Core Curriculum Analysis: A Tool for Educational Design

Lena M. Levander & Minna Mikkola


To link to this article: http://dx.doi.org/10.1080/13892240903069785

Published online: 23 Jul 2009.

Article views: 378

View related articles

Citing articles: 2 View citing articles

Full Terms & Conditions of access and use can be found at http://www.tandfonline.com/action/journalInformation?journalCode=raee20
Core Curriculum Analysis: A Tool for Educational Design

LENA M. LEVANDER* and MINNA MIKKOLA†
*Finnish Virtual University Service Unit, TKK, Finland, †University of Helsinki, Helsinki, Finland

ABSTRACT This paper examines the outcome of a dimensional core curriculum analysis. The analysis process was an integral part of an educational development project, which aimed to compact and clarify the curricula of the degree programmes. The task was also in line with the harmonising of the degree structures as part of the Bologna process within higher education in Europe.

An electronic core curriculum analysis matrix was designed for describing scientific and professional knowledge and skills. The generation of the descriptions was supported by the application of a participatory working process. The resulting descriptions were stored in a database and available for all the teachers to redesign the curricula. The descriptions were analysed in order to assess their usefulness in curriculum design. The teachers had described their courses in qualitatively different ways. The emerging description categories were named as implicit, explicit, brief and extensive.

Our study emphasises the benefits of core curriculum analysis and of a course description database as a tool for curriculum design. The study also points out the importance of teachers’ description strategies and the challenges arising during the process. The regularly updated electronic database of the core curriculum of courses is a very useful means for curriculum design, as well as student guidance, mobility support and the orientation of new staff. The analysis process enhances educational design on all levels of education. It offers support for documentation and participatory curriculum development.

KEY WORDS: Core curriculum analysis, Curriculum design, Curriculum development, Educational development

Introduction

There is a common understanding that university curricula should address societal aims and represent updated disciplinary understanding and competencies. The goals, and correspondingly the curriculum content, however, are often a collection of more or less structured knowledge that has been passed on and evolved over time (Barnett, 2000; Charlton, 1991; Stark, 2002; Toohey, 1999). Generally, the disciplines and courses include historical influence and cultural variation as well as institutional tradition and teacher-specific orientation (Becher and Trowler, 2001; Stark, 2002). In practice, university teachers base their teaching on their own education, experience and research. Because the body of knowledge of a discipline is extensive, the teacher
as an expert selects, structures and simplifies the knowledge in order to help the student to understand it (Thielens, 1987, cited by Hativa and Goodyear, 2002). From this point of view, there are inherent degrees of freedom concerning curriculum content.

Curriculum sometimes relates to the whole process of education for a degree and at other times just the minimum of listing the included courses (Richmond, 1971 quoted by Law and Glover, 2000). This listing of courses by their names generally refers to the content, but may also include, for instance, the working method or learning objectives. As educational developers, we perceive the notion of curriculum to include description of educational goals, content of education, working methods and learning outcomes. From this point of view, it is important to structure the curriculum into a progressive and interconnected path of teaching and learning. As a systemic view of designing teaching, constructive alignment calls for a systematic and outcomes-based approach from the teachers (Biggs, 2003; D’Andrea, 2003). However, while giving clear guidelines for the relatedness of learning objectives, working methods and the assessment of learning outcomes, the notion of constructive alignment leaves plenty of room for designing and structuring the curriculum content.

To develop degree programmes, it is essential for the programme manager, and to some extent individual teachers, to master the curriculum as interconnected courses along the learning path. At the degree programme level, the curriculum becomes more complicated due to the mix of disciplines and the number of teachers working for the degree programmes. This makes the degree programmes very extensive and difficult to grasp as a whole; it may be difficult for both the programme manager and the individual teacher to keep the connections between courses at degree level in mind. Individual teachers tend to focus on their own research and teaching, especially when they have a strong disciplinary or field-specific orientation. Teachers often have very little time to learn about teaching concerning the whole programme and contents taught by other teachers. Unfortunately this individualistic approach by the teachers often leads to courses mushrooming with new knowledge and skills to be taught and learnt. Consequently, not only the content but also the number of courses tends to increase within a degree programme, which also threatens students with work overload (Charlton, 1991; Harden and Davis, 1995; Hietala et al., 2004).

A degree programme and a single course usually have a general description of goals and a list of contents for the students (and teachers) to get an idea of what is involved. These descriptions may, however, be unspecific and do not explicate systematically the content of teaching and the outcome of learning. Traditionally, individual teachers are not required to write a detailed document about their teaching goals, or the content or working methods of the courses. Planning and implementing teaching has largely been a private issue. This also conveys the possibility that the actual delivered teaching content is the teacher’s implicit, internalised knowledge, not described beforehand in published course descriptions. Thus, within the actual content may lie a partly hidden curriculum, unknown to students and colleagues (Barnett, 2000). The content, however, is only one aspect of educating future experts. Learning is also a social situation and involves learning how experts in that discipline work and communicate with each other. In other words, learning means also participating in a community of practice (Wenger, 1998). Teaching and learning takes place in interaction, and new conceptual understanding is also created during the interaction (Martin et al., 2002).
Therefore, it cannot be assumed that everything can be planned in advance. Despite this inherent dynamics in teaching and learning, some consistency is needed between programme design and implementation (Owen, 1999).

To overcome some of the above mentioned challenges, we present in this paper a conceptual tool, core curriculum analysis, and discuss the experience of its pilot use. With this tool, the degree programmes were to be analysed, described, shared and made comprehensible from the level of individual courses to the level of the whole programme. Since the basis of the core curriculum analysis was the teachers’ analyses and descriptions of their courses building up the curriculum, the ways they describe their courses was found to be crucial for the redesign of curricula. Therefore we examined the teachers’ description strategies more closely. Our research question is: what are the resulting analytic descriptions of the courses like and how informative are they for the purpose of sharing during curriculum development? The article also touches on the administrative and social aspects during the educational development process aiming at restructuring the degree programmes. Institutional issues of power and tension can arise during processes of educational development and restructuring (Trowler, 2004), the understanding of which is crucially important in any change processes.

The Notion of Core Curriculum in Higher Education

The concept of core curriculum has been used in basic medical education since the 1960s in North America (Bandaranayake, 2000). There are many definitions of the core, but Bandaranayake (2000) concludes that the core should be defined as what is common rather than only what is essential to particular degree programmes. The essential should be determined within the core. Harden and Davis (1995) elaborated on the definition of core by providing the following four perceptions to illuminate it: core as essential aspects of each subject or discipline; core as essential competencies for practice; the core as a study of only the key disciplines; and core as areas of study relevant to many disciplines. Within these perceptions, the curriculum can be identified as disciplinary aspects, practical competencies and relevant topics for several disciplines.

The core curriculum can be presented for different purposes at institutional, national and global levels. The core curriculum is not rigid or absolute and should be reviewed regularly (Harden and Davis, 1995). According to Blight (1995), core curriculum refers to why, how, when, where and what kind of education is offered; core curriculum also covers the content and how it is organised within a degree programme. From this perspective, the articulation of programme specifications in the UK context follows the same idea as the core curriculum analysis (QAA, 2000).

Various methods have been reported in order to analyse the core curriculum in ongoing degree programmes. Methods include, for instance, a semi-structured questionnaire and interview schedules, isolating critical incidents, analysis of what knowledge and skills are required, the wise-man approach, the Delphi technique, a listing of what is important, an analysis of current professional practice and a multidisciplinary group of teachers who consult from sources (Charlton, 1991; Harden and Davis, 1995; Bandaranayake, 2000). Amundsen and her colleagues concluded that the unstructured form of concept mapping can be a useful tool to
identify and describe important course concepts and the relationships between them (Amundsen et al., 2004; see also Donald, 1983).

We used the definition presented by Karjalainen and Jaakkola (2000) and Karjalainen (2003): a core curriculum is an internal logical and sequential structure of the curriculum. It describes the knowledge and skills to be taught and learnt in a particular course or a degree programme. Karjalainen (2003) also structured the core curriculum in three levels of essentiality in terms of knowledge and skills; must know, should know and nice to know. Due to the research-intensive and practice-oriented nature of the context in our study, we used additional categories to further characterise the scientific and professional knowledge and skills in our analytical framework (Mikkola and Levander, 2003; Mikkola, 2005). The core curriculum matrix with analytical dimensions and the levels of essentiality appear in Table 1.

This matrix served as an analytical tool in the pilot study we describe in the next section.

The Pilot Use of Core Curriculum Analysis Tool

The context of the paper is an educational development project that took place at a university of about 40,000 students in Finland. In 2000, the Faculty of Agriculture and Forestry (about 3,000 students) launched an educational development project to develop the curricula of all the degree programmes (Mikkola and Levander, 2003; Mikkola, 2005). Following the initial start, the Faculty Board decided to use core curriculum analysis as a conceptual analysis tool to be applied by teachers in designing new curricula. This decision implied the content of education and it’s structuring as the central workable aspect of the restructuring effort, which was strongly connected to other aspects such as educational goals and learning objectives. The core curriculum analysis was carried out during 2002–2003. The exercise involved all the teachers and departments of the faculty. The educational developer constructed in cooperation with the Faculty Education Development Board an

<table>
<thead>
<tr>
<th>Dimensions and the degrees of essentiality</th>
<th>Must know</th>
<th>Should know</th>
<th>Nice to know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific disciplinary knowledge</td>
<td>Essential theories, concepts, models, principles</td>
<td>Complementing knowledge that expands and brings details to the ‘must know’ elements</td>
<td>Special knowledge that can be mentioned or that the student can pursue if interested</td>
</tr>
<tr>
<td>Scientific disciplinary skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional disciplinary knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional disciplinary skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General academic skills</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. The core curriculum matrix with analytical dimensions and levels of essentiality
analysis tool, the core curriculum matrix (Table 1), based on the model that was used at the University of Oulu (Karjalainen and Alha, 2005). The educational developer also organised and carried out the process by offering training and consultation for teachers analysing the curriculum. By making use of the results of this analysis, the teachers and the departments negotiated a revised curriculum of the degree programmes.

External pressure for core curriculum analysis arose later in the form of the Bologna Declaration and the harmonisation of degree structures in the European Higher Education area. The Finnish Ministry of Education considered this restructuring as an opportunity also to redesign the higher education curriculum by recommending that the new curricula should be based on field-specific core curriculum analysis (Ministry of Education, 2002; Lindblom-Ylänne and Hämäläinen, 2004; see also Hietala et al., 2004; Karjalainen and Alha, 2005).

An electronic data base with core curriculum matrix was designed and was placed on an internal web site. The teachers were asked to analyse their teaching in order to focus and make visible the absolutely essential content of their course curricula and save descriptions in the database to be seen by all teachers. Once the database was created, it was meant to be updated regularly to offer support for future educational design and possible other administrative needs.

Within six months, the database consisted of more than 300 courses, which comprised more than half the courses offered by the faculty. The analyses were carried out either by the teacher in charge or by a group of teachers. Discussion between one another whilst analysing one’s core curriculum was encouraged. The courses described and recorded were mainly regular, required courses in the basic, intermediate and advanced levels of the study programmes.

The first stage of the pilot core curriculum analysis was to make the present curriculum explicit and visible for all the teachers (and students) of the faculty. The second stage was the process of negotiating and integrating the course curricula into redesigned degree programmes. This stage involved discussions held within the departments about the content and use of this database to redesign the curriculum. This paper focuses on the outcome of the first stage, which is reflected on and discussed by using the experience from the second stage.

**Study Material and Method of Analysis**

The main aim of the core curriculum analysis was to collect analytical information about the curriculum of the present education in order to support the redesigning of the curricula of the degree programmes. However, as we followed the incoming descriptions during the process, we observed that the descriptions varied a great deal, even though we had set the same framework for the analysis during the training workshops. We began to pay attention to the informativeness of the descriptions, and discovered that the clarity and comprehensibility varied widely. We would like to point out that these initial descriptions do not directly indicate the quality of the teaching content or of the teacher, and there is no quality judgement involved here from this point of view.

After the first stage of the project was completed (core curriculum analyses in the database), we began to examine more systematically the quality of the analyses
available in the database. We asked questions: How do the teachers describe the essential core curriculum? How useful are the descriptions in the redesigning effort? How informative are they for us?

The study material consists of the courses recorded in the database. We also made use of informal and confidential discussions where teachers were describing their ambiguous relationship to the database and the entire project (Mikkola and Levander, 2003; Mikkola, 2005). First, we systematically selected every tenth record for the initial analysis (37 descriptions). The first reading was done independently by both authors. We looked at the descriptions to locate permeating qualitative features in order to construct preliminary categories. This was followed by a discussion to establish the main features of the categories. The second round consisted of 55 descriptions to confirm the findings of the first round. In all, 94 descriptions were analysed. This we found sufficient, as we could fit these descriptions into the categories we had created. Our scheme for analysis was used for exploration in order to understand the differences between the descriptions. Because the essential feature was the analytic quality of the descriptions, we did not attempt to make quantitative calculations to find out how many descriptions belonged to each category.

**Descriptions of Core Curriculum**

Our reading of the teachers’ descriptions of their courses focused on the extent, clarity and comprehensiveness. During our analysis, we created categories for two notions: the extensiveness and explicitness of the descriptions. These categories formed together the comprehensiveness of the descriptions making them informative. The different qualitative poles were well distinguished in most descriptions, but certain fuzziness remained in some descriptions (see Figure 1). We interpreted these categories as presenting heuristic description strategies adopted by the teachers. Brief descriptions were characterised by a small number (5–15) of conceptual terms or theories usually presented as a list. Increasing extensiveness would offer more conceptual terms and specific theories. Implicit descriptions were generally characterised by upper-level concepts only. Increasing explicity would offer more

![Figure 1. The analytic dimensions exhibited in the descriptions.](image-url)
clarifying information about the context, specific theories and their applicability, particularity, and an organised depiction of the relationships of the concepts. To be adequately informative, the description needed to be explicit and extensive.

Most descriptions were brief and implicit, resulting in very limited and general descriptions of the content of teaching. Extensive and explicit descriptions were more infrequent, and resulted in descriptions that offered the reader more understanding of the content of teaching. We noted that it was helpful if the description additionally used particular concepts instead of only generic ones. Some descriptions were fuzzy, either very long or short, this difference not quite coinciding with the explicitness or implicitness of the description. In general, very explicit descriptions could not be as short as the implicit ones. These in-between cases mixed levels of the analysis such that some very general concepts varied with the explicit and specific notions. This unevenness of the teachers’ analyses represented features from the implicit and explicit categories.

Next, we illustrate further on the categories, and then provide an example to compare the informativeness of the same course content described in four ways. The brief implicit descriptions use very few generic words about the content of education. For instance, more specific issues of education or the arrangement of content cannot be judged solely from the description. In this way the description leads one to ask the question: ‘What exactly are you teaching about the subject?’ The brief explicit descriptions use very few words in describing the content of education. The chosen words are, however, more specific, referring not only to the level of education but also to the arrangement of content. The description would provide the reader with a reason to ask whether certain additional issues are dealt with or how the content is arranged or connected to the content of other courses. The extensive implicit descriptions use several words describing extensively the theoretical and upper level concepts presented on the course, but in such a generic way that the level of education cannot be deduced from the description. The extensive explicit descriptions use several words to describe content and in such a way that the theoretical concepts and their particular applications, level and connections become clear to the reader. The extensive explicit description offers other teachers a point of reflection for their teaching, and the opportunity to structure the content of education and, furthermore, to link skills and practice in education.

We have constructed an example to illustrate an idea of what the description is like. The example is set in microbiology (concerning the dimension of scientific knowledge ‘must know’) and is created in order to avoid any connection to the confidential material in the database.

Our example: A course in food poisoning: a created example of a core content analysis description.

Brief implicit: Food poisonings, their causes, impacts and prevention in industrialised and developing countries.

Brief explicit: Food poisonings, Enterobacteriaceae, Staphylococcus, Clostridium, etc., mechanisms of distribution and contraction, symptoms of disease
and basic laboratory diagnostics, preventive measures and HACCP (Hazard Analysis Critical Control Point).

**Extensive implicit**: Food poisonings caused by various microbes and chemical substances in the food, their prevalence in the environment, humans and animals, activities distributing food poisonings and methods of prevention and treatment, industrial quality management schemes, local, national and international official cooperation in combating food-borne hazards, the inseparability of food safety from food security in different parts of the world.

**Extensive explicit**: Food poisonings caused by main microbiological groups such as prions, viruses, bacteria, protozoans and worms, and main chemical compounds such as biogenic amines, fungal, algal, shellfish and fish poisons. The molecular mechanisms of poisonings in human tissues are explored along with perceived symptoms, prognosis and medical treatment. Laboratory diagnostics, including aerobic and anaerobic sampling, enrichment, quantitative and species assessment methods, species and serovar analyses by PCR (Polymerase Chain Reaction) are explained. The procedures for official announcement and the collection procedure of official statistics are presented. International cooperation between the EU and WHO (for example, Salmnet) is discussed. The mechanisms of distribution of food poisonings and their complex environmental, human and technological factors in the food system are made analysable with the polygon of the contagion as a conceptual tool. Industrial measures of prevention, such as HACCP (Hazard Analysis Critical Control Point), Total Quality Management, ISO (International Standardisation Organisation) and EMAS (Eco-Management and Auditing Scheme), are discussed.

This example illustrates the different ways in which even the same course content can be described. These heuristic description strategies form a sequence of developmental steps in that the first strategy, the brief and implicit approach, is a weaker description strategy than the brief and explicit, which again is weaker than the extensive implicit. The most developed strategy was the extensive explicit, offering better basis for more grounded discussions and sharing deeper understanding of the content of the course than the other strategies.

Concerning the tripartite division of the essentiality of core content, the teachers concentrated mainly on the area of ‘must know’. The analysis of the descriptions indicates that scientific knowledge was well defined, but included very little information about scientific skills. Professional knowledge was not described very comprehensively, and even less characterisation was given to professional skills. Yet there were exceptions to this overall picture, suggesting that in some subjects the content was understood more professionally than in others. These results may indicate that the courses are mainly knowledge-intensive and reflect the perceptions about university teaching. It may have been difficult to see how the course supports professional skills.
Reflecting on the Outcome

After the exercise, it became obvious that only some of the core curriculum analyses of the courses were produced with developed strategies (explicit extensive). The variable quality and differing description strategies used by teachers in describing the core curriculum of their courses were very probably due to different background factors. These became evident in various discussions and electronic mails with teachers. Some teachers perceived the inherent possibility for negative criticism, and therefore were unwilling to be explicit in the descriptions. Others again were concerned about possible redesign, threatening their ‘own course’, and avoiding potential demands for combining, splitting or even a ‘take over’ of the course by other teachers. The teachers also feared the possibility that someone else in another educational institute could benefit from their descriptions. Teachers expressed their concern that an academically lower-level institute could adopt the course content and claim that their educational offering was basically similar to the university-level course. In addition, the educational competition between universities and other institutes was evident on this platform, which was generally considered positive, but may potentially be considered negative for one’s own teaching and reputation. One factor limiting the quality of descriptions, leading to less informative description strategies, was the research orientation and time limitations of the teachers; their preferred commitment was to research, not teaching. Finally, not all the teachers were committed to structural changes anyway; the emerging new structure implied not only extra work and new qualitative challenges but also competition with other teachers and limited resources. The educational redesign effort, perceived as extensive and threatening in any organisation, presents a major challenge both for the leadership and teachers of the departments (Lemann, 2006).

Despite the variable quality of descriptions, they represented the basis for redesigning the degree programmes. As such, they invited the teachers to discuss the results and offer to redesign the curricula. These discussions were often confidential and took place within departments. The teachers were encouraged to gather together and analyse their course descriptions to determine the overall picture, to detect overlaps and gaps, to learn what the others teach and to discuss whether they are in line with expectations for a positive learning result for a degree. The resulting changes were uneven, some departments making bigger changes than others. Changes, such as the order of the courses within a degree programme, took place. Moreover, some courses were found to need more horizontal connections and they were scheduled to run simultaneously.

The core curriculum analysis presents a case for faculty learning in describing what teachers are teaching. As such, learning the outline of content of degree programmes takes time, which is clearly required when the personnel are committed to tasks other than just teaching, and when teaching in an insecure environment. The outcome, although not as extensive and explicit as expected, generated discussion of teaching content within the departments and the faculty. The core curriculum analyses of the courses offered a reference basis for negotiations on redesigning the education of the degree programmes.
Discussion and Conclusions

The process of the core curriculum analysis resulted in documented information about the course curricula which is accessible simultaneously to all the teachers of the faculty. This kind of documentation is rarely available for curriculum design.

Developed description strategies produced useful information about course curricula. As a tool for sharing information, core curriculum analysis is efficient, easy and feasible when used according to advanced description strategies. The extensive and explicit descriptions enable the sharing of essential features and make connections to other courses transparent. The less developed strategies produced descriptions which were not in themselves so informative. These, however, were useful enough, as they raised awareness and initiated discussions in small circles within the departments and in some cases between the departments. As such, the dimensional description strategy became visible, and led teachers to reflect on what theory and practice means and how they may be connected to education in mutually supporting ways.

It also became evident, however, that several obstacles reduce the quality of descriptions. To support the process, the academic community must address questions of uncertainty, competition and the threat of plagiarism. The power issues and personal tensions that exist within the academic community and surface during a change process appear a challenging research topic; however, these issues are referred to as only highly important circumstantial matters in our study.

Despite these challenges, core curriculum analyses are evidently a powerful developmental tool. They could facilitate other important issues connected to the development of the European Higher Education Area and the Bologna process. One of these is the issue of student mobility; it has often proven difficult to know what kind of curricula are actually taught and learnt, and to what extent the degree programmes in different higher education institutes are corresponding. In addition, the documents would reveal historical changes in content, which would help those students with breaks in their studies. On the basis of core curriculum analyses, comparisons could be made in order to design personal study plans for mobile students. It can be useful to inform and work collaboratively on curriculum design, especially in situations where joint degrees are developed. Moreover, core curriculum analysis descriptions are useful when BSc degree students continue their education at Master’s level in another degree programme or university.

The possibility of profiling the education is a major advantage for the universities. The dissemination of the details of curricula, however, can expose the institutes to excessive evaluation and mutual competition. On the basis of this case study, core curriculum analysis as a powerful developmental tool also demands the learning efforts of teachers; the use of this tool calls for analytical ability and the evaluation of the essentiality of the teaching and learning. This approach is not necessarily inherent without training and collegial effort.

Acknowledgements

We wish to thank Dr. Asko Karjalainen from the University of Oulu, Finland, for his support during the restructuring project. We would also like to thank the anonymous reviewers for their very useful comments.
References


