

Continuous curriculum updating: An alternative approach to periodical reformulation in university

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Abstract

Research on curriculum continuous updating is reported (CCU); the objective was to test a methodology and its technological database device. The hypothesis considers that CCU allows the professor's creativity and brings closer the prescribed curriculum with the curriculum-in-use. A CCU methodology and its database (BDW 2.0) were designed. They were tested with 22 professors from three universities (2 Mexican and 1 Chilean), and they produced 85 records. The prescribed curriculum is a power and exclusion dispositive that provokes an anti-democratic education and diminishes the professors' pedagogical freedom. The results show the types of modifications used in daily classroom work. These modifications are not usually recorded, and the valuable experience of professors is lost. The proposed methodology allows the systematic recording of this as it provides an informative and historical archive for the CCU. The conclusions account for the relevance of teachers' curriculum practices in the curriculum in use and imply bringing teachers' voices into the prescribed curriculum. That is, the currere occupies the hegemonic place instead of the mandated curriculum.

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Introduction

When a university professor observes the curriculum updating processes established by one elite group and observes that the processes lead to changes that are operated at the same time, in the same way, and at the same pace, that professor should question that not all careers, fields of knowledge, specialists, and professional practices may be carried out in the same way. Diversity, plurality, free-thinking, and professional creativity are knocked down by those practices. The curriculum as a control dispositive is subjected to accountability politics, the routinization trend, the constant erosion of freedom, and, in the last instance, an attempt to undermine democracy. Suppose university education has the objective of educating and shaping the new generations to face world challenges such as climate change, massive migration processes, regional wars, exacerbated violence, and the isolated individual without taking part in the community. The new generations will have to be other humans, different from what we are today. The curriculum conceived as a prescription will not respond to those

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challenges. We have to think of other and different ways to carry out the modification that the university classroom needs.

Professors are the best response to the necessity of changing the curriculum; in fact, they make daily changes to the curriculum. The professors of the universities make constant modifications to the contents of study programs or syllabi; they do it with the support of their pedagogical experience and scientific knowledge. They make these modifications without having a formal process of curricular evaluation. Constant modification is carried out as a response to conditions of celerity of economic, scientific, technological, and social changes. For example, a professor is required to return to the content of a previous syllabus because the students do not know it, and they require that knowledge to understand new content. In this case, the professor incorporates the content of the previous syllabus before starting a new topic. The majority of professors, collectively or individually, make many modifications to contents, in some cases following the official curriculum, but in most cases far from it or in opposition to it. Professors are isolated in their classrooms; they make adaptations when the context requires it, and then professors do it on their own; for example, a professor includes in his course the most recent research papers or professional work techniques. However, many universities are institutionally bound by accountability processes. This situation forces them to engage in standardized curriculum modification processes that omit classroom specificities and specific curriculum practices.

The modification of contents, as we have described in the previous paragraph, offers research veins that tend to build new ways for curricular design and evaluation. When professors teach in university classrooms, they have already selected the content that they will teach. How did they elect those contents? What criteria were used? And how did they carry out the updating? These were the questions that guided the research regarding it. So, we have done research on how professors of the university's faculties do the updating of curriculum contents. This research focused on the selection of content for the formation programs of Mathematics education majors with the intention of becoming high school teachers. We consider that the fundamental problem in the processes of curricular change is that the written curriculum is very different and distant from the curriculum-in-use. We believe that this distance implies that the formal or written curriculum is fiction and the curriculum-in-use is where education really takes place; then, we assume that it is necessary to bring them closer to improve formation. Our working hypothesis states that continuous updating is possible if an appropriate methodology is used and technological support is designed for this objective.

This paper's objective is to consider how professors select content to teach in the university and what their criteria are. In the same way, we got interested in looking for a way to systematize the professors' modifications in order to propose a curriculum-updating methodology. When we researched methodologies for curriculum change, we also designed a technological device, a database in Web 2.0; the professors used it as a pilot test. We collected data from three universities that have programs in mathematics education in both undergraduate and graduate school: the Autonomous University of Zacatecas and the Autonomous University of San Luis Potosí, both of them in Mexico, and the University of The Lakes in Osorno, Chile. It is important to take into account that this work was supported by the Program for Professional Development of University professors from the Public Education Secretary in Mexico under Grant number 28232 UASLP-CA-266. Next, we show the document's revision that we did before carrying out the research, the theoretical perspective

that has guided our search, the methodological principles used, and the most relevant results.

Ways Of Curricular Updating

In the era of information and open resources, students experience curricula way beyond what planners could imagine, and the distance between curricula (prescriptive curriculum and curriculum-in-use) is bigger. The restricted conception of the curriculum (objectives, contents, sequences, learning activities, methods, resources, and evaluation) is increasingly ankylosed. What happens if we do not frame the curriculum design as a technical task but rather as a cultural imperative to improve a productive human dialogue? (Fung, 2017, p. 18). In the face of that situation, the constructive alignment of the curriculum (Biggs, 2003 in Fung, 2017) remains in a technical appearance that leaves aside the reality and the necessity of a constructive dialogue between the university and society. "We are seeing today a fast adjustment under a kind of authoritarian capitalism; it restricts not only the idea of change but also the idea of education and democracy itself" (Säfström, 2018, p. 621). The imperative of constant change talks about a strategy of state reproduction. This strategy changes only what's necessary in order to keep the existing conditions; promoting the idea of change and freedom is a historical task of educational theory and resistance in regard to the imperative of constant change.

University professors, theoretically, discuss in a collective way the curriculum changes, but they must assume the decisions of international organizations such as The Organization for Economic Co-operation and Development (OECD) and Programme for International Student Assessment (PISA), the national normative instances, accreditation organisms and the institutional normativity that has pre-established models. The space that is left for professors to pose their ideas about curriculum is, really, minimal or non-existent. The prescriptive curriculum is an exclusion dispositive because it promotes values and knowledge from a certain symbolic order that responds to interest groups. The curriculum has been understood as a power dispositive (Jobst & Are, 2015) that allows for it to be filtered and performed into several instances of an institutional organization (Parkison, 2014, 2015), from state secretariats to internal university authorities (internal and directive councils). These powers are also installed into collegiate groups when they discuss and decide on several curriculum topics, always in pre-established times and as a response to other powers. Nonetheless, professors have their curriculum interpretation, and they produce worlds of specific meanings for their profession (Jobst and Are, 2015, p. 113). That interpretation of curriculum has been named by us as teacher curriculum practices; these practices and their products will build daily the curriculum-in-use; in fact, they do. Overall, these results constitute the curriculum continuous updating (CCU). Unfortunately, this updating is lost; it remains in what the professor does in his classroom because the professor's curriculum expertise is not recognized, and his authority has been erased in the prescriptive curriculum.

The accountability and standardization politics have noticeably influenced the education sector both in regard to the curriculum as well as the learning results and the institutional dynamic itself; the commodification of textbooks aligned to standards and high-performance tests for students has also affected the curriculum (Krise, 2016). Parkison (2019) identifies three elements in the scope of education: authority is shown as academic standards, internal persuasive discourse is presented as curriculum, and a non-normalized space is assumed as a

pedagogical practice. From this perspective, the curriculum is a softened institutional mandate, always tied to academic standards; in this situation, only the pedagogical practice can take distance from it. In fact, professors take that distance. How could both the curriculum practices that professors carry out to do the curriculum continuous updating (CCU) and the adequations they apply to their curriculum be recovered?

The combination of different curriculum assessment methods and understanding the curriculum as a complex process with diverse dimensions of analysis can achieve an understanding of the teaching practice and learning field (Anderson et al., 2015). There is a lack of discussion among curriculum planners regarding the theoretical frameworks that support the curriculum logic, its structure, and its design (Reeves et al., 2011; Reeves & Hean, 2013; Anderson et al., 2015). Anderson et al. (2015) pose the idea that a curriculum should be evaluated from a perspective of the complexity that the curriculum and its components imply: the formal curriculum, the curriculum-in-use, and the curriculum experienced by students. They suggested that whoever wants to evaluate the curriculum or design it should do it with support from systematic research.

“The pre-structured and highly controlling character of the prescribed curriculum is inherently anti-democratic because it severely restricts the intellectual participation of teachers” (Fitz & Nikoladis, 2019, p. 1; Timberlake et al., 2017). The authors advocate for the professional and intellectual autonomy of the teachers over the curriculum and its implementation since it constitutes a necessary condition for democratic life. However, the world movement of standards, assessment, and accountability (SAA) doesn't contribute to life in democracy and democratic deliberation (Levison, 2012 in Fitz and Nikolaidis, 2019; Krise, 2016; Parkinson, 2019). The most recent authors recover the values that, theoretically, SAA promotes: equity, efficiency, transparency, dialogue, democratic deliberation, a stronger government, freedom, and diversity (Levison, 2012, p. 263-268 in Fitz and Nikolaidis, 2019, p. 7). They evaluate the effects of a prescribed curriculum from this category, and they conclude that deficiencies surpass by far the possible positive effects. Both the implementation of the prescribed curriculum and its design are anti-democratic and block the school's capacity to promote democratic values. It replaces the confidence and the valorization of the individual with depersonalized and autocratic mechanisms.

In the face of the appearance of The Common Core State Standards (CCSS) in the USA, Timberlake, Burns, and Barrett (2017) reported that among the teachers who applied the prescribed curricula, an alarming ideology was articulated about the fact that inequities (disability and poverty included), could be resolved by keeping the students with high standards and ensuring equity of access to content, in fact the notion of equality and equity being the same was encouraged. The findings of the research suggest the necessity to question the simplified notion of equity and the consequent loss of docents' knowledge and experience. “Behind the high expectations of curricular similarity is the involuntary consequence of expecting all the children to participate in the same lessons, at the same pace” (Timberlake et al., 2017, p. 51).

William Pinar points out that the curriculum emphasis should not be on objectives formulated narrowly and standardized tests but on empowering both students and teachers to develop and express their own identities (Pinar, 2012, p. 22), perhaps through Currere or through continuous curriculum updating. The accountability, standardization, and assessment system has turned into a pressure system for teachers and curriculums rather than a system that

ensures the transmission of cultural assets and education for democracy. Objectives, contents, and standardized assessments are uniform and static, while empowerment of civic education is particular, specific in context, and dynamic. The prescribed curriculum is imposed on teachers and students, and with that, it undermines good civic education (Levison, 2011, p. 36). On the other hand, the hidden curriculum teaches behavior rules to ensure obedience and flexibility so that the workforce meets the demands of corporative capitalism (Halpern, 2018, p. 40). The mechanics of establishing discipline is the base for the production of subdued, docile, and molded individuals to achieve economic goals and to ensure political obedience (Foucault, 1975/2007 in Halpern, 2018, p. 41). It is believed that education philosophy must appeal to meanings beyond consumerism, material wishes, and indifference, that is, compassion, generosity, independence, and privacy (Gatto, 2005 in Halpern, 2018, p. 41). We believe that these practices could gradually replace the prescribed curriculum. Collegial discussion would be necessary to reach agreements in the teachers' groups.

Theoretical Perspective of Our Analysis

From the critical perspective that supports this paper, we begin with the consideration that the curriculum is a power dispositive; at the same time, it is a discourse and a way of thinking (Angulo, 2017). We located that discourse in the articulation notion, understood as "all those practices that establish relationships between elements and differential positions inside a discourse" (Laclau & Mouffe, 1988, p. 177); in this case, we talk about curriculum practices: as the critical application of curriculum changes, the translation of curriculums from one to another country without mediating the necessary reflection and adaptation, or even the generation of their own curriculum models. It's considered that the curriculum is a synthesis of cultural elements...that constitutes a political-educational proposal and is driven by diverse groups and social sectors whose interests are diverse and contradictory (De Alba, 1991).

We have named curriculum discourses the articulation between curriculum practices (Angulo, 2017). The articulation that arises in tension or in diverse alliances (De Alba, 1991). Among these discourses, we recognize continuous curriculum updating (CCU), which exists at universities and emerges as opposed to curriculum trends and regimented dispositions (Angulo, 2017). We took the theoretical position mentioned in the previous paragraph, and the following theoretical principles were derived: continuous curriculum adequation, curriculum structure modification, and content modification.

Continuous Curriculum Updating

It is a curriculum practice that professors carry out in university classrooms; they make small or big decisions about their syllabus daily. We have observed that practice at Mexican geology and mathematics education schools. We theoretically have characterized the practice as an analytical category to get us closer to the reality of the curriculum by researching (Angulo, 2017). Previously, we have detected the most common activities in that practice: elimination, incorporation, or movement of contents; in the same way, the adjustments to learning objectives and even the modification of other curriculum elements such as the bibliography, forms of assessment, and the methodological constants (Angulo et al., 2016). Adequation has become a requirement in the face of circumstances of celerity in social, political, cultural, economic, and scientific change processes. Fortunately, professors carry out the updating even

with the fear of 'setting aside' the institutional mandate (prescribed curriculum), but they have the conviction of such need based on both their teaching experience and disciplinary formation.

Finally, the contents are knowledge selected to the detriment of omitted knowledge. In this sense, the educational contents are legitimized knowledge, generally by an institutional political group. Regarding the translation and reformulation process of contents from the scientific, professional, social, and cultural fields to school, it is suggested that we consult our paper about the representation process (Angulo, 2007). Next, the notion of the artisan process is developed; we conceptualize the professors' ways to carry out the content modifications without having a formation on curriculum design.

Artisan Processes For The CCU

The expression 'artisan processes' refers to the teacher's empirical set of skills rather than a rustic characteristic or a pejorative adjective. The notion of artisan processes is built on the concept of 'researcher occupation' proposed by Sánchez Puentes (2010). He understands the following:

Researcher occupation as...the set of activities and attitudes non-expressed but which are in operation during the scientific production process...the researcher frequently carries them out without noticing these basic activities, without which the scientific activity is not possible. In this sense, the plot and warping of the researcher's occupation point out a kind of raw material that is non-visible. It is, for that matter, the hidden link or nervous system of numerous activities and tasks of scientific work (p. 58).

We suppose there is a similar structure in the teacher's occupation. This scholar does research and teaching; therefore, they have a mixed occupation: professor-researcher. The activities and attitudes that are 'non-expressed but which are in operation' show simple operations that, as a whole, make complicated processes that the professor-researcher masters and, sometimes, is the only one who knows as an expert. The field of empirical skills has been frequently forgotten by educational researchers, who tend more to do theory than to theorize the practice. In this regard, Lijnse (1995) argues that the researchers are not in touch with the school world; they ignore that the scholars daily carry out activities that, if they were systematized, would be able to constitute a valuable methodological tool. Additionally, the systematization of such activities will lead to the theorization mentioned. Our artisan processes talk about these activities.

The artisan processes are skills for the daily modification of contents in the teaching process. The professor uses these skills very intuitively and elaborates insightful answers to contextual needs such as a) scientific knowledge transformation, for example, in geology, when a new era is assigned to a stone and, with it, it changes the previous interpretations, then it's necessary to incorporate new contents; b) professional demands, for example, when the tablet is introduced to teach, the universities have to introduce the learning to manipulate such device; c) the needs and characteristics of learning, for example, when a students' group didn't learn to clear mathematical formulas, and a new course is necessary, the scholar of this course must begin with this topic before teaching the topics of a new course.

The artisan processes are used without an order, but they are perfectly identifiable for who uses them. These processes have generated a solution to a problem with the practices. Constantly, the scholars rearrange contents from their didactical experience about the way to

teach a course as well; they lean on the scientific knowledge that they are incorporating. The professor designs a study program or works with a program that was assigned to him, but in both cases, he puts the study program to the test and reads it over several times. The scholar reformulates the study program from these readings. The reformulation is carried out by the confrontation between contents and student outcomes in-class presentations or exercises, contents and examination results, contents and evaluations, or contents and other colleagues' programs that are similar or equal. At this point, it is important to consult students on the content once they are familiar with it. For example, the current study program can be compared with previous study programs with class presentations or with learning results, book indexes, or research results. The confrontation is usually carried out to find the lack of content in the study program, which results in the insertion of new content. Collegial discussion among teachers will involve consideration of contextual analysis.

Once the scholar has decided to reformulate, he organizes the contents into a list; he reviews and orders the contents in agreement with the subject objectives and with the possibilities of the school, the students, and himself. The consequence of that process is any of the following: a. some contents have changed their place in the subject; b. Some contents have been eliminated; some contents have been moved to other subjects; or d. some contents have been incorporated into the subject. The reformulation or confrontation of contents is done by interchange, reordering, elimination, or incorporation. The repetition of contents or their reorientation and the identification of new contents or obsolete contents are the causes of confrontation or reformulation of contents. The new scientific knowledge that is learned by the professor also causes the confrontation and reformulation of contents. Collegial discussion among teachers is considered inescapable as it will include classroom-specific conditions and will involve the consideration of contextual analysis.

Methodological Process of Research

Research Methodology

A qualitative methodology has been used to address the research problem (the gap between the prescribed curriculum and the curriculum in use) and the importance of the curriculum in use. The research objective was to pilot test a database (BDW) created to record and justify daily curricular changes in the classroom and to confirm the assumed methodology based on the results. The working assumption is considered a methodology for continuous curricular adaptation, which was confirmed by the pilot test. The person responsible for recording these changes is the teacher who makes them, and other teachers and educational authorities will be able to see the suggested changes once they have been authorized by the teacher who makes them. The central problems faced by teachers are that they do not record the changes they make, and these changes are, therefore, unknown to their peers and lack institutional legitimization. The theory underlying the research is based on the critical and complex curriculum (De Alba, 2007). The importance of the study lies in its potential to create a platform common to all teachers and authorities of an educational program, a platform that reflects the continuous adaptation of the curriculum from the classroom, i.e., a curriculum created from the classroom and not from the institutional power, and a platform that enables collegial discussion among peers for the institutional legitimization of the curriculum in use.

The research subjects were graduate and undergraduate teachers at three university schools:

the Undergraduate School of Mathematics Education at the Universidad Autónoma de San Luis Potosí, the Graduate School of Mathematics Education at the Universidad Autónoma de Zacatecas, both schools in Mexico, and the Graduate School of Mathematics Education at the Universidad de Los Lagos de Osorno, Chile.

These institutions were chosen because all three offer undergraduate and postgraduate courses in mathematics education, and the contents are similar in terms of mathematics education, although they differ in depth. The school in San Luis Potosí offers undergraduate courses, and the schools in Zacatecas and Osorno offer postgraduate courses.

Methodology of Continuous Curriculum Updating

The envisaged scenario, once it has been tested, is that all university teachers will employ a methodology of continuous curriculum updating. There are two central purposes for this: first, that university curricula increasingly become the product of the lived curriculum and collective discussion; second, that daily updating implies that teachers identify techniques that come from the conception of the curriculum as a control device and consequently, act in the opposite direction as a form of resistance (Ball & Olmedo, 2013). It is also necessary to note that if the results of teacher modifications are not institutionally installed and legitimized, teacher participation is unlikely to take place, and the struggle for a curriculum created by teachers, and not by the institutional leadership, will not bear fruit. We consider that one alternative is the methodology of continuous curriculum updating that we propose here.

The methodology favors two major moments: the first, the recording in a database (BDW) of the continuous modification that, in fact, occurs on a daily basis, and the second, the struggle for institutional legitimization that also favors the use of the database. For the database, we have proposed a technological device (Web 2.0-BDW) to collect teachers' curricular practices. And a methodology for continuous curricular updating as a product of the database application. The BDW was created by the authors of this work at the Autonomous University of San Luis Potosí (UASLP) and was tested in the three universities mentioned above.

The database is a system that applies the WEB 2.0 philosophy to foster dynamic participation in the curriculum process and encourage teachers and other stakeholders to get involved. The database uses open-source technologies such as HTML 5.5, CSS3, Bootstrap, Dynamic Web Languages, PHP 7, and JScript (jQuery + jQuery-UI). The BDW includes several modules: storage for the educational programs, sections for suggestions for each part of the program, a display of elements to select the modification criteria for each suggestion and a specific space to write the justification for each suggestion. The data stored in the database can be dumped into Excel for analysis. The movement within the database can be seen in Figure 1.

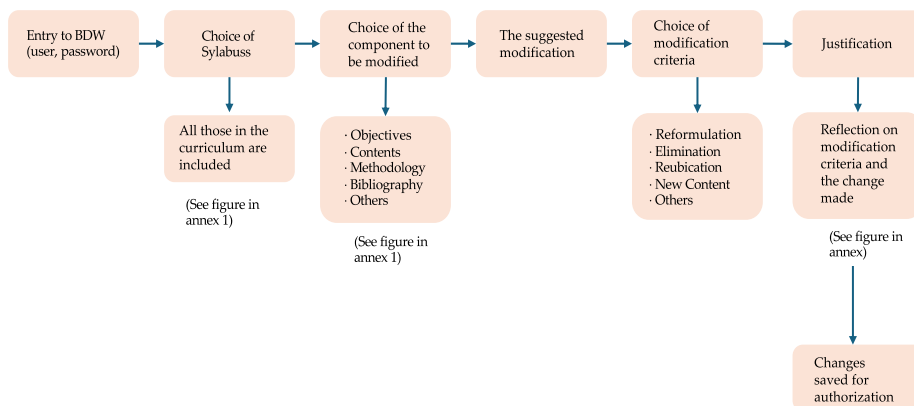


Figure 1. Components of database

Findings

The database was tested by 22 professors from three universities that used it, two of these universities in Mexico and one in Chile. They produced 85 records. The professors' suggestions were made for 34% of the 44 courses from the Mathematics education curriculum. Suggestions were uploaded in a 1-hour session; that is, each professor spent no more than 15 minutes on each program for each change s/he made. The database's versatility allows it to be used for short periods and as many times as necessary. A professor can upload one observation or several ones in the same program in a very short time, for example, when a session class is finished. This situation allows the professor to register his observations when his suggestions are fresh. The curriculum continuous updating methodology (CCU) sets a space for professors to produce their own meanings (Jobst & Are, 2015, p. 113); it contrasts with the minimum and ridiculous space that the prescribed curriculum provides.

Regarding the aspects of the program that received modification suggestions, the professors' choice is evident: objectives, course basic data (schedules, pre-requirements, practice, etc.), contents, methods, course name, and bibliography. These could be done for one program or several. The modification of those elements, either by deletion, new contents or methods added, or changes in their depth, extension, or purposes, allows the professor to readjust the course and, even more, the formative process. Zabalza (2009) says that whichever modification to contents (in the same way as to objectives) produces several positions, modalities, and conceptualizations regarding school activities. This author acknowledges Schiro (1978) and points out that behind these instances, it is possible to identify four school models: one focused on disciplines (academicism), one focused on social change (critical), another addressing efficiency (technological), and the last one guided towards the student (psychological). The presence of several positions taken on a school model (in consequence of formation) shows that it can be very enriching if it is shared within the community. A vertical curriculum exists, and it is employed as a power dispositive in an institution where the curriculum modifications and practices are not shared (De Alba, 2015). The proposal of continuous curriculum updating (CCU) is an alternative. The curriculum, as a softened institutional mandate subjected to academic standards, imposes vertically the prescribed curriculum; only the professors' daily

curriculum practices and their pedagogical practice can resist and take distance from it (Fitz & Nikolaidis, 2019)

Modification criteria of contents were registered, too; the database allows one to choose from a criteria list or to suggest another criterion. The list has the following criteria: appreciation of research results, valorization of learning sequences, learning performance, comparison with other courses, and other criteria. The learning results and the evaluation of our own teaching sequence are the most useful criteria, and the professor decides to change the contents or objectives based on that. It is striking that very little of the research results are taken into account. It is important that 22 records show that other criteria are used by professors to modify the course. These criteria were not collected by the database; in the future, they will have to be incorporated. The multiplicity of modifications and their criteria allow for the evaluation of the curriculum from the complexity and from the professor's autonomy (Fitz & Nikolaidis, 2019; Timberlake et al., 2017). At the same time, those processes allow us to question the pre-structured and controlling character of the curriculum.

There were six types of suggestions made by professors about topics in the courses: insertion, elimination, modification, relocation, questioning, and precision. The insertions represent 42% of 78 suggestions, and all of them point out to adding new content, for example, class planning, software, mathematics epistemology, socio-cultural trend, statistical inference, declination curves, strings, pendulum, etcetera. Out of them, 16 were pedagogical, and 62 were mathematic characters. The fact that these suggestions pointed to adding contents instead of decreasing them (4%) or modifying them (20%), relocating them (8%), questioning their pertinence (4%), or asking for precision in contents (22%), shows that professors tend to add contents and, as a consequence, they saturate courses with excessive contents. Contents saturation is an old idea that suggests that the quantity of the contents guarantees the fact that students learn in the same way, at the same pace, and at the same time, with the same lessons (Timberlake et al., 2017). This situation responds to the accountability and assessment politics that institutional mandate imposes and ignores the students' possibility to learn and build their knowledge in accordance with their conditions and creativity.

Lastly, the database recovered professors' ideas that justified several proposed changes. The database has a space in which professors can enter the justifications. If professors had the possibility to reflect not only on the contents (prescribed curriculum) but also on the internal circumstances (students' knowledge, learning outcomes, institutional conditions) and external ones (science advances, social demands, etc.) that surround them, as well as the circumstances pertinence, there would be more dialogue and the reality would not be left out from school (Fung, 2017). It would be possible for the professors and students to be empowered (Pinar, 2012) from the collegial discussion on the teaching of the disciplines. Here are some examples of justifications extracted from the database:

Example of a justification for a change of content in the Teaching Practice subject:

Eliminate the Microteaching Unit because it involves only practice in unrealistic or simulated classroom sequence situations. It is imperative that students practice in the reality of middle and high schools with students studying mathematics.

Example of a justification for a change of content in the Algebraic Structures subject:

The order of the content units is defined according to the learning sequence since the algebraic structure of modules is defined on the basis of the fields, which have the rings as their

underlying basis. The latter have a group as their substructure.

It is important to highlight the richness of the justification file stored in the database. These justifications contain the teachers' curricular reflections on the curriculum in use in the classroom. They also contain the seeds of continuous updating. When the database operation was tested, we designed a methodology for continuous curriculum updating based on the database results. That methodology is described as follows.

Methodology for the Continuous Curriculum Updating

A methodology that allows the recognition of the professors' curriculum practices was considered necessary as an option to trace and keep records (BDW) and an articulation strategy with institutional curriculum changes. We expect that this methodology allows the professors' curriculum practices to be recognized and legitimized as an essential resource for a curriculum change, at the same time as a dispositive for continuous curriculum updating (CCU). The CCU daily occurs at school; now, with these tools, it should happen systematically. The methodology considers four moments without a specific sequence; they can be simultaneous: the continuous adequation of contents, the analyses of curriculum impact evidence in the context, the genealogical analyses, and the articulation with the institutional framework.

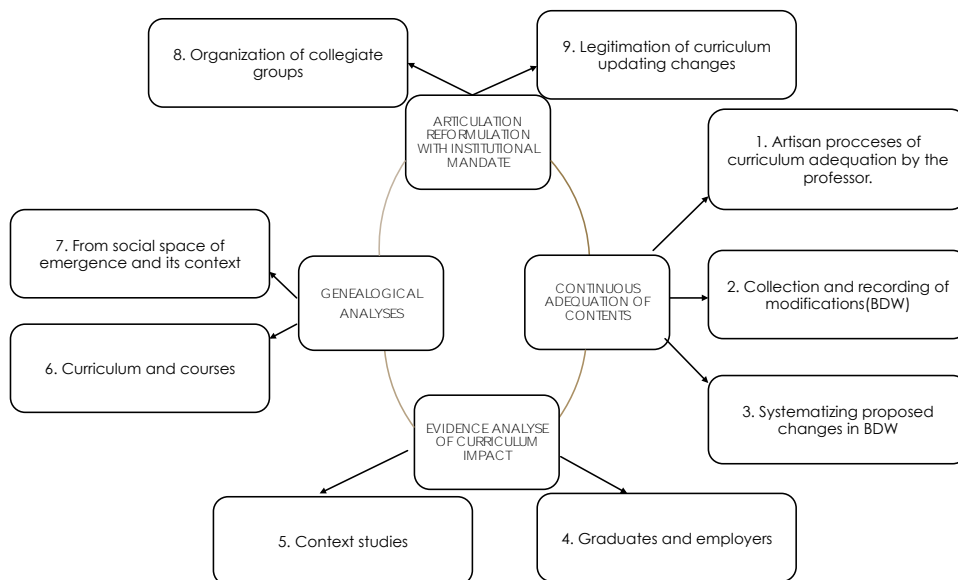


Figure 2. Methodology for the continuous curriculum updating

The methodology can be observed in Figure 2, and it consists of 1) the identification of artisan processes used by the professor, 2) the collection and recording of modifications suggested in database records, 3) the systematization of changes proposed by several professors for some curriculum courses, four y 5) the research and analyses about how the curriculum impacts the context (studies about graduates and employers), 5) Social context studies. 6) The genealogical analyses produced by the historical knowledge of the curriculum in a specific institution, and 7) its characterization as a space of emergence. 8) The collegiate group organization allows the

articulation of the curriculum to be reformulated with the institutional mandate. 9) The evaluation of collegiate groups indicates the appropriate transition that a reformulation should follow. Finally, 10) the official acceptance of the reformulation should be published.

The professors carry out changes established in a non-systematic way; artisan processes are the name assigned to them. Professors will use the BDW to keep a record of the modifications made in each class; in the same way, they will indicate the criterion for those modifications; the database admits suggestions for each curriculum part (general data, requirements, objectives, contents, methodological strategies, forms of assessment and bibliography); additionally, BDW offers alternatives for each element (changing name or hours or contents). The institutional person in charge of the BDW systematizes the changes suggested and presents the reformulation to authorities. The interaction of the curriculum updating methodology with the database is shown in Figure 3.

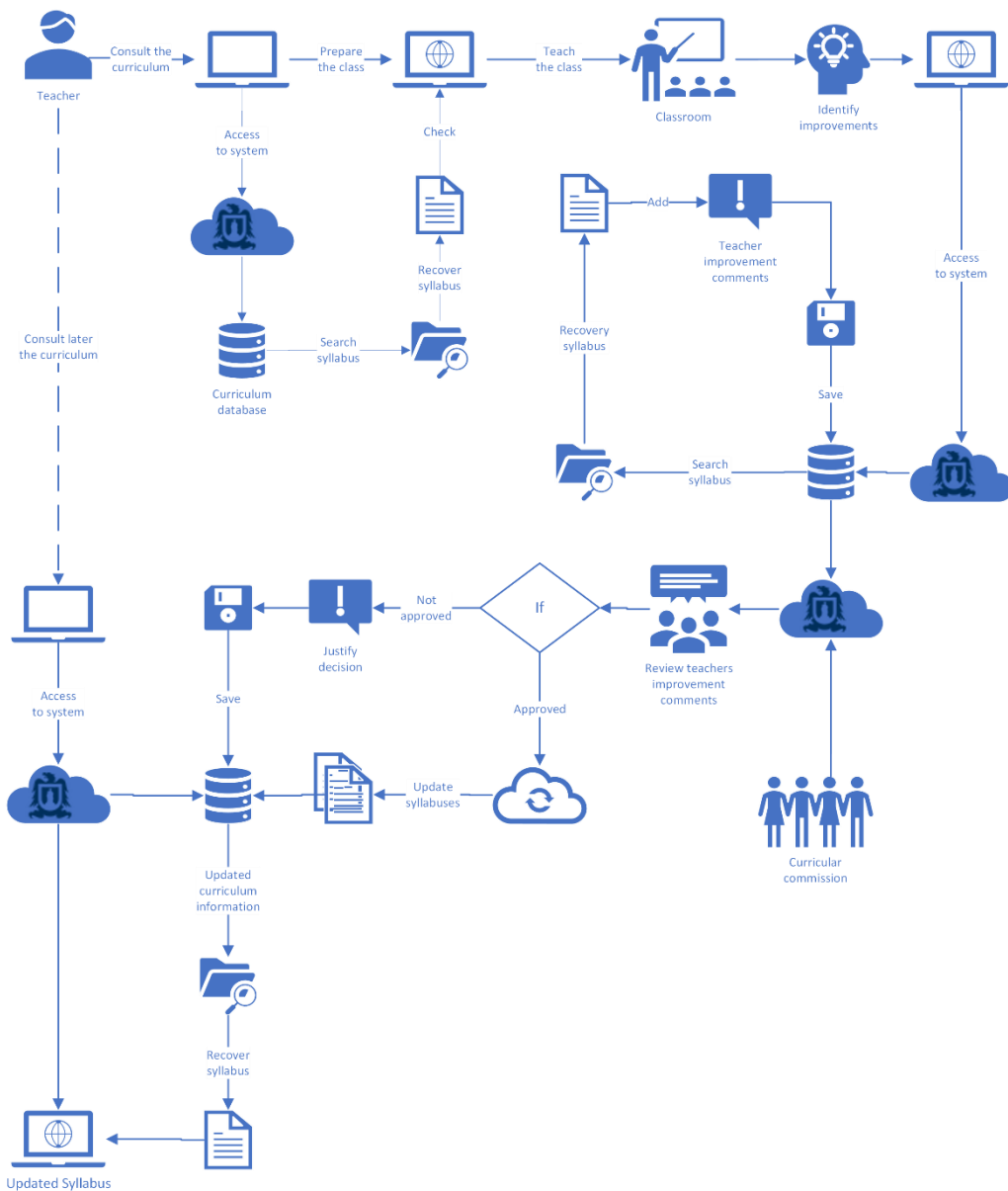


Figure 3. Database flow

Discussion and Conclusion

This paper is a result of research carried out between 2017 and 2019 with 22 professors from three universities, two Mexican and one Chilean; it includes undergraduate and postgraduate schools in Mathematics education. The objective of the research was to recognize the distance between the prescribed curriculum and the curriculum-in-use. That distance increases with traditional styles of curriculum reformulation, that is, quick reformulations elaborated by curriculum commissions that rarely integrate professors or consults with all of them. The

reformulated curriculums thus provoke impositions, and the curriculum becomes just a dead letter; the professors do not consider them as their own curriculum. The prescribed curriculum is a power dispositive (Fung, 2017; Säfstrom, 2018) and a way of exclusion (Jobst & Are, 2015); it is filtered in all educational levels and instances, including the collegiate groups. This situation is a consequence of the accountability and standardization policy (Krise, 2016; Autio, 2017; Hua, 2017). “The inclusion of the silenced voices and colonized minds on the agenda of curriculum theory and studies revitalizes the significance of education for democracy” (Autio, 2017, p. 7).

When we started our research, we recognized that professors consider the institutional mandate alien if they do not elaborate on it. Even though the prescribed curriculum is consulted with them sometimes after the professors make a lot of changes and updates. In the face of that circumstance, we ask ourselves: Is it feasible to recover the continuous modifications made in the classroom? We had made the assumption that it is possible to carry out continuous curriculum updates (CCUs) if the modifications are recovered, recorded, and systematized. As an objective, we had to formulate an ad hoc methodology and, as a part of it, design a database to allow such recovery and systematization. We have tested the BDW and the CCU methodology; they are feasible, and they bring the prescribed and curriculum-in-use closer. They allow us to recover the professors’ opinions about the curriculum and each course. We identified the CCU as the most used curriculum practice, and that practice implies other practices: modifications of curriculum structure, graduates’ profile and objectives, contents, methodologies, activities, and forms of assessments. The curriculum, as a continuum and a cultural imperative (Fung, 2017) rather than a technical task, would encourage a reflective dialogue and an education for democratic life.

Declarations

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