

Critical Pedagogy and Materials Development; Content Selection and Gradation

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Abstract

The study aimed at presenting how materials developers can design materials based on the tenets of Critical Pedagogy (CP). Having reviewed the literature on CP, the present study attempted to propose ideas for the selection and gradation phase of Materials Development in line with the tenets of CP. The distinguishing feature of the study was to exemplify a critical class with critical materials by drawing upon Freires' Problem Posing, Generative Themes, and Concentric Circles concepts. Additionally, the study proposed Immediacy and Comparison to be employed as tools to select and grade the content of critical materials.

Keywords: Critical pedagogy, Content selection and gradation, EFL learners, Materials development.

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Introduction

The general question one faces before launching a project, even in our daily lives, is to see a justification for that start. Why do and should we rethink our current position? Why are we after making things happen differently? The barrage of questions to these effects can run continually. However, answering these questions is not endless like the questions themselves. The answer is this: the need to bring about a change is most felt when things are not the way they should be. The same story occurs in our educational system. The system is not fulfilling its commitments to nurture souls which are meant to be at the service of social change and equality while economic concerns are of top priority (Kanpol, 1999). So, an attempt should be made to rectify the unwanted situation. Narrowing down our debate, SLA field of study is no exception to this *unwanted-ness*. It has been leading a cloistered life and its main concern has been language and how it is mastered by language learners from other linguistic backgrounds. Is it all that our current SLA should be looking for? Theoretically the answer is no since the philosophy of education, no matter what field of study we are taking on, goes beyond the walls of schools and serves broader scopes. However, to favor activism and pragmatism, our answer is that current SLA maybe detached from wider social scopes. To bring a change in society has not been any of SLA choices before the introduction of the *Pedagogy of the Oppressed* (Freire, 1970) and Critical Pedagogy movement. The major point of departure for the proponents of Freire and Critical Pedagogy is to cement micro level of education and macro level of society together (Akbari, 2008). Following, comes the rationale for introducing Critical Pedagogy as the way to militate against the “effects” of practicing SLA as it is being practiced currently.

Critical Pedagogy and SLA: A luxury or a necessity?

Pennycook (1990, 1989) argues that a main gap in second language education is its separation from broader issues in educational theory. He believes that the nature of second language education demands us to understand our educational practice in wider social, cultural, an political terms since ESL is ideological. Although the ideological dimension of education may not be clear and we may not be aware of that, it is in fact, and is far away from neutrality (Benesch, 1993; Shor, 1992; Pennycook, 1998, 1990, 2001; Kanpol, 1999; Akbari, 2008). Benesch (1993) claims that the notion that some kinds of teaching are ideological while others are not has been questioned by a number of L1 and L2 educators like Cummins (1989), Pennycook (1989, 1990), Shor (1992), and Simon (1992).

The ideological character of ESL has been proposed to manifest itself in the form of a “hidden curriculum” of which students, teachers, and other educational staff are not aware. This refers to a collection of the messages and intentions of academic institutions that are not detailed in the official curriculum (Freire, 1970; Slattery, 2006; Giroux, Penna, & Pinar, 1981; McLaren, 1989). As mentioned above, many scholars hold that SLA is ideologically laden and is not a neutral enterprise. Therefore, an attempt should be made to militate against the adverse effects of an ideological SLA. That is where a curriculum based on the implementation of CP might help.

Norton and Toohey (2004) observe that CP considers education as a political undertaking and aims at raising learner’s critical consciousness to be aware of their sociopolitical environment and equips them against the status quo. However, although the body of literature on an ideological ESL abounds, not much attempt has been made to nullify this educational system

which perpetuates and gives voice to the dreams of a special group (Simon, 1992). In line with the foregoing, in the introductory chapter to *Pedagogy of the Oppressed*, Macendo (2000) complains of the marginality of Freire's work as one of the key originators of CP. He says that although it has been internationally acclaimed, it is still peripheral to most educational curricula. Though stated 12 years ago, Macendo's complain holds true even now. A great cause of such marginality can be attributed to the absence of material specifically designed in line with the spirit of CP tenets. That is why Crookes (2009) puts that not much research has been carried out on materials development with a view on CP. To our knowledge, no published study has attempted to propose guidelines to base Materials Development on the components of CP thus far save for the study conducted by Rashidi and Safari (2011). However, the study can be critiqued from at least one perspective. First and foremost, as the researchers themselves rightly predict and make a mention of that, their study remains at the level of theory and does not provide tangible examples and clear cut ways of how their 11 proposed principles can be put into practice. Therefore, they have added to the available pile of theoretical ideas on CP. They believe that this is not a pitfall to their study in that it can "... be excused. The reason is that every situation and reality differs" (Rashidi & Safari, 2011. p. 258).

We do not intend to prove their justification unsatisfactory since one of the purposes of the present study is to show how this theoretical stagnancy can be compensated for and in the last section of the study we will take up the point. This study aims at filling the gap in the literature by first extracting the main tenets of critical theory and then, proposing principles to be followed by materials developers to make current ESL materials come closer to the spirit of CP. But, before going squarely to the tenets, current ideas on Materials Development are dealt with and then, the position on which CP stands within the Materials Development literature is addressed.

Materials Development and Critical Pedagogy

Richards (2010) alerts that Materials Development is not receiving the attention it should receive in second language teacher-education and sometimes, its position is underestimated within graduate education. This is confirmed by Harwood (2010) when he asserts that although there are disagreements, most of those active in the realm of Materials Development consistently believe that materials design should play a part in teacher education. The point doubles in importance when it is looked upon in the light of Allwright's (1981) argument holding that no pre-prepared materials can fit any class exactly and some level of adaptation in line with the given context is deemed necessary since materials represent at some level the world from which they spring and are considered to be cultural artifacts due to their thematic content. However, it stands to reason that cultures and contexts are not universally defined and their demands are inherently distinguished. This locality, as Tomlinson (2003, 2005) maintains, should be taken care of by relating materials to the very context of learners and their lives. But the question that can be raised aptly here is how to take account of this contextuality in our materials and not be accused of engaging in an "essentially a theoretical activity", as many believe Materials Development to be so (Samuda, 2005. p. 232).

CP can bolster the purpose of any educational system by bringing about changes which aim at making students more aware of their immediate situation and existence besides making a link between the macro-level of society and micro-level of classroom in order to transform society (Akbari, 2008). To do this, the curriculum and syllabus should be *criticalized* first. The

way to do this is to design materials based on the tenets of Critical Pedagogy, this is what the present study sought to fulfill. Before dealing with the tenets of Critical Pedagogy, reviewing the position of Critical Pedagogy in works on Materials Development is in order. A good point of departure is Nation and Macalister (2010). The researchers propose a model of materials design process the outer circles of which, they point, have a major effect in steering the actual process of course production. Their model has 8 components with 'Evaluation' in the surrounding circle which includes other seven circles of 'Principles', 'Needs', and 'Environment' as outer circles and 'Content and Sequencing', 'Format and Presentation', and 'Monitoring and Assessment' as inner circles. The last surrounded circle is that of the 'Goals'. The elements included there influence directly course content selection and sequencing. Environment, needs, and principles are related to the present study in that the analysis of immediate environment and need of learners are of paramount importance within the framework of Critical Pedagogy.

However, a most relevant issue here is that we should not erroneously equate the need and context talked about by Nation and Macalister (2010) and other scholars like Tomlinson (2003, 2005) and the *Need and Context* within the framework of Critical Pedagogy. The former is limited to linguistic levels and not something beyond that meaning that linguistic needs of students are of top priority. On the other hand, the latter is more than a linguistic level and encompasses social levels, as well, and how this link can result in social change, equality, and empowerment. What has already been proposed regarding context characterizes the first meaning explained above? A case in point to justify our argument is Nation and Macalister (2010). The most relevant part of their model of the parts of the curriculum design to our discussion is where they talk about the effect of need and environment. In describing needs analysis of their model, Nation and Macalister (2010. p. 1) put that the results of this need analysis is a "realistic list of language, ideas of skill items, as a result of considering the present proficiency, future needs and wants of the learners". Regarding the effect of environment, they add that this has to do with the environment constraints like whether the teachers of a given context are trained. No trace of the tenets of CP can be found in their model!

This absence of the inclusion of CP principles is not limited to Nation and Macalister's work. In the introductory chapter of his reference book on Materials Development, Tomlinson (1998) lists sixteen principles he thinks most SLA researchers agree upon to be most related to the development of materials for teaching languages. But, none is related even indirectly to the tenets of CP.

In another seminal study on curriculum development, Graves (1996) proposes a framework for course development and its components. The same critique leveled at Nation and Macalister (2010) is rightly applicable here since all Graves's proposed components are primarily and mainly linguistic concerns and nothing more. Even when Graves talks about culture what she has in her mind is the affective impact of culture. Goals and objectives of a course are determined, in Graves's model, by the level of mastery target learners are expected to reach. Here, social change and transformation are not the focus. As for the content of a course, social relevancy is not intended to be covered and determining factors are structural, tasks, communicative needs and so on. Therefore, as reviewed, it is clear that no curriculum model available now has taken account of the tenets of CP and that is why an ideological SLA needs more critical evaluation. The accrued situation, of course, is in a sense given since for decades educational curriculum and syllabus design have been informed by thoughts like what follows.

Yalden (1987, as cited in Richards & Renandya, p. 76) asserts that three principles that can affect syllabus design are 1) a view of how language is learnt, which would result in a structure-based syllabus; 2) a view of how language is acquired, which would result in a process-based syllabus; 3) a view of how language is used, which would result in a function-based syllabus. Hence, all the stuff pivots around language itself and nothing else should adulterate this purity. Moreover, as Pennycook (1990, 1989) puts it, mainstream SLA is not linked to other wider social theories whose mission is to change the society through educational systems. To live this out, Freire and Macendo (1987) are very unambiguous and succinct. They hold that an educational program should be something more than learning how to read and a critical curriculum aims at making learners aware and critical to “read the world” while they “read the word”.

The present study reports on only one part of a comprehensive study on how curriculum design can be informed by the tenets of CP. Since material design is composed of different components (Richards, 2001), our study is a report on the content section and how it can be selected and graded since addressing all the components is not possible within one single article and falls prey to incomprehensiveness and reductionism. In addition to the literature presented, the present study, also, draws on Freire’s work (1970) and exemplifies how Immediacy and Comparative Texts can be employed as ways to select and grade CP materials.

Short Words on Content: Selection and Gradation

To be on clarity’s side, we first provide short definitions for selection, and gradation. Selection has to do with answering the question; what material should be selected to fit the purposes of a given course (Nunan, 1998; Nation & Macalister, 2010). Gradation, on the other hand, is associated with how the selected materials can be sequenced so as to reach the best possible results. Traditionally, complexity has been the criterion for sequencing material. It has been a process of going from the simplest linguistic units to the most difficult ones (Nunan, 1998). In a most recent work on Materials Development, Nation and Macalister (2010) propose linear and modular approaches to sequencing and grading of material. By the former they mean the same traditional one, i.e. “beginning with simple frequent items that prepare for later more complex items” (p. 82). By the latter they mean that a course is divided into independent non-linear units. What we aimed to do in this study was to intermingle these two approaches with Freire’s ideas, namely “problem posing”, “generative themes”, and “concentric circles” to provide an example of how CP materials can be selected and sequenced. Therefore, providing a background of the ideas we drew upon is pertinent here.

Freire’s (1970) conceptualization of educational systems as “banking” ones led him to propose “problem posing” as the way to counteract the situation. According to Freire (1970):

The former attempts to maintain the submersion of consciousness; the latter strives for the emergence of consciousness and critical intervention in reality. Students, as they are increasingly posed with problems relating to themselves in the world and with the world, will feel increasingly challenged and obliged to respond to that challenge. Because they apprehend the challenge as interrelated to other problems within a total context, not as a theoretical question, the resulting comprehension tends to be increasingly critical and thus constantly less alienated. Their response to the challenge evokes new challenges, followed by new understandings; and gradually the students come to regard themselves as

committed. Education as the practice of freedom—as opposed to education as the practice of domination—denies that man is abstract, isolated, independent, and unattached to the world; it also denies that the world exists as a reality apart from people. Authentic reflection considers neither abstract man nor the world without people, but people in their relations with the world. (p. 81)

It is readily understood from the long quotation that one of the main features of problem posing education is to relate the micro world of education to the macro level of society (Akbari, 2008). But how to create the link between the two levels is important. To do that, Freire (1970) put forward a methodology whose nub is “Generative Themes”. Freire (1970) observes that:

It is to the reality which mediates men, and to the perception of that reality held by educators and people, that we must go to find the program content of education. The investigation of what I have termed the people s "thematic universe", the complex of their "generative themes"—inaugurates the dialogue of education as the practice of freedom. The methodology of that investigation must likewise be dialogical, affording the opportunity both to discover Generative Themes and to stimulate people's awareness in regard to these themes. (pp. 96-97)

Therefore, a generative theme is termed so because it corresponds to the people's concerns and ideas (Roberts, 2000). In other words, a generative theme is a central social and political issue that looms large in a context for a given community. That is way Generative Themestrigger conversations.

The last Freire' concept to explain is concentric circles. For Freire, Concentric Circles are where Generative Themes can be positioned. They can move from the general to particular. In this study, the researchers have created a nexus between Concentric Circles (layered Generative Themes) and the idea of Immediacy. By that is meant that the Generative Themes can be gradated according to their tangibility and familiarity to the people of a given people. The most tangible and familiar generative themes are put in the most inner circles and then, they increase in their scope.

Social transformation and social justice

Freire (1970) believes that reality is really a process of undergoing constant transformation. In problem-solving education, people develop their power to perceive critically *the way they exist* in the world *with which* and *in which* (original italics) they find themselves; they come to see the world not as a static reality but as a reality in process, in transformation. Therefore, students and teachers with critical views are prepared to situate learning in the relevant social contexts, unravel the implications of power in pedagogical activities, and commit themselves to transforming the means and ends of learning, in order to construct more egalitarian, equitable, and ethical educational and social environments. A central aim of critical pedagogy is changing society; seeking to build and develop a more equitable, hospitable, and humane place (Freire, 1970). Kellner (2007) asserts that for Freire, the pedagogy should nurture revolutionary subjects, i.e. capable of rebelling against oppression and battling for a more democratic and fair social order. To this end, Freire (1970) defines a transformative role for education to play. Kellner (2007, p.171) puts this transformative theme in the following way: “Freire's pedagogy of

the oppressed seeks to transform individuals from objects of educational processes to subjects of their own autonomy and emancipation.” To put it another way, education should be at the service of self-emancipation rather than a tool to perpetuate oppression in its social and legitimate forms. This transformation and social justice can be bought about through a couple of ways. One is to reconcile micro-level education representative of macro-level society. Akbari (2008), for example, argues that “Critical pedagogy (CP) in ELT is an attitude to language teaching which relates the classroom context to the wider social context and aims at social transformation through education. However, this reconciliation is not fulfilled without transformation.

Therefore, a lot of different and new thought is required. Quintro (2011) observes that thinking in a new way always necessitates personal transformation; indeed if enough people think in new ways, social transformation is inevitable. He defines CP as a process of constructing and critically using language as a means of expression, interpretation, and/or transformation of our lives and the lives around us. This process of personal transformation leads to empowerment. From critical perspectives teachers in traditional methods have been disempowered because they have become increasingly positioned as classroom technicians employed to transmit a fix body of knowledge, to implement set curricula. Instead, CP theorists argue that teacher must be treated as transformative intellectuals who constantly explore their own and their students’ lives. So this view breaks down the troublesome theory/practice dichotomy and adopts the notion of informed praxis (Pennycook, 1990).

Rejection of banking method of education

CP is against banking models of education in that this system is oppressive and dehumanizing (Freire, 1970). It prevents inquiry and creativity by characterizing students as receptacles and containers required to memorize everything they are taught. This turns classrooms into a site of innumerable limit situations. Monchinski (2008) states that one of the biggest limit situations confronting teachers and students on a daily basis in the everyday classroom is what Freire called “the banking system of education.” Freire (1970) suggests that the banking method is a system of education in which the teacher is seen as having all of the knowledge and students are simply empty vessels waiting to be filled with this knowledge. It suggests that the students do not have any prior knowledge and the teacher is the source of all information (Freire, 1970; Macrine, 2009; Pennycook, 2001). In other words, students are not expected to think how their attitudes towards themselves and towards the society are being formed or think about the hidden ideologies present in their textbooks which are unconsciously passed into their minds in order to make them as subjects of wider social institutions. This culture of silence embodies marginalization of voices and ideas of students from certain socioeconomic and cultural backgrounds and, thus, their disempowerment and social exclusion (Ranson, 2000; Abedinia, 2000). In this system the version of reality to which students are exposed is a motionless, mechanistic and static one. This motionlessness is embodied in the “narrative character” of this education and the content of the materials covered by this system which is detached from the existential life of students and tends to dichotomize human beings and the world (Freire, 1970). It pits teacher against student and both against the joys that education can and should bring and fosters antagonistic relationships between teachers and students i.e. teacher-student contradiction (Monchinski, 2008; Freire, 1970). Freire (1997, p. 54) makes a list of “attitudes and practices” indicative of the banking concept of education as follows:

- the teacher teaches and the students are taught.
- the teacher knows everything and the students know nothing.
- the teacher thinks and the students are thought about.
- the teacher talks and the students listen meekly.
- the teacher disciplines and the students are disciplined.
- the teacher chooses and enforces his choice, and the students comply.
- the teacher acts and the students have the illusion of acting through the action of the teacher.
- the teacher chooses the program content, and the students (who are not consulted) adapt to it.
- the teacher confuses the authority of knowledge with his own professional authority, which he sets in opposition to the freedom of the students.

After enumerating above-mentioned features, Freire (1970) proposes problem-posing education as the solution to negate the domesticating effects of banking education. He states that "in problem-posing education, people develop their power to perceive critically *the way they exist* in the world *with which* and *in which* (original italic) they find themselves; they come to see the world not as a static reality, but as a reality in process, in transformation" (1970. p. 83).

Dialogical method

The dialogical approach to learning abandons the lecture format and the banking approach to education in favor of dialogue and open communication among students and teachers. According to Freire (1970), in this method, all teach and all learn. The dialogical approach contrasts with the anti-dialogical method, which positions the teacher as the transmitter of knowledge, a hierarchical framework that leads to domination and oppression through the silencing of students' knowledge and experiences. Kanpol (1999) states that a critical postmodern condition objective is to question control mechanisms. A classroom context would be a place to practice dialogical relationships and learning becomes a reciprocal process. But a word of caution is in order here. One should be careful of not interpreting dialogue as a method. In the introductory chapter to the Pedagogy of the Oppressed, Macendo (1970) eloquently reveals wrong takes on praxis as intended by Freire. Quoting a long paragraph from Freire, Macendo believes that for Freire dialogue is not a technique. Rather, for Freire, dialogue "dialogue characterizes an epistemological relationship. Thus, in this sense, dialogue is a way of knowing and should never be viewed as a mere tactic to involve students in a particular task. "(Freire, 1970. p. 17). Macendo adds that in looking so at dialogue, dialogue presents itself as an integral element of the process of both learning and knowing. It is "an I–Thou relationship, mutuality between teachers and students (Freire, 2005, p. 45). This dialogical inquiry prevents students' "Mutism" and attempts to establish a kind of shared knowledge and mutual relationships which are against the process of dehumanization (Benesch, 2010; Freire, 2005; Monchinski, 2008; Pennycook, 2001; Shor, 1980; Smyth, 2011).

Praxis

Praxis is the power and know-how to take action against oppression while stressing the importance of liberatory education. Praxis involves engaging in the cycle of theory, application, reflection and then back to theory. Social transformation is the product of praxis at the collective level" (Freire, 1998). "Praxis may be understood as the mutually constitutive roles of theory grounded in practice and practice grounded in theory. Praxis is a way of going beyond

dichotomization of theory and practice and considering them as dependent (Pennycook, 1999; Pennycook, 2001; Eryaman, 2006, 2007; Benesch, 2010). It is an understanding of the ways in which human beings are dominated and also forms of actions that are aimed at countering dominating forces (Giroux et al., 1981). The point that seems relevant here is that one should be cautious in interpreting the meaning of theory and practice. Atkinson (2010) eloquently makes a distinction between theory with its initial capitalized, i.e. "Theory", on the one hand and that of "theory" with a small initial, on the other hand. He observes that the former has a bearing on "a system of principles, ideas, and concepts, used to explain, understand, or predict some phenomenon or phenomena." The latter, on the other hand, is speculative in nature and so, suggestive of an everyday application. The above-mentioned, however, is one side of the saddlebag and yet to be balanced by a second side, here having to do with practice dimension. Theories are not given birth to in a vacuum and are meant to be applied to and tested in practice. Only is such a theory tenable. Otherwise, the speculative nature of theories overrides the scientific, rigorous elements and this can be tantamount to erroneously squaring laymen guessworks with nuanced, exact readings of a phenomenon. Not being oblivious of that, Atkinson (2010) makes a case for another upper- and lower-case distinction but this time for practice. An initially capitalized practice, i.e. "Practice", is delimited to mean "practice which is outward-looking, reflective, and open to reformulation." This way of defining practice can be well welded together with the first definition of the theory referred to above. Following is what Atkinson means by practice with a small "p", i.e. "practice." It is defined as a "customary or habitual action." This take on practice is more compatible with the second definition of theory, namely "theory" with the small initial. The only are practice and theory with their initials capitalized are the focus of practice and CP. Hence, Atkinson delimits praxis to the link between theory and practice that is a mutual and dialectic one meaning that theory always directly informs practice, and practice, for its part, dialectically informs theory in turn.

Interpretation of the hidden curriculum

The hidden curriculum refers to a collection of all the messages and intentions of academic institutions that are not detailed in the official curriculum (Freire, 1970). These messages and intentions can cover a broad range of issues that pertain to academic, political, economic, and any other number of issues but will always have an effect on students of academic institutions. This curriculum keeps teachers in the service of the dominant political and economic system despite their good intentions (Giroux et al., 1981). Attempting to understand how the working of schools is, McLaren (1989) talks about discovering a "hidden curriculum" which constraints the success of minorities, women, and the poor. Slattery (2006) maintains that the goal of hidden curriculum is to socialize people into accepting the roles assigned to them by the capitalist class. He characterizes the hidden curriculum with a teaching nature which is aimed at submission, deference and respect for the established organization of work. A radical view sees curriculum work from the perspective of race, class, and gender analysis. Following is a number of considerations that Slattery (2006) believes such a curriculum should take care of:

ask the students to describe their image of the 'typical' male and the 'typical' female. The students should then share their views with the rest of the class, the aim of the exercise being to make the students aware of sex-role stereotyping as an assumption, underpinning the socialization of males and females.

_ students should be asked to complete the following activities:

What do you feel it means to be male or female? Check off everything on the list in the box below that you feel applies to you.

_ encourage the students to think carefully about their own actions and the extent to which they may be perpetuating gender-role stereotyping

_ consider where, how and why women's and girls' experiences, achievements and contributions have been excluded from the knowledge that is valued in society;

_ provide both females and males with access to a wider range of knowledge, skills and ways of being. It should contain those areas of knowledge and living that are of particular significance to women and girls, to

_ acknowledge the multiple perspectives that women have because of ethnicity, culture and class;

_ students will be as knowledgeable about female as male contributions to society;

_ there will be no difference by gender in the classroom interaction of students and teachers or in expectations for student success

-there will be no sex bias in the content of courses taught or instructional materials used;

_ there will be no sex stereotyping in the hidden curriculum of the school;

_ unravel the ways through which social and institutional structures act to maintain the dominant position of men in society;

_ explore system and personal models that fulfill expectations of social justice, and that are based on broad rather than narrow views of what it means to be female or male.

Treating method as a colonial construct and borrowing the main tenets of post method

Pennycook (1989) argues that method is a prescriptive concept that expresses a positivist, progressivist, and patriarchal understanding of teaching. However, with the appearance of colonialism, method seems to have assumed easily identifiable colonial properties. Kumaravadivelu (2003) asserts that the concept of method is a construct of marginality which gives it colonial coloration. It values everything related to the colonial Self and marginalizes everything related to subaltern other. Method ignores the local knowledge and interests and tries to prescribe one approach of teaching and learning English to all learners with their different goals. To get rid of problems of method, Kumaravadivelu (2006) introduces the concept of post method. He believes that it is an effort to liberate teachers from being restricted in their choices of teaching methods. He visualizes post method pedagogy as a three-dimensional system consisting of three pedagogic parameters: particularity, practicality, and possibility.

Contextualized language teaching programs, praxis (teachers must theorize what they practice and practice what they theorize), and attention to students life experiences are the main features of these dimensions.

The Implementation of CP tenets in Content and Sequencing of Materials

With the concepts taken from Freire (1970) and the literature presented above, we attempted to squeeze the tenets of CP into our syllabus. In what follows an example of our implementation is catered for.

One of the researchers was teaching at a language institute at the time when the study was being carried out. The researchers decided to allocate 40 minutes in every session to practice “freedom” in the classes. Therefore, the researchers tried to find a generative theme to start from. We found a very interesting point of departure. The teacher researcher said that today half of the students were wearing surgical masks. It was very relevant to our study since at the time the west half of our country was severely suffering from hazy and dusty weather. The researchers planned to put the students deliberately to the following question in order to find a common reason (i.e. a generative theme): Why are you wearing surgical masks? Then, the students sparked up a conversation about the terrible weather they were experiencing. The researchers made up their mind to bring some material on the theme to the class (i.e. problem posing and linking micro and macro levels). Therefore, some material on the sources and dangers of haze and dust was downloaded from the Internet and, in the first session, was doled out to students in the form of printouts (i.e. selection). Then, some leading questions were posed to trigger a cooperative conversation among students (i.e. dialogical method). To observe both the linear and modular approaches to curriculum design, on the one hand, and Freire’s idea of concentric circles, on the other, the researchers planned to cover four different topics, among which one more topic will be discussed in the next part. These four topics were included because in a modular model for curriculum design, as Nation and Macalister (2010) propose, a course is divided into independent non-linear units meaning that the material covered during a course are not contingent upon each other. To account for the concentric circles and linear models for curriculum design, each of the four topics were discussed in three sessions. This was where the researchers should go through the process of gradation. To do that, we based our gradation on immediacy of the issues to be covered. So, we began with the most inner concentric circle of our first topic, namely hazy and dusty weather because it was the most immediate and tangible evidence of what we were conversing about. After that, the next session, we went beyond the immediate context to a broader context, in this case Iraq’s war time situation since, in student’s opinions, Iraq was involved in the war and failed to mulch its parched areas. The material the researchers gave to the students for this session was a listening track on the Iraqi people facing the same problem; haze and dust in Iraq. The last circle of the first generative theme haze and dust (i.e. the last to come in the gradation process) was the reasons of Iraq-America war and its effects on nearby countries like Iran. In this session, students were required to write a short paragraph on the probable effects of the war on their country. It was interesting to find out that a couple of students imagined and attributed the increase in the number of respiratory diseases in their context to the aftermaths of the war. Even more interesting was to link arboreal diseases of the local jungles to the chemical materials transferred by wind from the war zone. Every session the material covered was discussed, too.

A second example for the implementation of CP principles was the discussion made on the experience teachers and students have of a very frequent incident in Lorestan Province in Iran. In the hometown of one of the researchers self-immolation is very much higher than everywhere else. This is sadly an exclusive female practice. By all accounts, the city has the highest rank in the country. However, because of some bureaucratic and confidential limitations, formal statistics are denied access. It was one of the topics, one of the researchers decided to discuss in his class (i.e. Generative Theme). To do that, the researcher introduced an own-written text about self-immolation to his class (i.e. content selection and content gradation since the idea of self-immolation was most tangible and immediate (i.e. Immediacy) in the context). The text had subjective follow-up questions meaning that the questions demanded the students to go to their own existential conditions to find the answers (macro-micro level linkage). One of the questions read like this: is self-immolation an issue in your community? What do you think are the reasons for that? Subsequently, the students of the class and the teacher had a 15-minute discussion on the topic (dialogical method). An outgrowth of this was another Generative Theme, namely terrible economic situation the community was dealing with due to lack of economic infrastructures which, they held, was itself a function of unjust distribution of wealth and governmental budgets among different cities and provinces (i.e. the second Generative Theme located in the next Concentric Circle). Hence, because it was a broader issue and was beyond the immediate context, it was gradated next to be discussed in the coming session. To make the students more aware of their pitiful and miserable existence, Comparative texts were drawn upon. The economic statistics of an adjoining city was brought to the class and students were invited to compare it to their city. This helped the class to get more insights into their terrible existence. To even go one step forward in the Concentric Circles proposed by Freire, this time self-immolation and economy were related to each other in a broader way by going beyond the immediate context (i.e. Immediacy) by linking the issue to the Tunisian Revolution. A hint was given to students by asking them whether they had any idea of who Mohamed Bouazizi is. Unfortunately only a small number of the students knew him. Thus, he was introduced. Mohamed Bouazizi (29 March 1984 – 4 January 2011) (Wikipedia, 2012) was a Tunisian street vendor who self-immolated as an objection to the government confiscation of his tools. This set in motion demonstrations and riots throughout Tunisia in protest of social and political issues in the country and catalyzed the Tunisian Revolution. The common Generative Theme of all the topics was relevant, so, this time the syllabus was not modular because the topics were not independent.

Conclusion

Driven by lack of Materials in line with Critical Pedagogy, the present study set off to exemplify and propose ideas on how the current SLA mainstream can be more *criticalized*. What makes this study different from the background is to look at Critical Pedagogy from a practical lens since all the bulk of the studies conducted so far has been focused on the theoretical side of Critical Pedagogy. Both teachers and students were happy with the activities involved in the classroom as the issues raised were very much related to their lives and were immediate. It is hoped that the present study can pave the way for more practical studies to be carried out using experimental methods to see the difference that this approach can make in more controlled ways.

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The Effect of Modeling Based Science Education on Critical Thinking¹

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Abstract

In this study to what degree the modeling based science education can influence the development of the critical thinking skills of the students was investigated. The research was based on pre-test – post-test quasi-experimental design with control group. The Modeling Based Science Education Program which was prepared with the purpose of exploring the influence of the modeling based science education on the critical thinking skills of the students was designed in the way to include the objectives and the modeling process steps of the units of Physical Phenomena Learning Field, Electricity in Our Lives of Science and Technology Teaching Program of the 7th grade level which was enacted by the Ministry of National Education (MEB) in 2005. The study was conducted with four groups from different secondary schools; two were experiment groups and the other two were control groups of which were availability samplings. In the study the participants were 56 girls, 58 boys and in total 114 students. At the end of the research, it was found that there existed a significant difference ($p < 0,05$) between the pre-test and post-test average scores of the control group. However, it was ascertained that there was not a statistically significant difference ($F_{1,111} = 3,332$, $p = ,071$, $\eta^2 = 0,029$) between the post-test average scores which were refined according to the experimental and control groups' critical thinking pre-tests.

Keywords: Science education, modeling, critical thinking

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¹ This study is based on Kaan Batı's doctorate dissertation titled *The Effectiveness of the Modelling Based Science Education; The Impact of This Education on Students' Views on the Nature of Science and Critical Thinking Skills*.

Introduction

Although history of science education at elementary and secondary schools levels dates back to the beginning of last century, a great deal of change and improvement took place particularly in last 30 years. New paradigms in philosophy of science and the arising needs of the time were among various factors leading to this change. The second half of the 20th century witnessed enormous changes in technology and industry which brought about a change in policies of science education since this era necessitated new generations of people capable of understanding and internalization science and accessing to information. In other words, contemporary approach in education is based on a strong conviction in the scientific knowledge and methodology and emphasizes competencies enabling individuals' access, understand, produce and critically evaluate scientific information (AAAS, 1995; Harlen, 2006; Hodson, 1992, 1998). As such this new approach has a strong reliance on students' critical thinking skills.

Critical Thinking

Critical thinking has long been one of the essential cognitive skills that science education aims at developing in students. In order to actualize this goal, educators must first decide on what kind of features critical thinking entails which will in turn shed light on the planning of educational methods and techniques that can foster development of these skills in students. Various researchers (Ennis, 1996; Facione, 1990) offer the term "*critical thinking dispositions.*" The word "*disposition*" refers to one's tendencies, constitution and abilities². On the other hand, viewing critical thinking from a dispositional standpoint poses challenges for educations since changing or improving individuals' inborn characteristics is not an easy task. Therefore, other researchers such as Perkins, Jay and Tishman recommend three essential components of critical thinking instead of using the term *disposition: inclination, sensitivity and ability* (Cited by Ennis, 1996). This conceptualization of critical thinking views it as a set of learned (acquired) skills. Lai (2011) views critical thinking as consisted of two dimensions, namely, *cognitive ability* and *disposition*. However, she does not see disposition as an inborn quality but rather as an *attitude*.

Considering different views on critical thinking, one can conclude that it consists of inborn (dispositional) as well as acquired traits. Lai (2011) views disposition as "attitudes or habits of mind, include open- and fair-mindedness, inquisitiveness, flexibility, a propensity to seek reason, a desire to be well-informed, and a respect for and willingness to entertain diverse viewpoints" (p.2). The ability dimension of critical thinking refers to "*cognitive skills of analysis, interpretation, inference, explanation, evaluation, and of monitoring and correcting one's own reasoning*" (Facione, 2000. p. 2). Although researchers conceptualize critical thinking as consisting of dispositional (inborn) and acquired tendencies and qualities, no empirical study examining critical thinking from a dispositional standpoint was found in the literature. Only Gega (Cited by Yıldırım, 2009) noted that a well-designed science education program can foster and improve such dispositions. Lai (2011) proposed that individuals acquire critical skills competencies in young ages and continue improving them through their life spans. Although a great number of adult people lack in critical thinking skills, theoretically individuals can acquire these skills at any stage of adulthood.

² Disposition: A person's inherent qualities of mind and character (Oxford Dictionary)

Viewing critical thinking from an educational point of view, Kayabaşı (1995) refers to critical thinking skills as problem solving strategies a person uses, and a disciplined focus on phenomena as well as the perfect thinking ability. On the other hand, Crazer's definition of critical thinking focuses more on one's judgments of viewpoints and as his or her construction of relationships between concepts (Cited by Akar, 2007). Norris (1985) sees critical thinking as "...rationally deciding what to do or believe" (p. 40). This definition also includes one's critique and evaluation of thoughts and viewpoints. However, this definition lacks some essential components since individuals with critical thinking skills should also offer reasonable hypotheses, firm observations and accurate inferences. In short, the person should have creative thinking, reasoning and additional dispositions. Facione (1990) proposes that an ideal critical thinker is;

habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit. (p. 9)

Likewise, Marzano and colleagues (1988) noted that people with critical thinking skills and competencies have the following characteristic;

- Seek a clear statement of the thesis or question
- Seek reasons
- Try to be well informed
- Use credible sources and mention them
- Take into account the total situation
- Try to remain relevant to the main point
- Keep in mind the original or basic concern
- Seek alternatives
- Be open-minded
- Take a position (and change a position) when the evidence and reasons are adequate to do so
- Look for as much precision as the subject permits
- Deal in a systematic manner with the parts of a complex whole
- Be sensitive to the feelings, levels of knowledge, and degree of sophistication of other people
- Use one's critical thinking ability (Marzano et al., 1988, p 32)

Although there is not a consensus on the definition of the term "critical thinking" (Obay, 2009), there is reasonable consensus that the objective of teaching critical thinking should be enabling people to think, be fair, open-minded and decisive (Marzano, Brandt, Hughes, Jones, Presseisen, Rankin & Suhor, 1988). In emphasizing the need for inclusion of critical thinking skills and disposition in teaching programs, Yıldırım (2009) claimed that individuals with critical thinking skills and dispositions will inevitably use them in their personal conducts. Vieira, Tenreiro-Vieira and Martins (2011) suggest that efforts toward development of critical thinking

skills as a part of science education should involve the following features: obtaining reliable information by using reliable resources; forming valid arguments and counter-arguments based on sound evidence; analyzing these arguments and counter-arguments; and posing questions and answers in order to arrive at further clarification and challenges. Hence, this study uses this conceptualization by Vieira et al (2011) and envisioned that critical thinking taught in educational environments will be generalized to other settings in which their daily lives take place.

Literature on critical thinking has not arrived at an agreed upon definition of the term yet (Obay, 2009). On the other hand, some studies report that a problem-based learning approach enhances students' critical thinking skills (Eren, 2011; Obay, 2009; Yıldırım, Yalçın, 2008). There have been studies reporting no significant impact of a problem solving approach on individuals' critical thinking skills (Özcan, 2007). However, there have also been research findings reporting that scientific process skills approach (İleri, 2012), inquiry based 7E model (Macit, 2006) and the argumentation approach (Gültepe, 2011) might have significant contribution to individuals' critical thinking skills. These studies found a medium-linear relationship between students' scientific process skills and their critical thinking skills. On the other hand, in process of the problem solving and the scientific process skills application students tend to be overly dependent on the operational process as they proceed to further stages of the process thus they experience an anxiety over the ending of the operation (İleri, 2012). As a result, students tend to not sufficiently think on alternatives. One of the striking findings regarding work targeting development of critical thinking skills has proven to be work involving book and newspaper reading habits. Findings of two studies with different samples showed that book and newspaper reading and reviewing news on the papers significantly increased students' critical thinking skills (Kaloç, 2005; Kırıkkaya & Bozkurt, 2011).

In addition, a study examining a science and technology instructional program's effect on 4th and 5th grade students' critical thinking skills found significant improvement (İleri, 2008). On the other hand, in a study with a large sample Akar (2007) found that students' critical thinking skills were significantly lower than the norms of the measurement instrument. The discrepancies between findings by İleri (2012) and those of Akar (2007) could in part be attributed to the years of the studies and the program in use in 2007 was newly enacted. Furthermore, Akar (2007) found that variables such as new-old programs, age and gender did not significantly contribute to the variance in critical thinking skills. Notwithstanding, academic achievement and socio-economic status were variables with greatest contribution to the variance in students' critical thinking skills.

Modeling Based Science Education

In announcing “*A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*” (NRC, 2012) The National Research Council of the United States stated the priority of the new approach to science education as elimination of the mundane aspects of scientific methods. Indeed, in addition to the experimental processes, the scientific process involves modeling, a critical stance and communication. The more applications of scientific methodology moves away from scientific content, the more difficult it becomes to understand, of scientific concepts, principle and generalization. Therefore, instead of using a single scientific method scientists use a diversity of methods. Thus the produced information has strengths and weaknesses depending upon the techniques used and the culture in which the

production of information takes place. Not merely relying on a simple-linear ordering of methods will help students evaluate as to how/why some theories have stronger properties than the others (NRC, 2012). The transformation of scientific method to a model based approach has given rise to the need for science educators to widen their views points so as to include; improvements in scientific information; social processes by which it is evaluated and communicated; contexts; redefinition of the epistemological values and the role of modeling (Develaki, 2007). Model based approach or model-based inquiry are essentially processes by which scientists produce new information (Develaki, 2007).

To put it more concretely, the modeling process involves steps such as: Encountering a question or problem; forming temporary models or hypotheses regarding the causal or holistic relations of phenomena, conducting systematic observations in order to test accuracy of these hypotheses; forming models based on these observations; evaluating the models in terms of their usefulness, predictive value or their capacity in explaining and revising the model and applying it to new circumstances (Windschitl, Thompson & Braaten 2007). Indeed the modeling process refers to a process similar to that frequently used by scientists. Model based science education has to do with teaching strategies that bring about constructing cognitive models, critiquing and changing processes (Khan, 2007). Model based science education involves the following steps: suggesting sub-models; expressing/sharing these models with peers; planning and applying data collection in order to evaluate one's own suggestions; critiquing one's own and peers' models and changing models based on emerging evidence. (Cardoso Mendonça, Justi, 2013).

In defining modeling process, Gilbert (2005) used the following categories and conceptualizes their interrelations as shown in Figure 1: mental models, expressed models, consensus models, scientific models and teaching models.

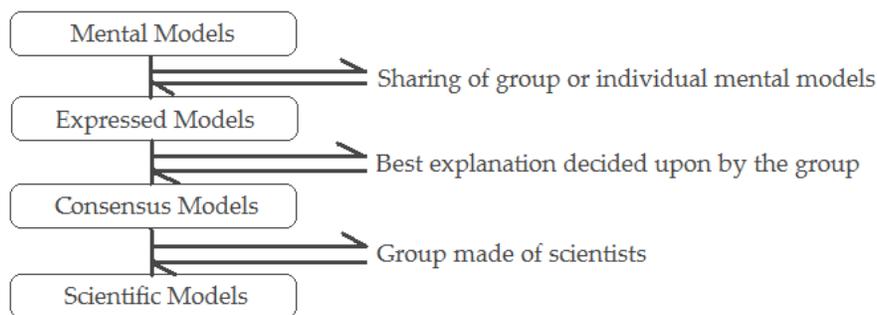


Figure 1: Interrelations of Different Models (Gilbert, 2005)

Gilbert (2005) proposes that all models used in science education should be viewed as teaching models. Since the next stage (step) requires participants to be scientists, in class modeling process for this study was designed up to the consensus stage.

This study examined the degree to which a model based science education program improved primary school students' critical thinking skills. More specifically, does the model based science education program have significant impact on primary school students' critical thinking skills? The following two research questions were addressed in seeking answers to this main research question;

1. Is there a significant difference between experimental groups' critical thinking skills pre-test and post-test scores while using a modeling based science education program with primary school students?
2. Is there a significant difference between experimental and control groups' post-test critical thinking skills scores while using a modeling based science education program with primary school students?

Method

In the study, the pre-test – post-test quasi-experimental design with control group was used. This design can be given as in the following:

Experimental Group	M	CCT-X	MDFEP	CCT-X
Control Group	M	CCT-X	Routine Practices	CCT-X

The Modeling Based Science Education Program (MBSEP) which was prepared with the purpose of exploring the influence of the modeling based science education on the critical thinking skills of the students was designed in the way to include the objectives and the modeling process steps of the units of Physical Phenomena Learning Field, Electricity in Our Lives of Science and Technology Teaching Program of the 7th grade level which was enacted by the Ministry of National Education (MEB) in 2005. The 7th grade Electricity in Our Lives unit which was chosen within the scope of the research composed of 32 objectives and covers 16 class hours. The reasons why these units were chosen are generally they include abstract concepts like “electrification” and “electrical current,” these concepts are often used in daily lives and they are observable phenomena and the experiments can be carried out easily and with attainable materials. In the program sticking to the anticipated duration, daily plans and activities covering 16 hours were prepared. For each activity special forms for teacher and the students were prepared, activity flyers of the students were collected during the study which made it possible to use them as a qualitative data source in investigating the views of the students in regard to their critical thinking skills (Table 1).

The main philosophy on which the activities are based can be called the process of constituting scientific model. This process was developed by the researcher with the data gathered from the literature (Gilbert, 2005). This process is shown in Figure 2. As it is seen in Figure 2, the modeling process starts with a phenomenon or a problem situation. These problem situations were obtained from the subject titles in the science and technology teaching program. Within the scope of this research, two phenomena which were “*electrification*” and “*electrical current*” were elaborated on. In Table 1 which goals and objectives the activities aimed at were given.

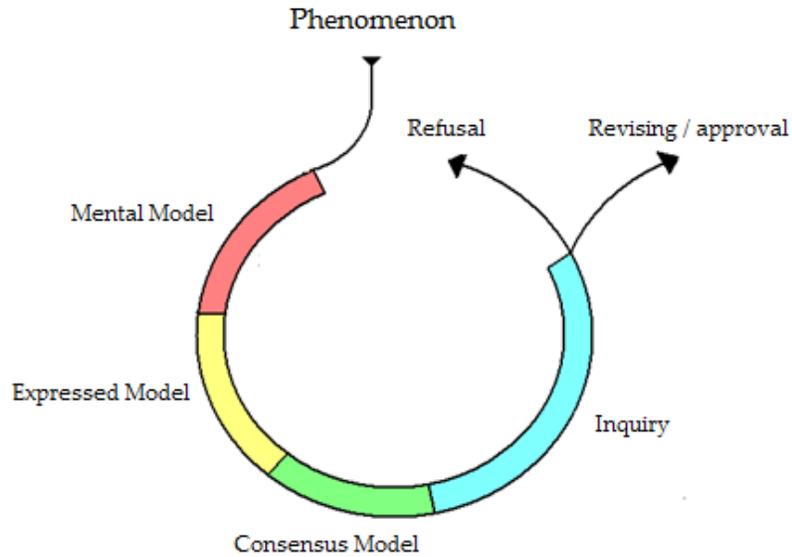


Figure 2: Modeling Process

The first part of the process consists of forming mental models, sharing the mental models (expressed models) and through discussing in the classroom, choosing the model which will make the best statements about the phenomena (consensus model). These processes can be specified as the parts of mental processes in which critical thinking skills of the modeling process are intensely used. At the end of the consensus model, the students were asked to assess the model in terms of individual usefulness, predictive power, coherence and testability. After answering these questions, the consensus model, which was the second part of the process, was proceeded. This part is the one which is, in Figure 2, called inquiry and in which the skills of research-inquiry are used. In this part students were asked to experimentally test the model they had created. Under the light of the data gathered from the experimental processes, there emerged two options as reject and accept about the model developed. The rejection of the model was a result of that it did not overlap with the experimental results. In this case, the revision of the previous models or a reinvention of a new model was expected. In the case of the emergence of any coherence between the experimental results and the model, it was accepted by the students; while in the case of the emergence of any incoherence between the processes and the model at some points, the model was revised. In the control group there was no interference with the time. The teachers were asked to maintain with their routine practices.

Table 1: Activities Based on Modeling: Goals and Objectives

Name of the Activity	Goal of the Activity	Target Objectives (Science and Technology Teaching Program)	Target Attainments:
Faraday and Electromagnetism	Recognition of the Modeling Process	Independent Objective	Openness to new ideas. Considering the evidence supporting the ideas and their reasons Thinking independent from the prejudices or any kind of authorities Create a cause-and-effect relation depending on the evidence and supporting ideas
Modeling Activity	Recognition of the Modeling Process	Independent Objective	Openness to new ideas Considering the evidence supporting the ideas and their reasons Thinking independent from the prejudices or any kind of authorities Create a cause-and-effect relation depending on the evidence and supporting ideas
The Nature of Electrification	Designing Models with Regard to What Electrification is	1.1. Realizes that some articles or objects can be electrified if they are contacted to each other.	Openness to new ideas Considering the evidence supporting the ideas and their reasons Thinking independent from the prejudices or any kind of authorities Create a cause-and-effect relation depending on the evidence and supporting ideas
How Does Electrification Occur?	Testing the Model Created by Electrification	1.2. Discovers through trials that two same articles after being electrified in the same way push each other without contacting while two different articles pull each other without contacting (BSB-8, 9, 30, 31). 1.3. Depending on the experimental results, infers that there are two types of electrical charges (BSB-31).	Create a cause-and-effect relationship Organizing the evidence, main and supporting ideas Considering the evidence supporting the ideas and the reasons

I am Making Electroscope	Designing Electroscope and Testing the Model	1.9. Shows the function of the electroscope on a tool s/he has designed (BSB-18, FTTC-5).	Considering the evidence supporting the ideas and the reasons Create a cause-and-effect relation depending on the evidence and the supporting ideas
What is Electrical Current?	Forming Models Related to the Electrical Current	2.1. Realizes that electrical current is a type of energy transfer. 2.2. States that electrical energy sources provides the circuit with electrical current. 2.3. Realizes that a closed circuit is needed for the generation of the current in electrical circuits. 2.4. Explains that the direction of a current in an electrical circuit is from the positive pole of the generator towards the negative pole and shows this on a circuit schema by drawing.	Openness to new ideas Considering the evidence supporting the ideas and their reasons Thinking independent from the prejudices or any kind of authorities Create a cause-and-effect relation depending on the evidence and supporting ideas
Current Voltage Resistance	Investigation of the Interrelations of Electrical Current, Voltage and Resistance	2.10. Through trials discovers the relation between the voltage of an element of a circuit between two poles and the current on it (BSB-8, 9, 30, 31). 2.11. Explains that the ratio of the voltage between the poles of a circuit element to the current on it is called the resistance of the circuit element.	Creating a cause-and-effect relation Organizing the evidence, main and supporting ideas Considering the evidence supporting the ideas and the reasons

Sampling

Application of the Modeling Based Science Education Program was done by science and technology teachers. Three schools with similar socio-economic backgrounds were chosen for the study. A science and technology teacher from each school was selected. Teachers were randomly assigned to experimental and control groups. Then teachers assigned to experimental groups were provided a 4-hour training on scientific models' roles in science education, modeling process and the Modeling Based Science Education Program. Distribution of teachers and the groups are illustrated in Table 2.

Table 2: Distribution of Teachers and Groups

	Teacher 1	Teacher 2	Teacher 3
School 1 (Sincan)	E1 - C1		
School 2 (Keçiören)		E2	
School 3 (Keçiören)			C2

(E: Experimental group, C: Control group)

Demographic information on teachers selected to apply the program is illustrated in Table 3.

Table 3: Demographic Information of Teachers

	<i>Gender</i>	<i>Work Experience</i>	<i>Attained Degree</i>
<i>Teacher 1</i>	Female	3 years	Undergraduate
<i>Teacher 2</i>	Male	6 years	Master's
<i>Teacher 3</i>	Male	10 years	Master's

Given that teachers in experimental and control groups might interact and thus impact each other's application, such grouping arrangement was done. Although teachers in both groups were informed prior to the applications, such arrangement was still necessary in order to further ensure that groups will not impact one another. In other words, assigning teachers from different schools to experimental and control groups was done in an attempt to ensure the internal validity of the study.

Participant students were selected from the science and technology classes the respective teachers were teaching. Participants were 56 female and 58 male students (a total of 114 students). Students distribution to experimental and control groups and to gender are shown in Table 4.

Table 4: Demographic Information According to School Attended

School	Group	Female	Male	Total
1 (Sincan)	E1 – C1	27	26	53
2 (Keçiören)	E2	16	18	34
3 (Keçiören)	C2	13	14	27
Total		56	58	114

(E: Experimental group, C: Control group)

In order to test if the groups' critical thinking skills differed prior to application of the program, their pre-test scores were examined. Descriptive statistics of groups' scores on CCT-X pre-test are given in Table 5.

Table 5: Descriptive Statistics CCT-X Pre-Test Scores

Group	N	Mean	sd
E1 (Experimental 1)	26	36.6154	6,21660
E2 (Experimental 2)	34	30.9118	6.60288
C1 (Control 1)	27	35.0741	6.18886
C2 (Control 2)	27	34.5185	6.06611
Total	114	34.0526	6.58349

In order to test if experimental and control groups' mean scores on pre-test Critical Thinking Skills Scale differed significantly, ANOVA was used. ANOVA results are illustrated in table 6.

Table 6: Comparisons of CCT-X Pre-Test Means of the Groups

Source	Sum of Squares	df	Mean Square	F	p
Group	540,202	3	180.067	4.546	0.005
Error	4357.482	110	39.613		
Total	137090.000	114			

($p < 0.05$)

As shown in Table 6, a significant difference between means of experimental and control groups on pre-test scores of the Critical Thinking Skills Scale was found ($F_{3,110} = 4.546$, $p = 0.005$). In order to find the specific pairs of groups with mean significant mean differences, multiple comparison tests were used. Results of these comparisons are shown in Table 7.

Table 7: CCT-X Pre-Test Multiple Comparison Results of the Groups

	(I) group	(J) group	Mean	Std. Error	p	95% Confidence Interval	
			Diff (I-J)			Lower Bound	Upper Bound
Tukey HSD	E1	E2	5.7036*	1.63972	.004	1.4260	9.9812
		C1	1.5413	1.72938	.809	-2.9702	6.0528
		C2	2.0969	1.72938	.620	-2.4146	6.6084
	E2	E1	-5.7036*	1.63972	.004	-9.9812	-1.4260
		C1	-4.1623	1.62243	.056	-8.3948	.0702
		C2	-3.6068	1.62243	.123	-7.8392	.6257
	C1	E1	-1.5413	1.72938	.809	-6.0528	2.9702
		E2	4.1623	1.62243	.056	-.0702	8.3948
		C2	.5556	1.71299	.988	-3.9132	5.0243
	C2	E1	-2.0969	1.72938	.620	-6.6084	2.4146
		E2	3.6068	1.62243	.123	-.6257	7.8392
		C1	-.5556	1.71299	.988	-5.0243	3.9132
Scheffe	E1	E2	5.7036*	1.63972	.009	1.0480	10.3592
		C1	1.5413	1.72938	.851	-3.3689	6.4515
		C2	2.0969	1.72938	.690	-2.8133	7.0070
	E2	E1	-5.7036*	1.63972	.009	-10.3592	-1.0480
		C1	-4.1623	1.62243	.093	-8.7688	.4442
		C2	-3.6068	1.62243	.183	-8,2133	.9997
	C1	E1	-1.5413	1.72938	.851	-6.4515	3.3689
		E2	4.1623	1.62243	.093	-.4442	8.7688
		C2	.5556	1.71299	.991	-4.3081	5.4192
	C2	E1	-2.0969	1.72938	.690	-7.0070	2.8133
		E2	3.6068	1.62243	.183	-.9997	8,2133
		C1	-.5556	1.71299	.991	-5.4192	4.3081
Bonferroni	E1	E2	5.7036*	1.63972	.004	1,2980	10.1092
		C1	1.5413	1.72938	1.000	-3.1052	6.1878
		C2	2.0969	1.72938	1.000	-2.5497	6.7434
	E2	E1	-5.7036*	1.63972	.004	-10.1092	-1,2980
		C1	-4.1623	1.62243	.070	-8.5215	.1968

	C2	-3.6068	1.62243	.170	-7.9659	.7524
C1	E1	-1.5413	1.72938	1.000	-6.1878	3.1052
	E2	4.1623	1.62243	.070	-.1968	8.5215
	C2	.5556	1.71299	1.000	-4.0469	5.1580
C2	E1	-2.0969	1.72938	1.000	-6.7434	2.5497
	E2	3.6068	1.62243	.170	-.7524	7.9659
	C1	-.5556	1.71299	1.000	-5.1580	4.0469

Table 7 shows a significant difference between means of Experimental group 1 (E1) and Experimental group 2 (E2) on pre-test CCT-X scores. Therefore, while analyzing post-test results of the students, pre-test scores were used as a covarying variable.

Data Collection

In order to measure students' critical thinking skills Cornell Conditional Reasoning Test X Form was used. The test was originally developed by Ennis and Millman (1985) and is part of Cornell Critical Thinking Test serious. The scale consists of 72 items with 3 choices and is used with people between 4th and 14th grade levels. The purchase and adaptation of the scale was done by Akar (2007). Macit (2006) reports reliability coefficients for the test as ranging between 0.87 and 0.91. The reliability coefficients found in the adaptation study with a Turkish sample was 0.71 (Akar, 2007). In order to further investigate the reliability of the test, a sample of 94 students from schools in Ankara, Turkey were selected. The Cronbach alpha coefficient with this sample was 0.752. The test was used for pre-testing and post-testing of the groups of students participating to the current study. Each administration of the test took approximately 50 minutes. Indeed studies with the same scale indicate a time period of 50-55 minutes for its administration to middle school students (Macit, 2006).

Data Analysis

In order to determine whether there was a significant difference between critical thinking scores of experimental and control groups' t-test, ANOVA and ANCOVA were used. One-Way ANOVA was used to examine whether there was a significant difference between students' pre-test scores in the beginning phase of the study. In order to examine if there was a significant difference between pre-test and post-test scores of students in the experimental group which was the first research question of the study dependent groups t-test was used. To seek answers to the second research question of this study which inquired if there was a significant difference between experimental and control groups' post-test critical thinking skills scores while using a modelling based science education program, ANCOVA was used. While running ANCOVA, students' critical thinking pre-test scores were used as covariates.

Internal and External Validity

In order to improve the generalizability of the findings, 3 schools from two districts of Ankara Metropolitan Area with similar socio-economic backgrounds were selected. Selection of the schools and their assignments to control and experimental groups were articulated in the

sampling section. All applications for the study were conducted in regular class meetings. No activity with both experimental groups (whether in class or in laboratories) did not take place outside of school premises. Thus it was assumed that circumstances of both experimental groups were equivalent.

The study aimed at examining improvements in students' critical thinking skills. No information on students' achievement levels in science and technology classes was obtained nor any information regarding students pre-class work or after class work was included in the study in an effort to ensure internal validity of the study. Planned activities were carried on by the science and technology teachers of each group and the researcher participated only as an observer. No further involvement beyond observing was selected in order to eliminate any bias toward the experimental groups. Observing control groups was also done to ensure unbiased application of teaching processes. Prior to conducting the study, meetings were conducted with each teacher. Their knowledge on the modeling process and whether they have such applications in their teaching activities was inquired. In addition, a class meeting of each teacher was observed. These observations of the groups showed that there were no significant differences between groups prior to the study. Similar observations were made during the study. In order to prevent the control group from being influenced by the program applications done with the experimental groups, the Teacher 3 who was the second control group's teacher was not included in the 4-hour training mentioned above.

Again, prior to conducting the study, the GPower Program was used to determine the power of the study, sample size, error percentage and effect size were estimated. These preliminary calculations revealed an effect size of 0,25 (medium), alpha (α) 0.05, and the power of the study was 0.95. In order to be able to use F tests in the analyses an minimum of 76 people was estimated for the sample size. Thus, a total of 114 students were included in the two experimental and the two control groups of the study. At the end of the study the power of the study was calculated as 0.35³. Cohen (1988) stated that power of studies up to 0.10 is considered small up to 0.25 as medium and to 0.40 as large.

Findings

The first research question of this study inquired whether there was a significant difference between experimental group's critical thinking skills pre-test and post-test scores while using a modelling based science education program. Descriptive statistics on pre-test and post-test scores of both experimental and control groups are shown in Table 8 .

³ Analysis:	Post hoc: Compute achieved power	
Input:	Effect size f	= 0.25
	α err prob	= 0.05
	Total sample size	= 114
	Number of groups	= 4
	Number of covariates	= 1
Output:	Noncentrality parameter λ	= 7.1250000
	Critical F	= 1.9186393
	Denominator df	= 109
	Power (1- β err prob)	= 0.3547677

Table 8: Experimental Group CCT-X Pre-Test-Post-Test Descriptive Statistics

	N	Min	Max	Mean	sd	Variance	Skewness	Kurtosis
CCT-X Pre	60	14.00	44.00	33.38	6.99	48.88	-0.41	-0.31
CCT-X Post	60	20.00	46.00	35.98	6.17	38.11	-0.56	-0.35

Considering the skewness and kurtosis statistics in Table 8, critical thinking skills pre-test and post-test scores of the experimental group were within the range of normal distribution (+1 , -1). On the other hand, in order to obtain further information on the normality of the data, normality tests and histogram graphs were used. The normality tests results of the experimental group's critical thinking skills pre-test and post-test scores are shown in Table 9.

Table 9: Experimental Group CCT-X Pre-Test-Post Normality Test Results

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistics	df	p	Statistics	df	p
CCT-X Pre	.114	60	.050	.963	60	.068
CCT-X Post	.115	60	.045	.956	60	.032

Shapiro-Wilk values in Table 9 shows experimental group's post test scores were not normally distributed. On the other hand, the pre-test scores were normally distributed ($p < 0.05$). the histogram graphs of the experimental group's pre-test and post-test critical thinking skills are shown in Table 3.

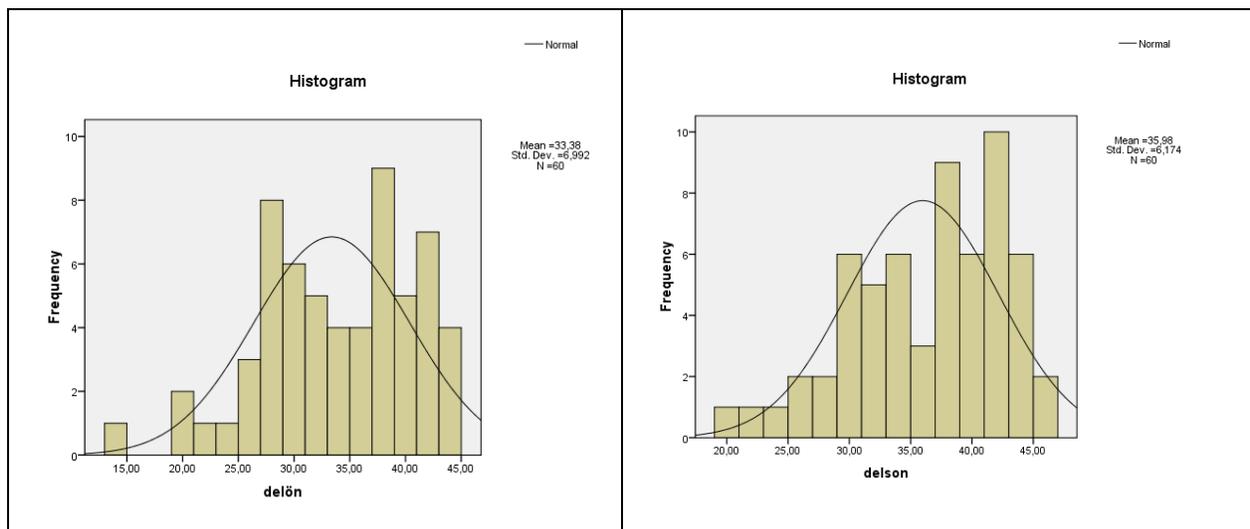


Figure 3: Histogram Graphs of Pre and Post-Test Score of Experimental Group

Group sizes, normality tests, skewness and kurtosis statistics were considered together experimental group's pre-test and post-test scores had satisfactory normal distribution. Thus it

was determined that using parametric statistics in examining mean differences between pre-test and post-test scores would be suitable. Hence, t-test was used to determine if there was a significant difference between pre-test and post-test scores of the experimental group. Results of t-test are illustrated in Table 11.

Table 10: Experimental Group CCT-X Pre-Test-Post Test Results

		N	Mean	sd	Df	t	p
CCT-X	Pre test	60	33.38	6.99	59	-3.738	.000
	Post test	60	35.98	6.17			

($p < 0.05$)

Table 10 shows that there was a significant difference between pre and post scores of the experimental group ($p < 0.05$). In other words, application of the program led to a significant difference in students' critical thinking scores.

The second research question of this study inquired if there was a significant difference between experimental and control groups' post-test critical thinking skills scores while using a modeling based science education program. Descriptive statistics of experimental and control groups' post-test results are shown in Table 11.

Table 11: CCT-X Descriptive Statistics According to Post-Test Results

Groups	N	Mean	Sd	Corrected Mean
Experimental(Group 1)	60	35.98	6.17	36.48
Control (Group 2)	54	35.53	6.12	35.02

Table 11 illustrates that students' means on corrected post-test scores were quite close to one another. In order to test if there was a significant difference between these means ANCOVA was used. While running ANCOVA, students' critical thinking pre-test scores were used as covariates. ANCOVA results are given in Table 12.

Table 12: ANCOVA Results According to CCT-X Pre-Test Adjusted Test Scores

Sources of Variance	Sum of Squares	df	Mean Square	F	p
Pre Test	2333.900	1	2333.900	135.883	.000
Group	57.235	1	57.235	3.332	.071
Error	1906.509	111	17.176		
Total	150124.00	114			

($p < 0.05$)

Table 12 shows that there was not a significant difference between groups' post-test mean scores when they were adjusted for pre-test scores ($F_{1,111} = 3.332$, $p = .071$, $\pi^2 = 0.029$). Therefore, it could be concluded that the program did not bring about a significant difference between experimental and control group students' post-test critical thinking scores.

Results and Discussions

In this study the influence of modeling based science education on the development of the students' critical thinking skills was investigated. Modeling Based Science Education Program, which was developed with this aim was applied to the level of lower secondary school 2nd grade (7th grade in primary school) by the course teachers and the critical thinking development of the students was attempted to be detected. The main hypothesis of the study was that the modeling based science education program might contribute to the development of the critical thinking skills of the students. However, although there was a significant difference between the CCT-X pre-test and post-test scores of the experimental group students, there was not any significant difference between the means of the CCT-X post-test application of the experimental and control groups. In this case, the significant difference emerged between the pre-test and post-test scores of the experimental groups should be interpreted cautiously. Though it is stressed that modeling based approach does contribute to the development of the creativity of the students (Arslan, 2013), it is assumed that this development is not reflected on the critical thinking dimension. Another point to be discussed within the theoretical stance of the study was that critical thinking is an inborn quality and can be improved in time. However, in the conducted studies, it is put forward that in our country's educational system students barely find opportunities to develop their critical thinking skills (Akar, 2007). Parallel to this, the teachers who participated in the study agreed that developing critical thinking skills is not an easily attainable skill and students are not sufficiently present at the settings where they can improve their critical thinking skills and thus they do not have experience with such an activity. In addition to these, considering that the program developed for the study was not long enough for the students to enable them to improve their critical thinking skills, it can be understood why this targeted skill was not developed.

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A Review of Curriculum History and the Conceptual Framework of Curriculum History in Turkey

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Abstract

Curriculum is generally defined based on the philosophical perspectives of the individuals. One of the definitions of curriculum states that curriculum is a field of academic study and research, having an intrinsic research systematic, theory, and tradition. From this perspective, this study is designed as three main chapters. The first chapter consists of the development process of curriculum as a field of academic study. In the second chapter, the period between 1918 and 1938 in the USA, during which curriculum studies have been institutionalized, was described and then the development process of the curriculum history as a field in curriculum studies was analyzed. In the final chapter of the study, the significance of the studies developed around the education history in Turkey within the context of the curriculum history and the relations between the education history and the curriculum history were analyzed.

Keywords: Curriculum studies, the curriculum history, research on the curriculum history, the education history

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Introduction

Despite the fact that curriculum as a praxis had a relatively prolonged history, curriculum as a praxiology only became possible as a consequence of a series of developments occurred in the USA during the early periods of the 20th century (Goodlad, 1985). An analysis of the development process of curriculum as a field of academic study points out that the Herbertian tradition, developed in the USA since the late 19th century as well as progressive philosophy of education, and management theories developed in the field of business administration significantly contributed to this paradigm shift. “The Curriculum” written by John Franklin Bobbitt in 1918 can be considered as the first step of the development process of curriculum as a field of study (Kliebard, 1975, 1986; Giroux, Penna, Pinar, 1981; Jackson, 1992). During the period of approximately 15 years following the publication of the above study, curriculum studies went under a rapid development, leading to the subsequent publication of main works referred to as classics today as well as the introduction of postgraduate courses on curriculum and teaching in universities and ultimately paving the way for specialization in the field of curriculum development. Furthermore, conducting a large scale research study as “The Eight-Year Study” during the period between 1930 and 1940 led to the introduction of the early comprehensive theoretical perspectives on curriculum development (Kriedel and Bullough, 2007; Kriedel and Bullough, 2002; Watras, 2006). During the following years, curriculum developers have been provided an occupational organization by the foundation of ASCD (The Association for Supervision and Curriculum Development) in 1942. The concept of curriculum has developed comprehensively in the USA thanks to such rapid developments. Curriculum practices developed from various philosophical movements were applied and the foundations of scientific and technical paradigms were introduced in the same period. This broad perspective has led to a significant accumulation of knowledge during time and curriculum studies have been categorized into various fields of study. Curriculum theory, curriculum philosophy, curriculum development, and the curriculum history are some of the subcategories of this field of study (Behar-Horenstein, 2000).

This study analyzes the development process of the curriculum history, which has been stated above and developed since the 1960s as a subcategory of the curriculum, as a field of academic study and its condition in Turkey. In the first chapter of the study, the development process of curriculum as a field of academic study has been analyzed. Afterwards, the course of development of the curriculum history as an academic field and its conceptual framework have been theorized and discussed. In the final chapter of the study, the curriculum history in Turkey has been analyzed and a conceptual framework has been suggested for the studies dealing with the curriculum history.

Curriculum: Development from a Philosophical Speculation Towards a Field of Scientific Study

Although the question of “what knowledge is of most worth?” was reportedly asked by Herbert Spencer, it seems that all civilizations throughout history have responded this question in some way or another. When considered from this aspect, it can be suggested that curriculum is a form of praxis. On the other hand, the nature of the response provided for the question of “what knowledge is of most worth ?” began to go under a change towards the end of the 19th century

and in the beginning of the 20th century. The question of “what is the most valuable knowledge?” constitutes a basis for curriculum studies in the USA, where production, domestic migration and immigration have been increased due to the development of science and technology and the nature of the responses provided for this question has consequently begun to be determined by scientific approach rather than philosophical speculations. It can be said that the Herbartian pedagogical concept developed in the USA as well as progressive philosophy of education, and the principles of scientific methods have a significant role in the dominance of scientific approach in curriculum studies.

The Herbartian pedagogical concept has caught the attention of a group of American educators towards the end of the 19th century. Herbart left behind a rich collection of heritage in terms of philosophy, psychology, and education. Herbart’s ideas on education and philosophy were developed based on the ideas of Kant, Hegel and Pestalozzi (Compayré, 1886; Cubberley, 1947; Dunkel, 1969). Herbart was mostly influenced by the ideas of Pestalozzi in the framework of pedagogy and according to Herbart, the child should be active during the learning process and should be in the center of the learning process. The pedagogical concept developed based on these ideas became a strong tradition within a short period of time.

The essential point emphasized by Herbart was the development of the characters of the individuals. In order to perform character education, the structure of school curriculum is required to go under a change. Herbart made two basic suggestions for the purpose of such a change. First suggestion was the concentration of the courses so as to make sure that an essential course such as history or literature would be in the center of curriculum. Another suggestion was the rearrangement of course subjects in correlation to one another (Compayré, 1907; DeGarmo, 1895; Pinar, Reynolds, Slattery and Taubman, 1996). Herbart emphasized five basic principles for the integration of his suggestions into the learning process. These five principles or steps were preparation, presentation, association, generalization, and application (Herbert, 1896; 1913). Although Herbart’s ideas did not receive much attention during his life, his ideas became widespread as a result of the efforts made by those who followed his pedagogical ideas over the years after his death. In particular, Karl Volkmar Stoy, Tuiskon Ziller and Wilhelm Rein contributed greatly to the formation of the Herbartian pedagogical tradition. Especially, the contributions of Tuiskon Ziller and Wilhelm Rein were significant in the transformation of the Herbartian concept into a theoretical structure and its development as a pedagogical theory (Dunkel, 1969). Many American pedagogues went to Germany towards the end of the 19th century to study the works of Ziller and Rein. Amongst these pedagogues, Charles and Frank McMurry brothers as well as Charles De Garmo had significant contributions to the Herbartian concept to become widespread in the USA and wrote books for the adoption of this pedagogical concept in the USA (Cubberley, 1947; Dunkel, 1969).

What is the contribution of the Herbartian concept to curriculum to become a field of academic study? As a matter of fact, the curriculum field began to become an academic field with the introduction of Bobbitt’s book published in 1918. Under these circumstances, what is the contribution of the Herbartians to this process? The most significant contribution of the American Herbartians was that they placed the curriculum concept in the center of the discussions about education theory and education (Pinar, Reynolds, Slattery and Taubman, 1996). In addition, the sense of curriculum suggested by them was in fact significant considering the conditions of the period. It can be said that the ideas suggested to design the course subjects in correlation to one

another and to allow for certain progressivity in the teaching process have provided an insight for today's interdisciplinary curriculum studies. Furthermore, the fact that curriculum as a concept constitutes a basis for discussions on education had an influence on the discussions that took place in intellectual circles. It can be said that these discussions provided a basis for curriculum to become a field of academic study in the following years.

Another significant factor influential in curriculum to become an academic study was the progressive philosophy of education that was developed in the USA. The development of this philosophical approach, which was developed in Germany, in the USA became possible thanks to the American pedagogs educated in Germany. Amongst these pedagogs, Francis Wayland Parker was the leading figure (Tanner and Tanner, 1975). According to Parker, as distinct from the Herbartians, the foundations of curriculum were based on the interests and needs of the children. In fact, this perspective adopted by Parker was fundamentally a different synthesis of the theories suggested by Pestalozzi, Froebel and Herbart. This new synthesis also provided a basis for the progressive philosophy having a significant place in the American philosophy of education (Kliebard, 1986; Pinar, Reynolds, Slattery and Taubman, 1996; Tanner and Tanner, 1975).

The ideas suggested by Parker were fundamental in the development period of the progressive philosophy of education. In the development of this fundamental approach, the contributions of such intellectuals as John Dewey, William H. Kilpatrick, Abraham Flexner, Lester F. Ward, and George S. Counts were particularly significant (Cremin, 1964). Dewey's studies in Chicago University significantly contributed in particular to the understanding of the theoretical and practical framework of the progressive concept. Furthermore, the Project Method developed by Kilpatrick was also significant in that it provided a new perspective in the practice of progressivism. The influence of the progressivist intellectuals on curriculum studies can be said to become more prevalent than that of the Herbartian tradition. In this context, the curriculum concept based on the concentration and correlation of the courses, developed by the Herbartians as an alternative to the classical subject-oriented curriculum concept, went a step further by suggesting that the interests and needs of the children should be in the center of curriculum and emphasizing that the teaching process should be based on learning through practice and experience, which definitely allowed for the introduction of a new paradigm. The idea that schools were in fact a manifestation of life and one of the objectives of schools was to ensure individuals to become efficient and productive citizens as suggested by the progressivist intellectuals can be considered amongst the contributions of this approach to curriculum studies. In particular, the objective of educating individuals to become efficient and productive citizens can be said to have a significant influence on the concept of scientific curriculum development.

The developments mentioned above can be considered as the cornerstones in the development process of curriculum as an academic field. A number of developments taking place in the first quarter of the 20th century allowed for the concept of scientific curriculum to be established based on these foundations. In this context, the most significant development was probably the development of the industry in the USA after the Civil War. The social texture gradually began to change as a result of rapid developments in industrial, transportation, and business sectors following the period after 1865 as well as domestic migration and immigration. Factors such as increase in the production of iron and steel, manufacturing of machines and urbanization have triggered a social transformation. The productivity of industrial enterprises and

their successful business activities resulting in high profits were particularly significant in the process of social transformation.

The contributions of a mechanical engineer to this development process had a great influence not only in the industrial field but also in other fields such as business, management, and education. The perspective of the engineer named Frederick W. Taylor about management processes resulted in radical changes in the concept of management in the early years of the 20th century. The theory suggested by Taylor was in fact quite simple. Each work would be completed in a shorter period of time provided that such work was divided into specific and significant smaller units and detailed time studies were carried out for the period of time allocated for the work (Taylor, 1911). The theory suggested by Taylor found a chance for a wide range of application field in the industrial sector within a short time leading to an increase in the profit levels. Consequently, the large-scale success in the industrial area came to the attention of those who study in the field of social sciences. Efficiently used in production units and factories, this approach was ultimately considered to be used in schools and education sectors. In fact, there would be no difference between a school and a factory provided that schools were considered as factories, teachers as workers whereas school management was considered as overseers. On the other hand, students were considered to be raw material in this process. The key problem was to determine the qualities of the product to be manufactured and the road map for the production process. The answer to this problem was curriculum.

John Franklin Bobbitt developed a practical suggestion about how to educate students to become efficient and productive citizens in his work *The Curriculum*, published in 1918 (Bobbitt, 1918; 1924). Based on this suggestion, all works and activities constituting the social life could be divided into smaller units and systematically taught to students. This suggestion made by Bobbitt was in line with the scientific principles adopted by Frederick W. Taylor in the industrial sector. If these principles resulted in a great increase in industrial production, then it would lead to efficient results in schools teaching students how to become a citizen (Callahan, 1962). In this respect, Bobbitt's suggestions were later considered as the starting point in terms of the development process of the curriculum field (Pinar, Reynolds, Slattery and Taubman, 1996). The twenty three year period between 1918 and 1941 was quite an active period in terms of curriculum studies. Shortly after the publication of Bobbitt's book, many books on curriculum design began to be published subsequently. This publication activity also found its way through the journals published in the same period. The concept of curriculum expert became popular in a short time and curriculum studies began in many states. These developments also took place in higher education towards the end of the 1930s. The department of curriculum and training found in Columbia University can be considered as a reflection of curriculum studies at university level. Furthermore, ASCD established in 1941 contributed to the institutionalization of curriculum studies within the scope of an occupational organization. Consequently, open to philosophical speculations during the period prior to 1918, curriculum gradually began to become a scientific field after 1918 and became independent amongst the educational sciences in the beginning of the 1940s.

Development Process of the Curriculum History in Curriculum Studies

Curriculum studies have achieved more than going through the institutionalization process since the beginning of the 1950s. Curriculum studies constituted an exclusive literature and

gained many grounds due to the publication of a great number of books, articles, and study reports as well as post-graduate and doctorate degree courses provided in universities during the thirty two-year period between 1918 and 1950. Moreover, a curiosity emerged amongst scholars during the same period to explain the origins and development of this accumulation of knowledge. Curriculum studies as a more specific field of study within the scope of the education history began to be explored since the beginning of the 1960s. On the other hand, there can be found other studies conducted in earlier periods to analyze the development process of curriculum as an academic field. Amongst these studies, the doctorate study titled *A Critical Review of Various Conceptions Underlying Curriculum-Making since 1890* by William M. McCall, submitted to The University of Missouri was quite significant. In the study, McCall (1930) introduces the development process of curriculum in the USA as a field of study through the studies carried out by the Committee of Ten and the Committee of Fifteen, and then he explores the contributions of Bobbitt to the process. Chapter 5 of the study discusses a study by Frederick Bonser on primary school curriculum whereas Chapter 6 introduces the education theory by Julius Merriam and its reflections on curriculum studies. The study carried out by McCall can be considered amongst the earliest studies on the curriculum history as it analyzes a number of reforms influential during the early periods of the 20th century and providing an insight to the developments in the curriculum field.

Another perspective about the curriculum history can be found in the work titled *Education in the Forming of American Society: Needs and Opportunities for Study*, a study on the education history written by Bernard Bailyn. Although this work is about the development of education through the American history, it is also significant for including discussions about the developments in the curriculum field. In the work that was published in 1960, Bailyn attributes the underlying cause of the developments in the curriculum field to high increase in the population of children of school age and demand boom as a consequence of the increase (Bailyn, 1960; Kliebard, 1992). Another work that analyzes the developments taking place in the early 20th century and leading to the emergence of the concept of curriculum development was *The Curriculum Field: It's Formative Years* written by M. L. Seguel. Kliebard (1992) considered this work as the first systematic work focusing on the curriculum history and described it as a work that analyzed the history of the field within the context of its founders. As a matter of fact, Seguel (1966) explored the historical foundations of the curriculum field developed around seven key figures in his work. The work is also significant in that it explores the curriculum history based on its contributors. In other words, it analyzes the curriculum history within the context of significant figures who contributed to its development as a field. Seguel's work was the first specific work on the field of curriculum history. Although the work was rather distant from the education history or the traditional perspective of education history, it played a crucial role in the development process of the curriculum history as a subcategory in the academic field by exploring the subject matters in its historical integrity and in line with the course of development.

An article written by Arno Bellack in 1969 was a milestone in terms of the construction of the conceptual perspectives of the studies on the curriculum history. In the study, Bellack pointed out that the curriculum history should focus on four main subjects. These subjects were the developments in curriculum and teaching practices, the development of curriculum as a field of study and research, the lives and careers of curriculum theoreticians, and the activities of the national committees and commissions acting within the scope of curriculum studies (Bellack, 1969).

This conceptual framework suggested by Bellack (1969) can be considered as being quite functional within the scope of the curriculum history and guidance for the determination of the research problems. An analysis of the studies carried out in the USA shows significant academic efforts within the context of the curriculum studies, the lives and careers of the scientists conducting research on the curriculum field, and studies on the problems dealing with the nature of the curriculum field. It can be suggested that the conceptual framework suggested by Bellack would make significant contributions to the institutionalization of the curriculum history studies in Turkey. Provided that the curriculum field is an academic and systematic research field, the historical and philosophical foundations of the field should be able to respond to the specific problems of the field. In this context, the present or the desired future condition of the conceptual framework of the curriculum history in Turkey should be also analyzed with a view to respond to such problems.

The Conceptual Framework of the Studies on the Curriculum History in Turkey

The studies on the curriculum history in Turkey are generally carried out within the scope of the studies on the education history. These studies on the curriculum history are in general deals with the subject matter within the context of the teacher education and the history of the institutions that educate teachers, general education history, or the viewpoints of the prominent figures on education. The studies directly related to the curriculum history amongst them appeared to be those analyzing the curricula designed during the Republic Period. It is a fact that these studies significantly contributed to the Turkish education concept. On the other hand, whether these studies satisfactorily contributed to the understanding of the specific problems of the curriculum field or providing an intellectual basis for the curriculum field is a significant concern. This issue can also be considered as one of the reasons why the curriculum studies are devoid of a sound basis. In this context, analyzing the place of the studies on the curriculum history in Turkey within the conceptual framework suggested by Bellack (1969) would provide a more precise perspective.

The Development Process of Curriculum Studies

The development of the curriculum studies in historical continuity is a basic field of research within the scope of the studies on the curriculum history. Such questions as how the field has emerged, what types of problems fall within its scope, and its development process should be accounted for as expected from an academic field. From this point of view, it appears that this problem was either mostly ignored or analyzed rather briefly in the studies conducted in Turkey on the curriculum field. For instance, Selahattin Ertürk's work titled *Eğitimde Program Geliştirme* (Curriculum Development in Education), one of the earliest works published in Turkey on the curriculum field, mainly focused on the technical processes (Ertürk, 1972). On the other hand, a work by Fatma Varış titled *Eğitimde Program Geliştirme: Teori ve Teknikler* (Curriculum Development in Education: Theories and Techniques) published in the same period, rather different from the work by Ertürk, includes curriculum studies carried out during the late period of the Ottoman Empire and partially mentions about the efforts made during the Republic Period in Turkey (Varış, 1971). The recent studies, however, emphasize that curriculum studies were introduced with the proclamation of the republic (Demirel, 2010; Gökmenoğlu & Eret, 2010).

It is beyond question that analyzing only the systematic changes in school curricula would be insufficient to inclusively explain the development process of curriculum studies. The reason is that the curriculum and curriculum history fields cannot be restricted to a mere analysis of the changes in school curricula. During the Pre-Republic period, especially since the 19th century, school curricula of colleges, vocational schools, and military schools began to be explored recurrently. Moreover, significantly comprehensive curriculum studies were carried out on the curricula of primary schools, high schools, and colleges during the period after 1880 (Somel, 2010; Fortna, 2005). Consequently, the schooling process that began to appear especially since the 19th century should be taken into account in analyzing the development process of curriculum studies. Considering that the schooling process only began in 1923 would apparently lead to overlooking a significant historical accumulation and the conceptual dimension of the historical process.

In this respect, such subjects as the schooling process that began to develop since the 19th century, the changes occurred in the new schools and their curricula during the course of time, the textbooks used in these schools and their didactic characteristics, the teachers employed in these schools as well as other activities associated with education and teaching are required to be analyzed within this scope.

The Lives and Careers of Curriculum Theoreticians

Curriculum theory, in the most general sense, can be considered as an analysis of the educational life based on its various dimensions (Pinar, 2004). From this perspective, analyzing the empirical processes of all types and nature associated with the education and training processes as well as the learning process from various dimensions is considered amongst the primary duties of those who carry out studies on the field of curriculum theory. The curriculum history field requires studying and understanding the biographies of the curriculum theoreticians as well as their studies and contributions to the field.

In this respect, significant studies were also carried out in Turkey. The studies on the lives of the education theoreticians such as İsmail Hakkı Baltacıoğlu, İsmail Hakkı Tonguç, Rauf İnan, Halil Fikret Kanad were quite significant within this scope. On the other hand, it is still impossible to find comprehensive biographies or well-documented monographies of the scientists who played an important role in the foundation of the curriculum field in Turkey. For instance, it is a significant drawback that no studies have been carried out on the scientists such as Selahattin Ertürk, Fatma Varış, Hıfzı Doğan, and İzzettin Alıcıgüzel, who specialized in the curriculum field by studying abroad and subsequently played significant roles within this scope in Turkey. Consequently, one of the most significant challenges faced by the curriculum historiography is the introduction and transfer of the heritage of the scientists, who played a leading role in the foundation and development of the field, to the next generations. Overcoming this challenge would be a crucial step to develop a tradition within the scope of curriculum studies. Developing a tradition for an academic field is highly important for the future of that field. The construction of a perspective for the future is only possible when an academic field is formed based on a sound historical background.

Curriculum Commissions and Their Activities

Another field of study analyzed by the curriculum history researches is associated with the activities of the curriculum commissions carrying out curriculum studies or making decisions on the implementation of curricula. The earliest curriculum commissions in the pre-republic period were founded after 1870. The activities of the curriculum commissions during the period of Abdul Hamid II were particularly significant. These activities included developing new curricula, research studies intended for the implementation of the applicable curricula, the procurement of the required classroom materials, equipments, and other requirements for the schools, and training teachers for the new curricula developed to be implemented (Ergin, 1977; Koçer, 1991; Somel, 2010).

An increase in schooling can be considered amongst the major factors playing a crucial role in the intensified activities of the curriculum commissions especially during the period of Abdulhamid II, and the progression of such activities during the subsequent constitutional period (Ergin, 1977; Koçer, 1991). The curriculum commissions meticulously examined the quantitative increase at the primary and secondary education levels as well as the problems that had arisen within the scope of the vocational schools and post graduate schools recently opened for education during that period. Another significant point was that the curriculum commissions explicitly identified the political functions of curriculum. The curriculum reports and the commission reports prepared by the curriculum commissions included suggestions to remove certain subjects from the curriculum as such subjects could endanger the unity and solidarity of the empire and to follow a disciplinary proceedings for teachers who fail to comply with the requirements of the current curriculum (Başbakanlık Osmanlı Arşivi / The Ottoman Archive of Prime Ministry [BOA] Mf. Mkt. 1331/1118. 30; Mf. Mkt. 1313/283.19; Mf. Mkt. 1325 / 997.52).

As much as the reports prepared by the curriculum commissions are concerned, it can be said that the earliest curriculum development activities in Turkey did not take place in 1923. In fact, the period of Abdulhamid II, during which systematic and planned efforts within the scope of the curriculum studies had been undertaken, can be considered to be the beginning of such activities. Consequently, one of the major challenges for the curriculum history studies is to comprehensively determine the development process of the curriculum field in Turkey. An interdisciplinary perspective is definitely required to address this challenge.

The Problems of Curriculum and Instruction

The problems of curriculum and education are another field of study within the scope of the curriculum history. The problems encountered during the implementation of the curricula, understanding the problems about education within the context of the course of the historical background, and the measures taken to address such problems can be listed amongst the main issues to consider within the framework of the curriculum history. Within the context of the curriculum studies in Turkey, the problems of curriculum and education were considered amongst the main problems undertaken by the education bureaucracy in the period of Abdulhamid II. Although the education bureaucracy refers to the curriculum commissions for the solution to the problems of curriculum and education, legal regulations also took place regarding such problems. Furthermore, such problems have been transferred from the Ottoman Period to

the education bureaucracy of the Republic Period. The problems encountered during the implementation of the primary school curriculum of 1926 and in the case of the practical education provided in the village institutes during that period can be considered within this scope.

Conclusion

The development process of curriculum as an academic field began towards the end of the 19th century and it was completed within the first 30-year period in the 20th century. Curriculum studies were especially influential in the USA both as an occupational field and a research field as a result of postgraduate programs and occupational organizations established during that period. An interest for the analysis of the development process of the curriculum field was observed during the course of its development. In fact, a similar interest was also observed in other scientific disciplines. Such research fields as the history of medicine and the history of physics require understanding of the development process of its own scientific field within the scope of its course of development and conveying the results of this understanding to the new individuals receiving occupational education and training in the same field. Ensuring this understanding is quite crucial to establish a sense of occupational identity.

An analysis of the studies within the scope of the education history in Turkey indicates that significant studies were carried out on certain subjects such as the general education history, and the history of the institutions providing education and training to student teachers. However, the studies on the curriculum history or the research fields of the curriculum history remained to be restricted in scope. In fact, the curriculum field has a unique historical background in each country and culture. This background is essential in the construction of identity as well as in contributing to the introduction of new theoretical initiatives. Today, the curriculum field in Turkey is seen merely as a technical scientific field and thus, the variety of practices transferred from the late Ottoman Period to our day and those adopted during the Republic Period have been overlooked. Such an approach would be insufficient to understand the origins of the curriculum field and to constitute a basis for future practices. Both international and national understanding of the development process of curriculum studies in the course of historical continuity would have significant contributions to the development of the concept of education in Turkey.

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Miscellany

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