Redefining Scientific Literacy In The 21St Century: Comparison Of Expert Opinions

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Purpose

The impact of increased information on societies has also increased through advances in science and technology. This reveals the necessity of science and technology literate society. The rapid change in scientific knowledge shows that the definition, content and dimensions of scientific literacy must also be dynamic. In this respect, it is important to determine the content and dimensions of the scientific literacy in the 21st century. The main objective of this basic need is to determine the basic structure and dimensions of scientific literacy in the 21st century. In this study, the results of the second round of the Delphi technique which was performed in three rounds were included. In detail, as one of the sub-objectives of the study, it was aimed to compare the opinions of national and foreign experts on the sub-dimensions of scientific literacy and to determine the general tendency.

Method

Delphi technique is a valid and reliable technique in which expert opinions about a problem situation are systematically obtained. With this technique, it is aimed to reach a consensus of opinions among the individuals who look at this problem situation from different angles, and this is done through the implementation of successive surveys. In this study, with the use of Delphi technique, experts' opinions about the scientific literacy in the 21st century were collected through "scientific literacy expert opinion form" in three technical rounds. For this purpose, at the second round of this Delphi study, opinions from a total of 58 experts, 11 foreign and 47 domestic, were obtained. While the first section, which contains the basic structure of scientific literacy, consists of six sub-dimensions; the second section, which contains the subjects and concepts that should be included in scientific literacy, consists of three sub-dimensions. In this study, only the sub-dimensions in the first section were evaluated. The first part consists of a total of 41 propositions, including basic concepts and principles of science (7 items), science, technology, engineering, mathematics, society and environment (11 items), science process skills (4 items), scientific thinking skills (9 items), 21st century skills (3 items) and value and attitude (7 items) sub-dimensions. In order to collect data, the opinion form was emailed to the experts and the experts were asked to score the items from 1 to 10 (10; totally agree and 1; disagree) and to explain the rationale of their scores. The data obtained in the second round were subjected to descriptive analysis and the values of arithmetic mean, median, mode and standard deviation of each item were calculated. It has been decided that the items that had been scored 7 and above by the 85% of the experts and had a standard deviation of less than 2.00 were not sent to the third round due to the attainment of high consensus.

Results

At the end of the second round, there were 12 items that matched with the criteria set and remaining 29 items were sent back to experts for the third round. Regarding the results of the second round, while the national experts concurred on five items, foreign experts concurred on three items for the basic concepts of science sub-dimension. In general, consensus was reached for total of four items. It

is worth to mention that, the item 6, "Use scientific knowledge to derive evidence-based conclusions," was rated 7 or more by 100% of foreign experts while 89% of domestic experts rated it 7 or higher. For 11 items under the sub-dimension of science, technology, mathematics, engineering, society and environment, both domestic and foreign experts were concurred on 3 items. One of the three items was the same. Under this sub-dimension, the item “participation in the context of science and technology in democratic processes” drew the attention. While 90% of the foreign and only 65% of the national experts rated it 7 or higher. The standard deviations for this item was found to be below 2 for foreign experts (1.36) and above 2 (2.28) for national experts. In the third sub-dimension, science process skills, which consisted on 4 items, national experts reached consensus only on 1 item, while foreign experts reached consensus on 2 items. The differences in general tendency on scientific thinking skills also drew attention. There were 9 items in this sub-dimension, and national experts reached consensus on all of these items, while foreign experts reached consensus only on 1 item. The item was "to develop an argument by reasoning about scientific, personal, social and economic problems" for which consensus provided by both expert groups and rated 7 or higher by all the foreign experts. Neither domestic nor foreign experts had provided consensus on any of the three items placed the sub-dimension of 21st century skills. Also, no consensus was reached on the values and attitudes sub-dimension among the foreign experts, while for two out of seven items, consensus was reached among the national experts.

Conclusions

According to the findings obtained at the end of the study, it can be said that 21st century skills was not considered as a sub-dimension of scientific literacy by both national and foreign experts, although it was seen as the skills that an individual should possess today. This was not very different for the values and attitudes sub-dimension. The general trend among the experts showed us that many items in the values and attitudes sub-dimension were not considered as necessary for scientific literacy. This might be due to the fact that many experts think an individual does not have to be interested in science to be scientific literate.

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