Invited Paper - What effect does an academic's concept of curriculum have on their engagement with its design and development?

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Abstract

The undergraduate curriculum is one of the most important products higher education institutions offer their stakeholders [1] as it both determines and drives outcomes. Despite this, the most notable outcome of a "review of the literature on curriculum in higher education in the UK, the USA and Australia … [is that there] is the dearth of writing on the subject" [2]. That literature which does address higher education curricula assumes a common understanding of the term *curriculum* and targets curriculum related issues such as 'inclusive curriculum', 'learner-centered curriculum', internationalization of the curriculum or it focuses on the design of individual courses – that is, single units of study [2].

Accepting that an important aspect of our role as academics is "not to impart knowledge, but to design learning environments that support knowledge acquisition" [3], what impact might a higher education academic's understanding of the term 'curriculum' have upon the process and activities they undertake when designing and developing courses and programs of study?

This paper reports on the initial findings of an on-going study whose aim is to tease apart the factors that affect an individual academic's engagement with curriculum design and development. So far, data has been collected from 22 academics involved in teaching computer science, software engineering, engineering, and information systems courses at three Australian universities. The constructivist grounded theory methodology proposed by Charmaz [4] was selected for this project. Accordingly, data collection and analysis are being conducted concurrently, with the outcome of earlier data analysis informing subsequent data collection.

Initial data analysis indicates that academics focus their attention on course level curriculum rather than program level; don't frequently discuss ideas and proposed changes with peers; that curriculum design and development at individual course level is essentially a solitary activity; and that academics don't have a coherent view of the whole degree program. These findings are in accord with those reported in 1997 by Stark, Lowther, Sharp and Arnold [5]. Furthermore, the diverse understanding of just what curriculum is caused confusion during focus group interviews. In addition to the findings noted above, participants described the goals and outcomes of a curriculum as a specification or set of requirements, and noted that the written, official or "espoused curriculum" was a complex, "designed object" whose internal relationships were hard to understand and visualize. Participants also identified the notion of "drift", where a curriculum moves out of alignment as teaching staff, responsible for individual courses are replaced, and/or small but frequent change to course goals and outcomes are implemented without reference to degree outcomes.

In this paper *program* refers to a complete, integrated course of study leading to the award of a degree qualification. *Course* refers to a single unit of study, sometimes called a unit, subject or module. Students take a number of courses each semester. A *program* is constructed from many courses. *Academic* refers to a teacher at a higher education institution, sometimes called faculty.

Background

Through its ability to determine and drive outcomes, the undergraduate curriculum is key to achieving quality outcomes for all stakeholders: students, academics, higher education institutions, professional bodies and society more generally. Despite this, curriculum in higher education has not received the attention that it has at other levels of education. Professional bodies associated with higher education have provided guidance on appropriate content for whole programs of study, e.g. the ACM/IEEE "Ironman" curriculum [6] for computer science. However, the elements of a higher degree curriculum and the relationships between those elements have not been studied widely.

For many university academics the concept of curriculum is unfamiliar [7]. Many develop and teach courses which reflect their own, frequently research-driven, interests and pay little heed to the need for program coherence or even to identifying the aims and objectives of their course. Barnett[8] argues that "curricula in higher education are to a large degree *hidden curricula*, being lived by rather than being determined. They have an elusive quality about them. Their actual dimensions and elements are tacit. They take on certain patterns and relationships but those patterns and relationships will be hidden from all concerned, except as they are experienced by the students" [8].

What is curriculum?

Descriptions of the term curriculum abound: a curriculum can be described as 'a list of subjects', a 'set of courses', the 'entire course content', 'a set of planned learning experiences', the 'written plan of action' as opposed to what is actually done in the classroom or even a 'decision making process' for determining educational purposes and how they are to be achieved or some combination of these concepts. The literature also provides a variety of conceptions of curriculum which essentially center on deciding what should be included (content or subject matter), what are the most appropriate processes and conditions for learning (structure/organization and practice), and how to assess that learning has taken place.

The literature is also unclear whether *curriculum* applies to programs or to courses or to both. Where it suggests curriculum applies to both programs and courses, it is unclear what the relationship between the two is. For example, Tyler [9] and Zais [10] are quite clear that they see the concepts of curriculum as applying at both program and course level but they do not discuss the relationship between them. On the other hand, Stenhouse [11] does not give any hint to which level he considers curriculum belongs, though his language – singular verbs and nouns, and use of terms such as "classroom teacher" – suggests that he is more focused at course level. Print [12] too is not clear to which level his definition applies. However, as he defines curriculum as "*all* the planned learning opportunities offered to learners by the educational institution and the experiences learners encounter when the curriculum is implemented" [12, p. 9] (my emphasis), I suggest that Print sees curriculum as applying to a program rather than individual courses.

Just how academics perceive the term curriculum and what is meant when they use it depends to a large extent upon the context and their disciplinary area [13]. Yet, despite this abundance of meanings and conceptions, frequently when writing about or discussing curriculum it is "with the untested assumption that [we] are speaking a shared language" [14, p. 2].

I contend that common usage and the definitions provided in the literature include multiple, widely differing concepts within the one term. I believe that Lattuca and Stark [1] are aware of the issues and confusion that has arisen from using a single term to mean multiple, different concepts when they propose their "academic plan". They distinguish between a curriculum – content and sequence – and the process of curriculum development which they refer to as "the iterative process of planning". The combination of both is an "academic plan" [14, p. 15].

I suggest that based on the literature and current usage *curriculum* can be described as:

- *a concept* – how one thinks about a curriculum in the abstract or meta level;
- *an artifact* – a set of documents (for implementation), e.g. the written, published, official, intended curriculum;
- *a body of knowledge* – content (that is to be transmitted) and which may include some notion of sequence;
- *a process* – the life cycle of curriculum or curriculum planning, i.e. an iterative process that includes inception, design, development, delivery (teaching), evaluation, change and retire;
- *a product* – an attempt to achieve certain objectives through the structure, organization and approach to delivery;
- or a combination of some or all of the above.

Why is it important to understand the concepts of curriculum?

I contend that how an individual perceives curriculum will affect the process of curriculum design and development in which he/she engages as well as the output of that process – the written, the official, intended or planned curriculum.

I agree with Lattuca and Stark [1] when they say that without an common view of curriculum academics "seldom link the elements they mention into an integrated definition of the curriculum [instead thinking] of separate educational tasks or processes, such as establishing the credit value of courses, selecting the specific disciplines to be taught or studied, teaching their subjects, specifying objectives for student achievement, and evaluating what students know" [14, p. 2]. They also note that "the most common linkage faculty members address is the structural connection between the set of courses offered and the related time and credit framework" [14, p. 2]. Additionally I suggest that without an integrated definition of curriculum it is very difficult for academics to understand the impact changes have on course outcomes, let alone on program outcomes.

I further contend that the curriculum intent – that is the aims, goals and objectives [10,12,15] – of a higher education degree program is met by the sum of the outcomes of the courses from which that program is constructed, and that improved student outcomes will be achieved if all involved at either program or course level have the same understanding of curriculum. Aligning the various elements of a curriculum to create a coherent curriculum to is widely accepted as improving student outcomes [9,7,5,16,17]. A coherent curriculum is especially important at university level, because the "complex learning with which higher education institutions are concerned is best promoted by coherent curricula. However, curriculum coherence is not widespread" [18].

Finally I contend that a common, well understood definition will enable the development of quality curricula (both program and course) which create learning environments [3] from which learning is likely to "emerge" [19]. Furthermore, such a definition will improve communication and overcome ongoing differentiation and disputation – the outcome of existing attempts to arrive at consensus [12] and is vital if higher education is to accept the challenge of harnessing the potential of information communication technology (ICT).

Design / Method

As the study is not testing a hypothesis but is attempting to discover what academics actually *do* when engaged in curriculum design and development, the researcher determined it was appropriate to follow Charmaz' [4] constructivist grounded theory methodology and data analysis method [20, p. 130]. Based on the researcher's view that the development of new curricula and the updating and innovating of existing curricula is a design [21,22,23] or problem solving activity [12] it was decided that data should be collected from engineering, computer science and information systems academics only. Specialists in these fields regularly grapple with problem solving and the design of improvements to those problems and their training prepares them to approach design problems in a systematic way. Despite this, engineering, computer science and information systems academics, many of whom have explicit training in facets of design, seldom apply their design skills to curriculum development activities [8].

Initially it was planned to collect data via in-depth, semi-structured, one-to-one interviews with at least 30 engineering, computer science and information systems academics from three Australian universities. However, it soon became apparent that academics were not used to thinking about curriculum and the processes with which they engage when designing and developing curriculum – despite engaging regularly with curriculum as they design and develop courses, and participate in program reviews and accreditation visits. To alleviate a perceived significant potential for the researcher to influence responses when prompting individual interviewees, it was decided to conduct the remainder of the data collection via small focus group interviews. Focus group interviews are particularly helpful in getting participants to "explore and clarify their views" [24] in a way not readily achievable in one-to-one interviews.

Each focus group lasted for one to one and a half hours and was composed of three or four participants drawn from a single institution. In all but one instance, focus group participants were drawn from more than one of the specified disciplines. The researcher moderated focus group sessions which were a guided discussion that explored participants' approaches to, and understanding of, curriculum and curriculum design at both a course and program level. An activity oriented question was used to break the ice and to get participants thinking about the elements of a curriculum.

Using a magnetic whiteboard, colored pens and prepared labels identifying possible elements of curriculum, participants developed a model of curriculum. Elements were drawn from data obtained during the one-to-one interviews and from the literature. In some instances participants created new elements for inclusion in their models. Discussion centered on the model, which was continually refined and elaborated, and the concepts and understanding of curriculum that it documented.

Six, one-to-one interviews were conducted with engineering and computer science academics from one, research-intensive Australian University and the data was analyzed using Charmaz' [4] approach to grounded theory. The themes identified in the one-to-one interviews informed the small focus group interviews. Thus far, five focus group interviews have taken place. These have involved 16 engineering, computer science and information systems academics drawn from three Australian universities: two of which are first-tier, research-intensive institutions.

Participants also provided a small amount of demographic data: institution, appointment level and type (e.g. permanent, sessional); length of involvement in higher education curriculum development; involvement in curriculum development at other levels (e.g. vocational or secondary school); and whether they have formal education qualifications (e.g. Graduate Certificate in Higher Education, Diploma of Education).

Interim Findings and Discussion

At this stage, the work is on-going. The one-to-one interviews only have been analyzed in depth. Focus group interview data has been quickly analyzed between each group so that any important aspects of one focus group could inform subsequent focus group sessions. More substantial analysis of this data has begun. Further data collection and completion of in-depth analysis of the focus group data will be carried out during the remainder of 2013.

Thus far, 22 engineering, computer science and information systems academics have participated. Of the 22, six are women and seven have formal educational qualifications – five hold a Graduate Certificate in Higher Education; one a Bachelor in Adult Education and another, a Graduate Diploma in Education (Secondary Mathematics). Focus groups were high energy with participants saying they had enjoyed the opportunity to discuss and debate the curriculum in this manner. So far, no correlations between any of the demographic data collected have emerged but the demographic data has helped guard against selection bias when choosing participants.

Key findings from the one-to-one interviews – that academics focus their attention on course level curriculum rather than program level; don't frequently discuss their ideas and proposed changes with peers; that curriculum design and development at course level is essentially a solitary activity; and that they don't have a coherent view of the program curriculum – are repeated in the focus group interviews. These findings accord with those reported in 1997 by Stark, Lowther, Sharp and Arnold [2] from their study of 59 academics at two United States universities. In that study academics were asked "about their assumptions and the influences upon them as they work with colleagues in planning program curriculum" [5, p. 99].

During the focus group interviews, the confusion caused by the lack of a commonly accepted understanding of the term curriculum was apparent, which accords with Barnett's [8,1] findings. Discussion of the elements of a curriculum was frequently interrupted by the discovery that one or more members of the group were talking about a program while others were talking about a course or vice versa. Also causing confusion and significant discussion were participants' different understanding of which elements formed a curriculum and which were constraints or influences. Interestingly, even though right from the start one Focus Group was very definite

about the different aspects of a curriculum as they saw them – the process involved with designing and developing a curriculum; the output of that process, that is the course material; and the formal, written curriculum – and would not begin discussing their concepts until they were all clear they were discussing the same thing, they discovered at one point that two of the group were talking about curriculum in terms of a program while the other was thinking about it in terms of a course. Participants also suggested that program and course curricula were organized in some form of hierarchy, potentially with the courses mapped from the program curriculum almost 'cookie cutter' style.

Focus group interviews have highlighted the variance in participants' understanding of the distinct concepts typically encompassed by the term curriculum. The concepts identified were: the *written, official*, "*espoused curriculum*" (Focus Group C) which is generally expressed in terms of content and graduate outcomes; the *process* which surrounds the inception, design, development, delivery and maintenance of a curriculum; and the *method of delivery and the structure* and sequencing of content. Often there was robust discussion about exactly which elements formed part of curriculum and which were influences and constraints.

Participants indicated that they saw the written or formal curriculum as a specification, likening curriculum goals to project requirements, evoking the world of projects and design that the selected participants inhabit. Participants felt that the structure of a course – that is whether a course was taught in a number of weekly 'chunks' or whether it was taught in intensive mode, and the teaching methods and learning activities – was not part of the curriculum but instead was simply an implementation of the curriculum, again echoing their design backgrounds and reinforcing the view of the formal curriculum as a specification. They argued that a course curriculum – the goals, outcomes and to a lesser extent, the content – would not change if, for example, the method of delivery changed or the structure changed from a weekly to intensive mode.

Focus group participants were generally clear that curriculum is a design problem and a curriculum itself was a "designed object" (Focus Group C). Participants saw the graduate or student outcomes as the guiding principles or the goals that one set out to achieve; the aims, learning outcomes and structure constituted the "thing" one designed to achieve the specified goals; the content, the subject, subject matter, topics, modules of content were some of the material one had to work with to design the "thing"; and the mode of teaching, teaching method, learning activities, assessment were the means of implementing it. Available resources and cost were determinants or constraints. Like all design problems, it was suggested that one would start with the goals and then, factoring in the constraints such as human resources and costs, one would proceed to design a solution which would be used to guide the implementation. As also noted by Barnett [6] participants did not explicitly follow any specific approach to design which they may have learned. Rather they seem to use various design mechanisms which they follow unconsciously, perhaps reflecting their training, experience and background.

A phenomenon, which participants called "curriculum drift", was clearly identified. Drift was defined as the movement out of alignment of a newly designed or recently reviewed program, the curriculum for which is coherent and cohesive. Drift happens relatively rapidly and was most frequently caused when the academic responsible for teaching individual courses changed and so

changed course outcomes. Such changes were frequently implemented without reference to program outcomes. Participants also admitted that they themselves often implemented change piecemeal so as to avoid dealing with the administrative overhead surrounding more significant curriculum change. They acknowledged that, over a period of two or three years, a series of small changes was likely to cause significant curriculum drift, resulting in a program curriculum which was severely out of alignment. Curriculum reviews, especially those occasioned by accreditation were events which re-aligned the curriculum and made it coherent and cohesive once more. One participant saw drift as positive, stating that it was a "natural way of exploring change" (Focus Group C) but acknowledged that drift affected quality if it was not properly monitored and controlled.

The difficulty academics had in understanding the complex connections between the overall outcomes of a program and how they mapped down onto the individual courses was identified as a significant problem when trying to maintain program cohesion and coherence. This mapping was made more difficult when a course was shared across programs and even more so when those programs were in different faculties. Participants felt that some form of visual representation of a curriculum and the relationships between the various elements, especially learning outcomes and content, would assist individual academics when designing, developing, delivering and maintaining their courses as well as providing real assistance to a program convener with responsibility for ensuring that a program meets an accrediting body's requirements.

Additional points of interest from the one-to-one data include: the term 'student' is notable in its almost total absence from interviewees' discussion of the term curriculum and the process surrounding change; consequent on this is the apparently teacher-centric notions presented alongside interviewee focus on teaching and content delivery rather than on student learning; the need to rework / redevelop material before being confident to teach it; and that discussion with peers was more prominent for those interviewees whose definition of curriculum was not clearly associated with either a course or program. These points are not so strongly emphasized in the focus group data potentially reflecting the group nature of the interviews.

Conclusions & Challenges

It is anticipated that the knowledge gained through this research will facilitate taking up Barnett's challenge of developing an "analytic framework ... [to help] in understanding curricula and curricula change" [8, p. 256]. Such a framework will also provide a clear and well-understood definition of the term *curriculum*. Together these will provide academics with a greater understanding of the elements of curriculum and the relationships between them thus providing a mechanism to monitor and control curriculum drift. A better understanding of curriculum will facilitate the development of flexible higher education engineering, computer science and information systems curricula which can be adapted readily to deal with development and changes in technology. The findings and understanding gained from this research will inform the design and calibration of a model of '*curriculum as abstract*' – a curriculum framework – and '*curriculum as process*'.

As the research is limited to the Australian context and the disciplines of engineering, computer science and information systems, the findings may not be generalizable to other national higher

education systems or to other disciplines within the field of higher education both in Australia and abroad.

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