

Curriculum mapping and instructional affordances: Sources of transformation for student teachers

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Introduction

Semiotics is the study of semiosis or sign action; it can describe any process that includes the production of meaning, whether linguistic or not. Thus semiosis defines the process of making meaning as mediated by signs and the interpretation of those signs. Significantly, teachers' awareness of semiosis generates metasemiosis, as their engagement in such deep reflection stimulates conceptual reframing, which can be qualified itself as a trans-semiotic process. From intuiting to perceiving to wording, stages of clarification operate that Charles S. Peirce (1877a) has deciphered and theorized as being inherent to the process of belief confirmation that characterizes scientific inquiry. In a similar manner, intuiting, perceiving and wording curriculum interpretations involves a subtle belief formation that this article aims to explore through hierarchizing and mapping curriculum concepts in teacher education. We are using a Peircean analysis in part due to his work with existential diagrams, making his theories a natural match for concept maps. The next section reinvests these concepts into theorizing the curriculum building process. It will highlight why curriculum mapping can stimulate semiotic inquiry and student teachers' transformation of knowledge.

Curriculum mapping as ontological design

Conceptual mapping requires a support for communication, such as an economic organigram, planning rubric, literary genealogy, geographic representation, anthropological card, systems representation, linguistic tree, semantic structure, cognitive frame, mental model, sociological tree of knowledge. Such visual maps constitute ontologies or conceptual structures that model 'what is'. When designing such models of reality, then, students are involved in an epistemic process, a way of conceptualizing disciplinary priorities. Therefore conceptual maps are sometimes named epistemic maps. Several excellent and thorough reviews have been published on concept mapping (Brown, 2002; Daley et al., 1999; Danesi, 2002; Gómez et al., 2000; Goodyear et al., 2005; Novak, 1995; Tochon, 1990ab). In this article we explore the semiotic basis for a specific form of educational inquiry based on curriculum mapping, which can stimulate *metasemiosis* (Urban, 2006) and make the process transformative. The concept of metasemiosis was alluded to by Thomas Sebeok (2001), John Deely, Susan Petrilli and Augusto Ponzio (1998) and other semiotic scholars who referred to the human as the only 'metasemiotic animal', able to generate meaning-making on meaning-making. We want to show that, as a semiotic tool, curriculum concept mapping can initiate a transformative semiosis of semiosis, a process we name trans-semiosis. We define trans-semiosis as the transformation of knowledge that results from the reframing process of metasemiosis. Since trans-semiosis is so closely related with the dialogical understanding of



TO CITE THIS ARTICLE PLEASE INCLUDE ALL OF THE FOLLOWING DETAILS:

Tochon, Francois Victor and Okten, Celile E., (2010). Curriculum mapping and instructional affordances: Sources of transformation for student teachers. *Transnational Curriculum Inquiry* 7 (1)
<http://nitinat.library.ubc.ca/ojs/index.php/tci> <access date>

self and the other – and knowledge is not distinct from the semiosis process – it results that trans-semiosis is an identity process.

When a student maps her curriculum, she has to organize her intuitive assumptions about what is hierarchically important and visualize it. In a similar way, the reader of a curriculum map must let hypotheses and assumptions emerge from the visuals. Then through induction the construction of assumptions takes place (Kankkunen, 2004). Finally, through deduction the meanings of such assumptions are interpreted and knowledge is dynamically designed. Concept mapping has often been interpreted within a classical cognitive framework, a framework that fixes semantic meanings instead of situating the pragmatics of the interpretive flow that characterizes learning trans-semiosis.

Peirce had been alerted early about the merits of diagrammatic mapping as a way to support and enhance logical reasoning and represent the Mind (CP 4.582). His ‘existential graphs’, published in 1906 (CP 4.618) had been invented in 1897, as he mentioned, and probably even earlier. Peirce created rules for reasoning with diagrams as a means of helping experiment with thought and investigate the logical relationships between concepts. Peirce tried to improve his system of concept mapping for more than 20 years and was not really satisfied with his logical, ‘gamma graphs’ at the end of his life. Nonetheless he considered that ‘all necessary reasoning is diagrammatic’ (Draft C, 90-102) that is, any conceptualizing is a mapping process. His purpose was ‘to illustrate the general course of thought: (...) a system of diagrammatization by means of which any course of thought can be represented with exactitude’ (CP 4.530). Each ‘phemic sheet’ would represent a universe of discourse as ‘icons of intelligible relations’ (CP 4.531). Øhrstrom (1997) indicates that diagrammatical reasoning is semiotically very powerful, yet as any representation it can’t be perfect or complete: it provides a viewpoint. Practical reasoning might not follow the rules of mathematical logic or might embody another mathematical field (Menand, 1997): the logic of ‘moving pictures of thought’ (CP 4.8).

Since Peirce proposed his existential graphs, much work has been done to develop logical maps that provide precise representations of ways of reasoning and fields of knowledge. Students’ revisiting of their own concept maps makes them aware of differences between their concepts. Their progress is measured by the degree of relevance of the logical links they established between concepts. Each time they achieve some degree of relevance between concepts, it contributes to their conceptual progress. Conceptual differentiation initiates in the students a process of integration that allows them to achieve a holistic vision of the scientific field studied (Novak & Cañas, 2006). Such structures make students ascertain what they know about their educational experience. The learner’s structure of understanding becomes precise and clear, which indicates their role in the essentializing, naturalizing process of school meanings. The study of how curriculum knowledge is transformed into something that can be handled in practice provides interesting indications on the interpretation of school notions and genres presented and processes described by the students (Tochon, 2000b). Such maps can be used to observe the initial stages of a learner’s knowledge as well as monitor conceptual changes. Novak & Cañas (2008, p. 180) indicate the links between learning and epistemology: epistemology deals ‘with the nature of knowledge and new knowledge creation’. Learners who struggle to map knowledge are engaged in a creative process. Novak compares concepts and propositions to the atoms of matter and the molecules of matter: they would be the building blocks of knowledge in any subject-matter. Concepts relate with perceived regularities (or patterns) in either events or objects designated by labels. The atomic analogy provides a Platonician perspective as if concepts were abstract universals; however their epistemic dynamics implies that they are in process and in construction. Curriculum mapping can be a method that makes students

acquire ‘a habit of changing habits’ (Kankkunen, 2004, p.1). It allows both students and teachers to evaluate their conceptual development and belief system.

Belief systems are the substrates of meanings sedimented by habits that crystallized into knowledge. Peirce’s 1877-1878 articles published in *Popular Science Monthly* propose a semiotic interpretation of beliefs: ‘Our beliefs guide our desires and shape our actions’ (Peirce, 1877a, III). Beliefs help establish conceptual stability even though they are changeable. Peirce stated that new beliefs are formed in situations of inadequacy and genuine doubt. In a genuine doubt situation, humans struggle to attain a new belief and this process is called ‘inquiry’. In a similar way, curriculum inquiry is led by genuine doubt on the ground of belief cultures. The inquiry process gives opportunities for deeper interaction with a variety of possible meanings, and it furthers the development of understanding. Peirce proposed four ways of fixing beliefs: tenacity, authority, a priori, and experiment (ibid, 1877b). Experimentation was his preferred way to provide negotiation, cooperation, and openness to alternatives. Peirce’s work thus helps provide a framework to understand teacher beliefs and more generally education. Experimentations provide teachers ways to investigate and alter their beliefs through abductive reasoning. This process, which is one of the foci of the present study, has a significant impact on teachers’ beliefs and affects their decisions. Genuine revision of prior judgments is a constant process. Moreover when curriculum reasoning is remodeled by (foreign) international standards and their ‘quality imperialism’ (Gough, 2006), the teachers’ inner conversations get ‘complicated’ within cross-cultural regimes of signs (Pinar, 2000), especially in such an internationalized curriculum field as English Language Teaching.

In this section, we have indicated that concept mapping research can be extended to subtle processes which imply a transformational understanding of one’s own semiosis. Semiotic curriculum inquiry thus defined can be integrated into teacher education to stimulate the ability of student teachers to reflect on their curriculum knowledge and the meaning making process more broadly. The next section digs into this analytical framework further.

Peirce’s analytical framework

For Peirce (1931-1958), logic has to be interpreted in its contextual dynamics; the context of an utterance conditions its interpretation. Any interpretable movement, or any thought is a sign (Chandler, 2003). Peirce developed taxonomies to describe how sign meanings emerge from the on-going interpretation of links between form, perception of the context, and possible meanings produced. His theory is subtle, adaptive and dynamic. Meanings are constructed to form realities, culture, and communication. Peirce’s model of signs depicts the agency components of meaning constructions in the reciprocal movement of signs, objects and interpretants. The sign mediates between the object and its interpretant. The interpretant is the interpretive ‘outcome of the sign which indicates that different signs may reference different aspects of an object, leading to different outcomes or effects. The process of creating the outcome or interpretant is a type of reasoning called abduction’ (Osberg, 1997, p.27).

As deduction and induction are not capable of generating new knowledge, a third inferential process creates hypotheses and instructional guesses: abductive reasoning moves from the interpretive result to the rule to the case (Bopry, 2002). As we move from abduction to deduction, we progress from the simple reconciliation of meaning toward the prescribed process of selecting the necessary truth (Shank, 1995). The Peircean model characterizes the semiotic process on the basis of three movements of meaning making: firstness, secondness and thirdness. Firstness (or idea-representamen) is associated with qualities that have an

iconic relationship with their objects (a photograph, portrait, map, etc.). Secondness (or brute actuality-object) comes in the recognition of 'the other'. It is the recognition that there is self and not self, and comes into play in the separation of field and ground, given that the nature of secondness is opposition. Firstness involves abduction – which is the spontaneous and direct emergence of meaning – and deals with the person's qualitative ideas and beliefs. Secondness involves induction through verbal and non-verbal signs that the person already experienced consciously. Thirdness associates firstness and secondness through reasoning and making connections, and it is deductive. Thirdness (or a sign's soul-interpretant) refers to the use of symbols. A symbol is a form of thirdness (such as waving hands, traffic lights, etc.). The symbol mediates between an object and the interpretant through law or reason.

Perception involves semiosis or meaning production on the basis of signs (Allot, 1994). As perception leads to conceptual interpretation, it is directed by the perceiver. It produces continuous change to provide an organizing construction within the perceiver. Semiosis is thus part of the perceptual process. Perception involves the patterns of action in response to the environment dynamics (Umwelt – Deely, 1994). The actions are complementary and interlocked with each other in the structuring of perception. Organizing perceptions are the ground of learning experience and, in turn, education organizes perceptions. According to Cunningham, human semiosis and education are but one and the same thing. 'If by semiosis we mean the lifelong building of structures of experience, then education is precisely that field which attempts to understand, nurture and make people more reflective about this process' (Cunningham, 1987, p.207). Thus educational perception is formed through semiosis. Cunningham (2002) proposes a broad model that details the cognitive process in terms of four components: signs, semiosis, inference, and reflexivity. He defines signs as metaphorical or analogical referents to some aspect, concept and object, or relationship. They are context-sensitive. Individuals develop new ideas and hypotheses through their experiences. The process of conceptualizing the curriculum is inferential. The results of this process contribute to the perception of knowledge. In Cunningham's view, reflexivity is the awareness of semiosis. Not all aspects of this rising awareness can be explicit and explicated as some irrupt from intuitions – or, in semiotic terms, abductions.

Semiotic theory offers a broad framework to understand such processes through highlighting the nuances of subtle possible progressions between implicit stages and more explicit stages of understanding within perception itself. Peirce devised ten classes of signs as part of his theory. In the terminology proposed by Merrell (2000), this taxonomy includes: a) Feeling (Peirce's *qualisign*); b) Imaging (*iconic sinsign*); c) Sensing (*rhematic indexical sinsign*); d) Awaiting (*dicent sinsign*); e) Scheming (*iconic legisign*); f) Impressing-saying (*rhematic indexical legisign*); g) Looking (Acknowledging)-Saying (*dicent indexical legisign*); h) Seing (Identifying)-Saying (*rhematic symbol*); i) Perceiving-Saying (*dicent symbol or proposition*); and j) Realizing (*argument*) (MS 540, CP 2.233-72). Shank & Cunningham (1996) derived from Peirce's taxonomy six distinct modes for abduction, which are sketched out as follows:

- 1) The **Hunch** type of inference opens awareness to the virtual possibility of a possible resemblance: initial observations might serve as intuitive suggestions for possible evidence.
- 2) **Symptoms** would appeal to possible resemblances, comparing properties to be considered, looking for the presence of a more general phenomenon. The detection of a symptom often implies a dependence on prior experience.

- 3) **Metaphor or Analogy** manipulates resemblance to create new, potential rules and conceptual frames.
- 4) The **Clue** would lead to the type of inference dealing with possible evidence, a mode of determining whether or not observations are clues of some more general phenomenon. The sign would help detecting the circumstances of a past state of affairs. In order to make a judgment, the observer would look for connections.
- 5) The **Diagnosis or Scenario** forms a possible rule on the basis of available evidence, in order to discover diagnostic judgments amidst observations. Such diagnoses create plausible scenarios from the cluster of clues. The patterns of clues take on a unity of character.
- 6) **Explanations** concern formal rules to account for puzzling clusters of data and gather scenarios into a coherent explanation that forms the basis for meaningful insight.

This model will help us analyzing the capacity of student teachers for ‘suspension of action and deliberation for critical thinking and conscious awareness’ (Petrilli & Ponzio, 2007, p.7). It elicits important aspects of curriculum semiosis that appear as affordances in the process of educational inquiry. The concept of affordance relates with the creation of meaning from the perception of meaningful ‘niches’ within a fluid and dynamic *Umwelt*. It refers to ‘the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used’ (Norman, 1988, p.9). It also integrates the understanding that sign meanings are associated with and negotiated within such semiotic niches (Schumann, 2003; Logan & Schumann, 2005; Burgin & Schumann, 2006). ‘A situation provides a suitable niche only for those persons who are prepared to meet and use its *affordances* effectively. Those not properly tuned or prepared will in some way fail to perform effectively in the situation as given’ (Snow, 1998, p.107). This leads us to anticipate that student teachers get attuned to curriculum ‘niches’ through transformative affordances. These niches are locations for knowledge transformation.

In this section, we have discussed semiosis, metasemiosis, knowledge emergence and generation processes through three types of reasoning. We have seen how reasoning provides meaning to signs, allowing for interpretations and inferences. The last step, based on the production of meaning, has been to explore how perception is structured by education on the basis of experience. For that purpose, we have presented a taxonomy that will help us analyze student teachers’ intentions related to curriculum mapping.

Research design

In this study, we propose to explicate curriculum mapping as the result of affordances that characterize semiotic inquiry in education.

Curriculum as an inquiry process. Semiotic analysis involves a variety of approaches that confer richness and flexibility in the signifying stages of inquiry. In the process by which student teachers conceptualize their curriculum field, transformative semiosis helps deconstruct reality such that its historical and cultural background can be deciphered. The semiotic viewpoint is integrative and encompassing and does not privilege particular stands: it makes individuals and groups self-critical of their own interpretive responsibility and action. The theory of affordances in education – as noted earlier – posits that the perceiver is active in sensing information-rich environments. Humans build a sense of meaningfulness through matching patterns of perception to semiotic niches. Education can be viewed as a

semiotic process of deciphering that co-constructs meaningful relations between one learner or a group of learners, the curriculum and the teacher. This understanding brings a humane dimension to the education process.

Setting. This study is one aspect of a larger inquiry that bears on the integration of portfolios in the English Language Teaching (ELT) department of a public university in Istanbul, Turkey. The student teachers were taught about the Common European Framework of Reference for Languages as well as the standards of the American Council for the Teaching of Foreign Languages (Tochon, 2008). We studied what role e-portfolios could play in the enhancement of teacher education. The aim of the teacher education program was to train culturally-learned teachers who have a deep knowledge of their discipline and their profession on the basis of exploratory and participatory action research (Kemmis & McTaggart, 2005). Curriculum mapping was integrated in the portfolio with multiple feedback loops and formative evaluations.

Participants. This study involved 23 volunteer student teachers of English Language Teaching (ELT). They were third year students in a 4-year Teacher Education program. Twelve students finished their curriculum maps in Spring 2008, while others decided to continue the process during Summer. At the end of the semester, 23 student teachers had completed their concept maps. The student teachers had various contrasted views on issues such as language policies, the role of English in globalization, and its role regarding Turkish secularism and issues related with Christian and Islamic fundamentalisms. Three student teachers were chosen for the purpose of this article according to the criteria below:

- The curriculum maps were contrasted enough to allow for a semiotic analysis of their development;
- We had information through observations and interviews about the meaning-making process that led to the construction of these maps;
- The correspondence of items in their curriculum map with subject-matter knowledge expressed by student teachers during interviews provided an indication of its ecological validity.

The oral interviews with the three participants whose concept maps were chosen for the study (two females and one male) were transcribed verbatim, and written interviews were used additionally to form an opinion about their curriculum inquiry.

Data. The study was based on multiple sources: group discussion, peer work, teacher's participatory observations, oral feedback on their curriculum design, research logs, students' comments, written and oral interviews. The student teachers had no idea about concept mapping before starting their portfolio. The participants studied with their peers and in groups and explored individually ways of building concept maps electronically to represent their curriculum knowledge. Student teachers were observed during both individual studies and group discussions at which time notes were taken. The students were given a written interview form, following which they sent their answers for the interview questions by e-mail. Participants were also observed while doing their curriculum maps and were interviewed orally for about 20 minutes each. Besides their memos, and transcriptions of interviews held in the Turkish language, the researchers translated parts of the student teachers' comments on the concept mapping process to share the details. From the beginning of the research logs were kept for each meeting day.

Procedure. While building e-portfolios, student teachers learned concept mapping to explore, envision and discuss their subject-matter knowledge, as Beyerbach (1988) and Beyerbach and Smith (1990) had modeled. Thus concept mapping was an integral step in portfolio planning. Curriculum maps offered a nice way to scaffold conceptual supports in this project-based learning through the student teachers' collaborations and their growing knowledge community. The participants' instructions were to detail through concept maps what they knew rather than what they did not know. They were given handouts and were guided flexibly in the process. They could search more information on the internet. They shared such information, comparing models and studies. It was decided not to constrain concept mapping with too many rules, of which formalism could restrict the creative flow. Most examples were from Novak's style maps. They met once a week at the computer laboratory and had another weekly meeting in a normal classroom to discuss the process and contents. It is usual in teacher education to guide the students and to provide precise formatting criteria for action. Here however, student teachers were free to choose their own framework and format when they mapped their curriculum knowledge. Participants were encouraged to include both curricular beliefs and facts in their concept maps, while being reminded that 'up-to-date' meanings are never perfect, nor immutable. After preparing their own concept maps, they compared their work with their peers and became evaluators of their curriculum maps.

Data analysis. Semiotic analysis is a hermeneutic process. It gave the researchers the opportunity to identify commonalities and be provided with flexibility in the research. The resulting emphasis was to try not to essentialize the data or the process but to study the normalization process which is inherent with curriculum design. We enacted an integrated and not dualistic epistemology – Peirce was a pragmatist while also considering that conceptual normalization was part of the process rising from firstness to thirdness. We utilized Shank & Cunningham's (1996) model of reasoning – derived from Peirce's works – to explain student teachers' mapping process as an initial step in the creation of their portfolio. We tried to show how they construct their curriculum through available affordances, or through the perception of specific 'semio-niches' proper to the classroom environment of ELT in Turkey. The questions addressed the following points: perception of curriculum knowledge; sub-concept maps and the rationale for their organizing; possible conceptual conflicts in the process of building curriculum knowledge; questions raised while choosing relevant knowledge; trans-semiosis: transformations of knowledge stimulated by the mapping process; criteria for curriculum relevance; ways of reflecting: thought processes and ways of categorizing what is important for the field of action; selection as political process: ways the curriculum was politicized by the categories chosen; curriculum and identity development: transformative learning in the mapping process.

Semiotic analysis of the curriculum mapping process

We focused on the answers of three student teachers related to their curriculum mapping. The answers were evaluated in terms of meaning construction; of student teachers' reflection on the subject-matter; of their way of categorizing the subject-matter; and the semiotic processes that supported deep, transformative thinking involving identity reframing.

Semiotic processes that led student teachers to think more deeply

Curriculum mapping was a special case of portfolio building process. Identical semiotic processes were at work in portfolio building, as in both cases the arguments were linking



normative experience. Hereafter, we analyze each student teacher's curriculum map as the progressive sedimentation of layers of understanding that stimulated semiotic inquiry to frame a personal view of the curriculum. It urged the students to think deeply about their subject-matter knowledge. What they learned about themselves in this process was to give attention to the meaning and usage of the language. They saw – which surprised them very much – that when they wrote a word on the map, they would immediately remember another subject-matter relevant to it. They decided to limit the sub-titles because conceptual fields were related to each other in a certain way. They had to hierarchize the subject-matter and select what they believed would be worth keeping on their map.

Shank & Cunningham's model (1996) guided us in the analysis of curriculum semiosis in the following sections. Harun, Seval, and Esra (pseudonyms) were the three students whose concept maps were chosen for the present study. They were invited to discuss their curriculum mapping and comment their maps, then share them with each other. This section analyzes their conversations, and the oral interviews as well as written remarks they made during the process. Their curriculum maps are presented in figures 1, 2, and 3.

Harun, Student Teacher 1

Hunch: Harun had no prior experience with concept mapping, and never thought about his own curriculum knowledge; therefore the selection of valid topics was a demanding task. His intuitions are not clear. In his oral interview, Harun complains about limited time he had for designing his curriculum map. He is trying to organize his thoughts which are fuzzy at this stage. His design incorporated both structural and social aspects of the curriculum.

Symptom: Harun searched the internet for possible designs. He drafted possible forms of maps trying to put titles and sub-titles. He felt confined mostly to the structural aspect, but it helped him remember basic curriculum knowledge and teaching techniques within the discipline. When we observed him, Harun was looking at the design on paper. He tried to put everything on one page, perceived as the most compact design. He preferred a hierarchical composition of topics. Because Harun's concept map structure largely followed the visual patterns that were given to him earlier, it was evident that these framed his knowledge of the discipline.

Metaphor: Observations indicated that Harun's designing process involved naming and ordering ideas within a hierarchy. He used internet as a reference resource for both choosing curriculum concepts and map designs. Harun designed his map according to samples on internet and comparing the results with his peers and paid more attention to design than to consistency between titles and sub-titles. Harun constructed his curriculum knowledge on a structural basis with contents, teaching and learning aspects, and then linked these elements to English understood as a worldwide language. He also alluded to the historical and economic backgrounds of the discipline. During the interview, Harun does not reflect about the language teaching literature and therefore it does not show up on his concept map. He does not feel the need either to discuss grammar and language skills.

Clue: Harun sees culture as the constructing element of language. He induced how popular English is through its historical importance and current impacts on economy. He emphasizes the social dimension of English as a possible cause for its worldwide popularity. He expresses clearly the connections between teaching and learning.

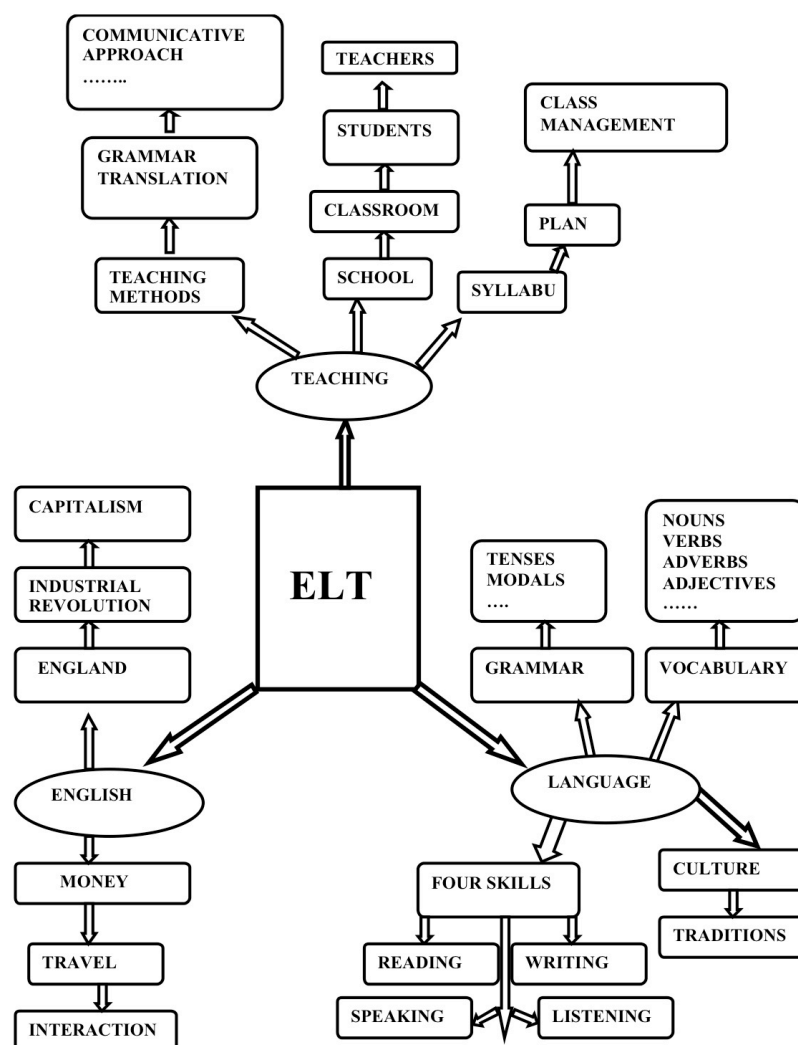


Figure 1. Harun's Curriculum Map

Diagnosis: Harun states that he used his previous curriculum knowledge in making those connections. Doing his curriculum map was a worthwhile experience. He evaluates concept mapping as a useful method for instruction. For Harun, capitalism and the industrial revolution are primary factors contributing to the popularity of English. To him capitalism largely the cultural specificity of the Anglo-world: it stimulates its expansion, promotes its hegemony and leads it to control the rest of the world. This diagnostic explains Harun's subtitles for English language teaching: 'money, travel, and interaction'.

Explanation: Harun clarifies the implications of curriculum mapping: he made a self-assessment of English Language Teaching, and realizes his need to work harder and master the discipline as a whole. The mutual connections between the three different foci of English, Language, and Teaching now become more meaningful to him. Harun could not post more details on his curriculum map because of the size of the paper and, in the electronic format, the size of the webpage. He wanted a hierarchical design that, because of this economy of space, might overlook some topics. The distinctive concepts on his map are 'English', and 'Culture'.

Deductive reasoning: Harun re-read his curriculum map and compared it with his peers, and then made a self-assessment. Knowing English means having advantages in terms of job opportunities. You may earn money more easily, and increase your standard of living. Then you can travel, and interact with other people, and cultures. These dimensions that may motivate learners are thus, key in Harun's curriculum vision. Capitalist power provides currency and characterizes the contributions of English. Harun connects that view with language politics. The power of that currency contributes to shape language policies and education policies around the world. At this point in the creation of the map, Esra intervenes in the conversation and compares her curriculum map with his. She finds his map inadequate, claiming that he needs to write more details about the classroom, language learning, the school environment, and the students, Harun then criticizes himself for not having better exposed issues related with the school, the classroom, and the students, agreeing that such topics should appear more clearly. He also compares his maps with the map of Seval. He finds that Seval examines the characteristics of the teacher and learner perspectives in more detail. He especially appreciates her statements about types of learners. Such deductions stimulate his transformative semiosis as he is discovering his own identity traits in the process, which leads him to revise his belief system.

Identification: The next semiosis levels (identification, prediction, and model building) appear clearly in Harun's oral interview. Harun corrects his previous views; he should have written 'Teachers' before the 'Students' title. He had identified these two opposite perspectives coincidentally, but they emphasize different ways of approaching curriculum reality. He responded that he would better pay attention to classroom ecology, and enlarge that topic.

Prediction: The other prospective aspects of what should be learned in English, such as the four skills, grammar, vocabulary... are already known and are not new topics for English Language Teaching. Nonetheless Harun still insists on the significance of culture in English learning. The cultural approach should be emphasized and the classroom activities would be better organized along the cultural dimension of the discipline.

Model building: Finally, Harun re-examines ELT through three basic categories: English, Language, and Teaching as expressions of globally constructed curriculum knowledge. This modeling process has been transformative for Harun as he feels a better sense of identification with his curricular stands.

Seval, Student Teacher 2

Hunch: When Seval started to design her map she faced the curriculum knowledge accumulated during her studies. Sketching these concepts on paper obliged her to categorize, and organize her mind map. Her initial hunch was to refer to her undergraduate studies at the university and to model her understanding according to that program. She was happy to perceive intuitively with a sense of wholeness the broad understanding that she had developed, grasping the numerous rhizomatic aspects of the field. The professor had advised her to write about any curriculum item that came to mind; it is what she did as she subsequently wrote down everything she remembered about English Language Teaching, then she organized these first intuitions. At first she had no idea of what her map could be, and how to locate and design knowledge making her approach intuitive.

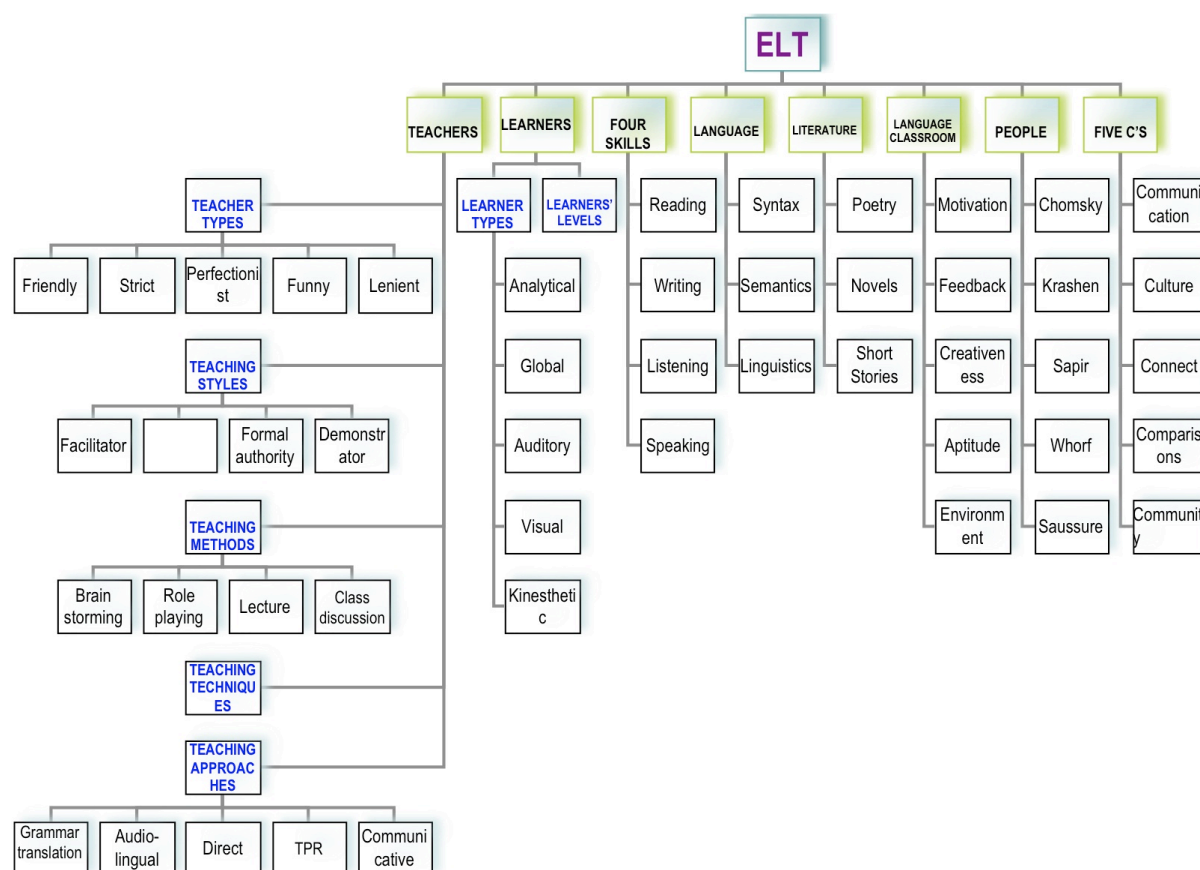


Figure 2. Seval's Curriculum Map

Symptom: Seval mentally surveyed her curriculum knowledge, and noticed that some emphasis should be given to the two poles of the learner and the teacher. She wanted to show the differences, as she felt it would help her understanding of language teaching. After the initial phase of clarification and classification, Seval focused on sub-maps titled 'teachers' and 'learners'. While she was attempting to conceptualize what her map could be, she realized that she had never reflected about some curriculum topics. As she did not know much about teacher types and teaching styles, she researched them on the internet, which increased her awareness of such nuances. While Seval started to reflect about language as an entity, and about its educational classification, she remembered more details about worthwhile knowledge, and decided to make her own design according to what was most important teaching for her. One marked preference for Seval was speaking of 'Linguistics' rather than simply 'Language'. She initially thought linguistics might include more educational topics than language, but then found that she could not compose a whole variety of important and useful topics under the 'Linguistics' label.

Metaphor: According to Seval, implementing knowledge relative to teacher and learner types, styles, methods and applications would make instruction more complete and enjoyable for both teacher and student. Seval felt that teachers should consider these factors while planning lessons, since in her opinion, these aspects contribute to an adaptive classroom environment. During the interview, Seval reflected on the needs of teachers for instruction. In her opinion, a language teacher should apply and connect the four language skills together. Although Seval identified linguists such as Chomsky, Krashen, Whorf and Sapir, and wants to mention them on her concept map, her knowledge about linguistics is not accurate.

Clue: Seval classified her knowledge in terms of ‘teachers, learners, skills, language, literature, language classroom, people, and 5C’s standards’ and tries to show the relevance of these categories and their necessity for the discipline. Seval likewise emphasizes teaching techniques and methods as what is mostly required in the discipline and believes that the ‘5 C’s standards approach’ is one of the popular and valid methods in language teaching. She notes that the literature in English on these topics is also important. Other important issues for keeping students’ learning alive include the language classroom characteristics, motivation, the need for feedback, and aspects of the class environment.

Diagnosis: Seval took each category one by one and inquired into the connection of each part to the whole. After much hesitation due to comprehension problems about the role of linguistics, Seval located it as a sub-title of the ‘Language’ category. She also put the linguists under the ‘People’ title to show their contributions to linguistic studies. Seval mentions the instructional materials as one of the classroom contexts while examining the context variables of language teaching. Then she talks about social strategies (teacher centeredness and learner-centeredness from the view point of individuals and large groups). She feels it is but one of the major issues of teaching in the Turkish context.

Explanation: Seval chose categories that were key elements for lesson planning. She detailed the teacher and learner categories, then emphasized the whole integration of the four skills into lesson planning. Seval divided ‘language’ into ‘syntax, semantics, and linguistics’ sub-groups to comprehend the nature/structure of language. Seval furthermore felt that if English literature is taught, the logic of English will be understood more clearly based on the reasoning that when given access to the literature, the students can acquire the utterances of the speech community more easily. Based on her opinion that students like to read poems, short stories, novels Seval reasoned that they would feel more comfortable learning English through literature.

Deductive reasoning: Seval clarified bit by bit the criteria for an appropriate teacher education: what should be the teaching and learning specifics, how to apply the 5C’s standards as a way to handle the curriculum, organize evaluations to match the Common European framework for languages, and integrate literature to provide cultural perspectives on the target language. These are all important features of English Language Teaching for Seval. Seval compares her own curriculum map with the one of Esra and finds hers to be better for several reasons. For starters, Esra discusses English Language Teaching as a general concept, and examines the skills as being the basics of language. Seval finds she is correct in examining the ‘Learners’ and the ‘Language classroom’ as two separate sub-groups whereas Esra deals with them as context variables for teaching. Esra talks about the learners in more details as she details the learner types and levels. Seval indicates that Esra does not mention any linguist, and literature does not appear on her map. At the same time, Seval finds Esra to be more successful in specifying topics such as instructional materials, social strategies, and the history of English teaching. Seval criticizes the minor part that evaluation plays in Esra’s curriculum map, as Esra says nothing about evaluation, and it seems out of her vision. Finally, Seval examines Harun’s map and criticizes its lack of information on teaching approaches, techniques, styles, and learners; according to Seval, Harun disregards the most important aspects of English Language Teaching, while discussing only two teaching methods: grammar translation and the communicative approach. Seval evaluates this knowledge to be insufficient, yet appreciates that he mentions the ‘Syllabus’ as an important aspect of curriculum knowledge for teaching.

Identification: Seval identifies teaching and learning specifics that impact classroom planning and education. The 5C's standards are distinctive language standards to demonstrate the interconnectedness of all areas of language learning. Literature is needed to comprehend the cultural codes of the speech community. With the first sub-title 'teachers', Seval deals with 'teacher types, teaching styles, methods, approaches, techniques', and indicates that teachers should know new methods, styles, approaches well to communicate with students and teach more meaningfully. She also identifies 'syntax, linguistics, semantics, the 5C's method' as a sub-group of 'language'. In her words, that's a good way of developing language skills. Seval does not need to write a separate title for language politics; indeed her curriculum map specifies that educational politics relate with any issues that concern teachers and learners. For her, Harun should detail the curriculum aspects that pertain to the school and classroom environments, the students, and the teacher with greater depth. These are also important aspects of English Language Teaching, and as Harun only shows 'English' as a sub-group of ELT dealing with money, travel, and interaction, Seval finds these issues irrelevant to the discipline. She evaluates her own curriculum map as being more successful than his as he does not seem to pay attention to the learners! Nonetheless she admits that he mentioned the syllabus as a useful curriculum instrument, which she forgot to place on her concept map. But she would prefer to write 'syllabus' as a language classroom characteristic.

Prediction: The choice of Seval's curriculum topics is justified by her main goal which is teaching performance in terms of interaction. She believes that this framework will provide a better support for learning. She perceives the history of English teaching – which is not found on her map – as generic only, possibly helpful for teachers and learners but of minor importance. Thus she considers her curriculum map to be a sound predictor of successful teaching. Seval verifies the implications of the 5C's standards and the literature on ELT training on classroom practice. She recapitulates the peculiar idioms and language utterances, and the cultural viewpoints of native speakers provided by literature, and tries to figure out how she would use them in a class situation. Finally, Seval feels that learners would develop their communicative skills with the 5C's orientation.

Model building: Seval says that language should be taught and learned in context. In addition, using a taxonomy makes knowledge more meaningful. Seval classifies her curriculum knowledge as a hierarchy of titles, and contexts are provided to match knowledge taxonomies. The main title is 'ELT' and the sub-titles are Teachers, Learners, Skills, Language, Literature, Language classroom, People, 5C's. Seval interprets the realization of her map in terms of curriculum modeling, and curriculum building has increased her sense of coherence in the discipline taught.

Esra, Student Teacher 3

Hunch: Esra first reflected on her undergraduate program and tried to find examples in her courses at the university. She was wondering what to teach, how to teach, and when to teach. She sailed on sight attempting at figuring out what she knew. She alluded to the contents of courses to which she added her own elements. In the oral interview, Esra remarks that her first concept map was intuitive and disorganized. She wrote down everything coming to her mind; there was no systematic order. Then she started to design another map.

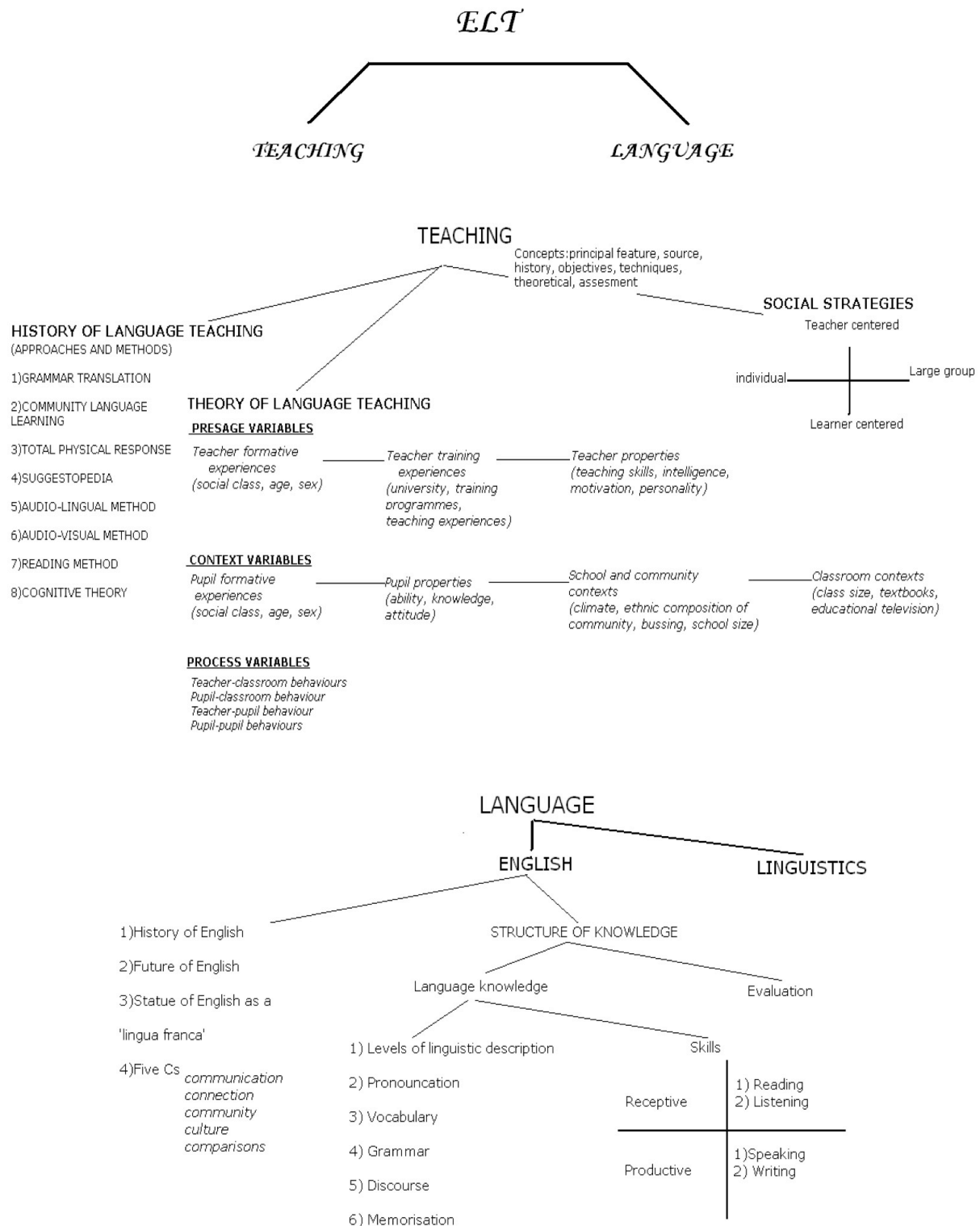


Figure 3. Esra’s Curriculum Map

Symptom: Esra drafted her first curriculum map somewhat randomly, and then realized that, after this initial brainstorming, she needed a systematic way of classifying her curriculum knowledge. She built two categories: ‘teaching’ and ‘learning’. She would make a proper selection to match her personal sense of order as necessary along the way. She reflected deeply for a good while, and noticed that certain titles were a good fit as curriculum

organizers. One title would remind her of another possible one, and it was an ongoing, creative process. She had to select the most distinctive ones to make English Language Teaching more comprehensible. Indeed ELT related topics such as SLA (second language acquisition), EFL (English as a foreign language), and linguistics were not clear in her mind and would call for more straightforward theorizing in the discipline. Esra looked for compact curriculum titles that could be flashy in her portfolio and would be noticed immediately. Her primary concerns while designing her concept map was the anticipated result for her e-portfolio. She was heavily geared by her university courses in the choice of contents.

Metaphor: While selecting and writing the sub-titles, Esra pushed herself to limit their number in order to avoid the complexity and messiness of knowledge ramifications. Most of the concepts were related to each other, which allowed her to conclude her selection concisely. ‘Language’ and ‘Teaching’ are the main curricular concepts and organizing metaphors. Esra was very interested in language as a science, but paradoxically, she did not really consider linguistics as a relevant category for her map. The categories she chose are important for language learning as an applied field. While she was examining her initial draft, more curriculum categories would come to mind. Then she tried to utilize Bloom’s taxonomy in an effort to better organize her map.

Clue: Esra emphasized the present and forthcoming status of English and the importance of the perception that people have of language status, which seemed to explain the role of ELT training in Turkey. If English became less important worldwide, she felt that ELT would be out of the agenda of Turkish education. Esra focused on the language and teaching aspects of ELT. She would not really consider much linguistics’ topics and its jargon as, for her, linguistics items were anyway already included in the broader, language category. Esra firstly considered teaching styles as a category that seemed relevant as a guide for action: in what way would the teacher be a model and, in other words, which characteristics teachers should expose in the classroom. Esra calls the teacher a facilitator, but what does the teacher facilitate in the classroom? She tried to find clues.

Diagnosis: She eventually chose ‘linguistics’ as well as ‘English’ as the sub-titles of ‘Language’ after consulting the maps of her peers. ‘History of language teaching’, ‘theory of language teaching’ then became sub-titles of ‘teaching’. Esra argued that English teaching practices, their historical background, and lingua franca status should be demonstrated during language training, as they were fundamental to the understanding of the discipline. The teacher should orient students towards not only acquiring knowledge, but also interpreting it critically. Besides the general teaching methods such as brainstorming, role-playing, she would distinguish the learner and teacher types separately, and develop the intelligence types as learner characteristics. She thus establishes a diagnostic of useful knowledge.

Explanation: Esra indicated that one might find her curriculum map political, but her attempt was epistemic. For her, teaching the sociocultural aspects was the most crucial in a discipline that otherwise might simply be submitted to hegemonic practices, leading her to question the historical background of English. Today, English seems to be accepted as a lingua franca. Language history would probably help explain to students why they learn English. Esra wants her students to further consider what would happen if they did not learn English, and why English is so popular today rather than other languages? Additionally, Esra examines the status of English, the 5 C’s standard approach, instructional materials, social strategies in classroom, and the language structure in both receptive (interpretive) and

productive (presentational) skills). She includes language knowledge and evaluation as crucial elements for teaching English. Esra does not discuss linguistics much because she does not believe it is important for teaching the language. In so doing, her conceptions match communicative theory; she wants to facilitate proficiency, not train grammar specialists.

Deductive reasoning: Having a second look at her map, Esra realized what was her real level of English language acquisition, as well as her current level of mastery of the theories, classroom applications, and methods. The map helped her reach a level where she could start investigating deductively and systematically into knowledge organizing and proficiency, after the first inductive phases. Curriculum mapping helped Esra remember and reflect deeply on her disciplinary field. She decided that teachers should practice different methods together for meaningful learning, and that such eclecticism would be more profitable in the classroom. The teacher's input in terms of personal experiences and characteristics are a necessary component of successful teaching as lived experiences make the material meaningful for the student. Esra forgot to mention Literature as an instructional tool, she notices. She believes in the usefulness of literature in language teaching but prefers using literature for homework as well as occasional classroom applications. Esra furthermore accepts the critiques she received from her peers on the 'Evaluation' part of her curriculum map. With more reflection, she would write 'Feedback' instead of 'Evaluation' as she agrees that it provides a better fit with her general conception of teaching. Esra examines Seval's concept map and finds that Seval has a deeper account of teaching in general, but she also feels that it not so much open to the characteristic details of the discipline and that Seval could be more specific. Esra appreciates Seval's curriculum view for classifying learner types such as visual, auditory and kinesthetic and taking their characteristics into account. This point in particular brings Esra to reconceptualize her own approach to concept mapping. Now, she would prefer not to express the Teacher and Learner characteristics under the title Theory of language teaching. As a result, viewing the maps of her peers helps Esra reframe her own knowledge. The first abductive and inductive phases are now replaced by deduction and she examines different rationales. Esra argues that Harun put general titles on his map and that he should have opened such generic conceptual boxes and refine their distinctive characteristics to look for their instructional (didactic) implications in the discipline itself.

Identification: Esra admits she needs some brainstorming to engage more in what English Language Teaching studies represent and make her curriculum more meaningful. She wants to attend conferences to see samples of processed curriculum knowledge. Feedback inspired Esra to reflect on the concepts of the discipline. She felt she could better classify the teachers according to types of professional experiences. She did not integrate language politics in her concept map. When it came to be discussed with the students she concluded that each curriculum map demonstrates a personal teaching philosophy. Each map depicts the discipline in various ways, and their approaches indicate their own politics of education. The distinctive point in her map is the role of history in constructing the field of knowledge. According to her, Harun should have put more sub-titles and have clarified the instructional topics, as he talks about only two methods grammar translation and communicative approach and needs to account for many more aspects of language teaching. Nevertheless, she appreciates his map's cultural viewpoint, as he reflects about English culture from a global perspective.

Prediction: Courses are not sufficient to acquire professionalism; Esra needs to experience more language teaching practices. She also needs to revisit her lesson plans as regards the

historical background of the discipline, and get a better sense of its worldwide potential value for the future. Esra uses Richards & Rodgers' book in her discussion of methods. She thinks teachers should add their own experiences to the methods to improve teaching. They should note their personal traits to make the best out of it and create a coherent, professional profile. Esra gives herself as an example: she sometimes becomes impatient, which may affect her professionalism. She evaluates the learners according to what they bring into the classroom, not as a measure of their learning aptitudes. In the classroom environment, the teacher should notice the students' background, their developmental characteristics, interests, and discover their talents. Commenting on her map, she mentions that linguistics includes semantics and syntax, so you do not need to show them separately.

Model building: Esra's concept map is based more on theories than practices. She considers the national curriculum and knowledge she received during teacher training, which indicates the key role of teacher education in shaping the curriculum values that will be enacted in the classroom. Esra divides the domain of 'ELT' into two main topics, 'Teaching' and 'Language'. Then she divides 'Language' into two sections: 'English' and 'Linguistics'. She makes two groups of language skills: receptive (reading, listening) and productive (speaking, writing). She classifies the methods under the 'History of language teaching'. She remarks that Harun added something more distinctive besides the categories they studied at the university: a different interpretation of disciplinary knowledge can be noticed on his map. She feels that because he built an original model, this helps her re-think about her own positioning.

If we compare the three maps, all three use previous curriculum knowledge constructed during teacher education at the university. Prior knowledge provides the hunch to start the reflective process but, while deliberating about the field of knowledge, the student teachers increase their capacity to work on curriculum at a metasemiotic level. Seval and Esra emphasize the teaching and learning aspects that are key to the transition from theory to practice. Their approaches are based on neo-constructivism but they follow structural procedures for instruction. First, a valid approach is chosen through needs analysis, then it is applied to the target group because its application can be meaningful. Finally the results and expectations are evaluated according to the objectives. Both Seval and Esra focus on the previously modelled structure that they were given during their teacher training, and do not use their capacity to reach a personal, idiosyncratic interpretation of their own. In contrast, Harun's inner dialogue helps him model a sense of globalization along the lines of a 'semiotic of the self' (Petrilli, 2003). Even if Harun's map seems somewhat distant from known designs of the field, he elicits a sociocultural perspective with global implications and connections that indicate a higher level of metasemiosis. His case manifests the metasemiotic process more clearly than the others. First he interrupts routine conceptions of the domain, he suspends his interpretation of English Language Teaching for a while as he reflects, and then deliberates on the imperialist power of English and imposed English language policies, and finally makes original decisions and suggestions in terms of communication, education, economy, and state governance. His metasemiosis involves knowledge reframing and determines his position towards the English language and culture. The process makes him feel the responsibility of his own curriculum knowledge as it relates to professional action. Thus he develops what Petrilli (2004) has named 'semioethics'.

Discussion

Evaluation of curriculum maps

A constructive approach of curriculum maps

Curriculum semiosis was explored among Turkish student teachers who will teach English as a foreign language. For that purpose, curriculum mapping was instrumental in helping activate reflection on the semiotic framing of the field and consequently help the students construe a sense of professionalism. Mapping curriculum knowledge allowed the participants to inquire into how they perceived, understood, constructed, interpreted, ‘enminded’ (Tochon, 2000a) and enacted the discipline taught. The feedback on this process shed light on the crucial role of teacher education courses in the shaping of curriculum contents. It is compatible with a constructivist view of teacher education. Curriculum maps support a constructive view of teaching, as it did for Harun. The study of semiotic features raises awareness of the sign systems and its codes. Student teachers give meanings to signs according to codes of which they are not aware. Student teachers who evaluate and interpret their curriculum knowledge reflect on the value of contents and the expressions of knowledge they learned previously. Such an inquiry process makes curriculum learning more meaningful. Student teachers do not acquire subject-matter knowledge as a set of neutral, sanitized concepts, but rather construct their own perception of relevant knowledge through interpretations, dialogues, collaborations, additions and improvements. They also adapt themselves to new knowledge that is reconstructed by their mutual contributions. Constructing their curriculum then becomes a relevance process: Each time, knowledge is added to prior models, students adjust themselves with new interpretations.

As this approach is experience-based, the resulting knowledge is experimental and intersubjective, allowing curriculum mapping to provide a framework for teacher development. Because curriculum mapping connects ideas visually, its design contributes to indicate the nature of the relations between ideas and cases. It provides a road map that shows the convergences and ways of connecting meanings and assumptions. In this respect, curriculum mapping is an approach we can recommend in the current reforms as its helps practitioners reflect on the organization of knowledge. As concept mapping has been recommended by the Turkish national curriculum to increase the quality of education at all levels (MEB TTKB Curriculum, 2005) this study provides supporting data for this approach in a pre-service context, demonstrating that it leads to more reflective, creative, collaborative, and pragmatic approaches.

Benefits of Curriculum Semiotic Mapping

The primary finding of this study is that curriculum maps can be used as training tools for student teachers to improve their professional skills or improve their view of the curriculum they will enact in classroom situations. Knowledge mapping proved to be an encouraging semiotic approach which allowed student teachers to get a sense of what was meaningful in the subject-matter as it eased communication between the student teachers and their teacher educator. Additionally, curriculum mapping facilitated the acquisition of major educational concepts as the curriculum maps indicated to students the connections between subjects that they had been taught and those they would choose to teach, thus legitimating their teacher education. Curriculum maps furthermore stimulated reflective practice among student teachers, leading them to re-conceptualize their personal, academic and professional knowledge. The student teachers could then collaboratively discuss the relevance of their priorities, better prepare professionally, and minimize the risks of being inexperienced.

Curriculum mapping also helped these student teachers to foster their professionalism as lifelong learners. They started to understand that curriculum building is a form of interpretive conceptualizing, it is partly fabricated. In the Peircean view, experimentation is important to fix beliefs. Curriculum mapping allows the students to review their personal reflections, expectations, past goals and criticisms. The process of developing individualized curriculum maps raised students' awareness of what they knew, and led them to reflect on the utility and the pertinency of subject-matter knowledge, their deficiencies in disciplinary training, possible lack of motivation and self-assessment in the growth of professionalism. In the beginning the student teachers had some difficulty locating and classifying subject-matters on paper. However, they soon felt they were placed in the position of future professionals making crucial choices as to what is to be taught during one school year. One particular motivating factor for the student teachers was their desire to behave like qualified teachers. Defining for themselves what a 'qualified teacher' would do motivated them to reflect about the concepts of their discipline. While they were appreciating their level of knowledge they were encouraged to represent their ideas on improving the field, which was a sound preparation for their internship.

The study indicates that teacher educators can use curriculum mapping as a reflective tool to professionalize student teachers through providing self-assessment and highlighting possible deficiencies. Students who map their knowledge reframe the functions and contents of the courses they took. Other aspects revealed by conversations around curriculum mapping were the importance of preparing for large class activities, and developing the listening and speaking skills required to teach in the target language. Curriculum mapping was an excellent instrument for both teacher educators and student teachers to foster their professional skills, and gave rise to important questions on the nature of curricular knowledge. The student teachers investigated proper ways to sequence knowledge, and the reasoning behind the construction of disciplinary knowledge.

The concept of affordance was useful in emphasizing that the national curriculum is not lived *in abstracto*, but must be adapted to specific meaningful niches and semiotic environments where it is being taught. Furthermore student teachers have their own semiotic niches and affordances with particular aspects of the curriculum, which will lead to prioritize particular segments of the national program; curriculum mapping proved to be an interesting way to dig into the rationales for such choices. Student teachers were guided from their initial level of intuitive inquiry (the firstness level) to articulate the major objects of the curriculum with coherence (at the secondness level) and start moving these curriculum concepts into a theoretical whole, which helped them reframe the field as their professional domain of thought and action. The whole process was deep enough that it not only aimed at teaching and learning but gave them a taste for 'deep education' (Tochon, 2008)

Curriculum knowledge construction

In this study, we have analyzed curriculum mapping as a metasemiotic, and potentially trans-semiotic process, which involves multiple layers of negotiation and design. Curricula tend to represent the authority that aims at fixing meanings for society. The shared understanding in Turkish institutions is that meaning construction can evolve in the students' minds but it is supposed to be stable and normed in the teacher's mind. The teacher gets training to objectify concepts in a way that will permit either their transmission or their reflective reconstruction. Bourdieu (2001) might note that such naturalizing is part of the school enforcement of the sociocultural heritage. As this study demonstrates, knowledge is certainly more than information processing. Its selection and processing emerges from identity processes.

Harun, for example, has a socio-political view of the discipline taught that differs drastically from the ones of its peers. When he compared his map to theirs, he realized that he missed some methodological dimensions that would be relevant compared to his initial vision. After discussion with his peers, however, he agreed to complement his political philosophy with other stands that indicate that he agreed to change to follow external suggestions. Over time the modeling process proves transformative for Harun as he feels an increased identification with his curricular stands.

Seval's reflection, on the other hand, is based on ascertained knowledge: she takes for granted knowledge she was given during teacher training courses. This prevents her from having a thorough reading of Harun's innovative views. She sees these views as insufficient from the viewpoint of methods as essentialized in the didactic discourse, although they dig into crucial issues in the sociology of knowledge and the politics of language. In this respect, Seval doesn't demonstrate much trans-semiosis outside of a few categories of understanding that she felt Esra articulated somewhat better than her, and for the increased sense of coherence within the discipline taught.

Esra deeply reflects on language status and how people perceive and create social valorization of particular language practices. She realizes that the current status of English might change one day, given how it is closely related with the current economic power of the Anglo-Saxon world, which could partly vanish in one or two decades. Esra develops a better understanding that her discipline of choice is a matter of epistemic and social representation. Then while considering Harun's map, Esra sees that he has a global perspective on the English culture that shows up on his map, which leads her to revisit her own map. This interaction with Harun's conceptualization of history leads her to reframe her perspective in a way that differs from the orientation provided in method courses, but it is a better fit with her new sense of what is important in what she will do as an English teacher. Through the trans-semiosis of these three student teachers, it becomes obvious that curriculum is related with shared experience, identities, humaneness as well as conceptualizing and design.

We have analyzed the dynamic emergence of relations between agency and structure, and observed how student teachers reconceptualize their discipline in original ways, including how the structure of their curriculum maps evolves as meanings are never fixed. The way concepts are conveyed in the school context explains why students often fail to personalize what they learned. Student teachers likewise often exhibit this tendency. As this study shows, however, student teachers would like to see knowledge as an effective and functional way of acting in their professional lives. The myth of effectiveness hides the values underlying evaluation. Evaluation is a valuing process and is part of a normalizing semiosis, leading prior knowledge to condition what is considered good education. Reflecting on the designing process helped student teachers understand the fabrication of knowledge for schooling allowing them to become critically reflective.

Conclusion

The student teachers' perception of the curriculum is based on values that differ markedly according to their sociocultural substrate and experiential history. In helping student teachers understand how central the valuing process is to education, semiotic analysis offers a useful interpretive framework, given how the goals of education can in turn be understood as semiotic expressions. When, for example, student teachers design their curriculum on electronic maps, they tend to reconstruct and reconceptualize their understanding of the

subject-matter for teaching. This form of curriculum building constitutes a meaning negotiation endeavor imbued with values that involves political and sociocultural choices, selection, a hierarchizing of values and their enactment into a model that can be taught in schools. Thus curriculum mapping can be an interesting instrument to observe and discuss hunches and values that lead the edification of curriculum choices among postulant practitioners. Viewing curriculum mapping, then, as a process and not as a goal in itself helps explicate how disciplinary knowledge is enmeshed with personal knowledge.

Based on the interviews that accompanied the process of curriculum mapping, we observed that the student teacher looks at the curriculum in terms of prior knowledge and experiences in search for semiotic niches on which to base his or her teaching practice. Curriculum mapping is based on the selection of and affordance with subject-matter niches in which student teachers feel comfortable. For them, the curriculum has conceptual niches to which they must get accustomed. The student teacher's semiotic inquiry can be regarded as the discovery of such affordances, which is why curriculum mapping is such a helpful process. Affordances do not exist independently from the perceiver but rather imply interaction in the meaning construction process. The curriculum supports a particular set of interactional constructions that are available for teachers who know how to use these affordances. Thus the theory of affordance, analyzed from a Peircean, semiotic viewpoint, provides a way to decipher how student teachers give meanings and functions to curriculum objects and interactively build their conceptual niches.

To sum up, when student teachers try to resolve their doubts, they follow hunches and look for clues, building scenarios and coming up with possible explanations. They sharpen their ability to catch what symptoms are important and need to be trusted, and which ones are irrelevant. Abduction is the beginning of the process of conceptualizing. Ideas are linked by reason and evaluated. As student teachers jointly compared curriculum maps they also challenged their beliefs, induced genuine doubt and stimulated conceptual reframing. The deciphering of affordances is an expression of semiotic inquiry. It helped student teachers explore the conceptual processes of selection elicited when designing the curriculum. In this process, the student teachers had to fix their beliefs. This implied selective decision-making. Mapping curriculum affordances generated a form of reasoning that was initially of abductive nature, as the student teachers were stimulated to enter a transformative process, through which they had to make meaning of their own meaning-making. We named that process 'trans-semiosis'. Understanding their own abductive reasoning in framing the subject-matter in turn characterized the student teachers' inquiry and gave the whole process an educational dimension.

Acknowledgements

The research reported in this article was supported by a grant from Tübitak – the National Science and Technology Council of Turkey – that permitted the first author to spend one semester onsite facilitating the integration of e-portfolios, and from the Spencer Foundation (#38723) that supported data processing on issues of globalization, standardization and organizational learning as well as a visit of the second author to UW-Madison. We are grateful to Elif Kir, research assistant, for helping with some aspects of data collection and transcription, and to Nathan Black who did the linguistic revision of the paper. We are also grateful to the pre-service teachers who participated in the study, to Münire Erden and to Ali Ilker Gumuseli for their support all along the implementation of the portfolio project.

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