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The Effect of Layered Curriculum on Reflective Thinking and on Self-Directed Learning Readiness of Prospective Teachers

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Abstract

Teachers are important role models for pupils. They should be reflective practitioners and self-directed learners. Teacher training process should promote being a reflective thinker and a self-directed learner. Curriculum should be designed in accordance with constructivism. The aim of this research is to investigate effects of layered curriculum on pre-service teachers' reflective thinking level and on self-directed learning readiness. In this study sequential mixed method design is used. A pretest-posttest control group design (quantitative phase) and a semi-structured interview (qualitative phase) are used. Layered curriculum is determined to have positive effects on participants' reflective thinking level and self-directed learning. According to findings of this research, layered curriculum can be an alternative way to improve pre-service teachers' readiness for self-directed learning and reflective thinking levels.

Keywords: Layered curriculum, reflective thinking, self-directed learning, teacher training.

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Introduction

Educating individuals as lifelong learners questioning, using the knowledge and having problem-solving skills are associated with the quality of adopted and applied curriculum. Constructivist learning approach focuses on how any student learns rather than what the student should learn. Educating individuals who are reflective thinkers and self-directed learners in that process are among the main goals.

Reflective thinking is one of the focal points of pragmatic philosophy that Dewey is a pioneer. For Dewey, reflective thinking is "effective, consistent and careful thinking any thought or information and information structure supporting to reach aimed results" (Dewey 1991:6). Current experiences are reorganized or constructed in the process of reflective thinking. Thus, experiences having meaning effects on realization of subsequent experiences. That process begins with the identification of the situation continues cyclically by listing what can be done about the situation, making future plans for the implementation and explaining what has been done (Başol and Evin Gencel 2013; Dewey 1933; Tripp 2003). Moon (2004) draws attention to the mentioned cycling as well by stating that individuals realizing reflecting to learn and continues to learn after reflecting.

It can be said that research studies done by Schön and Mezirow increased the interest in reflective thinking as well as Dewey did (Kember et al., 2008). Schön (1983; 1987) emphasizes thinking on what has been really done in that process and the need for revising the work done by drawing attention to the importance of gaining experience in reflective thinking. He identified two types of reflection as reflection in action and reflection on action. Reflection in action means the reflection process occurring during the execution of the action while reflection on action means behaviors after finishing the action and reflection process on thoughts. Killion and Todnem (1991) put forward the concept of reflection for action by expanding Schön's studies. Reflection for action is explained in that individuals think unexpected experiences gained from actions as a new way for new situations. For Mezirow (1991), reflection includes criticizing the assumptions about problem solving or content. The author states that one of the barriers in front of the reflective thinking is the perception of habits or behaviours not requiring thinking as reflective behaviour. Reflective thinking is a process where appropriate thoughts are produced, chosen and where inappropriate ones are picked out (Gelter, 2003).

Having the idea that the use of the concept of reflections in too wide and various forms causes misunderstanding, Kember and et al. (2000) put forward classifications of steps, including habit, understanding, reflection and critical reflection and applied in literature widely based on Mezirow's views. In that classification, habits include actions done after repetitions; understanding includes understanding cognitive domains, especially conceptualization and any current situation. Reflection is explained as questioning and internalization of knowledge and experiences, inferring and constituting a new perspective. The top level of reflection is deemed as critical reflection and explained as awareness of why individual perceives, thinks, feels and behaves in a clear way. Mezirow called that stage as "main reflection" (Kember et al., 2000; Kember et al., 2008). Accepted as one of the most important factors in the adoption of in-depth learning approach (Xie, Ke, and Sharma 2008) reflective thinking are stressed to be effective for prospective teachers to gain occupational skills. For this reason, developing reflective thinking is reported as one of the main objectives in teacher education (Ayers 2001; Loughran 2002; Willard-Holt and Bottomley 2000).

Reflective thinking offers individuals opportunity to rethink previous strategies, questioning and choose the rightest path when faced problems. In this regard it is associated with self-directed learning. Especially critical reflection constitutes one of the important bases of self-directed learning. Self-directed learning is stated as a process that individuals can select suitable strategies and methods to realize learning aims. Learning responsibility is undertaken by student in that process where personal characteristics are effective for learning (Candy 1991; Hollis 1991). Autonomy is one of the most significant concept of self-directed learning. Self-directed learners try to realize learning in an

appropriate path for their personal characteristic by identifying the right resources at flexible times and follow their learning process by making self-evaluation (Siminica and Traistaru 2013).

Self-directed learning is controlling and directing the process consciously and constantly to understand any situation-concept, solve problems, having or strengthening any skill (Long 1994: 14). Prior knowledge and positive or negative experiences of students are effective in that process. It is clear that when these properties are taken into consideration, self-directed learning is associated with lifelong learning process (Lee et al., 2014). In order to ensure self-directed learning, flexible learning environment must be provided to individuals, and individuals must be ready for the process. Considering teacher education, teachers having a high level of readiness for self-directed learning have properties to determine goals and choose effective activities to use during teaching and learning process. Also, it is stated that teachers whose readiness for self-directed learning is high level have the skills to maintain their motivation, to realize their own shortcomings and to solve problems effectively (Hwang and Gorrell 2001; Owen 2002).

When it is considered that teachers are important role models for students, it is crucial that at first, teachers should have the habit of reflective thinking and their readiness for self-directed learning should be high. In this context, it is of great importance that they should be provided with a flexible learning environment where they have learning responsibility. With aim to become active by being responsible for their own learning, thus ensuring permanent learning layered curriculum comes forefront (Başbay 2008). Kathie Nunley created the innovative teaching method entitled 'layered curriculum' after observing the different learning styles, understanding levels and multiple intelligences of her students. The layered curriculum takes individual differences of learners into account. Task options regulated towards higher level thinking skills are introduced to learners. There are steps (C, B and A) from basic knowledge and skills towards high level thinking skills in a similar way as progressively in Bloom's taxonomy. Learners choose the most suitable ones or the ones they want from the task list prepared for each step. Accordingly, the learners who have different learning levels, interests and expectations are provided with different ways during learning-teaching process (Başbay, 2005; 2008; Nunley 2003; 2004).

That learners are provided with options during the learning-teaching process is effective in an increase in their motivation and academic achievement. For the success of this process, it is important that students should take an active role and be given the chance to set a path which they follow in their own pace and features (Chapman and King 2005; Sullo 2007; Stenhoff et al., 2008). Layered curriculum raises students' responsibility for their learning by making the students active and realizes learning appropriate to the learning styles by allowing the activation of different ways of thinking (Gömleksiz and Biçer 2012).

Layer B requires application and analyzing skills. Students choose one of the such tasks, each of them are 15 points, preparing, discovering, trying, researching, comparing, distinguishing, reasoning, making interference. Layer A aims students to get an evaluation and synthesis skills and involves high level thinking skills. Students choose one of the such tasks, each of them are 15 points, criticizing, determining, guessing, identifying privileges, deciding, developing foresight, composing, designing, creative and unique products. In layered curriculum, the process ought to be organized carefully. In this process; product files, rubrics, and oral presentations about the chosen topic are used (Başbay 2005; Demirel et al., 2006; Nunley 2003; 2004; Pohl 2000).

Phases and features of layered curriculum are: First, units divide into C, B and A layers. Goals and objectives of the lesson for the two week period are decided and distributed to students. According to renewed Bloom's taxonomy, Layer C includes comprehension and recalling. Students review and construct their basic skills in this level, which includes explanations, listing, identifying, classifying, memorizing, repetition, gap filling, summarizing, discussing, reviewing, interpreting skills. Tasks that suitable for data collection on the topic have different points in terms of time and difficulty. It is expected at this level that students score 65-70 points by choosing desired tasks, students have to accomplish those tasks in order to go on to the next level.

When we consider the processes such as taking responsibility, choosing appropriate tasks, and defending the duties, we can associate it with reflective thinking and autonomous learning skills. It is important that teachers should accept these thinking types, being a model and preparing suitable activities in order to develop mentioned skills. Thus, there should be activities that develop reflective thinking and autonomous learning skills in in-service teaching. Hereby, the aim of this research is to investigate effects of layered curriculum on pre-service teachers' reflective thinking level and self-directed learning readiness. And we try to give answers to questions below;

Is there any significant differences between the experiment group, whom layered curriculum is carried out, and control group, whom traditional teaching is carried out, at the backgrounds of the students about reflective thinking and autonomous learning in testing and evaluation course?

What is the level of predictive power of reflective thinking in the autonomous learning background?

What are the opinions of the students in experiment group about the layered learning?

Method

Research Method: In this study sequential mixed method design was used. A pretest-posttest control group design (quantitative phase) and a semi-structured interview (qualitative phase) were used. This research was mainly conducted through quantitative method and having obtained the quantitative results, qualitative interviews have been carried out. Quantitative phase was planned in a paired pretest- posttest control group design. In circumstances when there is no chance to determine the participants randomly, experimental and control groups are chosen from the available groups. In a paired pre-test, post-test control group design, groups are randomly designated as experimental and control groups (Buyukozturk et al., 2013). Having completed the experimental actions, qualitative data were gathered from interviews conducted with 10 participants chosen randomly.

Participants: Participants of the research consist of 81 (46 female, 35 male) prospective teachers who took the course "Measurement and Evaluation in Education" at Canakkale Onsekiz Mart University in the spring semester of 2013- 2014 academic year. 43 prospective teachers participated in the experimental group and 38 prospective teachers were involved in the control group. In the data analysis process, taking the course attendance into consideration, data obtained from 74 prospective teachers in total, 39 participants in the experimental group and 35 for the control group, were taken into account.

Data Collection Tools: Research data were obtained through "Reflective Thinking Level Measuring Scale" and "Scale of Readiness for Self-Directed Learning".

Reflective Thinking Scale (RTS): Developed by Kember and his colleagues (2000), this scale was adapted to Turkish language by Basol and Evin Gencel (2013). Consisting of 16 items and 5 point Likert scale, it includes four sub-dimensions which are "habitual action", "understanding", "reflection" and "critical reflection". Cronbach Alpha reliability coefficient of the scale had been determined between the range of **.**62 and **.**76; and in the current research, reliability was found to range between **.**67 and **.**79.

Self-Directed Learning Readiness Scale (SDLRS): Developed by Fisher and his colleagues (2001). The scale was adapted to Turkish by Sahin and Erden (2009). Consisting of 40 items, 5 point Likert scale it includes three sub-dimensions which are self direction, learning will and self-control. Cronbach Alpha reliability coefficient of the scale had been determined between the range of **.**79 and **.**87; and in the current research, reliability was found to range between .81 and **.**89.

Semi-structured Interview Form:

In order to obtain the participants' views about experimental actions, three questions were asked. Upon getting permission of the participants, interviews were recorded. Each interview lasted 15 or 20 minutes. Having written the voice-recorded data, participants were asked for confirmation.

Process:

In the three credits theoretical course Measurement and Evaluation in Education, experimental implementation lasted for ten weeks. Initially, the course objectives were structured pursuant to the Bloom's taxonomy and they were grouped for C, B and A levels. Thus, task option tables were constituted in accordance with remembering and understanding for level C; applying and analyzing for level B; evaluating and creating for level A. Scoring Rubrics formed through tasks and activity tables determined in compliance with individual differences were photocopied in final form after receiving expert opinion. Experimental group students were informed about the instruction schedule. Implementation steps of the schedule, tasks' quiddity and their score values in C, B and A levels were explained.

In level C, there exist tasks such as reading activities, answering end-of-chapter questions, watching and talking about video recordings related to the subject, note-taking, listening to the guest teachers and asking them questions in the classroom, literature review and preparing brochures relevant to the subject, preparing power-point presentations, preparing affiche, table, illustrative cards, writing blurbs, writing briefly about central tendency and variance measures, displaying graphics, constituting tables which show different/ influential, weak aspects in common. In level B, there exist tasks such as summarizing books inferentially, calculating, writing test item, interviewing with teachers or experts, creating concept map, preparing puzzles, analyzing test items, composing self-dictionaries made up of measurement concepts, developing tests, commenting on the fractions of the pedagogic films relevant to subjects and evaluating them. Level A, there are tasks listed as creating original song, prose, poem, criticizing given cases, shooting advertisement films, writing for columns professionally, conceiving discussion activity related to test types, preparing informative film and journal about alternative measurement for prospective teachers, writing research report investigating at least 1 primary and 2 subsidiary and 3 internet sources. Students were informed about what needs to be done in order to proceed to higher level task. This phase lasted for three lesson hours. In the pre-test phase, data gathering tools were applied to students of experimental and control groups in one lesson hour time. For the experimental group, BOP was applied. As for the the control group, lessons were maintained through expression, discussion, question and answer. Data collection tools were reapplied to both groups and post test phase were completed.

Data Analysis

To analyze quantitative data, SPSS 17.00 statistics program was used. Descriptive statistics were specified. To identify differences between experimental and control groups, covariance analysis (ANCOVA) was used. Simple linear regression analysis was carried out to determine how reflective thinking predicts readiness for self-directed learning. Impact size were identified for the analysis carried out.

Throughout the analysis of the qualitative data, inductive content analyses were carried out by two researchers, separately. To ensure the coding reliability, the formula "Reliability=Agreement/ (Agreement + Disagreement) x 100" recommended by Miles and Huberman (1994) was used and the matching percentage was determined as 82%. In this respect, internal reliability was proven, for the external reliability, researchers keep interview records. To verify the internal reliability, participants were asked to confirm their views which were put in writing. As for the external reliability, it was endeavored to explain the research process in detail.

Findings

With the purpose of finding whether there is a difference in the way of reflective thinking level between the experiment group and control group, primarily scale of reflective thinking level, pretest and posttest descriptive statistics are presented in the Table 1.

Table 1. Groups' RTS points descriptive statistics.

Dimensions	Highest Points	Groups	Pre Test			Post Test		
			n	$\overline{X}$	s	n	$\overline{X}$	s
Habitual	20	Experiment	39	12.18	2.01	39	12.25	1.74
		Control	35	12.00	2.16	35	12.14	2.08
Comprehension	20	Experiment	39	8.97	2.38	39	10.64	2.11
		Control	35	10.82	2.79	35	10.88	2.76
Reflection	20	Experiment	39	9.28	2.81	39	11.61	2.36
		Control	35	10.54	2.54	35	10.63	2.46
Critical Reflection	20	Experiment	39	9.51	2.74	39	13.04	2.23
		Control	35	8.77	2.13	35	8.88	2.16
RTS	80	Experiment	39	38.86	4.59	39	46.92	5.06
		Control	35	40.04	3.84	35	40.69	4.00

As it is seen in the Table 1, Experiment group's RTS pretest mean score ($\overline{X}$ =38.86; s=4.59) increased in the post test ($\overline{X}$ =46.92; s=5.06). Control group's RTS mean score ($\overline{X}$ =40.04; s=3.84) remain nearly same in the post test ($\overline{X}$ =40.69;s=4.00). When the mean scores gathered from the sub-dimensions are viewed, it is seen that experiment group's average points increased in all sub-dimensions. The lowest increase seen in the dimension of habitual action. It is observed that the pretest and posttest mean scores of control group are quite close to each other. With the purpose of identifying the effect of experimental process of the students' reflective thinking levels, corrected posttest mean scores, ANCOVA results and impact factor are presented in the Table 2.

Table 2. ANCOVA results of groups according to corrected RTS post test points

Dimensions	Experiment Group Corrected Mean	Control Group Corrected Mean	F	p	η^2
Habitual	12.27	12.15	.31	.51	.006
Comprehension	11.39	10.04	23.49	.00*	.26
Reflection	12.07	10.11	42.36	.00*	.38
Critical Reflection	12.97	8.96	90.11	.00*	.69
RTS	48.53	40.49	41.85	.00*	.38

When the corrected posttest mean score is viewed, it can be stated that except the habitual action subscale, all subscales and points gathered through the scale are higher on behalf of experiment group and these differences are significant according to covariance analyzes. Examining the effect sizes, it is stated throughout the scale η^2=.38, in the comprehension subscale η^2=.26, in reflection subscale η^2=.38, in critical reflection subscale η^2=.69. According to the results it can be said that instruction design match with layered curriculum is effective in the levels of comprehension, reflection, critical reflection subscales and generally reflective thinking level. Descriptive statistics primarily related to pretest and posttest of SDLRS are presented in the Table 3 in order to determine whether there is a difference at the readiness level of autonomous learning between the experiment group and control group.

Table 3. Descriptive statistics of the groups in SDLRS

Dimensions	Highest Point	Groups	Pre Test			Post Test		
			n	$\overline{X}$	s	n	$\overline{X}$	s
Self Direction	65	Experiment	39	51.46	4.15	39	57.56	4.48
		Control	35	51.08	4.36	35	51.37	4.43
Willingness to	80	Experiment	39	59.38	5.04	39	66.81	5.02
Learning		Control	35	57.45	6.86	35	57.54	6.41
Self Control Skills	55	Experiment	39	38.48	5.05	39	48.51	4.54
		Control	35	37.97	5.61	35	38.23	6.49
SDLRS	200	Experiment	39	149.13	9.04	39	163.46	8.03
		Control	35	146.11	11.35	35	146.69	11.61

In the table 3, it is seen that experiment group's SDLRS pretest mean score ($\overline{X}$=149.13; s=9.04) increase in the post test ($\overline{X}$=163.46; s=8.03). SDLRS pretest ($\overline{X}$=146.11; s=11.35) and posttest ($\overline{X}$=146.69;s=11.61) mean scores of control group are similar to teach other. When the points gathered from the subscales are examined, it is observed that experiment group's mean score is increased in the all subscales and control group's pretest and post test results are quite similar to each other.

With the purpose of identifying the effect of experimental process of the students' autonomous learning levels, corrected posttest arithmetic averages, ANCOVA results and impact factor are presented in the Table 4.

Table 4. SDLRS ANCOVA Results of groups according to corrected post test points

Dimensions	Experiment Group Corrected Average	Control Group Corrected Average	F	p	η^2
Self Directing	57.40	51.55	64.69	.00*	.58
Willingness to Learning	66.01	58.41	56.07	.00*	.45
Self Control Skills	48.26	38.52	82.25	.00*	.61
SDLRS	161.89	148.33	68.13	.00*	.59

When corrected posttest means of groups are examined in the Table 4 it is stated that all subscales and points gathered through the scale are higher on behalf of experiment group and these differences are statistically significant according to covariance analyzes. Examining the effect sizes, it is found out throughout the scale η^2=.59, in the self-directing subscale η^2=.58, in willingness to learning subscale η^2=.45, in self-control skills subscale η^2=.61. . According to analyze results it can be said that instruction design match with layered curriculum is effective in the levels of comprehension, reflection, critical reflection subscales and generally reflective thinking level.

To identify the level of predictive power of RTS points on the SDLRS points, simple linear regression analyzes were carried out and results are presented in Table 5.

Table 5. Regression model of relationship between RTS Points and SDLRS Points

Model Dependent Variable Self Directed Learning	B	Se	β	T	p
Stable	99.328	11.349		8.75	.00
Reflective Thinking	1.25	.25	.51	5.02	.00
$R=.51$; $R^2=.26$; $F_{(1,72)}=25.24$; $p<.05$					

It is seen in the Table 5 that points of reflective thinking level predict %26 [$R=.51$, $R^2=.26$] of variance of readiness for self-directed learning. According to R variance analyzes relationship between two variables is significant [$F_{(1,72)}=25.24$, $p<.05$]. Beta value ($\beta=.51$) shows a positively relationship. In other words it can be concluded that reflective thinking is a significant predictive of self-directed learning. According to regression analyzes results equation of regression that predict the self-directed learning is; SDLRS=1.25x RTS +99.328.

As a result of the interviews that are conducted in order to find out the opinions of experiment group students about the layered curriculum; teaching, learner, learning, environment, and activities themes are determined and they are presented with sub-themes in Table 6.

Table 6. The opinions of participants about layered curriculum

Main Theme	Sub-Themes	Examples
Learner	Individual choice user Creative Growing	S2: "… it is good to have a chance of choosing suitable things form…" S5: "… I use my choice with activities that I think I can do…" S6: "… I understand that how I am a creative person…" S8: "… as time progress we can produce more creative products…" S10: "… we feel that we progress much better with every activity…" S3: "… every layer means much more progress…"
Learning	Permanent Significant High Level Easy	S4: "… we don't need to waste time for repetition because what we do makes it catchy..." S9: "… at last I understand that when I use these activities my students will have permanent learning just like me…" S10: "… I can say that permanent learning is occurred because we began from what we know already…" S1: "… each of the layers underlie the others…" S7: "… if we didn't take the lessons in that way, we would just listen without thinking on it; however, this activity required reasoning …" S6: "… without reading again and again and repetition I learnt the course of assessment and evaluation, such hard subject…" S3: "… all of the activities such as to provide easy learning…"
Environment and Activities	Amusing Hard Social Various	S2: "… I don't have such an amusing lesson during my college life…" S8: "… really funny outputs come to light such as songs, poets, visuals… we laugh a lot and once i thought that kind of learning can occur only in primary schools…" S5: "…I study with my classmates and we improve our friendship…" S4: "… our social sharing increase in the classroom…" S10: "… however it is hard to execute the activities that we have not done before. We had to be creative and it was not easy…" S1: "… it was not easy to prepare visual and it was hard to bring source to classroom…" S7: "… one of the best parts is to have different options. Various materials are used. I can't imagine such an enjoyable measurement and evaluation course…" S3: "… there were lots of creative, different activities and I will use them in the future…"

Discussion

The results of the research show that layered curriculum effects pre-service teachers' levels of reflective thinking and self directed learning positively, moreover their views about the layered curriculum are also positive.

Reflective thinking has an effect on gaining pedagogical skills of pre-service teachers. Thus, it is important to study and make activities in order to improve these skills in pre service training. It was found in this research study that the layered curriculum is effective in terms of improving pre-service teachers' comprehension, reflection, critical reflection, and general reflective thinking levels. It is stated that the highest level of reflection is the critical reflecting. Critical reflecting is awareness of reasons of feelings and behavior patterns (Kember et al., 2000). Concordantly, the significant increasing of especially critical reflecting points, accepted as the highest level, in the experiment group is an important finding.

When the literature is analyzed, it is seen that usually the effect of layered teaching on academic success has been searched (Lasovage 2006; Maurer 2009), layered curriculum increases not only the quality of learning process but also personal qualities of students (Burbank, Bates and Ramirez 2012). Swanson and Kayler 2008) emphasize that layered curriculum develop reflective thinking level of students and teachers as well. As it is seen, there is not any direct experimental research about the effect of layered teaching program on the reflective thinking level. Consequently this research study could contribute significantly into the literature.

It is determined in this research study that layered learning program has positive effect on sub-themes of self directing, self controlling skills, and learning willingness and generally preparedness of self directed learning. Nunley (2003; 2006) emphasizes that in layered teaching program control is in the hands of students. Providing options to students and giving them the opportunity of learning at will is important in terms of self direction and auto control. In respect to this it can be said results of the research are coherent with these statements. Morgan (2011) puts emphasize on learner initiative for preparedness of self directed learning. In layered learning initiative is on the learners, hence they can choose the suitable activity for themselves or they can decide whether is it time for sharing their learning outcomes with the others or not. From this point, positive affection of layered teaching program on preparedness of self directed learning is coherent with literature.

It is vitally underlined that in order to develop self-directed learning the chance of choosing educational duties systematically and actively in accordance with their interests should be given (Morrison and Premkumar 2014). It is stated that learning instruments such as active note taking, forming mind maps, creative writing, and flowcharts increase readiness for self-directed learning (Villareal, 2013; Mulig-Cruz, Barquilla, Tabudlong and Magallanes, 2015). In respect to this it can be said that the results of the research verify the knowledge in the literature. Readiness for self-directed learning is explained with such components; joining into control of learning process, decision making, joining individual and group activities, and critical and reflective thinking (Canipe & Brockett, 2003). As it is seen, readiness for self-directed learning is dealt with in relation to reflective thinking. Hence, in this research study it is stated that reflective thinking predicts self-directed learning significantly.

When the qualitative data of the research were examined, pre-service teachers were found to have a general positive attitude on layered teaching program. Pre-service teachers considered that students' choice of appropriate activities according to their individual preferences, revealing their creative sides and developing at each phase in layered teaching program were significant.They emphasized that they carried out permanent, meaningful, high level of learning in an easy way. Although, they generally find the activities and environment as social and amusing, they claim that while carrying out some activities they have difficulties. Participants state that they want to use layered teaching program in their career. Lasovage (2006) states that layered teaching program effects students' attitudes to course positively, increases learners' interests and attendance to lesson, and Başbay (2005) states that participants had a great time during layered curriculum.

Besides affecting positively the students' reflective thinking, readiness for self-directed learning positively in the experiment group, layered teaching program brings out positive feelings as well. As a result of this research study it was found out that layered teaching program can be used in order to bring up individuals who can think reflectively and learn self- directly, which is one of the main objectives of constructivist approach. Considering the teachers who have a high level of readiness for learning and reflective thinking are successful in managing teaching and learning process, using knowledge sources effectively, maintaining motivation, having effective problem solving skills, and being a model for students, it is thought that layered teaching program would be beneficial in pre-service teachers' education.

Conclusion and Implications

It is not possible that teachers who have been educated by traditional system can successfully raise a generation as lifelong learners with high level of thinking skills. Thus, their various skills should be improved through alternative ways in teacher education. Teachers who have a high level of readiness for self-directed learning always question themselves about their methods and strategies and how to develop themselves in order to leave a positive impression on students. In this sense, applying activities which can develop these skills in pre-service education could be useful not only for gaining new knowledge but also for improving their professional development (Rodgers, 2002; Evin Gencel, 2015).

It is seen in the current research study layered curriculum can be an alternative way to improve pre-service teachers' readiness for self-directed learning and reflective thinking levels. Therefore, program developers and teacher training policy makers could take these findings into consideration. In service trainings can be arranged for teachers about the layered teaching program and guidebooks can be published in order to ensure easiness in application process. Researchers can conduct new research studies which are integrated with layered teaching program like different learners styles, theories of layered learning, multiple intelligences, flipped learning, and blended learning. Moreover this program can be utilized in other courses and results can be compared.

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