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A Study on Science Teacher's Perceptions, Issues in Socio-Scientific Education

Vikas*

Department of Education, M.Ed. (Special Education) Visual Impairment, Kurukshetra University Kurukshetra, 136119

Abstract – This research explores the opinions of the students in science and class in the area of socio-science and their expertise in the application of socio-scientific questions in the teaching of science and technology. The thesis followed a qualitative approach to analysis, and the participant determination criteria survey methodology was used. The data from this analysis were obtained through a questionnaire comprising five questions that were open-ended. In the academic years 2009-2010, data for the study were obtained at the Summer School and evaluated through descriptive analyses. It was discovered that instructor applicants conceptualize socio-scientific problems in multiple forms. When the meanings are analyzed in general, it is found that the characteristics of social and science questions are recent phenomena that have a scientific foundation that have an impact on human and societal existence. Candidates for teachers claim that they are incompetent to use cognitive psychology in the instruction of science and technology.

Keywords: Socio-Scientific, Teachers Perception, Issues

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INTRODUCTION

Social-scientific concerns (SSIs) reflect critical social issues of social contexts relevant to research. Society, particularly religious, political, social and economic issues have been expressed, although there has been a considerable amount of empirical evidence and study practice. Therefore, SSI inquiry and negotiation involve science principles and methods to be incorporated into social building and practice. Socio-scientific tasks allow people to reflect on and develop decision making and analysis capabilities on the effects of knowledge on societal existence. It therefore is important for children of school age through science and technology lessons to be aware of the above trends, to focus on such concerns and to participate in classroom discussions.

Students prepare to be involved and educated members in community by socio-science topics. Students must develop techniques for this changing environment. Students need to learn. Science educators have a role in teaching students how to think about societal problems like scientists. The creation of powerful community made up of citizens who realize their present and future is supported by an efficient science guidance. In science classes, socio-scientific matters should be used for the following purposes: (1) to have rich frameworks for examining essential science contents; (2) to help students grasp the association of science to life; and (3). Many scholars today claim that new designs in science literacy can be accomplished by socio-scientific problems and advocate that socio-science are central elements of the existing schools of science and technology. It is also important that children of the school age are educated, guided towards learning, and that they address socio-scientific questions. Until students are informed about this problem, they will not understand how science and technology affect social life. It is the duty of the teachers to eliminate these constraints and to enable the students to plan themselves and lead them in this aspect. At this stage, it is only by determining the instructor candidates' expectations of their abilities to use social learning that we can achieve the outcomes by utilizing the socio scientific problems in science and technology learning, creating an effective learning method, learning what to think in reality and recognizing how to mirrored the stuff we learned. Under this framework, this research is intended to examine the views on socio-scientific concerns of science and classroom instructor applicants and their competencies in the area of science and technology teaching.

In 1958, Paul DeHart Hurt first used the word 'scientific literacy.' Paul DeHart Hurd clarified this definition as the distinction of hypothesis and dogma and legend, and public speeches in his 1958 book "Science Literacy: its Signification for American Schools." Miller (1983) defined scientific literacy as I an awareness of science standards and cognitive content; (ii) an understanding of scientific terms and values and (iii) a sensitization of the effect on individuals and community of science and technology. In the 1990's, the idea of science literacy arose across natural and social sciences as a more systematic and transdisciplinary framework. It takes a more systematic and broader viewpoint and study to investigate a broad variety of concerns, including wellness, alternative forms of energy, environmental issues, biotechnology, in order to resolve scientific and social issues together. Science awareness as a whole of the opportunity to utilized empirical information, recognize challenges and draw evidence-based assumptions, consider the environment and make judgments about improving the actions of individuals. science-literati want the knowledge of the relations between science and culture, the understanding of the basic principles that the scientist would provide, his opinions on the essence of science, the understanding of the gap between science and technology, the understanding of the essential ideas of science and the understanding of reciprocal experiences between science and community; The engagement and awareness of the participant in and around scientific literacy, their involvement in science talks, their cynical attitude to science-related scenarios spoken by other individuals, their desire to recognize and achieve proof based study, and their knowledge of the world and their wellbeing. The scientific literacy considered to be a matter for scientists, engineers or physicians, not only but also all students in the sense of scientific questions within societal bounds and the establishment of environments outside school borders where students may make use of their personal experiences in the context of science they are experiencing.

The aspects of research, technology and society (STS) have been introduced into the definition of scientific literacy in the historical growth of the scientific literacy framework since the 1950s. The STS movement has been a significant part of these three dimensions for more than 50 years. The STS phenomenon is the most prevalent and long-standing movement to date that has arisen to demonstrate scientific, technical and social uncertainty and interrelationship. In science curriculums, with a special focus on scientific literacy and technical applications of science, the connection between society and science often takes its position. At the end of the 1970's, several scholars in science education proposed a subject that included science, technology and culture and represented its cumulative impact. Scientific literacy was thus characterized in a social sense in the 1970s and early 1980s by widening its reach of science more intensively.

Socio-scientific concerns are a fitting and essential backdrop to promote science literacy in the society of today, which began with the STS revolution in the 2000s and was appealing for STSE dimensions. It has been mentioned. 1.2 Socio-scientific concerns Advances in research and technology have strongly connected culture to the present century, with science, technology, society and the world highly regarded. In science curricula in Turkey particularly after 2005 substantial changes and arrangements were made. The vision of both the 2005 Science and Technology Curriculum and the 2013 and 2018 Science Curriculum encourages all pupils, regardless of their distinction, to be taught as science-literate persons. In the science curriculum for 2018 the socio-scientific questions (SSIs) are also highlighted which shape a significant setting in the education of students as scientific-literate individuals and were first posed in the field of science-technology-community and the climate. In the last decade, several studies have illustrated the value of SSI in science education for the purpose of being a science literate citizen.

SSIs are described as contentious issues involving ethical, moral or legal dilemmas which have no definite agreement and vary from one's viewpoint. For e.g., students, professors, university students, various organizations and the public, who are facing a dilemma in connection with a nuclear power plant proposed to be constructed in Sinope, and others with different viewpoints on the different issues should address it using its multidimensional framework and afterwards Again, several contentious questions are debated in culture and in the media, such as surgical motherhood, glucose tolerance checks, various assessments by multiple professionals and a consequent links between science and community. In recent years, these challenges, which involve all mankind, have also become an important part of scientific education. Teachers play an important role in the successful transition of SSI to the classroom as in any educational shift. In determining if the substance of any topic contains a socio-scientific condition a thesis, a teacher or a pre-service teacher must determine whether it is scientific, whether it creates a problem for the individual, whether it covers the dimension of science, culture and technology, whether it is open-minded or represents several prospects, and the significance of ethical and moral considerations. Teachers in the teaching of SSI have great responsibility and science teachers should be trained in this field. It is critical, in particular, that science teachers be aware of and aware, what SSIs are and how they contribute to the objectives of science education for a successful method of SSI learning. There are several empirical results that demonstrate beyond question that the teachers do not have the critical information about SSI, knowledge of strategies and techniques and how to inform them about them. No research on the understanding of science teachers on these topics and the instruction of these matters have been identified in literature on SSI, which is becoming more relevant in Turkey. Given that literature offers little research with students, it is to be hoped that positive results can be accomplished by defining the SSI understanding of science teachers who are the most significant components of the teaching and curriculum practitioners, and their sense of the method of SSI teaching, which is essential for raising the knowledge of science and knowledge.

OBJECTIVES OF THE STUDY

1. Candidate teachers interpret socio-scientific concepts
2. views on socio-scientific issues which can be included in scientific lessons by teacher candidates
3. Views of teacher candidates on the contribution of science education to students

LITERATURE REVIEW

There is little research to review the collective selection of SSI-based teaching and learning by students. As such, the literature review comprises of teachers' collective curricula in general, teachers' viewpoints on the use of SSI-based methods and their approaches to SSI-based teaching architecture and implementation, and selection requirements for SSI-base curriculum. These parts together make a void in literature triangulate and illuminate.

Teacher Collaboration in General

We begin with a compilation of two evaluations in general of teacher engagement (**i.e., Kelchtermans 2006; Vangrieken et al. 2015)**. Collaboration is described as "cooperative teacher activities (their actual work together) for employment purposes" **(Kelchtermans 2006)**. In the context of the coordinating structure of the school as well as the agenda and substance of the partnership, teachers' collaboration was mediated according to **Kelchtherans (2006)** study. Teachers appreciate partnerships in student development and health functional aspects. Teachers must then create a degree of confidence and security in order to collaborate with teachers so that they can confront established beliefs. They must also interact with each other. However, the likelihood of confrontation rises when confronted with values. **Vangrieken et al. (2015)** analyzed 82 teacher collaboration research (2000–2015) and interpreted teacher collaboration as spectrum from one party to more human interdependence stages. They described an absence of deep cooperation among teachers, perhaps connected to the alienation of teachers, a culture of teacher individualism, and a tendency for teachers to escape questioning their underlying beliefs. The positives of teacher cooperation at teacher's level include improved engagement, lower workload, higher moral expectations, decreased isolation and increased student training; negative effects such as competition, conflict-related pressures, larger workload, and majority dependent compliance. **Vangrieken and others (2015)** have documented the benefits of collaboration. Collaboration may be avoided if teachers are reluctant to communicate, confrontations or disputes between individuals. The mechanism and outcome of cooperation can be known. Factors promoting cooperation exist mostly at the process level (e.g., established emphasis, specific position of the participant, flexibility); some scholars claim that a common discipline, such as biology or chemistry, involves co-operation. The collaboration literature, **Vangrieken et al. (2015)**, reflects on the causes, conditions, and consequences of collaboration but disregards the real collaboration process. They also demanded studies to investigate the cooperation of teachers.

Collaborative Curriculum Design

Clarke and Hollingworth's (2002) The IMPG was a valuable paradigm for the analysis of instructor learning through integrated instructional design (i.e. changes) intertwined professional development model **(Drits-Esser 2015; Voogt et al. 2011; Voogt et al. 2012)**. In the IMPG, there are four interrelated fields in which teachers may change: the teacher's personal domain of information, creeds and attitudes; the work domains comprising of the teachers' expertise and practice; the effect domain composed of excellent outcomes that teachers experience in the application of new practices; and the external domain (e.g., the PD). While the Clarke and Hollingsworth (2002) model was intended to explore individual instructor development, Voogt and collective curriculum designers **(Voogt etal. 2011, 2012)** were able to utilized the IMPG to examine progress at group level. They indicated that concept teams had largely benefited in the personal domain and practice domain. In addition, teachers executing the programme and focusing on the self-confidence of teachers within the personal realm throughout and after **(Voogt et al. 2011)**.

Socio-scientific Issues and Teachers

Despite many science teachers' reasonably optimistic outlook on SSI, teacher perceptions and practices research has found many constraints to the successful implementation of SSI teaching. These limits include the insight of teachers that the timeframe for preparation and enactment is short **(Ekborg et al. 2013, Sadler et al. 2006)**, the absence of SSI-oriented instruction manuals and limited cooperation from local administrators **(Lee et al. 2006; Tidemand and Nielsen 2017) (Saunders and Rennie 2013)**. Explorations of SSI learning encounters by students have reported how teachers battle with SSI. These challenges involve educators' distress in their schools in divisive debates **(Bryce and Gray 2004; Day and Bryce 2011)**, minimal appraisal experience **(Tidemand**

and Nielsen 2017), and the movement towards relying solely on empirical theories at the cost of contextualized awareness of the issue **(Ratcliffe and Millar 2009)**. However, several instances have recorded forms in which teachers have successfully carried out teaching directed to the SSI with these restrictions and challenges **(e.g., Lee and Witz 2009; Saunders and Rennie 2013; Simon and Amos 2011)**. **Bosser and colleagues (Bosser et al. 2015)** also indicated that the teaching of SSIs can not only be applied effectively but that "integrating SSIs is an advantageous way of stimulating classroom transformation".

The definitions within this context are plain, complicated, and chaotic. Simple case SSI's are direct uses of proven empirical expertise from a particular field and the relevant human harm, for example the broken arm, is negligible or rather minimal. **Fensham (2012)** reported that this group accounted for 90% of science instruction. The usage of proven details in different scientific fields requires complex SSIs. The vulnerability in humans is minimal to medium, for example cardiac bypass surgery. Complex SSIs include research in different fields and the danger to humans, e.g. global warming, is very high. The fourth group, chaos, requires unknown research, although the threats to humanity are very high, such as those on the Pacific islands, which, because of global warming, have risen maritime levels. **Fensham** warned that science instructors, who operate independently, cannot learn problems that fell into complicated cases and chaos categories.

METHODOLOGY

The study followed a qualitative approach to analysis, and the participant determination criteria survey methodology was used. In this respect, the research followed the following criteria: 1. Teacher applicants training of teaching or coaching classes of science education, 2. Candidates for the instruction of science and technology participated in the lectures, 3. The research was actively attended by teacher applicants. The research data was obtained from instructor applicants who enrolled at a University in Turkey's teaching programmes in teaching and science and technology. A research was attended by 83 instructor applicants, who completed the above steps and were asked to complete an inquiry. For certain purposes, 14 of the ways of the survey were not examined during the review and evaluation process. The analysis of 69 participants was then carried out. The research contained 29% of teacher applicants women and 71% males. Similarly, 29% were students in the teaching curriculum for science education and 79% were students in the school. The data from this analysis were obtained through a questionnaire comprising five questions that were open-ended. Using an open-ended test, the researcher will grasp the whole image and it helps people to share precisely their viewpoint or values. In the academic years 2009-2010, data from the study is obtained from the Summer School. Both questionnaires were introduced for teachers' applicants at informal meetings with the first researcher in order to gather teachers' views on the socio-scientific problems. The collected data were evaluated through descriptive study.

FINDINGS

- **Candidate teachers interpret socio-scientific concepts**

The definition of socio-scientific question is described in various ways by teacher candidates. One of the participating professors' applicants described the socio-science problem as "social and daily events as well as scientific issues of interest". Some meanings say that the "citizen's awareness of scientific information and development" are "sciences that affect daily life." Societal concerns such as global warming, cloning is "scientific issues that affect everyday life". Once concepts were analyzed in their entirety, it became apparent that socio-science issues were mainly regarded by teacher candidates as "a scientific question that interests society" In comparison, several of the instructor applicants had difficulties in the understanding, description and conceptualization of the concept of socio-scientific concerns. The reason of this is the reality that in science and technology lessons socio-scientific problems are not properly highlighted, and also that instructor applicants do not realize that they should use socio-scientific issues as well as they use certain resources to enhance the learning process. In the other side, this dilemma is affected by many other reasons because teacher preparation systems are being planned by the Council for Higher Education in Turkey and the education faculties are not scalable. As a consequence, in all these particular situations, instructor applicants have difficulty conceptualizing and explaining social-scientific concerns.

- **Views on Socio-Scientific Issues Which Can Be Included in Scientific Lessons by Teacher Candidates**

The following issues should be used, as socio-scientific issues according to the teachers candidates: "GMOs, world warming, nuclear, nuclear energy, power generation, water consumption, pollution from the environment, scientific inventions, technological and scientific development products, healthy nutrition, balance of energy," The instructor candidates' challenges are either favorably or adversely influenced by the topics that may be included. In the other side, the issues often debated in written and visual media, the social science concerns that the instructor applicants believed may be exploited in scientific and technical classes, are on the policy public agenda. From this stage on, the problems of the social sciences are considered to be of an everyday existence and are to be debated by the population. The problem of instructor applicants was found therefore in conceptualizing socio-scientific problems; recommendations consistent with literature were made with respect to the social-scientific concerns that can be included in scientific and technological lessons.

- **Views of teacher candidates on the contribution of science education to students**

Teachers also reported that the following tasks are found in the science and technology education: 'developing knowledge and generating the cultural realm,' 'understanding ties between science and technology and culture,' 'enhancing learning experiences and increasing participation in science and technology,' 'developing scientific processes'

An applicant for a teacher says that in science and technology classrooms socio-scientific problems should be present for knowledge raising and for the promotion of a general community.

"...youth and students in no social or science matters are vulnerable. We should guide the way, as educators, in this matter. It should be understood that people residing in and near the base stations would face negative conclusions and the irreversible losses left by base stations will never be contrasted with the rent value of any base station

As we understand it, educating people in culture by education and generating consciousness about the impact that scientific and technical advances have on human existence or wellbeing is the underlying explanation for tackling social science concerns in science and technology education.

It was recommended that students study research, technology, culture and environmental affairs in science and technology courses. A research instructor applicant expresses this connection to the argument that "study participants will scientifically understand social events and will see that science isn't a separate branch but is always present in the social environment." There are little question that scientific and technical advances have a beneficial or detrimental impact on existence of individuals or cultures. Scientific, technological, ethical and moral principles of individuals or cultures are changing due to this relationship. In addition, technical science advances are negatively impacting the natural world. Therefore, it is necessary to include socio-scientific questions to make students understand the trend of science, technology, culture and the world.

The usage of socio-scientific questions in science and technology lessons is claimed to enrich the learning climate. In addition, teachers assume that socio-scientific concerns make studying interesting and raise participation in scientific and technological lessons. In line with this, the students' opinion is that "students are profoundly involved in science and technology", "It gives students experience. The participation of students in lessons is growing". The following is a more comprehensive opinion on the issue:

"As the students understand that the dilemma they face is indeed in their classes, the teaching would be more exciting as we add life to the classroom. In addition, when seeking to find answers to the challenges, students can realize that they are members of the community".

One of the advantages of using socio-science problems is the advancement of scientific methods. With respect to learning these abilities, applicants for teachers mentioned their views: "Looking at pupils. A scientific way of thought", "I agree... that it would boost literacy in research". It can be said that socio-science questions help students determine, based on scientific expertise and study, according to the instructor candidates' views.

Teacher candidates said socio-scientific topics used in education in Science and Technology would help students to consider, debate, and solve problems. One of the teacher candidates who shares his thoughts on the subject says, "First of all, these topics are accessible to debate and the places for students to share their opinions are sufficient. Students speak about it by sharing their own beliefs". The instructor candidates have referred to the element of socio-scientific that is not appropriate, stressing that this will offer the framework for students to clarify and explore their reasoning. Such perspectives that students train to think, analyze and address challenges are as follows: Socio-scientific topics.

"It allows them the chance to think and articulate them scientifically and creatively. It develops a multidimensional capacity to think and grow research and issues. It leads to improving advanced thought capabilities in addition to curiosity and involvement in socio-scientific topics".

Scientific and technological advances make it more challenging for citizens to examine complex issues. It is also necessary for students to learn strong thought skills. It can be said that social and technological concerns lead students to focus on the influences of science and technology on social life and the climate. In addition to gathering students who speak about and overcome challenges, another contribution to help them gain perceptions and beliefs tends to be created by students. Socio-scientific concerns enable citizens to establish attitudes to environmental conservation and growth, to experiment with animals and human beings, or to build values that cover ethical issues.

With respect to socio-scientific behaviors and beliefs, the instructor contestant said: "We are raised as sensitive beings. They are economically and socially respectful. They value and defend nature and human beings".

DISCUSSION AND CONCLUSION

It was discovered that instructor applicants conceptualize socio-scientific problems in multiple forms. When the meanings are analyzed in general, it is found that the characteristics of social and science questions are recent phenomena that have a scientific foundation that have an impact on human and societal existence. Ratcliffe (2003) claimed in her book that these problems fell beyond empirical awareness, where she studied the properties of socio-scientific matters. In her view, socio-scientific concerns comprise largely of everyday issues which have a detrimental or positive impact on human and societal existence.

Candidates for teaching have chaos to benefit from the subjects impacting social existence in the world and Turkey and among those addressed in public the socio-scientific problems they should use in science and technology. Stuff such as global heating, infectious infections (swine flu, bird flu... etc.) cloning, environmental poisoning and genetically engineered products may be socio-scientific problems that can be included in the scientific and technology lessons. The content for use in teaching, such as the Website, news stories, TV, photographs and posters, depends on the problems with the named concerns.

According to the study findings socio-scientific questions have the roles to provide history, to consider science-technology, society-environment, to construct scientific systems, to reflect, to argue, to overcome the problems – to learn skills, to attitudes and morality. In addition, the participants said that social science strengthens the learning atmosphere and enhances the curiosity in science and technology. Pike continues the funding for the growth of science knowledge, decision-making and analysis skills of students utilizing socio-scientific topics. Socio-scientific problems should be seen as a means to train students for involved, educated community engagement.

Teacher applicants claim they are incompetent in applying socio-scientific problems in science and technology education. The underlying explanation for the incompetence of teacher applicants is the curriculum. They claim the curriculum they learned does not include any schooling and there is no lesson in teaching socio-scientific problems. In the other side, the competence of teacher applicants does not equate this skill with the technical experience, but with the human curiosity in socio-scientific problems.

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Corresponding Author

Vikas*

Department of Education, M.Ed. (Special Education) Visual Impairment, Kurukshetra University Kurukshetra, 136119

vikassaini21006@gmail.com

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Abstract –

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INTRODUCTION

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