

**WHAT IS THE PLACE OF KNOWLEDGE ABOUT NOS
AMONG THE OTHER TYPES OF KNOWLEDGE FOR
TEACHERS AND STUDENTS IN TERMS OF
“IMPORTANCE” AND “INTEREST” ASPECTS OF TASK
VALUE?**

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Abstract

The resources of the misunderstandings on Nature of Science (NOS) might be textbooks, teachers and media. The students themselves with their affective characteristics such as value given to any task related to NOS might also be a resource for misunderstandings. With this idea in mind, the perceptions of teachers and their students in high school for teacher education on importance of and interest in about NOS knowledge among the other types of knowledge as school subjects were studied. The study was conducted with 85 high school students and 25 teachers. In this study, quantitative research approach, descriptive research method and survey technique as data collection way were used. As a result of the study, the knowledge of NOS was found to be perceived differently by the teachers and the students in terms of “importance” and “interest”.

Key Word: NOS knowledge, Expectancy-value theory, High School Students

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INTRODUCTION

One of the most important aspects of informed decision making for scientifically literate society includes teaching about aspects of nature of science (NOS) as an objective for education of all people (Uno & Bybee, 1994; Damastes& Wandersee, 1992). As result of epistemological and educational studies, some aspects were determined to be necessary to teach about nature of science in schools (McComas, 1998). The aspects of NOS include dependence of scientific knowledge on evidence and observation, tentativeness, embeddedness in social and cultural context, importance of creativeness and imagination, difference between hypothesis, theory and law, definition of science, objectivity, and multiple ways to do science (McComas, 1998, Lederman, Abd-El-Khalick, Bell, and Schwartz, 2002).

Quality of learning NOS knowledge as similar to other types of learning is dependent on some measurable factors. These factors can be classified as affective and cognitive ones. The cognitive domain measurements include information processing level, reasoning ability and academic achievement (Lawson, 2006; Lawson, Banks & Logvin, 2007; Schunk, 2000; Yumuşak, Sungur & Çakıroğlu, 2007), while the most frequently emphasized factors of the affective domain in education literature are attitude, self-efficacy, anxiety and motivation (Osborne, Simon & Collins, 2003; Ekici, 2005; Savran & Çakıroğlu, 2001, Baldwin, Ebert-May & Burns, 1999; Mallow, 2006; Yumuşak, Sungur & Çakıroğlu, 2007, Glynn& Koballa, 2006). As an affective factor, motivation in education was determined as effective in action by some researchers (Osborne, Simon & Collins, 2003). Motivation is defined as the process which instigates and sustains a goal directed activity (Pintrich & Schunk, 2002). Among the many models for motivation, one of the most emphasized models; expectancy-value model that accepts the individual as an active and rational decision maker might be a strong reflective model for explaining the motivational situations of individuals who have been gaining, using and constructing knowledge for their

daily lives (Pintrich & Schunk, 2002). The model explains that individuals' choice, persistence and performance can be explained by their beliefs about how well they do task and how much they value task. The model claims that expectancies and values are directly effective on achievement choices, performance, effort and persistence (Wigfield & Eccles, 2000). Task value component of the model was shown to be positively correlated with the other important motivational constructs such as self-efficacy, intrinsic motivation, extrinsic motivation, and control of learning beliefs in the literature (Pintrich, 1999; Pintrich & De Groot, 1990, Douglas, 2006, Yumuşak, Sungur & Çakıroğlu, 2007; Bong, 2001). The correlational evidence gathered has been supporting the importance of "task value" component of the model on motivational forces which can initiate and provide action on task. Wigfield and Eccles (2000) explained that the most studied subcomponents of the "task value" were "importance", "utility" and "interest" (intrinsic value). The importance and interest factors are more related to intrinsic processes to explain choices, persistence and performance. Intrinsic factors are rooted from more complex and unobservable constructs; therefore they have potential to explain more than pragmatist surface ideas such as useful or not useful for the aim. Therefore; importance and interest components have a strong potential to predict educationally important outcomes.

The NOS aspects are not understood enough by the students, scientists, teachers and prospective teachers (Blanco & Niaz, 1997; Tsai, 2006; Irez, 2006; Ryan & Aikenhead, 1992; Sandoval & Morrison, 2003; Dagher & Boujaoude, 2005). They have misunderstandings about NOS. The resources of these common misunderstandings are explained as textbooks, teachers and media (McComas, 2003). But, the students themselves are not considered as the resources with their perceptions on value of NOS knowledge in schools. High school lessons are the most important contexts for learning NOS aspects. Interaction between students' and teachers' perceptions on NOS aspects might explain context to learn science more appropriately. By considering importance and interest as the effective factors on components of task value, this study aimed at examining the

perceptions of teachers and their students of high school for teacher training on importance of and interest in NOS knowledge among the other types of knowledge as school subjects.

METHOD

In this study, quantitative research approach, descriptive research method and survey technique as data collection way were used.

Participants

The study was conducted with teachers and students in an Anatolian Teacher High School in northern part of Turkey. It included 85 participants in ninth grade students and 25 teachers who taught different subject to the ninth graders.

Instruments

To collect data, one ranking questionnaire prepared by researchers was used. The questionnaire included 15 names of knowledge type as knowledge given in the school. In the questionnaire, the students were asked to rank the knowledge types by using “15” for the most important and interesting and 1 for the least important and interesting. Then, the instrument was applied to both teachers and prospective teachers.

Analysis of the Data

Data analysis was conducted by tallying the observations for each ranking unit (1, 2,... 14,15). Then all of the frequencies for each unit of ranking were determined and 15 units were combined into three different categories as “Of little” *for* 1–5, “Moderately” for 6–10 and “Very or Much” for 11–15. The combined frequencies were used to determine and compare the perceptions of the teachers and

prospective teachers on knowledge types in terms of interest and importance. The perceptions on NOS knowledge were labeled in the frequency order on the categories of both rankings.

RESULTS

The results of the study will be introduced under this title. The final form combined score results will be presented after that point in the result section. When considered NOS knowledge separately, it is ranked in “of little importance” category by 20 students (23.6%) whereas it is ranked in “very important” category by 33 of the students (38.9%) in terms of “importance” aspect. Majority of the students (86.4%) accept that NOS knowledge is important with the degrees from moderate to very.

The “interest” aspect showed different pattern from the “importance” aspects for the students. When taken NOS knowledge into account separately, it can be seen that 37 (43.6%) of students ranked it in the “of little interest” category while the 23 (27.1%) students saw it appropriate for “much interest” category. Again, majority of the students (56.4%) are interested in “NOS knowledge” with changing degrees from “moderate” to “much”. Differently from students, teachers presented that the majority of them (n=13, 52 %) ranked “NOS knowledge” in the very” important” category whereas only 2 (8%) individuals indicated it in “of little importance” category. Twenty-three of the teachers (92%) ordered it in the “moderate” and “very” categories.

When taken “NOS knowledge” into consideration separately for interest of the teachers, it is found that 5 (20%) of the teachers ranked it in “of little interest” category whereas 9 (36%) of them ordered in the category of “much interest”. Majority of the teachers (n=20, 80%) are interested in “NOS knowledge” with the degrees from “moderate” to “much”.

The general tendency of the majority (over 50%) showed that the students ordered “NOS knowledge” in the category of “moderate importance” while teachers ordered it as “very important”. When the order on types of knowledge are considered, it is seen that “Knowledge of NOS” are perceived as more important than “Knowledge of Economics” and “Knowledge of Art” by students while it is ordered in the same category with “Knowledge of Geography” and “Knowledge of History”. All knowledge types related to science are ordered in the “very important” category by both teachers and students. Teachers ranked “Knowledge of Physics”, “Knowledge of Chemistry”, “Knowledge of Biology”, “Knowledge of Art”, “Knowledge of Economics” as less important knowledge types than “NOS knowledge” while they ranked “Knowledge of Health” and “Knowledge of Geometry” in “very important” category in the same order. The other all types of knowledge presented in the school were ordered as in “very important” by the teachers.

The general tendency of the majority (over 50%) presented that the students and the teachers ordered “NOS knowledge” in the category of “moderate interest”, but the teachers put it into the tenth order while the students put it into seventh order. When the order on types of knowledge are taken into consideration, it can be seen that “Knowledge of NOS” are perceived as more important than “Knowledge of Economics”, “Knowledge of Education” and “Knowledge of Health” by students while the teachers ordered “Knowledge of Physics”, “Knowledge of Economics”, “Knowledge of Geometry” and “Knowledge of Chemistry” in the categories which had less order value than “NOS knowledge”.

CONCLUSION

The place of knowledge about NOS among other types of knowledge presented in the high school for teacher training was determined as the third least important knowledge type by the students while the teachers ranked it as the sixth least important knowledge type. The result showed that teachers have more positive

perception about NOS knowledge among the other types of knowledge in terms of “importance” than the students. The students’ perception on knowledge of NOS is corresponding to “of little importance”. This result might be a reason for misunderstandings on NOS aspects. As indicated in the literature, “value of the task” is directly related to learn about task correctly by effecting enrollment and performance (Bong, 2001). Although the order is corresponding to moderate level for the teachers, there is no enough importance perception of the teachers on NOS knowledge. The situation will be clearer when other knowledge types are considered. The knowledge types related to science content knowledge are considered as similar for their importance level while knowledge of NOS is perceived as a different thing from them. Again, the order provided by students showed that the knowledge types about science content are put in similar category whereas they put the knowledge of NOS in a different category with giving less importance. As another difference for the teachers and the students, the teachers ordered some knowledge types related to social sciences such as history, literature and education as more important than NOS knowledge while the students did not make such a ranking. When looked at “interest” aspect, it was seen that the students were more interested in knowledge types regarding to science than the knowledge types of social sciences such as “Knowledge on Native Language and Literature”, “Knowledge of History” and “Knowledge of Education”. The knowledge on NOS was ranked in “moderate interest” category by the students as similar to the knowledge types of social sciences. Differently, although the teachers put knowledge of NOS in the category of “moderate interest”, they presented opposite “interest pattern” from the students. They were more interested in the knowledge types regarding to social sciences such as “Knowledge on Native Language and Literature”, “Knowledge of History”, “Knowledge of Education” and knowledge types of technology, art, mathematics, and geography than the knowledge types of science content. Again, knowledge on NOS did not take required interest to teach the aspects of it in the educational environment constructed by the teachers.

This study is a descriptive study in nature. Therefore, the results of it should be carefully examined. The previous experiences on the issues about NOS or other knowledge types and science definitions of the students might be reasons of their perception.

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