

Reflections of Prospective Teachers Toward a Critical Thinking-Based Pedagogical Course: A Case Study

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Abstract—Promoting critical thinking (CT) in an educational setting has been appraised in order to enhance learning and intellectual skills. In this study, a pedagogical course in a vocational teacher education program in Turkey was designed by integrating CT skill-based strategies/activities into the course content and CT skills were means leading to intended course objectives. The purpose of the study was to evaluate the importance of the course objectives, the attainment of the objectives, and the effectiveness of teaching-learning strategies/activities from prospective teachers' points of view. The results revealed that although the students mostly considered the course objectives important, they did not feel competent in the attainment of all objectives especially in those related to the main topic of *Learning* and those requiring higher order thinking skills. On the other hand, the students considered the course activities effective for learning and for the development of thinking skills, especially, in interpreting, comparing, questioning, contrasting, and forming relationships.

Keywords—Critical thinking, critical thinking-based instruction, higher order thinking skills, teacher education

I. INTRODUCTION

TEACHING thinking skills has been discussed for years in related research, articles, and books, and its importance for promoting thinking skills, understanding, and learning has been emphasized [e.g., 2, 4, 7, 22, 24, 26]. Actually, not only mastering a given subject matter, but also coping with the demands of a rapidly changing world and challenging future entail the improvement of student thinking [3, 21]. For this reason, teaching thinking skills is of importance at every stage of schooling, by either specific programs that provide practice in selected teaching strategies or by restructured curricula and methods that are designed to promote and practice thinking within the traditional curriculum subjects, as opposed to preparing students to pass examinations, which leads to rote learning, and giving advice on learning [24].

Among various thinking skills, critical thinking (CT) is seen as a comprehensive and sophisticated higher order thinking skill. Although there is no well-established consensus on the definition of CT, it is defined briefly by Paul and Elder [25], as “thinking explicitly aimed at well-founded judgment,

utilizing appropriate evaluative standards, in an attempt to determine the true worth, merit, or value of something” (p.xxiv). CT has been valued in educational systems because it facilitates meaningful learning, transfer of knowledge to new situations, recognition and evaluation of information, its implications and consequences [16, 30]. In this context, if teachers are supposed to use CT skills in their classroom, initial teacher education should allocate more room for CT. Thus, CT skills should be incorporated into various aspects of all teacher education programs, so that prospective teachers become models of thinking strategies.

Any course that is designed for the purpose of promoting CT should involve instructional strategies and activities that will serve this purpose. In this regard, various strategies / activities such as questioning, role-playing, case study, discussion, analyzing experiences, building categories, semantic mapping, critical reading and writing, classification games, and transferring knowledge into real life are suggested, for developing CT skills [5, 20, 26, 27]. Above all, the necessity of thinking skill activities that include comparing, summarizing, classifying, interpreting, looking for assumptions, imagining, collecting and organizing data, hypothesizing, applying facts and principles to new situations, decision-making and designing projects have been emphasized [28]. In the meantime, teachers should encourage students to explore their own minds by fulfilling the roles, such as, stimulating students to explain things to each other, posing thought-provoking questions, helping students to search for what they need to know, and helping them clarify their thoughts [26].

There have been a great number of studies carried out about teaching CT in Turkey and abroad. These studies are mostly devoted to the determination of the impact of teaching CT on CT, on the CT disposition level of students, and on their academic achievement [e.g., 6, 14, 18, 31, 32]. There are several studies examining the attitudes toward the subject area into which CT-based instruction was incorporated [e.g., 1, 29, 35]. However, there is a lack of studies with regard to perceptions of students toward the teaching-learning process of courses designed according to CT-based instruction, especially in teacher education programs.

In the present study, the perceptions of prospective teachers toward the Development and Learning course that was redesigned by integrating CT-based strategies and activities into the course, to provide opportunities for practicing CT skills, were examined. Thus, the purpose of the study was to

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evaluate the importance of the course objectives, the attainment of the objectives, and the effectiveness of teaching-learning strategies/activities from prospective teachers' points of view. The research questions explored in this study were:

- (1) To what extent are the course objectives, related to the course topics, important for prospective teachers?
- (2) To what degree do they feel competent with regard to the attainment of the objectives?
- (3) Is there a significant mean difference in their perceptions toward the attainment of the objectives according to the two main topics (*Development* and *Learning*)?
- (4) Is there a significant mean difference between their perceptions toward the attainment of the objectives including higher order thinking skills (HOTS) and those including lower order thinking skills (LOTS)?
- (5) To what degree have the activities used in the teaching-learning process of the course affected their learning?
- (6) What are their opinions with regard to the effect of the designed activities on the development of their CT skills?

II. METHOD

A. Participants

This study was conducted in a vocational teacher education program in Turkey. The participants of the study were 64 prospective teachers who took the Development and Learning course enriched with CT-based instruction. Of them, 30 were females and 33 were males. One student did not specify his / her gender. Age ranged from 18 to 26, but mostly they were between 20 and 23 (86%).

B. Treatment

The Development and Learning course, which could be named as "Educational Psychology" in the teacher education programs around the world, has been taught in the second year, as a part of the four-year teacher education program in Turkey. Its aim is to equip prospective teachers with strong background information, skills, and practical strategies with regard to child and adolescent development and their learning, to become effective teachers.

For this course, the Inductive Model of Eggen and Kauchak's [9] instruction models for teaching thinking skills was applied. 35 CT strategies defined by Paul et al. [26] were integrated into courses and used as means leading to intended course objectives (see Appendix A for CT strategies and Appendix B for a lesson plan example). The five phases of the model followed in each lesson during 14 weeks were:

1. *Lesson Introduction*. Students were notified about the objectives and a brief overview of the topic was presented. Then, tasks that they were expected to master through given examples were given and what they were supposed to do were explained. As examples, case studies, role playing, and articles were used.

2. *The Open-Ended Phase*. After presenting examples, Socratic questioning was especially applied so that meaningful

construction of knowledge and understanding of the topic were strived to be ensured. Students were asked to analyze and evaluate cases, to solve problems given in the examples, to clarify and analyze the meanings of concepts, to compare and contrast situations, to note similarities and differences, to identify students' and teachers' behaviors related to physical, cognitive, moral, and personality development and related to behavioral, cognitive and humanistic learning approaches/theories, and etc. by taking Paul et al.'s [26] CT strategies into account.

3. *The Convergent Phase*. Students were stimulated to converge to find definitions of the concepts, principles or characteristics of development and learning theories, and differences, similarities, strengths and weaknesses of the theories without wandering from the topic. For students who had misconceptions, hints such as examples were provided or further questions such as "what do you mean?" or "why do you think this way?" were asked in order to understand their reasoning and meaning.

4. *Closure*. At this phase, definitions, principles, characteristics, differences, similarities, strengths and weaknesses were stated briefly, the relationship among them were formed and the implications of the converged information into learning environment were discussed by students as a result of the preceding phases.

5. *The Application Phase*. Finally, in order to apply what was learned, several assignments were given to students. Some were completed in the class with a group work, some were done at home.

While these phases seem to be hierarchical, it does allow flexibility such as replication of some phases within a session. For example, if more than one topic will be covered in a session, then the open-ended, convergent and closure phases can be followed for each topic. This can be more clarified by the lesson plan example in Appendix B. In addition, the lesson plans included Paul et al.'s [26] CT strategies as it can be seen from the example plan. During the instruction of the course, these CT strategies were stimulated by means of a variety of questions and tasks such as, case studies, thinking skill activities (e.g., comparing, decision-making, problem solving), puzzles, poster presentation, role playing, graphic organizers, article critique, and projects. Before giving tasks to the students, the instructor showed how to use the intended CT skill.

C. Instrument

A questionnaire composed of three subscales in each of which questions were posed on a five-point Likert scale with "5" indicating a positive response or agreement and "1" a negative response or disagreement was developed by the researchers. The first and second subscale included 53 course objectives of the course prepared in detail so as to cover each topic in the course content. In the first subscale, the students were asked to indicate "to what degree attaining these objectives was important". In the second subscale, the

students were asked to state “to what degree they felt competent in the attainment of these course objectives”. The third subscale was related to the effectiveness of the teaching–learning process of the course. In this part, 20 frequently applied in-and out-class activities / strategies promoting thinking skills were presented. The students were asked, “to what degree these activities were important for effective learning”. At the end of this part, there was an open-ended question asking the students whether the activities used in the course improved their thinking skills and how.

The instrument was reviewed by six instructors in the field of Educational Sciences and six students who had taken this course before. For the purpose of the pilot test, the final form was administered to the sophomore, junior, and senior students in the other departments. According to the pilot test results, Cronbach α values for each subscale were found .94, .98, and .95, respectively. Moreover, having administered to the participants of the study, these values were slightly changed to .97, .97, and .92, respectively.

D. Data Analysis

The data gathered through the questionnaire was statistically analyzed by means of a statistical computer package program, SPSS 15.0. Descriptive statistics including percentage distribution, mean, mode, median, and standard deviation were calculated.

As a large number of objectives were included in the questionnaire, the statistical analysis results were not presented for each one. Instead, first, the scores obtained for the objectives related to Development, the main topic, and those related to Learning, the other main topic, were summed and a mean score was calculated for each main topic separately. Then, for a more detailed analysis, the mean scores were calculated for each subtopic under these two main topics. Finally, the responses given to the objectives including Higher order thinking skills (HOTS) and to those containing Lower order thinking skills (LOTS) were separated into two groups (HOTS-based objectives and LOTS-based objectives) and the mean scores of both types of objectives were calculated.

Afterward, a paired samples t-test was utilized for testing the significance of the mean differences in the students’ perceptions toward their competency level in the attainment of the objectives according to the two main topics (Development and Learning) and the two cognitive levels (HOTS and LOTS). As the main assumption of this parametric test requires the normality of the corresponding variables, this assumption was tested by the one-sample Kolmogorow-Smirnov test. All variables were found normally distributed at the .05 significance level; thus, the assumption was not violated.

III. RESULTS

A. Perceptions toward the Importance of the Course Objectives

Descriptive statistical analyses (Table I) revealed that on the average, the students think the objectives regarding Development, the main topic ($M = 4.25$, $SD = .51$) are more important than those regarding Learning ($M = 3.78$, $SD = .73$). The mean difference in the students’ perceptions toward these two main topics was statistically significant, $t(63) = 6.52$, $p = .000$, $d = .75$.

TABLE I
 DESCRIPTIVE STATISTICAL ANALYSIS RESULTS REGARDING THE STUDENTS’ PERCEPTIONS TOWARD THE IMPORTANCE AND ATTAINMENT OF THE OBJECTIVES

Objectives related to	N _o ^a	Importance		Competence	
		M	SD	M	SD
Main Topics					
Development	33	4.25	.51	3.30	.66
Learning	20	3.78	.73	3.05	.62
Subtopics					
Basic Concepts	2	4.05	.98	3.48	.87
Physical development	5	4.38	.59	3.40	.73
Cognitive development	7	4.19	.60	3.14	.76
Linguistic development	5	4.05	.85	3.17	.90
Moral development	7	4.37	.65	3.43	.85
Personality development	7	4.30	.59	3.35	.81
Behaviorist learning	4	3.75	.94	3.18	.86
Social learning theory	4	3.70	.94	3.00	.79
Cognitivist learning	5	3.79	.89	3.02	.84
Humanistic learning	2	3.59	1.07	2.52	1.04
Motivation	5	3.90	.74	2.99	.88
Cognitive Levels					
HOTS	11	3.59	.87	2.86	.72
LOTS	42	4.19	.50	3.29	.60

^aN_o = Number of objectives

Furthermore, when the responses were examined as to whether the students’ perceptions toward the importance of the objectives varied according to the subtopics, it was realized that they considered all objectives important. Only with slight differences, among the objectives related to the subtopics of Development, those pertaining to the topics of morality, personality, and physical development were evaluated as more important than those related to cognitive and linguistic development. In terms of the subtopics of Learning, the objectives regarding cognitive learning theories ($M = 3.79$, $SD = .89$) came into more prominence when compared with the others.

Finally, findings in relation to the objectives including HOTS and LOTS revealed that even as all objectives were actually considered important, students do not think the objectives containing HOTS ($M = 3.59$, $SD = .87$) were as essential as those involving LOTS ($M = 4.19$, $SD = .50$). They perceived the objectives containing LOTS were significantly more important, $t(63) = 7.60$, $p = .000$, $d = .85$.

B. Perceptions toward Competency in the Attainment of the Course Objectives

The results showed that the students, on the average, feel indecisive with regard to their competency level in the attainment of the objectives and this result does not change by main topics, subtopics or cognitive levels (Table I).

Nevertheless, the mean difference in the students' perceptions toward the attainment of the objectives between the two main topics (*Development* and *Learning*) was tested. According to the paired samples t-test results, it was found that the students' perceptions toward the attainment of the objectives regarding *Development* ($M = 3.30, SD = .66$) was significantly different from that for the main topic of *Learning* ($M = 3.05, SD = .62$), $t(63) = 4.03, p = .000, d = .39$. The effect size was .39, which was at a small level according to the Cohen's criteria (Steven, 1996).

Besides, it was observed that the students were, on the average, undecided about their competency levels in both types of objectives: including HOTS and LOTS. However, the mean score of the responses given for the objectives, including HOTS ($M = 2.86, SD = .72$) was lower compared to the objectives including LOTS ($M = 3.29, SD = .60$), and the mean difference was found to be statistically significant with a medium effect size in favour of the LOTS-based objectives, $t(63) = 7.42, p = .000, d = .65$.

C. Perceptions toward the Effectiveness of the Teaching-Learning Strategies / Activities for Learning

Thinking skills strategies / activities frequently used in the course were listed in Table II. The findings as to what degree the students think that these strategies / activities were effective for learning were presented with their rank order according to the mean scores (Table III). The results highlighted that students mostly concurred on the effectiveness of all strategies / activities on learning, as more than half reported that the strategies / activities were *effective* or *very effective*.

TABLE II
TEACHING-LEARNING STRATEGIES / ACTIVITIES IN THE COURSE

1	Applying student-centered instruction
2	Applying activities stimulating CT
3	Applying activities stimulating creative thinking
4	Applying activities stimulating problem-solving
5	Giving responsibilities to students in activities
6	Providing active classroom participation
7	Providing interaction between students and instructor
8	Providing interaction among students
9	Relating course topics to each other
10	Doing comparison among theories
11	Making comments on a topic, case, or perspective
12	Applying questioning technique
13	Doing case studies
14	Preparing graphic organizers for each topic
15	Giving assignment stimulating research

16	Applying thinking skills activities into a topic
17	Doing group work
18	Using transparencies
19	Using worksheets
20	Giving feedback about students' performance

TABLE III
DESCRIPTIVE STATISTICAL ANALYSIS RESULTS REGARDING THE STUDENTS' PERCEPTIONS TOWARD THE EFFECTIVENESS OF THE TEACHING-LEARNING STRATEGIES/ACTIVITIES CARRIED OUT IN THE COURSE

Activities /Strategies	%					N	M	SD	Rank
	1	2	3	4	5				
1	3	8	3	39	47	64	4.19	1.04	8
2	5	5	3	39	48	64	4.22	1.05	6
3	2	5	5	48	41	63	4.22	.87	7
4	6	5	8	50	31	64	3.95	1.08	11
5	7	7	15	47	26	62	3.79	1.10	14
6	-	6	2	41	52	64	4.38	.81	1
7	-	9	2	34	55	64	4.34	.91	2
8	-	21	10	41	27	63	3.78	1.08	15
9	-	3	5	53	39	62	4.27	.71	4
10	2	8	5	54	32	63	4.06	.91	10
11	-	3	5	52	41	64	4.30	.71	3
12	3	8	11	50	28	64	3.92	1.00	12
13	5	8	-	48	40	63	4.10	1.07	9
14	8	18	7	34	34	62	3.68	1.33	16
15	8	15	13	52	13	62	3.47	1.14	19
16	5	5	3	36	52	62	4.24	1.07	5
17	10	16	8	38	27	63	3.60	1.31	18
18	5	18	7	49	21	61	3.64	1.16	17
19	7	25	11	42	16	57	3.35	1.22	20
20	3	11	13	40	32	62	3.87	1.09	13

When the results were examined in terms of the rank, it was found that the most effective activity was "providing active classroom participation" ($M = 4.38, SD = .81$). The percentage of distribution of the responses toward this strategy showed that out of the students, 41% indicated *effective* and 52% *very effective*. This was followed by "providing interaction between students and instructor" with $M = 4.34, SD = .91$. As to the interaction in the class, 89% of the students expressed a view of either *effective* or *very effective*. The third effective one was "making comments on a topic, case, or perspective" ($M = 4.30, SD = .71$).

On the other hand, "using worksheets ($M = 3.35, SD = 1.22$)", "giving assignments stimulating research ($M = 3.47, SD = 1.14$)", "doing group work ($M = 3.60, SD = 1.31$)", "using transparencies ($M = 3.64, SD = 1.16$)", and "preparing graphic organizers for each topic ($M = 3.68, SD = 1.33$)" were not perceived as effective as the others. In case of these activities, 23% to 32% of the students pointed out that these were either ineffective or slightly effective.

D.Perception toward the Effectiveness of Teaching– Learning Strategies / Activities for the Development of Thinking Skills

Regarding the effect of strategies / activities on the development of thinking skills, the responses disclosed the benefits of CT-based instruction for the cultivation of thinking skills and helped bring clarity and further understanding about strategies / activities used in the treatment.

The students indicated that they could consider cases, issues, events or situations from different perspectives and insights.

Before, I used to look at events from a narrow window; now this window has broadened and I can make varied comments on cases.

These activities compelled us to think. They made me think from different points of view. They helped me to find solutions more explicitly and in a short time.

Moreover, it was observed that the activities provided two students to take into consideration each others' views in terms of accuracy and deficiency, from the following statement;

The activities have helped me to adopt an idea, defend my thoughts and prove their accuracy, because I learned to examine a case from different aspects. Because of these activities, I learned that the opposite side of my own view might be true as well, and learned to make a decision on the right one by thinking and comparing both sides.

Because of these activities, I clearly realized the capacity of my thoughts in perceiving and interpreting events. Moreover, I believe that the activities helped us analyze things from different points of view and perceive the deficiencies in the others' thinking.

Furthermore, the following students' expressions showed that they were able to criticize and evaluate their own thoughts.

I think, the activities have developed my thinking skills because in order to propound my opinion on a topic, I strive to think and evaluate it.

In most of the lessons, subjective opinions were asked. Here the format provided us an opportunity to interpret our perspectives toward a topic by ourselves. As a result, it motivated us to put forth our opinions.

The findings addressed that some students felt they had improved in their thinking skills, such as, interpreting, comparing, questioning, noticing differences, and forming relationships:

I think my thinking skill has improved, and activities helped me interpret the issues, questions, and cases given in the activities.

By performing these activities, I have improved my thinking skills, such as, comparing and finding differences.

I guess my thinking skill has improved because the topics were illustrative, and I tried to find similar examples and relate them to the topic.

Because of these activities, I can relate one topic to another.

In this course, I have questioned my former education life and analyzed our classroom environments, and realized how the activities we had performed appeared to reflect in our education life.

Additionally, some of the students named activities that supported the development of their thinking skills. Among them, case study was almost always reported. It was also observed that by means of case studies they could put themselves into the position of the person in the cases.

Case study activities helped us to answer by making us think about how one would behave in a particular instance by putting ourselves into that person's shoes.

The activities have been really improving my thinking skills. As the case studies given to us were the kinds of events that we encountered in daily life, the activities have helped us to think of what we would do in such situations.

While a student expressed that his thinking skill did not improve much, he emphasized on case studies, by explaining how it helped him get solutions to the problems.

The activities developed my thinking skill a little but in case studies, we could form various views about them, and in this way, we could think of how these problems could be solved. Even though I did not speak out my thoughts, I was at least thinking inwardly.

In addition to the case studies, the students made comments on the impact of discussion, graphic organizers, games, and use of visual materials in their thinking skill.

Discussions about the topic or examples were effective in using the thinking skills.

I realized that I could achieve something by integrating my thoughts and the information that I had gathered through discussion.

I think this course has improved my thinking skill through games, use of visual materials, striving to find relationships among each other's concepts, and arrangement of theories via graphic organizers.

Besides, the students' responses also showed that CT-based instruction created an enjoyable student-centred environment and provided active participation.

Although most utterances reflected positive views, there were few students indicating negative feelings. Even as one student just responded by saying "no" without giving any explanation or reason, the other one addressed a problem of being forced to think instead of stimulating. On the other hand, another student's response disclosed that a negative attitude toward this course might have affected his / her motivation in promoting the thinking skill. To sum up, the results displayed that since CT-based instruction generally satisfied the students with its outcomes, it could be anticipated that this instruction would be able to aid the students' cognitive development in various ways.

IV. DISCUSSION AND CONCLUSION

In this study, the prospective teachers' perceptions toward the Development and Learning course enriched with CT-based instruction were examined. They evaluated the importance of the course objectives, their competency in the attainment of these objectives, and the effectiveness of teaching-learning strategies / activities carried out in the course, in terms of developing learning and thinking skills. Moreover, their self-evaluation in the attainment of the objectives was compared according to the main topics (Development and Learning) and cognitive levels (LOTS and HOTS).

The findings highlighted that the objectives were of importance for almost all students, although there were differences in terms of the topics and cognitive levels. From their points of view, the objectives in relation to the main topic of Development seemed to be more important than the main topic of Learning. Remarkably, students valued the objectives including LOTS more when compared with those requiring HOTS. In this regard, Resnick (as cited in [17]) warned about the fulfilment of a requirement, in order to allow the students to recognize the value of thinking; this is a sustained long-term cultivation of higher order thinking skills. For this reason, this application of CT-based instruction would require more time for students to recognize the value of HOTS.

The students' perceptions toward the importance of objectives were not reflected in their opinions about their competency to attain these objectives in a similar way. The prospective teachers, on the average, felt competent at a moderate level. Furthermore, their perception differed for the objectives related to the main topic of Development and those including LOTS, because more students felt competent in these objectives compared to those related to the main topic of Learning and those enclosing HOTS. Actually, these results were interrelated because most of the HOTS-based objectives were related to Learning. An underlying reason for these results might stem from the difficulty of the Learning topics including various theories, concepts, and principles.

Besides, Nickerson [23] emphasizes the impact of students' attitudes on the intellectual performance by stating "students who were interested in what they were learning were more likely to learn effectively than those who were not...the most difficult aspect of improving intellectual performance may be that of effectively fostering positive attitudes" (p.24). For this reason, the students' attitudes toward the importance of the course objectives might have affected their competency, because they considered the HOTS-based objectives not as important as the LOTS-based ones. In this respect, an anti-intellectual attitude among the students might have an effect on the students' perceptions. Anti-intellectualism is defined as a "preference for recipe knowledge and learning that is fact-oriented, memorized, and routine. It entails a disinterest and disrespect for intellectual and academic objectives of 4-year university programs, such as theoretical, hypothetical, and

intellectual pursuits, as well as critical thinking and academic research" (Shaffer, as cited in [10], p.110-111). In his study, for anti-intellectualism among graduate students, Elias [10] argues that students who have difficulty in adjusting to more theory and CT skill-based environment may develop anti-intellectual attitudes. Accordingly, in the present study, anti-intellectualism among students who preferred easy and practical educational experiences requiring memorization might have emerged and these students might have considered the HOTS-based objectives less important and felt less competent in the attainment of these objectives compared to the LOTS-based ones. Indeed, this attitude has been generally discussed within the framework of American tradition and culture, but this is an obstacle to effective learning and higher order thinking that has been encountered around the world and should be handled for the effectiveness of any educational program / institute / course.

Moreover, the students' thinking skill level, which was influenced by their previous educational experience, could affect their perceptions. If they had not had any opportunity to use HOTS before, if they were not used to applying HOTS, it was not unusual to have difficulties in these skills and in the attainment of the objectives requiring these skills. For this reason, the necessity of encouraging HOTS before the students arrive in college is emphasized [12]. This underlines the importance of courses providing these opportunities and stimulating higher order thinking in order to accomplish the continuity of thinking skill practices.

Designing such courses as a pathway to better thinking and learning requires careful consideration of the teaching-learning process that will serve the intended purposes, because thinking-based instruction values in-and-out-class activities, which are deemed to be a way of establishing a connection with the students' cognition and thinking. In this context, the students' responses toward the effectiveness of teaching-learning strategies / activities of the course might be taken into account. The results showed that the students mostly agree that the strategies / activities that took place in the course were either effective or very effective for learning. The explanations further exhibited that the students believed the strategies / activities have facilitated the development of their thinking skills, especially, in interpreting, comparing, questioning, contrasting, and forming relationships. In this regard, case study activities were mostly appraised, as it stimulated the students to put themselves in the position of the person in the case and to find solutions to the problems. This finding is consistent with the related literature, which underlines contributions of case studies to the enhancement of learning and development of CT [15, 19, 20]. Especially in teacher education, case study is deemed as a means for having prospective teachers prepared for the complexity of classroom settings [8, 13]. For instance, Doebler et al. [8], in their study, found out that case studies facilitated the decision-making ability of the teacher candidates, such as, evaluating educational circumstances, finding problems, and solutions. Beside case study, discussion, graphic organizers, games, and

use of visual materials were the other specified means for advancing thinking skill by the students.

Another noticeable point that was uttered by the students was an active and enjoyable classroom environment emerged as a result of CT based instruction. Consistently, in Sparapani's [33] study, teachers from all levels of education designed and implemented lessons encouraging higher-level thinking and according to most teachers and students, a positive classroom climate and active involvement were notable outcomes of these lessons. Indeed, research findings highlight that when students are stimulated intellectually they become better motivated and more engaged in classes [11].

The results that the strategies / activities were generally effective for learning and a positive learning environment was appeared as a result of interaction and active participation draw attention to the claim that thinking-based instruction in which thinking skills are integrated into the subject matter / tasks / activities may affect subject learning positively [28, 36]. However, perceived incompetencies in the attainment of the objectives showed that from the students' points of view, CT-based instruction did not meet the intended learning outcomes completely. Acquisition of content knowledge and thinking skills concurrently requires more practice and time. For this reason, thinking-based instruction should be expanded to various courses in a program. As the students perceived almost all objectives as important and nearly all activities as effective for learning and thinking, in other words, since they had positive attitudes toward this course such a thinking-based course should be maintained. Yet, it should not stand alone for one course. Above all, thinking skills should be encouraged at all levels of education system and students should be qualified in terms of thinking skills before coming to colleges or universities so that thinking skills can be used as means for learning besides being a subject to be learned.

The results of this study are based on a research carried out for the Development and Learning course in the Faculty of Tourism and Commerce Education. Similar studies conducted in other faculties and in other subject areas would provide testing generalizability of the findings. This study was limited to the CT skill, but further studies about other thinking skills, such as, problem-solving or creative thinking can be conducted. Another limitation was that the students' perceptions were taken into account in this study; however, the impact of the course on the course achievement and the development of students' thinking skill can be examined by means of achievement tests and scales specific to thinking skills.

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APPENDIX A

STRATEGY LIST: 35 DIMENSIONS OF CRITICAL THOUGHT

Affective Strategies

- S.1. Thinking independently
S.2. Developing insight into egocentricity or sociocentricity
S.3. Exercising fairmindedness
S.4. Exploring thoughts underlying feelings and feelings underlying thoughts
S.5. Developing intellectual humility and suspending judgment
S.6. Developing intellectual courage
S.7. Developing intellectual good faith or integrity
S.8. Developing intellectual perseverance
S.9. Developing confidence in reason

Cognitive strategies-Macro Abilities

- S.10. Refining generalizations and avoid oversimplifications
S.11. Comparing analogous situations: transferring insights to new contexts
S.12. Developing one's perspective: creating or exploring beliefs, arguments, or theories
S.13. Clarifying issues, conclusions, or beliefs
S.14. Clarifying and analyzing the meanings of words or phrases
S.15. Developing criteria for evaluation: clarifying values and standards
S.16. Evaluating the credibility of sources of information
S.17. Questioning deeply: raising and pursuing root or significant questions
S.18. Analyzing or evaluating arguments, interpretations, beliefs, or theories
S.19. Generating or assessing solutions
S.20. Analyzing or evaluating actions or policies
S.21. Reading critically: clarifying or critiquing texts
S.22. Listening critically: the art of silent dialogue
S.23. Making interdisciplinary connections
S.24. Practicing Socratic discussion: clarifying and questioning beliefs, theories, or perspectives
S.25. Reasoning dialogically: comparing perspectives, interpretations, or theories
S.26. Reasoning dialectically: evaluating perspectives, interpretations, or theories

Cognitive strategies-Micro Abilities

- S.27. Comparing and contrasting ideals with actual practice
S.28. Thinking precisely about thinking: use critical vocabulary
S.29. Noting significant similarities and differences
S.30. Examining and evaluating assumptions
S.31. Distinguishing relevant from irrelevant facts
S.32. Making plausible inferences, predictions, or interpretations
S.33. Evaluating evidence and alleged facts
S.34. Recognizing contradictions
S.35. Exploring implications and consequences

Source: Paul et al. [26] (p. 56)

APPENDIX B LESSON PLAN EXAMPLE

The topic: Cognitive Development

Subtopics: Basic characteristics of Piaget's and Vygotsky's theory of cognitive development, educational implications of the theories

The hour: 3 hours

Teaching strategies: Socratic questioning, case study

The Materials: Pictures, Slides, Projector

The instructional objectives:

The students will be able

to know cognitive development processes as to Piaget and Vygotsky to explain Piaget's and Vygotsky's theories regarding cognitive development to compare Piaget's and Vygotsky's views regarding cognitive development to follow students' cognitive development process to understand individual differences among students' cognitive development to help students' cognitive development to prepare educational environment towards improving students cognitive development level

Critical thinking strategies

S-11 Comparing analogous situations: transferring insights to new contexts

S-12 Developing one's perspective: creating or exploring beliefs, arguments, or theories

S-14 Clarifying and analyzing the meanings of words or phrases

S-20 Analyzing or evaluating actions or policies

S-29 Noting significant similarities and differences

S-35 Exploring implications and consequences

I. Lesson introduction

The students will be informed about the topics covered in that session and instructional objectives regarding cognitive development.

a. Regarding the topic "basic characteristics underlying the Piagetian theory of cognitive development"

Ia. The open-ended phase

The following questions will be directed to the students.

1. How do persons develop a meaning of a concept?
2. For example, what does "cat or cow" mean to you (their picture will be shown on the slides)? Why do you explain them in this way? From where does this information come?
3. Have you known them since you were born? How did you learn them?
4. Let's assume you encounter a mobile phone or mp3 player that you have never seen, how do you learn to use them? S-12

IIIa. The convergent phase

In addition to the preceding questions, by asking;

1. What could be the cognitive operations while learning a new concept, characteristics, principles, or procedure that we do not know?
2. What could be the cognitive operations if we already know the given concept, characteristics, principles, or procedure?

The students will be directed to find out the concepts underlying the cognitive operations; schema, assimilation, accommodation and equilibration, and their definitions. S-14

IVa. The Closure

Finally, the students will summarize the concepts and their definitions.

b. Regarding the topic "the characteristics of the Piagetian Cognitive Development Stages"

Iib. The open-ended phase

Sensory-motor stage

Pictures showing reactions of 9 months and 18 months old babies toward objects that were hidden will be displayed

1. Why is this stage called as sensory-motor? **S-14**
2. How babies develop concepts of objects? What are their characteristics affecting their conception? **S-12**
3. Could you describe what happens in these pictures? What are the differences? **S-29** are asked to define the cognitive characteristic "permanence of objects".

The other stages

The previous week, an assignment will have been given to the students. They will have been supposed to ask the definition of 6 concepts that will have been determined previous week by the class to the persons from different age groups; pre-school, elementary school and high school students. The instructor will ask them to explain the answers they obtained.

The following questions will be asked and discussed regarding the answers:

1. Are there differences between age groups? Why do their answers differentiate between groups? What are the differences? Are there similarities within groups? Why do they resemble within groups? **S-29**
2. What are the similarities in the answers given by pre-school students? **S-29**
 What could be their cognitive characteristics based on these answers and your observations in your life? Could you exemplify them? **S-12**
3. A picture showing conservation experiment with a child at age 4 will be demonstrated and students were asked to describe the picture.
4. What could the cognitive factors affecting their perception be? **S-12**
5. What are the similarities in the answers given by elementary school students? **S-29** Based on these answers and your observations in your life, what could be the cognitive characteristics of the concrete operations stage, which is corresponding to this age group? Could you exemplify? **S-12**
6. What are the similarities in the answers given by high school students? **S-29**
 What are your cognitive skills? Based on the answers, your observations in your life and your own cognitive characteristics, what are the features of the formal operations stage which is corresponding to this age group? Could you exemplify? **S-12**

IIIb. The convergent phase

Through these questions, the students will be led to describe the cognitive characteristics of the age groups; that is, the characteristics of the sensory-motor, preoperational, concrete operations and formal operations stages.

IVb. Closure

They will sum up the characteristics of each stage.

c. Regarding the topic "the Vygotsky's View of Cognitive Development"

IIIc. The open-ended phase

The following questions will be asked.

1. Do we learn anything from adults? How? How do they transfer knowledge to us?
2. How we learn from them?
3. What factors do affect? How?
4. How do you learn better individually or guided by the teacher?
5. How can guidance be effective in learning? Why? **S-12**

IIIc. The convergent phase

With these questions, the students will be directed to describe the key characteristics of Vygotsky's view of cognitive development.

IVc. Closure

The students will be requested to summarize Vygotsky's view and its characteristics: social interaction, language, the zone of proximal development.

V. The application phase.

The student will discuss the educational implications of the cognitive development theories **S-35**.

Then they will be asked to compare the characteristics of Piaget' and Vygotsky's cognitive development theories individually. The following graphic organizer adapted from Swartz, Fischer, & Parks [34] will be used. **S-29**

