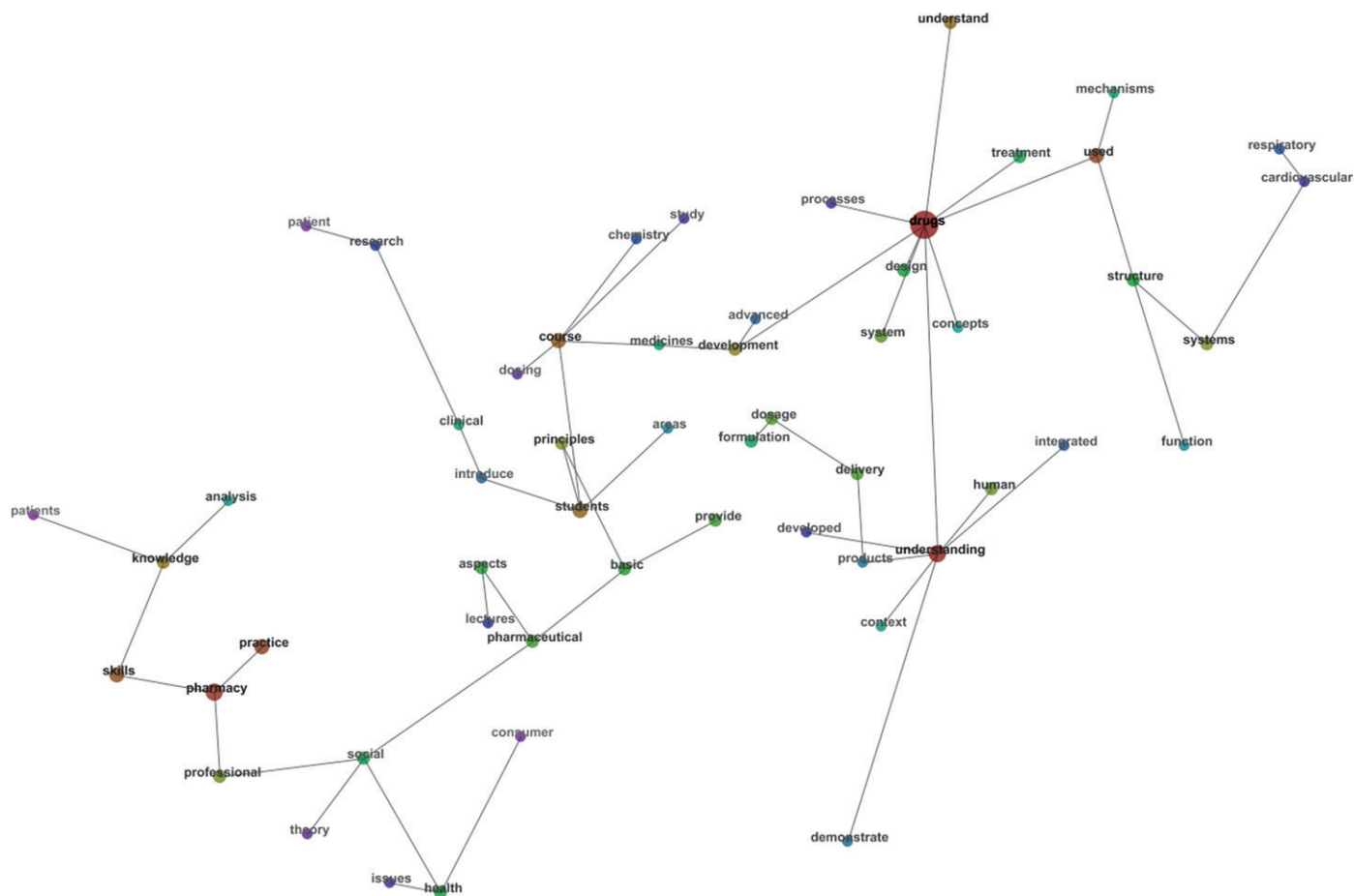
Figure 3. Leximancer concept map of an undergraduate pharmacy curriculum.

concepts frequently occur with pharmacy in the intended curriculum. Also, the key concept *drugs* was not closely connected to the concept pharmacy.

Closely connected to the concept *drugs* was the concept *used*, indicating that the theme of "how drugs are used" appeared a high number of times in the aims and learning objectives. Some of the learning objectives which demonstrate this are:

"Understand the mechanisms of action of chemotherapeutic drugs used to treat bacterial, fungal, viral and parasitic infections."

Table 3. Most Common Concepts Within Pharmacy Undergraduate Curriculum

Ranking	Concept	Count
1	Drugs	171
2	Pharmacy	62
3	Understanding	61
4	Practice	53
5	Skills	48

"To provide an understanding of the pharmacology (mechanisms, effects, side-effects and use of drugs) of drugs which affect these systems."

"To develop a rational and critical approach to the use of medicinal drugs in treatment of disease."

Concepts such as *respiratory, products, principles, products, dosage,* and *delivery* suggest that the learning aims and objectives were describing the content that will be covered.

Concepts that indicate what the students were expected to do were limited. Concepts such as *understanding* and *demonstrate* were the main examples found on the concept map. This can be seen in the following learning objective:

"Demonstrate understanding of different types of complementary medicines and issues relating to evidence for use of these medicines."

Looking across the curriculum at the concept map as a whole, there are a number of easily identifiable concept clusters on the map (Figure 4). Each of these concept clusters have been described and interpreted in Table 4 and can be seen in Figure 4. These clusters, despite attempts to remove subject headings, show that the subject headings
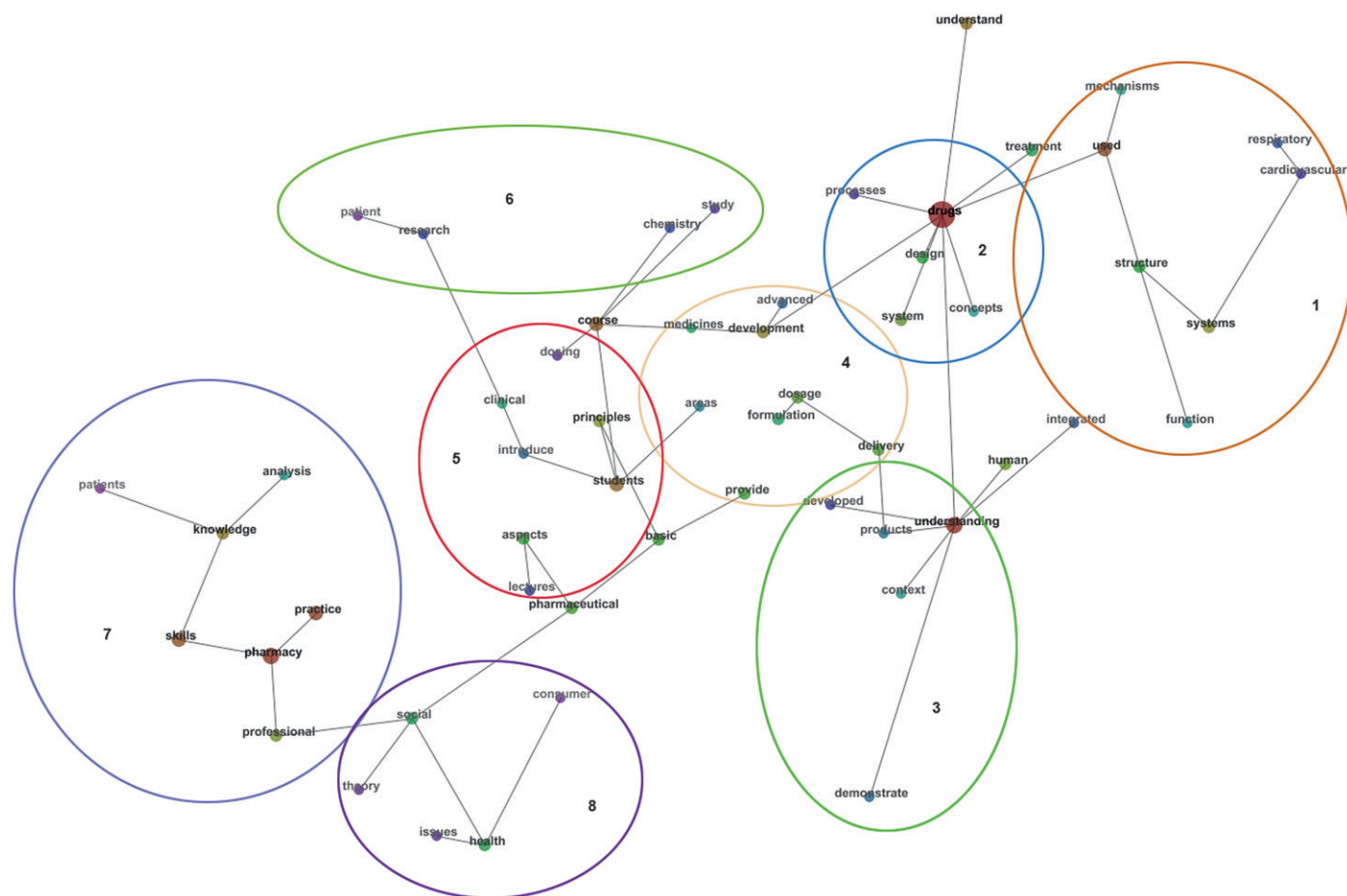
Figure 4. Concept clusters within the intended curriculum of an undergraduate pharmacy curriculum.

remain and imply that there is little integration of concepts within the intended curriculum.

A wide variety of assessment methods were used within the curriculum (Table 5). Theory examinations were the main form of assessment used in the curriculum and these tended to use multiple-choice and short-answer questions.

The university requires that all courses have more than one form of assessment that contributes to the final grade. The courses that related to the practice of pharmacy tended to have the greatest variety of assessment methods and number of assessment items. Practical assignments that related to laboratory work were the second most frequent form of assessment used, followed by written essays. The proportion of the assessment load related to experiential placements and oral examinations such as objective structured clinical examinations was lower at 5.7%

DISCUSSION

By looking at the intended curriculum using a concept map and auditing the assessment methods, we gained a new perspective of the pharmacy curriculum. We then used the domains of *knowing, acting,* and *being* to interpret our findings.[4] *Knowing* reflects on how the students might engage with the knowledge presented and consideration is given to the knowledge selected. Because knowing is an active term, we explored the approach to knowledge that students are likely to take as a result of their curricular experiences. *Acting* explores how the students might act, that is, how through their experience of the curriculum they might act like pharmacists. Within the domain *being,* ideas around who students are *becoming* as a result of their curriculum experience are reflected upon. We explored each of these domains and what they mean to pharmacy education.

The first observation made from the concept map was that there were a large number of concepts ranging from those based in the science discipline to those in the practice and social science disciplines. Each of these appeared as units and the concepts were not connected to each other. The likely result of this will be that knowledge is learned in discrete packages. The risk is that there is little opportunity to make the connections between knowledge packages.

Table 4. Key Concept Clusters Within the Intended Curriculum

Cluster Number and Description	Examples From Learning Aims and Objectives
(1) This area shows aspects of therapeutics, structure activity relationships and pharmacology. This cluster shows how the learning objectives which describe drug use, treatments, structure, mechanism, function and systems within the body are related concepts in the intended curriculum.	"Design strategies & structure activity relationships of drugs used in treatment or prophylaxis of infections & in treatment of cardiovascular, renal & respiratory diseases & in oncology" "It[the subject] provides students with a comprehensive coverage of antimicrobial, antiparasitic and cancer chemotherapy, as well as immunopharmacology and respiratory physiology and pharmacology"
(2) In this cluster, the curricular learning objectives centre around "drugs" and relate to the design of drugs.	"This course is to familiarize students with design strategies and structure activity relationships of drugs used in the treatment or prophylaxis of infections and in the treatment of cardiovascular, renal and respiratory diseases and biotechnology products" "Develop an appreciation of the relationship between drug structure and pharmacological activity, both desired (efficacy) and undesired (side-effects), ie, identify those properties of drug molecules that are required for optimal action at the desired receptors with respect to size, shape, position and orientation of functional groups and appreciate that drugs may also interact with receptors other than the desired target"
(3) This section of the concept map relates to knowledge and approach to knowledge.	"Understand the mechanisms of action of chemotherapeutic drugs used to treat bacterial, fungal, viral and parasitic infections." "Demonstrate understanding of non-prescription medicine schedules and the legal and professional responsibilities in their sale."
(4) This cluster relates to the subject area pharmaceutics and issues around formulation issues.	"Be cognizant of formulation design considerations for a range of extemporaneously compounded pharmaceutical products and potential physicochemical incompatibilities between compounded pharmaceuticals." "Self-direct and independently improve your knowledge and understanding of pharmaceutical dosage forms and drug delivery systems."
(5) For this cluster the emphasis is on clinical aspects of the curriculum which tend to delivered via lectures. The concept of "clinical" is only connected to the students, not the rest of the curriculum.	"The student will also learn how to extract clinically meaningful statistics from the literature in order to arrive at relevant and rational clinical decisions regarding patient care." "The purpose of this course is to develop the knowledge, skills and attitudes necessary to enable a student to develop individualized dosing regimens."
(6) The emphasis on this cluster is research, which is close to "patient" and extends to "chemistry."	"To integrate all areas of pharmacy, eg, pharmacokinetics, formulation sciences, research methods, chemistry in developing a structured approach to reviewing a patient and optimizing their medication use." "Based on the principles developed in these sections, the topic of chemical equilibrium is expanded to include a discussion of acid/base chemistry, including the roles and actions of strong and weak acids and bases, the importance of buffers, the chemistry of titrations and the roles of indicators."
(7) This cluster focuses on professional practice with an emphasis on knowledge and skills	"To link the knowledge and skills gained in previous years with the practice of pharmacy in the community pharmacy experiential placement." "To build upon the knowledge and skills gained in previous undergraduate years in the areas of therapeutics, pharmacokinetics and pharmacodynamics."

(Continued)

Table 4. (*Continued*)

Cluster Number and Description	Examples From Learning Aims and Objectives
(8) For this cluster the emphasis is on social pharmacy which relates the notion of consumer health based on social theory	"Discuss the broad structure of the pharmacy profession in Australia, including current and future trends, ethical dilemmas and the roles of professional organizations." "Discuss in a preliminary way the social, professional and ethical context of pharmacy practice." "Begin to develop professional pharmaceutical skills, interpersonal and workplace social skills."

Authors have argued extensively that pharmacy is a clinical discipline based on science.[26-29] In our approach to curriculum, while science-based subjects are the initial subjects, there does not seem to be a connection between science concepts and the other concepts such as practice or

Table 5. Frequency and Range of Assessment

Assessment Type	Contribution to Overall Degree (%)
Theory examination	55.6
MCQ	8.8
MCQ and short answer	37.5
MCQ, short answer and other	6.8
Short answer and problem solving	2.6
Practical Assignment	10.6
Laboratory report	10.3
Participation	0.4
Written Assignment	8.9
Essay	5.9
Paper	2.3
Reflection	0.5
Short answer and problem solving	0.3
Practical Examination	8.5
Laboratory skills demonstration	1.1
Objective structured clinical examination	7.4
Experimental Placement	5.7
Clinical log book/Reflection	0.5
Participation	0.0
Portfolio	5.2
Oral Assessment	5.5
Case Study	2.9
Presentation	2.6
Online Assessment	4.0
Blog	0.0
MCQ	0.5
MCQ and short answer	1.9
MCQ, short answer and other	1.3
Presentation	0.3
Other	1.1
Participation	1.1
Total	100.0

Abbreviations: MCQ = multiple-choice question

clinical concepts. When this occurs, there is little opportunity for the emergence of the thinking, acting, and being that are unique to the discipline.[30] Hence, it would appear that the curriculum is not providing students with opportunities to develop a way of thinking that is unique to pharmacists.

The risk with unitary packages of knowledge is that the students' approach to knowing becomes about the acquisition of knowledge and performance.[4,5] Because the knowledge is presented in a decontextualized way, it is not clear to the students what it is to be a pharmacist and they are likely to do what needs to be done to meet the requirements of the course rather than finding meaning in what is taught.[3,7]

Another factor that is likely to result in a performative way of knowing is the dominance of theory examinations. These examinations, in particular, those with multiple-choice and short-answer questions, tend to be inflexible; there is a "right" answer and the questions are well defined.[16] Thus, there is little room for interpretation or individual response. As a consequence, there are few opportunities for students to experience the uncertain situations and ill-defined problems that they are likely to encounter when they enter practice.

How the students might engage with knowledge was evident from the concept *understanding*. Using Bloom's taxonomy of educational objectives – remember, understand, apply, analyze, evaluate, and create – we found that the curricular learning objectives focused on the lower end of the hierarchy, thereby limiting student engagement with knowledge to the acquisition of knowledge or "container filling."[3,30,31]

Students' engagement with the curriculum knowledge is likely to result in a fragmented way of knowing as the content appears to be siloed, with limited opportunity to shift beyond understanding concepts. In addition, the assessment is largely focused on theoretical ways of knowing.

We also looked for opportunities being made available in the curriculum for students to "act" in their own way and begin to take on the role of a pharmacist. The opportunities to act as a pharmacist were not immediately evident from the concept map. The idea that the

practice of pharmacy is also reliant on the acquisition of skills is evident from the concept map; however, these skills are separated from other key concepts. Also, the nature of the skills required to be a pharmacist was not evident from the concept map. This further reinforces the idea that the approach to learning is largely cognitive.

Practice was presented as a concept and clues about how students might act were indicated by the presence of the concept *professional*. These concepts were separated from the other concepts, such as science-based concepts. The significance of this is that if the *knowing* and *being* are not integrated with *acting*, then the students' experience is likely to be fragmented.[4] Further to this, the students are likely to be performative in their approach to *acting*. They will do what needs to be done for the task at hand; hence, connections may not be made across the curriculum. This is likely to result in limited opportunities for students to establish meaning in what they are doing. For example, if students are required to complete reflective logs during pharmacy practice experiences and this is not integrated with other aspects of the curriculum, then the students' response is more likely to be performative.

Assessment, which was mostly in the form of theoretical examinations, seemed to offer limited opportunities to act like a pharmacist. There were a number of practical forms of assessment, which would give students the opportunity to "act"; however, the majority of these were laboratory-based assessments. The ways that students act in such controlled, scientific environments may not give them opportunities to act as pharmacists. Despite that pharmacy is claiming to be increasingly patient-centred, opportunities for students to interact with patients seem to be limited to experiential placements.

From the concept map and assessment audit, it is not obvious who students are becoming. Perhaps the most striking observation from the concept map was that there was a definite focus on drugs rather than patients. This implies that there is a mismatch between the curriculum and pharmacy's philosophy of patient-centred practice.[32]

Opportunities in the curriculum for student engagement appear to be fragmented. The presence of knowledge silos resonates with the idea of academic tribes described by Becher and Trowler[33] in that each silo has been constructed by different academic "tribes" who each have their own identity (eg, pharmaceutics tribe, science tribe, practice tribe). Hence, the following questions need to be asked: What impact will this have on the students? How will their identity be shaped? To whom do they relate? Who do they see themselves becoming as a result of the curriculum?

If there are several different ways of knowing and acting within the curriculum, then there is a risk of "fragmentation of being, a divided self, where neither thought nor action are brought under critical control nor tied into the individual's being as such."[4] Rather than enabling students to become pharmacists, the curriculum, may result in students performing, with their performance being one which conforms to the requirements of the curriculum rather than a performance that reflects the emerging student self. The risk with fragmented opportunities is that students may never fully engage with the practice of pharmacy. They are therefore likely to remain on the periphery of practice.

The methods used in this study could be applied to any intended curriculum to explore it in a holistic manner and to gain new insights to the outcomes of the curriculum. This study explored in detail the intended curriculum of one school of pharmacy. Exploring other curricula would be beneficial to determine the validity and reliability of the approach taken in this study. We conducted another study that explored the intended curriculum of all of the schools of pharmacy in Australia with similar findings.[34]

The assumption that the learning aims and objectives and the assessment methodologies are representative of the intended curriculum may be questioned. However, while learning aims and objectives are often written to meet external requirements, eg, accreditation, and may not be representative of the enacted or experienced curriculum, they play a pivotal role in the development of courses in that the teaching and learning activities and assessment are required to be linked to the learning objectives. The inclusion of both methods of assessment and learning objectives meant that both student and academic concerns with regard to the curriculum were considered. This study may have been improved by asking both academics and students to view and discuss the themes and concepts which emerged from the concept map and the assessment data.

The approach taken in this study has provided valuable insight into the intended pharmacy curriculum. In order to fully establish the domains of *knowing, acting, and being*, further studies need to be conducted to explore the reality of the enacted and experienced curriculum. The academic staff also should be surveyed to explore their intentions for their contributions to the curriculum.

This study described an innovative approach to exploring the intended curriculum by using contemporary higher education theory as a lens and by using Leximancer to generate a concept map. Leximancer has the capability to tag concepts to different sources; hence, we plan to use this approach to explore the curriculum and make comparisons with the indicative curriculum from the accrediting body, the Australian Pharmacy Council,[35] and to make comparisons with professional standards,

eg, National Competency Standards Framework for Pharmacists in Australia.[36]

CONCLUSION

Using content analysis and contemporary higher education theory to explore pharmacy curriculum, we gained new perspectives into students' learning experience. The study's findings reveal that the domains of knowing and acting are not connected to being. Knowledge appeared to be presented in independent units, potentially resulting in a fragmented way of knowing. Limited opportunities to act as pharmacists were observed on the concept map and these were not integrated with other concepts. The risk with such an approach is that students are likely to be performative in their approach to acting like pharmacists. Finally, when exploring the domain of *being*, the concept map revealed that the intended curriculum remains drug focused, which is counter to the profession's goal to be patient-centered. Hence, the findings and interpretations seem to support the idea that curriculum is based on delivery of knowledge and skills; little consideration is given to who students are becoming and ultimately leaves the concept of *professional becoming* to the students themselves. However, given the limitations of only exploring the intended curriculum, we believe that further research (outlined above), using this theoretical lens is necessary before definitive recommendations can be made.

If our graduates are to cope with an uncertain and complex future, we need to move beyond the idea that the provision of knowledge and skills is solely what is needed to develop them as pharmacists. Rather, consideration should be given as to how the students' curricular experiences enable students to become pharmacists. Without these considerations, it may be unclear to the students who they are becoming; if we use the idea that the curriculum is identity forming, then the design of our curriculum becomes "an itinerary of transformative experiences of participation."[7]

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