Prospective and In-service Teachers' Thinking about Teaching and Learning: A Metaphorical Analysis

Dawit Mekonnen*

Abstract: The domain of teachers thinking has got much attention since mid 1990s, for it is believed that thinking governs practice. Different methods have been used to unveil teachers' thinking. This study examined 27 prospective and 29 in-service teachers' thinking about teaching and learning by using metaphorical statements produced by respondents themselves. Metaphors were achieved by an open-ended questionnaire that asked 'How do you understand teaching and learning?' Findings indicate that the majority of metaphors formulated by prospective (77.6%) and in-service teachers (75.4%) refer to the behaviourist notion of learning. Very small numbers of metaphors that refer to constructivist notion of learning were formulated. This contradicts Ethiopia's education policy intentions and expected corresponding behavioural and role changes. By reflecting on the findings in light of the existing literature, possible rooms for intervention are suggested.

Key words: Teaching metaphors, teachers' thinking, teachers' practice

Introduction

It is widely recognized that educational reform bears fruit in classrooms as students and teachers interact. Hence, teacher-related factors have significant impact on what transpires in classrooms. One of these factors is teachers' beliefs about teaching and learning (Pajares, 1992). According to Snider and Roehl (2007, p. 1), "Beliefs guided by knowledge create professional expertise, but they may evolve into ideology, dogma, or myth in the absence of evidence."

Recently, the discourse on teachers' beliefs has centered on the extent teachers attach value to behaviorist and constructivist notions of learning and teaching. The latter has diverse conceptualizations which make characterization in few lines difficult. Yet, synthesizing the defining features of behaviourism and constructivism, Bichelmeyer and Hsu (1999) as cited in Boghossian (2006, p. 714) noted that:

* PhD, Faculty of Educational and Behavioral Sciences, Bahir Dar University, E-mail: **dawit_mm@yahoo.com**, P.O.Box 1207

> Where behaviorism views knowledge as resulting from a finding process, constructivism views knowledge as the natural consequence of a constructive process. Where behaviorism views learning as an active process of acquiring knowledge, constructivism views learning as an active process of constructing knowledge. Finally, where behaviorism views instruction as the process of providing knowledge, constructivism views instruction as the process of supporting construction of knowledge.

Behaviourist notion of learning emphasizes product (for example one of the responses reads as 'Learning is being filled with food') and knowledge is seen as a package to be transmitted ('Teaching is feeding') (Wilson, 1995; Reynolds, 2000). On the other hand, constructivist notion of learning emphasizes process ('Learning is a journey for new ideas and discovering new ideas') and knowledge is seen as students meaning construcing through their interaction with the environment ('Teacher is coach. Students are football players').

Different metaphors which are believed to be important in representing the various principles of constructivist notion of learning have been formulated. Teaching as persuasion, teaching as mentoring, teacher as catalyst, and teacher as mediator are some to mention. Teaching as scaffolding is the metaphor that is widely applied in recent days. This metaphor implies the construction of knowledge in social dynamics. Students are allowed to construct knowledge while the teacher is serving as catalyst (Alexander, et al, 2002). Teachers guide students in knowledge construction. Sfard (1998) also notes that it is the process of learning that gets much attention in recent theories of learning, not its products.

Though some critics equate the principles of constructivism and their dominance in educational reform in the world with 'cultural imperialism' of the West (Sher and Flinder, 2005), educational reforms meant to employ active learning methods in schools have become pervasive features of educational systems, grounded on the notion that constructivism promotes the construction of knowledge by students. Existing empirical evidence also shows that students learn better when they are actively involved in learning (Snider and Roehl, 2007).

As is the case in many countries, the education policy introduced in Ethiopia vividly depicted that the pedagogical implications of constructivism ─ active learning methods or student-centered teaching, would govern instructional practices in schools (Ministry of Education, 1994). Discussions of the application of active-learning and problem solving methods have become modus operandi of educational discourse. Reforms to realize the application of these methods in classrooms have been introduced in schools, ranging from structural reforms such as self-contained organization in primary schools to intensive and extensive teachers' upgrading and short-term trainings.

As stated at the beginning, it is necessary to examine teachers' beliefs as they are one of the factors that shape teachers' practice. Doing so is even more imperative at times of educational reform intended to change existing patterns of teachers' beliefs and practice. Accordingly, this study intends to examine teachers' thinking using metaphors employed by teachers to describe teaching and learning. The paper outlines theoretical bases of the issue and empirical evidence reported in other countries and presents and discusses findings gathered from prospective and in-service teachers.

Teachers' Thinking and Metaphors

Teachers' practice depends on a number of factors that reside on teachers themselves and other external factors like curriculum, classroom size, and availability of time, materials and others. Research has been trying to identify factors that influence teachers' practice so that teacher education can include essential elements in the preparation of teachers. Of the many issues that are believed to influence the roles and practice of teachers, sense of efficacy (Bandura, 1997), teachers' beliefs (Pajares, 1992), and teachers' thought processes (Clark and Peterson, 1986) commonly show up in educational literature.

The core idea of teachers' thinking is that it affects the practice of teachers. The pioneers (Clark and Peterson, 1986) of this proposition note that teachers' thought processes explain a large part of the psychological context of teaching, within which curriculum is analysed and acted up on through teaching and learning. Recently the study of teachers thinking has got the edge upon other factors in the effort to identify factors that influence teachers' actions. The underlying assumption of teachers' thinking is "In

education as well as in other sciences, researchers and practitioners are unconsciously guided by images and metaphorical patterns of thought recurring in their field," (Martinez, Sauleda, and Huber, 2001, p. 966). Fischler (1994), similarly, pointed out that each teacher has orientations of action that shape his/her belief about students' learning and role of teachers. The sources for these orientations are rooted in teachers' early personal experiences at home and in the community, in schools and teacher education programs (Richardson cited in Leavy, McSorley, & Bote, 2007). These orientations and images are constituents of teachers' thinking about teaching and learning.

Research on teachers' thinking has employed language data derived from teachers through oral interviews, written forms, and other data gathering mechanism to understand teachers' thinking about teaching and learning (Freeman, 1994). Freeman notes that "… relationship between the inner world of the teacher and the language which the teacher uses to express that world has provided the foundation for the study of teachers' knowledge…." (p. 77). Thus, it is contended that language represents thinking. Such representational language in education is labelled as metaphor of teaching and learning. Leavy, McSorley, & Bote (2007) stated that metaphors are unveiled by the language teachers use. Different language uses are presumed to correspond with different kinds of teaching-learning situations and practices.

Metaphors are believed to have many distinctive benefits although they also have limitations entrenched in their benefits. They are useful tools to examine pre-service teachers' beliefs and assumptions about teaching and learning and their impact on classroom practices. They also help to unearth perspectives that are not explicitly visible on the surface and hold succinctly large amount of information about teachers, students, and teaching and learning methods (Calderhead and Robson (1991) cited in Leavy, McSorley, & Bote, 2007). Explaining the versatility of teaching metaphors, Carter (1990, p.110) stated, "Recent studies of metaphor have suggested not only its pervasiveness but also its plausibility for framing the meaning persons assign to events and for communicating messages about meanings, which are difficult to capture in literal language." Lakoff and Johnson (1980), cited in Enerson (2001), also underlined that metaphors' pervasiveness surpasses

teachers' language and puts its mark in their day to day actions, making both their actions and thoughts 'fundamentally metaphorical in nature'.

On the bases of these virtues, metaphors are used not only to understand teaching beliefs, assumptions and practices but also as venues to modify unwanted thoughts and practices into desired ones as they "can function as tools by which teachers gain distance from their own practice … and provide a language that can bridge the gap between theory and practice" (Leavy, McSorley, & Bote, 2007, p. 1220). This, however, requires examination of teachers' metaphors, reflection on the metaphors, and considering alternative metaphors. Doing so helps teachers to examine their implicit assumptions and practices embedded in the metaphors, opening ways for questioning one's metaphors and changing them. On the other hand, when metaphors remain unvisited, they reinforce existing cultural classroom practices as they blur teachers from alternative teaching assumptions and beliefs. Indeed, Morgan (1986) as cited in Leavy, McSorley, & Bote (2007, p. 1221) indicated that although metaphors can be vehicles of change, they can also constrict conceptual frameworks because "…in creating ways of seeing, they create ways of not seeing." Hence, assessing and reflecting on teachers' metaphors is vital to address this limitation of metaphors and use them for intended purposes.

Uncovering Teaching Metaphors: Empirical Evidence

Two approaches have been suggested to derive metaphors of teaching and learning (Dershimer and Reeve, 1994). One is by inferring or exploring images that are beneath teachers' descriptions of their teaching practice. In this approach, researchers ask teachers to describe their practice in their own language. Metaphors are then derived from languages or words used by teachers in describing their practice. The second approach allows teachers to identify or select the kind of metaphor that matches with their thought. The former approach is believed to give freedom to teachers to come up with their own language or metaphors that might have been hidden in situations, whereas in the latter approach, teachers are asked to identify or rate teaching metaphors.

Both approaches have been used by different researchers. Inbar (1996), cited in Peretz, Mendelson, and Kron (2003) asked students, teachers, and principals to select metaphorical images that reflect the roles of each group.

Half of the students assigned a metaphorical image of “super controller” to their teachers while the teachers, on the other hand, attributed images like “listening ear”, “supporting shoulder”, and “protective tree” for themselves. Arnon, Shani, and Zeiger (1999) cited in the above sources asked teachers to indicate their level of agreement on 16 teaching metaphors. The majority of the respondents, (i.e., 59%) chose the metaphor ‘‘gardener’’, followed by “travelling guide”.

Peretz, Mendelson, and Kron (2003) asked teachers to select one occupation that reflected their teaching image out of seven pictorially represented occupations. The occupations were intended to represent different metaphors of teaching. This was done to liberate teachers thinking and concretise their image. The professions selected were ‘shop keeper’, ‘judge’, ‘animal keepers’, ‘entertainers’, ‘conductors’, ‘puppeteers’, and ‘animal trainers’. Each profession corresponds with some teaching style. ‘Shopkeepers’ represent a transmission role of teaching, ‘judge’ is seen as representing authority, strict rules and judgemental attitude; ‘animal trainers’ represent the use of reward and punishment, and so on. The findings indicated ‘animal keeper’ (35%), ‘conductor’ (30%), and ‘shopkeeper’ (23.3%) as the three major occupations identified by teachers that represent their image about teaching. The ‘animal keeper’ metaphor represents a caring image, ‘conductor’ represents concern for outcome, responsibility for group and individual learning, and ‘shopkeeper’ represents the selling of knowledge from teacher to students-transmission.

Another interesting finding was the variation in the meaning given to metaphors under different teaching situations. For example, the metaphor of ‘animal keeper’ as caring was perceived differently by teachers of low achieving and high achieving students. Those in low achieving group view the metaphor ‘caring’ in light of their contribution to develop the knowledge of students while those in higher achiever group perceive it in light of the personal growth of students. This seems to illustrate that teachers’ meaning to some metaphors is context bound.

The studies mentioned so far demonstrate the approach based on of asking teachers to select or identify a metaphor that describes their teaching practice. While this approach may give a clear direction and may simplify the analysis of data, it may in turn limit the range of responses that could be derived in an open-ended interview or questionnaire that asks for a

description of teaching and learning without limiting respondents to a set of metaphors. Studies of the latter type are based on the assumption that teachers' language will be analysed in terms of different types of metaphors while teachers may still utter a metaphor in the process of responding.

After giving a number of metaphors as examples, Martinez, Sauleda, and Huber (2001) asked pre-service and in-service teachers to formulate metaphors that indicate how they understand teaching and learning. The stated metaphors were analysed in light of three notions of teaching and learning: behaviourist, constructivist, and situated learning. The behaviourist or the empiricist notion interprets learning as a store of associations between stimuli and responses resulting from experience. The mind is perceived as a "wax plate" onto which our experiences in the physical world are etched. Constructivist notion refers to organization and elaboration of knowledge by students, active role of students in restructuring experiences and achieving conceptual coherence, understanding theories and concepts, and developing skills. Teachers are facilitator and students are perceived as constructors of knowledge rather than passive participants as in the case of behaviourist notion. The situated notion regards knowledge as distributed among individuals in a social community. Learning is supposed to be a result of actual participation in the activities of communities.

Results of Martinez, Sauleda, and Hubers' (2001) study indicated that the majority of metaphors (57%) formulated by experienced teachers represent the behaviourist, 38 percent represent constructivist, and only 5 percent represent situated notions of learning and teaching. On the other hand, many constructivist metaphors (i.e., 56%) were formulated by pre-service teachers, followed by 22 percent of behaviourist metaphors, and 22 percent of situated notions of learning. Differences between the two groups were explained by variation in the kind of courses taken by preservice teachers when they were in teacher training. Pre-service teachers were reported to have more exposure to educational courses that emphasise constructivist notion due to the surge of this theory in teacher education. Ravitz, Becker, and Wong (2000) cited in Snider and Roehl (2007), reported that English teachers in their study were more constructivist than teachers teaching other subjects. They also suggested that as a result of education on constructivist theory in teacher education, preservice and beginning teachers tended to develop constructivist belief although it dwindles as teachers get swallowed in schools' teaching culture.

Dershimer and Peeve (1994) also asked prospective teachers to describe their teaching practice through their own words to analyse the relationship between metaphoric languages used by prospective teachers and variations in the success of lessons, success measured by the extent of pupils' engagement in lessons and pupils' responses to lessons. They reported that metaphoric languages used to describe teaching were related to rate of success in carrying out instruction. Metaphoric languages that emphasized pupils' involvement and shared responsibility were used by successful teachers as opposed to those unsuccessful teachers whose metaphoric languages were related to controlling and concern only for teacher activities. The metaphoric languages used by successful teachers were found to be in line with the constructivist notions of teaching and learning. While this study could be an example of studying thinking through metaphoric languages by asking teachers to describe their practice, it also serves to demonstrate that there is a relationship between teachers' metaphoric languages and their practice.

Changing Teachers' Thinking and Practice by Changing Teachers' Metaphors

So far an attempt has been made to shed light on methods used to study teachers' thinking and the inconclusiveness of empirical studies though it appears that many of the studies reported that the majority of the metaphors formulated or rated by teachers illustrate the behaviourist notion. The essence of research on teachers' metaphors rests on the assumptions that metaphors represent teachers' thinking; change in metaphors will result in change in practice; and there is a match between teachers' metaphors and their practice. The first assumption has got firm and clear evidence. Philips (1996), cited in Martinez, Sauleda, and Huber (2001, p. 966), cautioned that "we may be insulated from ideas coming from outside and can easily get sucked into this self-sustaining whirlpool of thinking guided by metaphors-as long as we are unable or do not try to get access to our metaphors." They also noted that people's fundamental abstract ideas are dependent on diversity of complex metaphors.

Given that two major sources for teachers' beliefs, personal and schooling experiences, precede teacher education and that teachers' beliefs are believed to be major determinants of classroom practices (Pajares, 1992), it has been duly recognized in teacher education that identifying student

teachers' assumptions and beliefs about teaching and learning is an unchangeable step to help them develop meaningful knowledge and understanding of teaching and learning through preservice teacher education programs (Feiman-Nemser & Remillard cited in Leavy, McSorley, & Bote, 2007). To do so, metaphors can be useful tools, research suggests. For example, Dershimer and Peeve (1994) suggested that prospective teachers' preconceptions of teaching can be changed or improved by investigating and revising their metaphors for teaching and learning. Similarly, Martinez, Sauleda, and Huber (2001) indicated that classroom practices change following changes in teachers' preferred professional metaphor.

A study based on grounded theory by Tobin (1990) demonstrated rare evidence of change in practice following change in a metaphor that guides classroom management principle of a teacher. In one context the teacher was guided by the metaphor 'captain of the ship'. As captain of the ship, the teacher was assertive, businesslike and emphasized whole-class activities. In another context, the teacher assumed the metaphor of 'entertainer'. In this case, the teacher was found to be humorous, interactive, and amenable to student noise and risqué behaviour. According to Tobin, assisting teachers to acquire new metaphors in specific roles of teaching would help to change the classroom environment in the intended direction.

Another teacher who was getting hopeless because of students unwillingness to participate in her instruction and who was unable to teach as she wanted was turned up to be an entertainer teacher. Detailed interview with the teacher revealed that her classroom management principle is guided by a number of metaphors like comedian, facilitator, and distance. While the teacher had interest to maintain participatory classroom atmosphere as result of the metaphors of comedian and facilitator, the role that incubated from the distance metaphor forced her to distant students. To make matters more complex, the comedian metaphor was misused by students and they refused to cooperate with her. Following an assistance to change her metaphor into 'social director' based on constructivist notions of learning, significant changes in the participatory behaviour of students were reported due to the change in the teaching role of the teacher. Summing up, Tobin (1990:126) notes "A metaphor used to conceptualise a role can be changed in a process of changing the role … and…new beliefs for a teaching role emerge when a role is conceptualised."

In general, although it is recognized that changing teachers' beliefs or thinking is a very challenging task (Richardson cited in Leavy, McSorley, & Bote, 2007) and that teacher education struggles to do so, success stories in changing teachers' metaphors appear to base on intentional examination of teachers' held metaphors and intervention. The other assumption that underlies the use of metaphors in researching teaching is the match between teachers' teaching metaphors and classroom practice. As indicated in the foregoing review, this assumption seems to have got reasonable evidence from the studies of Tobin (1990) and Dershimer and Reeve (1994). This study intends to replicate Martinez, Sauleda and Huber (2001) conceptualization of studying teaching metaphors by asking respondents to describe teaching and learning through their own language.

The Problem

In general, there is adequate ground to assume that teachers' thinking can be reached by analysing metaphors. It also appears fairly agreed that changing teachers' metaphors would help to change their roles in the teaching learning process. All these depend by and large on exploring teachers' metaphors about teaching and learning. Not to do so may captivate teachers to some beliefs that would bar them from exercising sound teaching and learning principles, in case their metaphors are based on unsound pedagogical principles. Pajares (1992) noted that teachers' beliefs guide practices.

Evidence in this issue is very much limited to Ethiopian situation although there have been a number of swift changes that call for radical shifts in the teaching role of teachers following the introduction of the education policy in 1994. Yalew (2004) assessed in-service teachers' beliefs about active learning methods and their competence to employ them in classrooms using a questionnaire. The results indicated that teachers positively value principles of active learning and feel competent to employ them in classrooms. Another study on teaching practice and role of teachers (Dawit, 2001) indicated that while some structural changes in using group work in schools exist, many tenets that underlie the policy have not yet cropped up in classrooms. Questions like: Could teachers' metaphors about teaching and learning be behind this? Do teachers' metaphors of teaching and learning concord with policy expectations? are worth asking.

A worth noting point here is the role metaphors have in implementing new practices of educational changes. Difficulty in changing role and behavioural patterns of teachers has been well documented in the literature of educational change (Fullan, 1991). And teachers' images about teaching are the most invisible but decisive factors behind the difficulties teachers face when they are asked to change their practice (Hanny, 1996). Thus, considering in-service teachers teaching learning metaphors under policy expectations that call for the application of constructivist notions would give an insight into not only the nature of teachers' teaching metaphors but also in the extent to which policy expectations have been inculcated on teachers.

Moreover, studying the metaphors' of prospective teachers would help to tackle the problem while they are in teacher training. As indicated earlier, prospective teachers metaphors about teaching are developed before prospective teachers join teacher education (Fischler, 1994). Hence, it is necessary to unearth prospective teachers' metaphors while they are in teacher education in order to change them through various programs. In view of this, though success stories on the effectiveness of teacher education in changing prospective teachers' beliefs about teaching are rare, Sato and Kleinsasser, (2004), Fenstermacher (1994) cited in Leavy, McSorley, & Bote (2007,p.1219), indicated that one major goal of teacher education is transforming "navee and undeveloped beliefs into informed beliefs through identification and examination of their beliefs."

On top of this, experiences of student teachers in teacher education institutions and their general experience as learners are important factors in affecting the kind of image students build about teaching (Fischler, 1994). Teacher education in Ethiopia is characterized by traditional teaching methods. Examining prospective teachers' metaphors gives insight into how this situation is related to the images that shape prospective teachers' thinking. The main purpose of this study, then, is to examine prospective and in-service teachers' thinking about teaching learning by using metaphors. A critical cross examination of the topic under discussion in light of ongoing educational changes and practices is also made. The study attempts to answer the following questions:

- Which notion of teaching-learning do metaphors formulated by in-service and prospective teachers match?
- Is there a difference between prospective and in-service teachers' metaphors used to describe teaching and learning?

Methods

Subjects of the Study

Twenty-seven prospective and twenty-nine in-service teachers were selected through convenient sampling technique. Fourth year students of teacher education who were to graduate from Bahir Dar University in 2004/5 were taken as sample of the study. The prospective graduates had taken many professional courses and were expected to be teachers of Mathematics, English, and Geography during the data collection. Twenty-nine in-service teachers were also selected and used as sources of the data used in the study. The in-service teachers were teachers of Mathematics, English, Physics, Geography, Biology, and Amharic in grades 9 and 10. They had teaching experience that ranged from 13 to 25 years. Seventeen of the teachers had a diploma, and six had BA/BSc degree. Six of the diploma holding teachers were enrolled in the in-service summer education program to earn a BA/BSc degree during the time the data for the study were collected.

Data Collection

Describing teaching and learning gives respondents a wider more room to express their conception of teaching than characterizing it by selecting from a set of given teaching metaphors. Hence, questionnaire that asked 'How do you understand teaching and learning?' was administered to the subjects. The questionnaire incorporated a description and three different examples of metaphors. They were told to write down metaphors and statements that described their thinking about teaching and learning.

Respondents who faced difficulties to generate metaphors were asked to state their conceptualization of teaching and learning in two or three paragraphs. Then, they were asked to look for words and phrases that concisely represented the paragraphs they produced.

Data Analysis

Two notions of learning (behaviourist and constructionist) and another category labelled as 'Others' were used as category of analysis. Phrases or statements written by respondents were used as unit of analysis. After identifying responses that were relevant to the study, phrases or statements were coded in light of the above categories by two coders. The coders were the researcher and a lecturer, who has an MA degree in Educational Psychology. Intercoder reliability was found to be 0.87. Statements that were coded differently by the two coders were given to a third coder to decide the category of the statements. Eighteen statements and phrases were excluded from analysis as they were directly taken from examples. In addition, some responses that were not in tune with the purpose of the study were excluded from analysis and put under the category 'others'. Statements like 'Teaching is monotonous'; 'Learning is burning', and 'Teaching is least prestigious job' are some of the examples under this category.

Findings

Table 1 below shows frequency of metaphors according to the notion of learning.

Table 1: Frequency of Metaphors according to the Notions of Learning

	Pre-service teachers	In-service teachers
Behaviourist	38 (77.6%)	46 (75.4%)
Constructivist	5 (10.2%)	12 (19.7%)
Others	6 (12.2%)	3 (4.9%)

Table 1 indicates that the majority of the metaphors (77.6% and 75.4%) formulated by both prospective and in-service teachers represent the behaviourist notion of learning. Fewer constructivist metaphors were formulated by both prospective (10.2%) and in-service teachers (19.7%). The majority of the metaphors formulated by both groups of respondents indicate their conception of learning as 'storing' and of teaching as 'transmitting'.

A number of examples could make this assertion very clear. As indicated in Table 2, the majority of metaphors formulated by teachers show the role of a teacher as transmitting device and that of students as 'retaining objects'. The teacher is perceived as a source of knowledge who shapes the mind of students. The metaphor 'teaching is shaping students minds' has been frequently seen in the metaphors of both groups. Examples 1, 4, 6, 7, and 11 in Table 2 indicate teachers' conception of teaching either as transmitting or designing. The objects which were equated with students in these metaphors clearly indicate respondents' conception of students as passive agents. Metaphors like 'Teacher is a farmer of small land', 'Teaching is like cooking food', and 'Teaching is levelling the land' highlight an image of teacher as 'processor' and students as 'materials to be processed'.

Students are also conceived as consumers of knowledge. The expression that 'students' mind is 'tabularasa' can be illustrated by the metaphors 'Learning is feeding the empty mind' and 'learning is being filled with food'. A remark 'this is true to Ethiopian situation' has appeared in some of the metaphors formulated by respondents. One respondent stated 'A teacher is a river and students are water to be led in the Ethiopian context'. Another respondent formulated 'Learning is fetching water from swamp in Ethiopia'.

Table 2: Examples of Metaphors Related to the Behaviourist Notion of Learning

	Behaviourist Metaphors
1.	Teaching is moulding or trimming.
2.	Teaching is like cooking food.
3.	Learning is like a digestive system.
4.	A teacher is like journalist.
5.	Teaching is levelling the land.
6.	Teaching is feeding.
7.	A teacher is a carpenter.
8.	Learning is feeding the empty mind.
9.	Learning is like washing clothes.
10.	Learning is being filled with food.
11.	A teacher is a farmer of small land.
12.	Learning is knowing how to eat.

Table 3: Examples of Metaphors related to the for Constructivist Notion of Learning

	Constructivist Metaphors
1	A teacher is a coach. Students are football players.
2	Teaching is sparking a candle.
3	Teaching is brokering.
4	A teacher is a map for a plane while students are the pilots.
5	A teacher is base of a building. Students are architects.
6	Learning is a journey for new ideas and discovering new ideas.
7	Learning is exploring like Vasco De Gama. You find something new spontaneously.
8	Teaching is showing the door of knowledge. Students will swim in it.
9	Learning is solving problems of the community by applying theoretical knowledge.
10	Teaching is showing students how to work in the society. Students should know the society to be good citizens.
11	Learning is practicing, working, trying, cooperating, and solving community problems.

Few metaphors (5 and 12 by prospective teachers and in-service teachers, respectively) that fit constructivist notion of learning were formulated. The process of learning is well emphasized in the metaphors formulated. As indicated in Table 3, metaphors like 'Teacher is the map for a plane while students are the pilot' indicate attention for the process of learning. The metaphor 'Learning is exploring like Vasco De Gama. You find something new spontaneously' also illustrates learning is not retaining predetermined knowledge and students are constructors of knowledge.

Table 4: Respondents' Metaphors based on Subject Matter Specialization

Subject area	Notions of learning		Total
	Behaviourist	Constructivist	
English (14)	20	7	27
Maths (13)	14	-	14
Physics (5)	8	4	12
Biology (4)	7	2	9
Geography (11)	21	1	22
Amharic (9)	14	3	17

Note: Numbers in brackets indicate number of teachers.

All the metaphors formulated by mathematics teachers were within the behaviourist notion of learning. Physics teachers and English teachers formulated relatively a better number of metaphors (4 and 7 respectively) that reflect to constructivist notion of learning. The number of English teachers in the study might have also influenced the finding. Besides, Ravitz, Becker, and Wong (2000), cited in Snider and Roehl (2007), reported that English teachers in their study were more constructivist than teachers teaching other subjects. They argued that as a result of education on constructivist theory in teacher education, preservice and beginning teachers tended to develop constructivist belief although their beliefs might dwindle as teachers get swallowed in schools' teaching culture. Moreover, much has been preached about the importance of communicative teaching methodology in recent days. The notions of communicative method of teaching might click in the mind of teachers when they are asked to formulate metaphors.

Physics teachers formulated a fair number of constructivist metaphors, given their small size in the study. It appears difficult to explain why physics teachers could do this. Statements like 'Learning is using scientific theory to solve community problems', 'Students are architects', and 'Learning is exploring may indicate that the nature of the subject matter may have the power to influence teachers' conception. Such reasoning, however, begs questions like how about Biology or Geography teachers? Fishler's (1994) contention that science teachers consider learning mainly as transfer of knowledge; hence rare constructivist conceptions reside among them seems

to be supported by the few constructivist conceptions formulated by biology and mathematics teachers.

It should, however, be pointed out that such metaphors could not guarantee similar practice in the teaching of physics at the classroom level. In his study of the relationship between intention, action, and belief, Fishler (1994) reported that a student teacher of physics whose intention of learning coincided with the constructivist notion of learning ended with instructional activities which were in line with the behaviourist notions. Interview data obtained from the teacher indicated that the student's intentions about physics teaching were not deep enough to change his subjective theory of teaching that he developed from college experience.

Discussion and Implications

The findings indicate that both prospective and in-service teachers' metaphors heavily agree with the behaviourist notion of learning. The assumption is that students are receivers of knowledge and teachers are providers of boldly colours their thinking. Some of the metaphors ('cooking food', 'being filled with food') formulated by respondents clearly illustrate this. This finding is similar to the findings reported by other researchers (Martinez Savelda and Huber, 2001; Leavy McSorley and Botes' , 2007). In the studies cited, in-service and preservice teachers made more self-referential statements that equate teaching with the transmission of information than constructivist statements.

No visible difference was observed between in-service and pre-service teachers' metaphors. The findings imply that the training of pre-service teachers could not significantly change their assumptions and beliefs about teaching and learning. However, in Leavy McSorley and Botes' study, change in teaching metaphors from the behaviorist notion to the constructivist one was reported following exposure to teacher education courses. Similarly, Ravitz, Becker, and Wong (2000), cited in Snider and Roehl (2007), reported that as a result of education on constructivist theory in teacher education, preservice and beginning teachers tended to develop constructivist belief although it dwindles as teachers get swallowed in schools' teaching culture. Martinez et al. also indicated that preservice teachers formulated more constructivist metaphors than in-service teachers.

As such the finding of this study appears to contradict the findings reported in previous studies.

It is not possible to explain empirically this inconsistency between findings of different studies. Yet, as indicated at the beginning of this study, teacher education usually struggles to shake off students' belief about teaching and learning (Richardson cited in Leavy, McSorley, & Bote, 2007). A number of possible justifications can be given to explain the inconsistency in the findings by considering the context of teaching and learning in teacher education faculties and the background of respondents. Insofar as personal experience and day-to-day teaching of educational/professional courses tell, it is uncommon to see courses that design strategies that unearth prospective teachers' beliefs of teaching and learning and pave way to change their held beliefs. Definitions or principles of constructivism surface only in some of the courses in manners that are not coherent enough. Such practices could be too weak to challenge prospective teachers' thinking of teaching, as success in changing beliefs depends on intentional identification of students' beliefs and designing of interventions.

The lesson, despite policy and curriculum changes, leaves the mental set in which these changes are interpreted and applied much unchanged. This is consistent with a study which reported that pre-service and in-service teachers view teaching as a mechanical process of dealing with fixed knowledge (Moje and Wade, 1997). Thus, simple definitions of constructivist notions of teaching or teaching principles of constructivist notions of learning by using behaviourist notions of learning (lecturing) will reinforce students' belief that theories in professional courses cannot be applied. Teachers' thinking about teaching and learning develops from every day pedagogical practices. So, what evidence do pre-service teachers need more than the practice of teacher educators to make them believe teaching is feeding or learning is storing of information? Ethiopian teacher education has been characterized by traditional methods of teaching that are based on empiricist notions of learning. The same is true about teaching in schools. Given the fact that teaching-learning culture and experience are the main sources in shaping one's metaphor (Silman and Duna, 2001), it is not unexpected to see that respondents' metaphors that lean towards the behaviourist notion of learning.

It is clear that constructivist notion of learning is the order of the day. It has been indicated that constructivism is a common feature in teacher education programs. As far as the Ethiopian situation is concerned, the education policy has stipulated that teaching will be based on the pedagogical implications of constructivism. The findings indicate that teachers' belief in the study agree more with the behaviourist theory of learning than it does with the constructivist. What are the efforts being made? Where are the challenges? What are the missing links?

Reflecting on the idea of constructivist notion and the findings of this study vis-à-vis the on going practices of teacher education and education in general gives a gloomy image. On the other hand, the education system is experiencing many swift changes. These changes include many dimensions: Structural changes (duration of training), curriculum changes, organizational changes (vocational education, the 8-2-2 system) and expected changes in role and behaviour of actors. Implementation literature indicates some of these changes (structural changes) are simpler to be adopted compared to other kinds of changes such as behavioural changes (Fullan and Pomfret, 1977). Changing duration of training is simpler than changing classroom practice of teachers.

In Ethiopia, while the structural changes are introduced in a sweeping speed, behavioural and role changes are not yet in real motion. Certainly, it is the latter that matters most at the end of the day. Change bears fruit when it reaches the classroom (Fullan, 1991). That is to say it is when teachers and teaching learning practices are changed that real effect will be observed.

Measures had been taken by the Ministry of Education to upgrade teachers to the level demanded by ongoing changes. Teacher training institute graduates (12+1, in the earlier education system) to a diploma level (12+2, in the more recent education system); diploma holding teachers have been upgraded to a degree level. The extent of the effect these efforts bring in classrooms remains to be investigated yet, close observation of course organizations and running practices could tell something. The effort and attention given to change the teaching behaviour of teachers do not look adequate. In the upgrading of teachers from a diploma to a degree level, there is one subject methodology and one educational psychology course.

Teacher educators who are subject experts design the subject methodology courses. It is offered in a distance mode. Prior study shows the course outlines of this course fail to cover topics and objectives of teaching specific subjects (Dawit and Alemayehu, 2001). They deal mainly with general educational topics and content area topics. And it is the responsibility of this course to develop constructionist conception of teaching in teachers (Tobin, 1990).

Sadly enough, very few teacher educators are trained to be subject method teachers. This means that many do not have adequate training in teaching methods, except language teachers; nearly none in science areas. Hence, how to train would-be teachers and upgrade in-service teachers in line with constructionist notion of learning is the missing link between intention and action. Concerned bodies do not seem to be unaware of this. Summer training has been organized for higher education teachers. The quest for proper teaching learning environments has been raised. The concern seems to exist. To sum up classroom changes in the training of teachers are a necessity to initiate constructivist notions of learning. Structural changes are not enough. Hence, if metaphors are believed to guide teachers' thinking and if teachers' thinking is believed to affect practice, what should then be done?

Recommendations

Although the samples included in the study are not large enough to make strong generalizations, a number of lessons can be drawn from this study. First of all, it is important to explore prospective teachers' metaphors about teaching so that teacher educators can address the issue during training. This demands, competence from teacher educators so that they can teach in line with the constructivist notions of learning. Bodycott (1997) reported that prospective teachers enter teacher education with well-formed images of what teaching is. Efforts to change them in teacher education have yielded fair results when the images are identified from the beginning. Appropriate direction also needs to be given to change these images.

This conceptual change can be smoothened and fastened when prospective teachers are aware of their thinking (Marteins and Crosier, 1994 cited in Sillman and Dana, 2001). As indicated earlier, this can be done by exploring

teachers' thought through metaphors. Hence, general education and method teachers should help prospective teachers to enrich their thinking by reflecting in their teaching practices and micro-teaching sessions. This requires change in a number of interrelated factors. Prospective teachers observe and imitate in-service teachers who might be teaching in a traditional manner. Hence, the same should be done for in-service teachers.

It is also useful to organize educational courses in light of the teaching principles that prospective teachers are expected to apply after graduation. Thematic teacher education helps students to know what their role should be in teaching (Shulman, 1987). Many teacher education programs have tags like teacher as facilitator, problem solver, and catalyst and so on. Thirdly, it would be important to organize seminars, workshops, or short-term training for in-service teachers so that they can make changes in their metaphors with the help of trainers. There is evidence, though limited that metaphors can be changed (Tobin, 1990).

Lastly, it is an established fact that practices of schoolteachers and teacher educators serve as sources for prospective teachers' metaphors. The following statement sums up what our educational system needs to pay attention to *"Teachers cannot be constructivist teachers when they have not been constructivist learners"* (Stoffelt, 1994 cited in Sillman and Dana, 2001, p. 2). Hence, there is a strong need to teach in line with the constructivist notion. Further studies are needed to give us deeper insights into the extent to which a change in teaching metaphors leads a change in practice and how teachers develop metaphors.

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