TÜRK FEN EĞİTİMİ DERGİSİ
Yıl 11, Sayı 1, Mart 2014

Journal of
TURKISH SCIENCE EDUCATION
Volume 11, Issue 1, March 2014

http://www.tused.org

Determination of Pre-Service Science Teachers' Self-Efficacy Perceptions and Efficacy Levels about the Diagnostic Branched Tree Technique*

Ayşe Nesibe KÖKLÜKAYA[1], Aysun ÖZTUNA KAPLAN[2], Vahdettin SEVİNÇ[3]

[1] Instructor Dr., Gazi University, Gazi Education Faculty, Ankara-TURKEY
[2] Asst. Prof.,Dr., Sakarya University, Education Faculty, Sakarya-TURKEY
[3] Prof. Dr., Sakarya University, Faculty of Engineering, Sakarya-TURKEY

Received: 23.03.2013 **Revised:** 25.01.2014 **Accepted:** 09.02.2014

The original language of article is English (v.11, n.1, March 2014, pp.63-74, doi: 10.12973/tused.10103a)

ABSTRACT

This research is aimed at identifying self- efficacy perceptions of the pre-service science teachers on the one of the alternative measurement and assessment techniques called diagnostic branched tree. The research is carried out 66 pre-service science teachers in 2009- 2010. Perception of Competencies on the Self efficacy perceptions of pre-service teachers on Alternative Measurement and Assessment Techniques scale's second subscale and the documents which prepared by pre-service science teachers are used for data collection. According to the result of the research, pre-service science teachers perceive themselves efficiency about preparing the diagnostic branched tree, but the documents when evaluated with control list, it is precipitated that pre-service science teachers' proficiency about preparing diagnostic branched tree is low level.

Key Words: Teachers' Self-Efficacy, Alternative Measurement and Assessment Techniques, Diagnostic Branched Tree.

INTRODUCTION

Three basic goals were identified for education; retention, deep understanding and active use of knowledge (Perkins, 1991). Many of the reigning theoretical assumptions on which contemporary testing and assessment are based on behaviorist views of cognition and development. In the 1990's, it is realized that new, alternative ways of thinking about learning and assessing learning are needed (Office of Educational Research and Improvement [OERI], 1994). In Turkey, the curriculum of Science and Technology Teaching put into application through a change in curriculum in 2005 was based on constructivist approach to learning. Considering the fact that the constructivist approach is effective on active, social and creative learning, it can be seen that this curriculum supports student-centered approach (Gömleksiz,

Corresponding author e-mail: nkoklukaya@gazi.edu.tr

* This research was presented in International Conference on New Trends in Education and Their Implications. (ICONTE). 11-13 11. 2010.

2005). This understanding has embraced all changes and amendments necessary for all elements of the curriculum.

Researches and applications in the field of education have had a deep influence on not only teaching-learning approaches but also assessment approaches (Baki & Birgin, 2004). Fourie and Niekerk (2001) note that new insights of learning theories are directly reflected in assessment and evaluation activities. Therefore, the curriculum of Science and Technology Teaching in 2005 was designed in accordance with the constructivist approach and it is pointed out that students should be presented with multiple assessment opportunities to display their knowledge, abilities and attitudes and that an alternative assessment and evaluation should be carried out (MEB, 2006).

Linn and Gronlund (1995) define evaluation as the process of collecting information to make a decision about student performances through several assessment instruments. In accordance with this purpose, assessment instruments should be multifaceted and should directly measure learning by the student having the student as a part of the process (Bednar, 1992).

When the literature of alternative assessment and evaluation is analysed, the characteristics pointed out are that it is focused on the learning process rather than the outcome, both students and teachers participate in the evaluation process, an assessment of portfolios and performances are carried out (Torrance & Pryor, 2001; Özden, 2005; Atılgan 2009; Bekiroğlu, 2004; Gürdal, et al., 2001; Bahar, et al., 2008; Semerci, 2001; Hamayan, 1995), the instrument of measurement should be enduring and authentic, what students can do should be measured rather than what (s)he knows (Pierce and O'Malley, 1992), and alternative instruments of measurement should be used (Arslan, 2008).

Alternative assessment-evaluation techniques include portfolios, diagnostic branched trees, structured grids, tables of semantic analysis, rubrics, questionnaires of self-assessment, questionnaires of peer-assessment, check lists, etc. (Turgut, 1990; Piburn & Baker,1997; Bağcı & Kılıç, 2001; Hargreaves et al., 2002; Bekiroğlu, 2004; Nitko, 2004; Ayas, 2005).

Diagnostic branched tree which is one of the aforementioned alternative measurement techniques is an assessment technique in which correct and wrong questions are inter-related and each correct-wrong decision have consequences affecting and determining the next correct-wrong decision (Bahar, et al. , 2008). In the diagnostic branched tree, staged questions about the same subject are preferred to be asked, statements become more difficult as branching increases, and statements should be made with a transition from the concrete to the abstract and from the general to the specific (Aydoğdu & Kesercioğlu, 2005). In this technique, each student is presented with an A statement. If the student's answer is in the direction that the statement is "correct," (s)he is presented with a B statement which is related to this answer in a way. If the student's decision is the direction that the statement is "wrong," (s)he is presented with a C statement which is again related with this answer. Table 1 shows that this process goes on from B statement towards either D or E statement, or from C statement towards either F or G statement (Bahar et al., 2008).

The concept of self-efficacy begins with Bandura's social learning theory. According to theory, self-efficacy makes a difference in feelings, thoughts, behaviours and motivations of the people. According to the Lenz and Shortridge-Baggett, (2002) people's beliefs in their talents to perform significant behaviours is an important precursor of how they are functioning in terms of choice behaviour, effort expenditure, thought patterns and emotional reactions (Zulkosky, 2009). A lot of researches have shown that academic self-efficacy is positively associated with grades in college (Hackett et al., 1992; Bong, 2001).

According to the literature, researchers have studied about alternative measurement techniques through receiving teachers' perceptions about usage of these techinques (Jonson, 1999; Corconan, 2004; Çakan, 2004; Doğan, 2005; Flowers et al., 2005; Sırkıntı, 2007;

Kanatlı, 2008; Çoruhlu et al., 2009; Arslan et al., 2009). Otherwise, researchers have studied pre-service teachers' self-efficacy perceptions and knowledge levels about alternative measurement techniques (Slater, 1996; Campbell & Evans, 2000; Volante & Fazio, 2007; Kilmen et al., 2007; Birgin & Gürbüz, 2008; Kolomuç & Açışlı, 2013; Tay, 2013). It is seen that, there was a deficiency in literature about alternative assessment and measurement techniques' dimension of practice and it is predicted that this research will pick up this deficiency. In this study, the self-efficacy perceptions and levels of pre-service teachers, who are the future practitioners of the curriculum of science and technology teaching related to measurement technique of diagnostic branched trees, are determined. The basic structure of diagnostic branched tree technique is shown below:

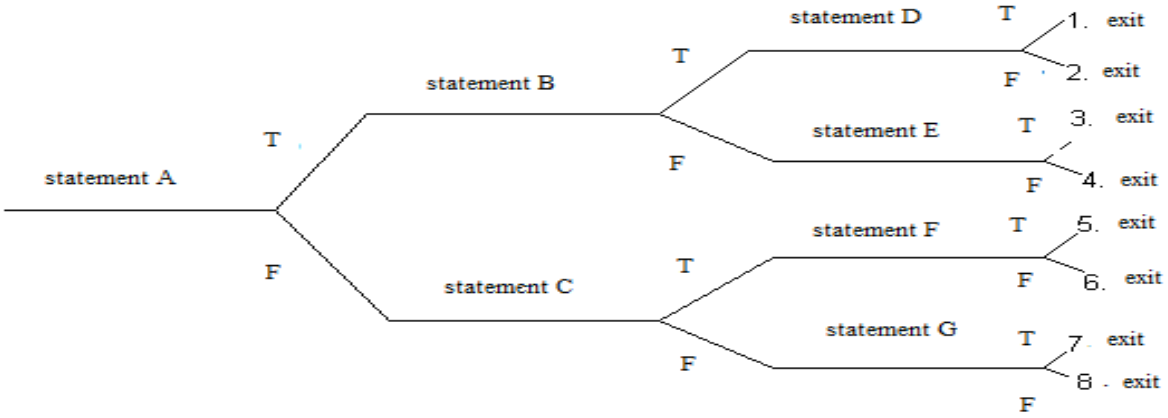

Figure 1: General Outline of Diagnostic Branched Tree

It is seen that, there has been a movement from traditional assessment to alternative assessments in Turkey with 2004 Science and Technology Curriculum. Alternative assessments have many advantages, for example, these assessments; assess higher-order thinking skills, focus on the growth and the performance of the student (Law and Eckes, 1995). For this reason, alternative assessments should be used widely in science education by teachers. According to the literature, there are many researches about concept maps, portfolios, self-assessments, peer- assessments etc. (Kan, 2007; Eroğlu & Kelecioğlu, 2011; Yurdabakan & Uzun, 2011; Kaya, 2013) but there are few researches about diagnostic branched tree. So it is thought that, this research will make a contribution to literature.

In this sense, the aim of this study is to determine pre-service science teachers' self-efficacy perceptions and levels about diagnostic branched trees

In line with this purpose, answers to the following sub-problems were sought:

- What is the self-efficacy perception level of pre-service science teachers' in relation with the diagnostic branched tree as an alternative assessment-evaluation technique?
- What is the self-efficacy level of pre-service science teachers' in relation with the diagnostic branched tree as an alternative assessment-evaluation technique?

METHODOLOGY

a) Research Design

This study aims at determining self-efficacy perception of pre-service teachers studying at the department of elementary science teaching in relation with diagnostic branched tree as one of the assessment-evaluation techniques which growingly becomes more important according to constructivist approach. In the study, the existent condition of such efficacy is described. In this respect, a survey method has been used in the study (Karasar, 2006).

b) Sample

Through the method of purposeful sampling was used. Purposeful sampling method selects participants for a specific reason (e.g., age, culture, experience), not randomly (Law et al, 1998). In this research, the participants selected among students who studied "Assessment and Evaluation" course before the study.

The participants of the study are 66 senior class pre-service science teachers who were registered elementary science teaching program. Data were obtained from 66 senior class pre-service science teachers but 42 of them have prepared diagnostic branched tree, randomly.

c) Instrument

During the process of data collection, in search of answer for the first sub-problem, the sub-part of the diagnostic branched tree was used as the self-efficacy scale. The scale's name is "*The Level of Competencies Related to Alternative Measurements - Evaluation Tools of Candidate Teachers*". It has developed by Köklükaya (2010). The scale has totally 42 items and 4 sub-part. One of the sub-part is about self- efficacy of diagnostic branched tree and it has 8 items. "*Diagnostic branched tree*" sub-part was used in this research. The alpha reliability coefficient of pre-service teachers' self-efficacy scale related to diagnostic branched tree is .91.

The pre-service teachers in the study group determined their self-efficacy scale for each item marking one of the options "unqualified," "insufficiently qualified," "undecided," "qualified" and "very qualified." The answers by pre-service teachers were evaluated in the following way: unqualified (1), insufficiently qualified (2), undecided (3), qualified (4) and very qualified (5).

Document review method was used to seek answers for the second sub-problem. The diagnostic branched tree prepared by 42 pre-service teachers selected randomly among 66 people in the study sample was assessed through the check list developed by researchers. The check list in Table 2 was used to determine self-efficacy of pre-service teachers in preparing diagnostic branched trees. The items of the check list were designated from the observable scale items. The check list was evaluated with yes and no scale, and later each yes was marked with 10 points. The self-efficacy of the pre-service teachers according to the check list was marked on the scale of 70 points and then transformed into 100 point scale.

Table 1. *Check List for the Diagnostic Branched Tree*

	Performance Dimensions of the Diagnostic Branched Tree	Yes	No
1	You can determine statements for the diagnostic branched tree in an order from the general to the specific.		
2	You can determine statements as correct and wrong through the diagnostic branched tree.		
3	You can prepare each statement of the diagnostic branched tree in a way to uncover students' misconceptions.		
4	You can prepare the statements in a way to question an interconnected network of meaning in which nothing is disconnected in terms of meaning.		
5	You can prepare statements to determine in what statements students make mistakes through the diagnostic branched tree.		
6	You can mark the diagnostic branched tree.		
7	You can write the statements in the diagnostic branched tree from the concrete to the abstract.		

d) Data Analysis

Data obtained quantitatively from the research were analysed in the package software programme. Self-efficacy perceptions of pre-service teachers in relation with the diagnostic branched tree technique were summarized and tabulated in frequency distribution and percentages. In addition, the diagnostic branched tree prepared by the pre-service teachers was evaluated through the check list developed by researchers, and the obtained findings were tabulated with their frequency distribution given.

FINDINGS

Self-efficacy Perceptions of Pre-service Teachers in Relation to the Diagnostic Branched Tree Technique

The table 2 shows the percentage and frequency distribution according to total points for answers the pre-service teachers gave to the scale items about the diagnostic branched tree, and the self-efficacy perception levels of the pre-service teachers in relation to the diagnostic branched tree.

Table 2. *The Self-Efficacy Levels of the Pre-Service Teachers in Preparing a Diagnostic Branched Tree According to Points They Scored in the Scale*

Score Interval	Self-efficacy Level	f	%
8 points	Unqualified	1	1.52
9- 16 points	Insufficiently qualified	1	1.52
17-24 points	Undecided	7	10.60
25-32 points	Qualified	51	77.27
33-40 points	Very Qualified	6	9.09
TOTAL		**66**	**100.00**

In line with the points scored by the pre-service teachers in relation to the preparation of the diagnostic branched tree technique, it has been concluded that 51 pre-service teachers saw themselves qualified or this technique, 7 pre-service teachers were undecided, 6 of them saw themselves very qualified, 1 of them saw himself/herself insufficiently qualified, and another one of them saw himself/herself as unqualified.

When the total score of the pre-service teachers in the scale for their self-efficacy in relation to the preparation of the diagnostic branched tree is calculated, it can be concluded that the pre-service teachers perceived themselves as qualified for the preparation of the diagnostic branched tree with an average of 27.54 point.

Self-efficacy of Pre-service Teachers in Relation to the Diagnostic Branched Tree Technique

This section discusses self-efficacy of pre-service teachers in relation to the diagnostic branched tree which is one of the alternative assessment-evaluation techniques. The diagnostic branched trees that prepared by pre-service science teachers were evaluated through the check list (Table 1). Pre-service science teachers' self-efficacy levels and score intervals is shown in Table 3.

Table 3 shows the percentage and frequency division of self-efficacy level of the pre-service teachers according to their score in the evaluation of their diagnostic branched trees through the check list. It has been determined that 1 student was very qualified, 7 students were qualified, 22 students were insufficiently qualified, and 12 students were unqualified in preparing a diagnostic branched tree. When the score of the pre-service teachers were

evaluated through the check list in Table 1 and the average point was reached through evaluating their scores on a 100 point scale, it was concluded that the pre-service teachers were insufficiently qualified in preparing a diagnostic branched tree with an average of 46.66 points.

Table 3. *The Self-Efficacy Level of the Pre-Service Teachers According to Their Score in the Evaluation of Their Diagnostic Branched Trees through the Check List*

Score Interval	Self-efficacy Level (by preparing a diagnostic branched tree)	f	%
76-100	Very qualified	1	2.38
51-75	Qualified	7	16.66
26-50	Insufficiently qualified	22	52.38
0-25	Unqualified	12	28.57
TOTAL		**42**	**100.00**

A diagnostic branched tree prepared by a pre-service teacher is given as an example in Figure 2, 3, 4 and 5 with its original form.

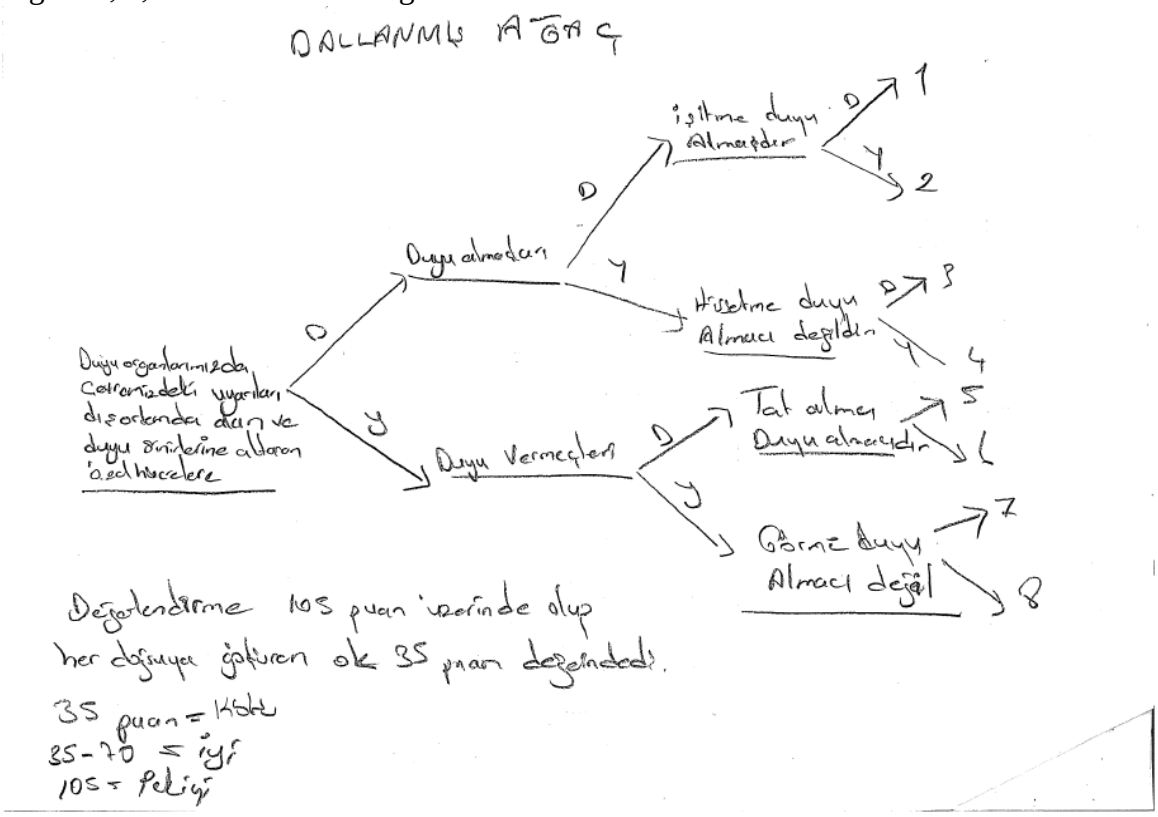

Figure 2*: The Exemplary Diagnostic Branched Tree Prepared by the Pre-Service Teacher* E_9 *(Original)*

When the diagnostic branched tree prepared by the pre-service teacher E_9 was evaluated according to the check list in Table 3, it was determined that the pre-service teacher was unqualified for preparing a diagnostic branched tree according to the defined criteria. The questions in the diagnostic branched tree have not been given in full sentences; the statements have not been determined to be correct or wrong; the diagnostic branched tree has not been prepared in a way either to uncover student misconceptions or to specify in what stage the student don't understand the statement. Because the statements have not been fully composed, it is clear that the diagnostic branched tree is not from the concrete to the abstract and from the general to the specific. The diagnostic branched tree has been marked. Considering all these, it was determined that the pre-service teacher E_9 scored 10 points in preparing the

diagnostic branched tree technique and was unqualified. But according to the self-efficacy perception scores, pre-service teacher E_9 is qualified with 30 points.

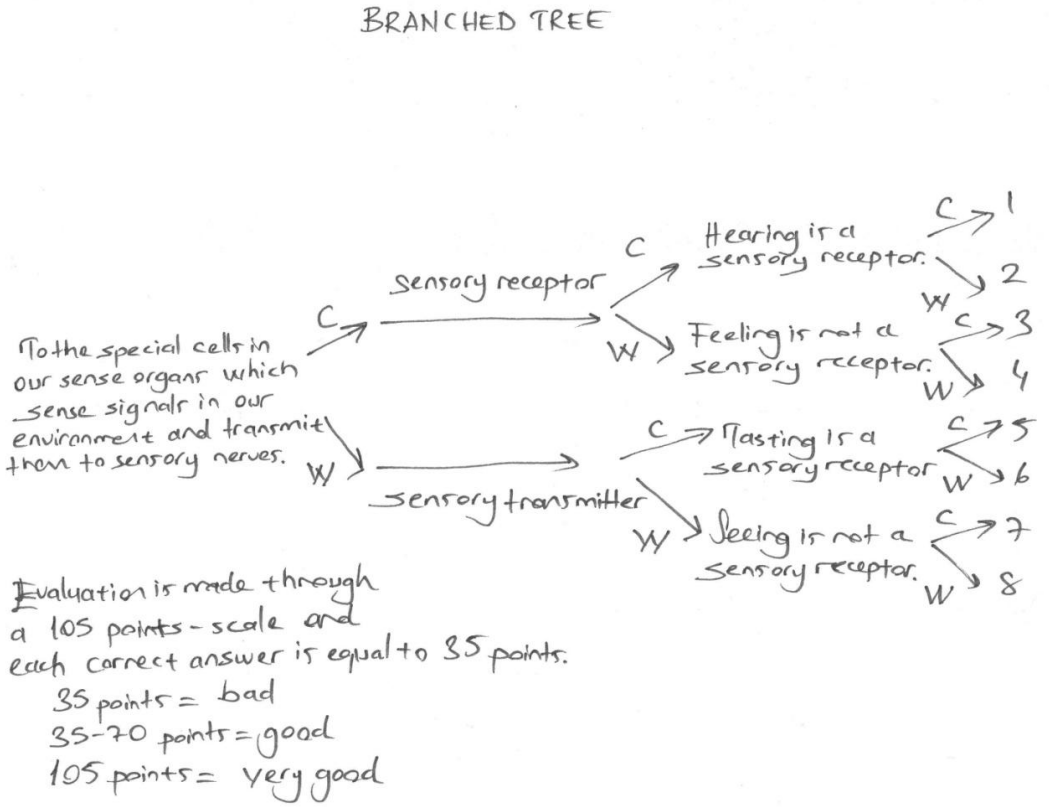

Figure 3: *The Exemplary Diagnostic Branched Tree Prepared by the Pre-Service Teacher* E_9

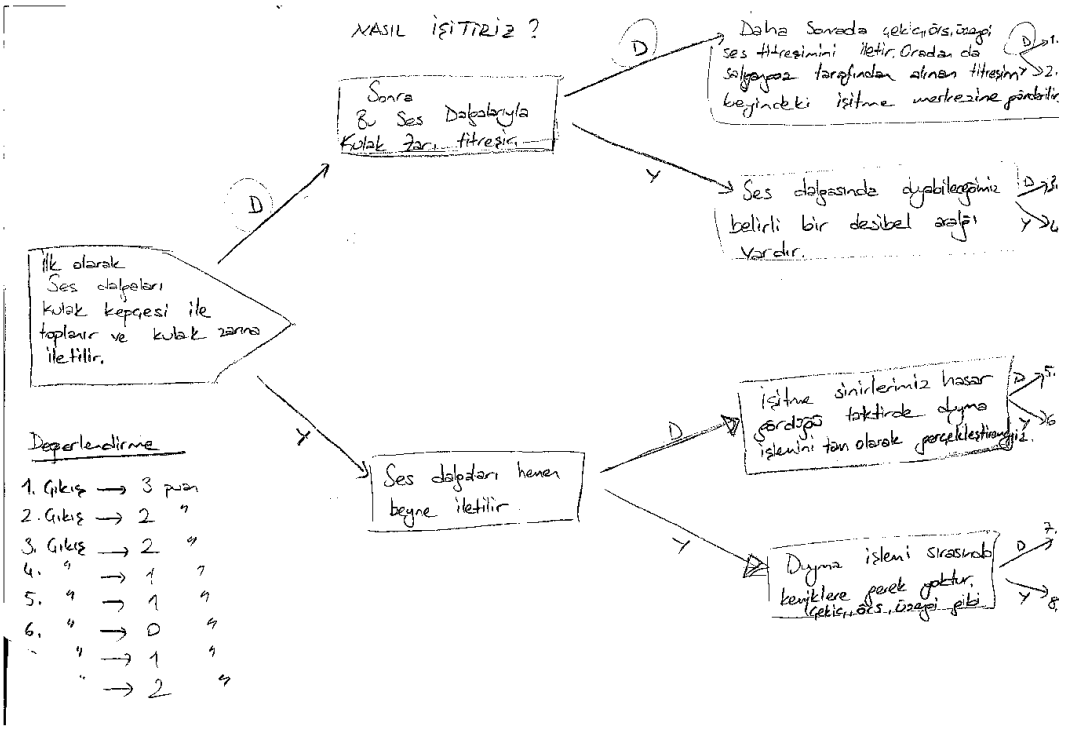

Figure 4: *The Exemplary Diagnostic Branched Tree Prepared by the Pre-Service Teacher* K_{36} *(Original)*

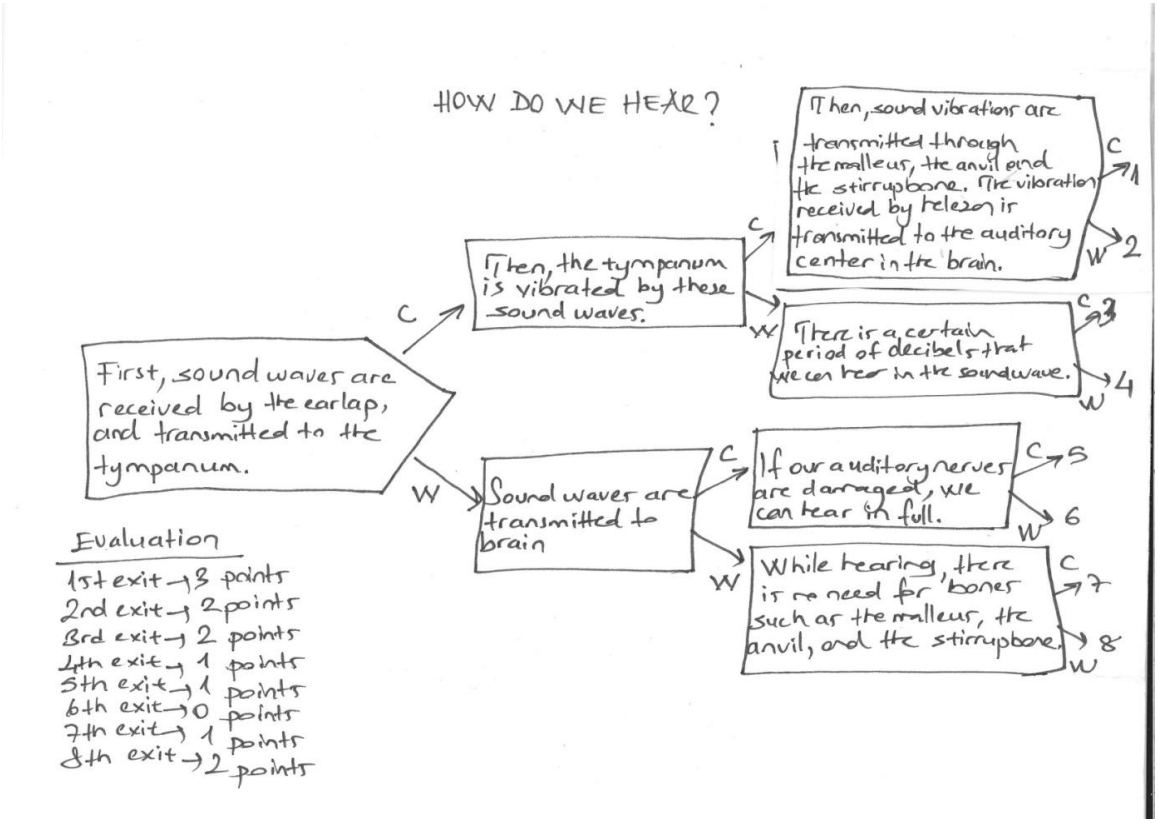

Figure 5: *The Exemplary Diagnostic Branched Tree Prepared by the Pre-Service Teacher* K_{36}

The pre-service teacher K_{36} has been able to write correct and wrong statements while preparing the diagnostic branched tree, the statements have been written in a way that students could see in which part of the subject they made mistakes and also the statements have been written in an order from the general to the specific. The statements in the diagnostic branched tree are not disconnected and have been prepared to question the same network of information. The pre-service teacher K_{36} has also been able to mark the diagnostic branched tree. Although there is a diagnostic branched tree, it has not been prepared in a way to uncover student misconceptions. When the diagnostic branched tree prepared by the pre-service teacher is evaluated through the check list, the pre-service teacher K_{36} has been found qualified for preparing a diagnostic branched tree with 60 points. However, there is another mistake by the pre-service teacher: It can be said that (s)he has prepared some statements as a clue. The first statement begins with "first of all...," and the second statement continues with "then..," which has increased the students' probability to predict the right path. But according to the self-efficacy perception scores, pre-service teacher K_{36} is very qualified with 36 points.

DISCUSSION and CONCLUSION

It has been concluded that pre-service science teachers perceived themselves qualified for preparing a diagnostic branched tree through the average score they got in the diagnostic branched tree preparation scale. When the qualifications of pre-service Science teachers for preparing a diagnostic branched tree are analysed through the check list, it has been concluded that the pre-service teachers have been found to be insufficiently qualified in this respect. Therefore, it has been determined that pre-service science teachers thought that they knew how to prepare a diagnostic branched tree in theory because of the scale scores. But according to the check list scores they could not put their theoretical knowledge into practice. When other studies in this field are analysed, it has been concluded that 48% of the pre-service

teachers found themselves unqualified in evaluation through grid method according to the findings obtained from the study by Kilmen, and et al. (2007). Considering the fact that pre-service teachers have perceived themselves unqualified while studying with a structured grid, and they have perceived themselves qualified for the preparation of diagnostic branched trees as it has been found out in this study, it is recommended that the self–efficacy perceptions and efficacy of pre-service science teachers should be determined through other techniques of alternative assessment and evaluation. Similarly, according to the Buldur's (2009) result of the research, a significant difference was determined between the self-efficacy pre-, mid- and post-test scores of the pre-service science teachers. Pre-service science teachers' self-efficacies about using the alternative assessment approach increased as the implementations advanced. Results are similar with this research's results. In addition, when considering the percentage values obtained through the study by Birgin and Gürbüz (2008), it has been concluded that most of the pre-service class teachers do not have enough knowledge about alternative techniques of assessment and evaluation. Researchers have studied pre-service teachers' self-efficacy perceptions and knowledge levels about alternative measurement techniques (Slater,1996; Campbell & Evans, 2000; Volante & Fazio,2007; Kilmen et al., 2007; Kolomuç & Açışlı, 2013; Tay, 2013). It is indicated that, pre-service teachers' self-efficacy perceptions and knowledge levels are in low level. Results are similar with this research's results. Through these studies carried out with the pre-service teachers from the departments of elementary science teaching, it is recommended that more studies should be carried out to determine self-efficacy perceptions and efficacy of pre-service teachers studying in other departments in relation to the alternative techniques of assessment and evaluation. According to findings obtained through this research, it is recommended that studies should be carried out to investigate the causes of pre-service science teachers' low efficacy in preparing a diagnostic branched tree as one of the alternative assessment-evaluation techniques. Also it is recommended that more studies should be carried out to determine self-efficacy perceptions and efficacy of pre-service teachers studying in other departments in relation to the alternative techniques of assessment and evaluation. Also this research could be repeated with teachers in different departments.

REFERENCES

Arslan S. A., Avcı N. & İyibil Ü. (2008). Preservice physic teachers' perception levels about alternative assessment and measurement techniques. *D.Ü. Ziya Gökalp Faculty of Education Journals, 11*, 115-128.

Arslan Sağlam, A., Kaymakçı Devecioğlu, Y. & Arslan S. (2009). The Problems about alternative measurements and assessment techniques: Sample of Science and Technology Teachers, *Ondokuz Mayıs University, Faculty of Education Journals, 28*, 1-2.

Atılgan H. (2009). *Assessment and Evaluation in Education*. Anı Publishing: Ankara.

Ayas, A. P. (2005). Concept Learning, S. Çepni (Ed). *Science and Technology Teaching in Theory and Practice* (65-91), PegemA Publishing: Ankara.

Aydoğdu, M. & Kesercioğlu, T. (2005). *Science and Technology Teaching in Primary School*. Anı Publishing: Ankara.

Bağcı- Kılıç, G. (2001). Constructivist science education. *Educational Sciences: Theory and Practice, 1*(1), 9-22.

Bahar, M., Nartgün, Z., Durmuş S. & Bıçak, B. (2008). *Traditional- Assessment and Evaluation. Teacher Handbook*. PegemA Publishing: Ankara.

Baki, A. & Birgin, O. (2004). Reflections of using computer-based portfolios as an alternative assessment tools: a case study. *The Turkish Online Journal of Educational Technology – (TOJET), 3*(3), 79-99.

Bednar, A. K., Cunningham, D., Duffy, T. M. & Pery, J. D. (1992). *Theory into Practice. In David H. Jonassen and Thomas M. Duffy, eds. Constructivism and the Technology of Instruction: A Conversation*. (17-34). Hillsdale, NJ: Lawrence Erlbaum.

Bekiroğlu- Ogan F. (2004). Traditional and Alternative Assessment and Evaluation Techniques and Practice in Physics. Nobel Yayıncılık: Ankara.

Bong, M. (2001). Role of self-efficacy and task-value in predicting college students' course performance and future enrollment intentions. *Contemporary Educational Psychology 26*(4), 553–570.

Birgin, O., & Gürbüz, R. (2008). Eliciting pre-service primary teachers' knowledge level about assessment- evaluation. *Selçuk University Journal of Social Sciences Institute,* 20, 163-179.

Campbell, C. & Evans, A. J. (2000). Investigation of preservice teachers' classroom assessment practice during student teaching. *The Journal of Educational Research*, 93,6.

Corconan, A. C., Dershimer, L. E. & Tickhenor S. M.. (2004). A teacher's guide to alternative assessment, taking the first steps, *The Clearing House, 77* (5), 213–216.

Çakan, M. (2004). Teacher's measurement and assessment practices and levels of competences: Primary and secondary education, *Ankara University Faculty of Education Journals, 37*(2), 99-114.

Çoruhlu, T. S., Er Nas, S. & Çepni, S. (2009). The Problems faced by science and technology teachers about usage alternative measurements and assessment techniques: Sample of Trabzon, Yüzüncü Yıl University, *Faculty of Education Journals, 4*(1), 122-141.

Doğan, B. A. (2005). Teachers' perceptions about assessmen techniques in science education (Sample of Van) Master's thesis, Yüzüncü Yıl University, Institute of Science, Van.

Eroğlu, M.G. & Kelecioğlu, H. (2011). An analysis on the validity and reliability of concept map and structural communicatıon grid scores, *Hacettepe University Journal of Education, 40*, 210-220.

Flowers, C., Delzell L. A., Browder, D. & Spooner, F.(2005). Teachers' perceptions of alternate assessments, *The University of North Carolina at Charlotte, 30*(2), 81–92.

Fourie, I. & Van Niekerk, D. (2001). Follow-up on the portfolio assessment a module in research information skills; an analysis of its value. *Education for Information, 19*, 107-126.

Gömleksiz, M., N. (2005). An assessment of the implementation of new science and technology curriculum. educational sciences: *Theory and Practice.5*(2), 339-384.

Gürdal, A., Şahin, F., & Çağlar, A. (2001). *Principles, Strategies and Methods in Science Education,* Marmara University Publishing, 668: İstanbul.

Hackett, G., Betz, N. E., Casas, J. M., and Rocha-Singh, I. A. (1992). Gender, ethnicity, and social cognitive factors predicting the academic achievement of students in engineering. *Journal of Counseling Psychology 39*(4): 527–538.

Hamayan, V. (1995). Approaches to alternative assessment, *Annual Review of Applied Linguistics, 15*, 212-26.

Hargreaves, A., Earl, L., & Schmidt, M. (2002). Perspectives on alternative assessment reform, *American Educational Research Journal, 39*(1), 69-95.

Johnson, B. R. & Onwuegbuzie, A. J. (2006). Mixed methods research: a research paradigm whose time has come. *Educational Researcher. 33*(7), 14-26.

Jonson, J. L. (1999). *Understanding Barriers to Teachers' Use of Alternative Classroom Assessment*. (Master's thesis). Universty Of Nebreska.

Kan, A. (2007). Portfolio assessment, *Hacettepe University Journal of Education, 32,* 133-144.

Kanatlı, F. (2008). Reviewing classroom teachers' perceptions about alternative assessment and mesaurement techniques. Master's Thesis, Mustafa Kemal University, Institute of Social Sciences, Hatay.

Karasar, N.(2006). *Scientific Research Method*. Nobel Publishing: Ankara.

Kaya, S. (2013). Effects of cooperative learning and peer assessment on academic success, metacognitive awareness and helping behaviors. Master's Thesis, Cumhuriyet University, Instute of Educational Sciences, Sivas.

Kilmen, S., Köstereliođlu Akın, M., & Köstereliođlu, İ. (2007). Pre-service Teachers' Efficacy about Alternative Assessment and Measurement. *AİBU Journal of Education Faculty 7*(1), 129-140.

Kolomuç, A. & Açışlı, S. (2013). Perspective of Prospective Primary School Teachers on Alternative Evaluation, *International Journal of Social Science, 6*(1), 1657-1667.

Law, B. & Eckes, M. (1995). Assessment and ESL. Peguis publishers: Manitoba, Canada.

Law, S., D., Letts, L., Pollock, N., Bosch, J., & Westmorland, M. (1998). Guidelines for Critical Review of Qualitative Studies. Accessed:10.11.2012 http://www.musallamusf.com/resources/Qualitative-Lit-Analysis-pdf.pdf.

MEB, (2006). Science and Technology Curriculum (6.7.8. classes), Ankara.

Nitko, A. J. (2004). Educational Assessments of Students, Englewood Cliffs, NJ:Prentice Hall.

Özden, Y. (2005). *Learning and Teaching*. PegemA Publishing: Ankara.

Perkins, D.N. (1991). Educating for Insight. *Educational Leadership, 49*(2), 4-8.

Pierce, L. V. & O'Malley, J. M. (1992). *Performance and Portfolio Assessment for Language Minority Students.* National Clearinghouse for Bilingual Education. Washington: DC.

Piburn, M. D. & Baker, D. R. (1997). *Constructing Science in Middle and Secondary School Classroom*. Needham Heights: Allyn &Bacon.

Punch, K. F. (2005). *Introduction to Social Researchs: Qualitative and Quantitative Approach,* Ankara: Siyasal Publishing.

Semerci, Ç. (2001). Assessment and measurement according to constructivist theory. educational sciences: *Theory and Practice. 2*(1), 429-440.

Sırkıntı, A. (2007). Primary school teachers' perceptions about Portfolios in Math Lesson.Master's thesis, Gazi University, Institute of Education Sciences, Ankara.

Slater, T. F. (1996). Portfolio Assessment Strategies for Grading First-Year University Physics Students in the USA. *Physics Education, 31*, 82–86.

Tay, B. (2013). The views of social studies teachers about alternative assessment, *International Journal of Social Science, 6*(3), 661-683.

Torrance, H. & Pryor, J. (2001). Developing formative assessment in the classroom: using action research to explore and modify theory, *British Educational Research Journal, 27*(5), 615-631.

Turgut, M. F. (1990). *Assessment and Measurement Methods in Education*. Saydam Publishing: Ankara.

Volante, L. & Fazio, X. (2007). Exploring teacher candidates' assessment literacy: implications for teacher education reform and professional development, *Canadian Journal of Education, 30* (3), 749–770.

Yurdabakan, İ. & Uzun, A. (2011). Comparative analysis of primary school 4'th and 7'th grade students' opinions on self-assessment, *2nd International Conference on New Trends in Education and Their Implications*, Antalya.

Zulkosky, K. (2009). Self-Efficacy: A concept analysis, *Journal Compilation, 44*(2), 93-102.