

# Journal of Turkish Science Education

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## Editorial

### In Memoriam of Norman G. Lederman

As the family of Journal of Turkish Science Education, we are sorry to lose one of the honorable colleagues Prof. Dr. Norman G. Lederman. We believe that those who are interested in science education are also sorry for this lose. In order to develop science education field globally, we follow Dr. Lederman as both young and old science education researchers. Also, we looked up Dr. Lederman one of the leaders of the science education community. Around 40,000 citations in Google Scholar are one of the indicators that he remarkably effected the development of science education field.



His ideas and studies increased the interest towards him and his thoughts were the subject of around 150 postgraduate theses with citations of his works in our country. We believe that this situation is similar with the other countries as well. But as Turkish science education community, we much appreciated and valued his ideas and theories in the modern construction of science education. We always remember his legacy with respect on behalf of both our country and globally in science education community.

Best regards,

Editor-In-Chief  
Prof Dr. Salih Çepni

Editors  
Dr. Ümmühan Ormancı  
Dr. Bestami Buğra Ülger  
Dr. İsa Deveci  
Dr. Yılmaz Kara

Many Turkish colleagues in Science Education worked with him as Ph.D. students and scholars respectively. **Many of the two colleagues' experiences and memories were shared below.** They are Prof. Dr. Mehmet Fatih TAŞAR (Chair of ESERA in 2009) and Asst. Prof. Dr. Çiğdem HAN-TOSUNOĞLU.

## An Intellectual Man: Norman George Lederman

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### Academic Life

The life of Norm started in 1952, New York City. The first degree awarded to him was done in 1971 where he was awarded the B.S. degree in Biology from the Bradley University. After that, he went on to be awarded the degree for M.S. biology from the New York University in 1973. He was a biology teacher of a high school and college student of Illinois and New York. He also taught biology to the students of the Syracuse University in that time. During the time when Norm was a teacher, he went further and obtained the degree of M. S secondary education from Bradley University (1977) and after that he went on to obtain his Ph.D. in science education from the Syracuse University in the year 1983 under the supervision of Dr. Marvin Druger.

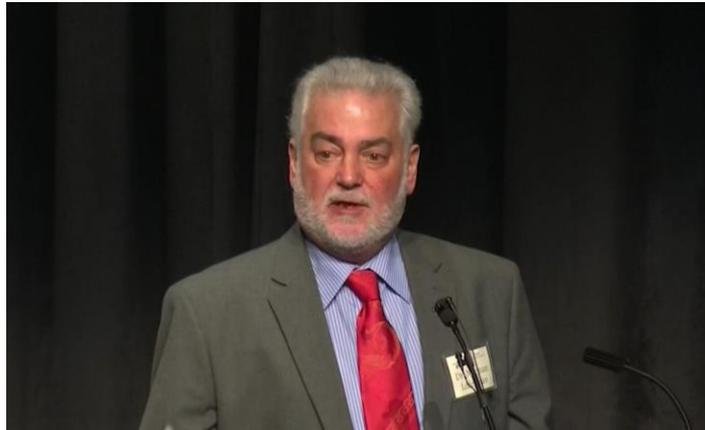
The position for an assistant professor was held by Norm in the field of science education at the Syracuse University, the Oregon State University (OSU) and the State University of New York – Albany. The year 2011 was a prominent year for Norm where he chaired OSU's department of mathematics and science education. He left this chair and joined Illinois Institute of Technology (IIT)'s new department of mathematics and science education. The achievement of a distinguished professor in IIT was given to Norm, and until his retirement in 2020, he made his IIT department successful at a local, national, and international level where he is deemed as a prominent figure for the discipline-based mathematics and science education.

### The Prominent Publications

After earning his doctorate, he published his first article titled “*Classroom factors related to changes in students' conceptions of the nature of science*” with his supervisor in the *Journal of Research in Science Teaching* (JRST) in 1985. Although the paper was not his most popular work, it provided him to take the first step towards becoming one of the leading scientists in the field of nature of science (NOS). Norm pioneered in the field of teaching and learning NOS and in Scientific Inquiry. The focus of Norm's study was on pre-service and in service comprehension of a teacher's knowledge about the subject matter and pedagogy. In our field, the paper published by Norm on the review of research literature on NOS in the *Journal of Research in Science Teaching* (JRST) is one of the top most cited pieces of the literature. The contributions of this paper in the research on NOS in science education is paramount and has shaped how we conduct the research in this field for over 3 decades. Norm's career was prominent. He published more than 200 articles in journals that were professionally refereed and 46 book chapters. Norm authored and edited 11 books and his publications has been cited over 39,000 times at the end of February 2021. Other his most cited research including development of views of nature of science questionnaire (V-NOS) (Lederman et al., 2002), a critical review of science teachers' conceptions of nature of science (Abd-El-Khalick & Lederman, 2000), the nature of science and instructional practice (Abd-El-Khalick et al., 1998) and inquiry as a context for learning nature of science (Schwartz, Lederman & Crawford, 2004). His contributions are relevant not only to nature of science and scientific inquiry but also bear upon teachers' pedagogical content knowledge and subject matter structure (Figure 1.).

### Figure 1

Norm has made numerous presentations and invited talks at professional conferences and meetings



### His Awards

Norm was awarded the Illinois Outstanding Biology Teacher Award by the National Association of Biology Teachers (1979). He was also awarded the Presidential Citation for Distinguished Service in 1986 and Outstanding Mentor Award (1998) from the Association for the Education of Teachers in Science (ASTE). He provided major contributions and leadership to many important national and international organizations in the fields of science teaching, science teacher education, and science education research. Norm became the president of Association for the Education of Teachers in Science (AETS) (1994), and a member of the board of directors (1994–1998) and director of teacher education (1996–1998) of the National Science Teachers Association (NSTA), and NARST executive board of directors (1997–2000) and then NARST president (2002). Norm served as the North American representative to the International Council of Associations for Science Education (2004–2010).

The impact of Norm in the field of science education allowed him to be elected as a Fellow of the American Association for the Advancement of Science in the year of 2009 and in the next year, he was elected as a fellow of the American Education Research Association. In 2011, NARST honored him with the Distinguished Contributions to Science Education through Research Award for the outstanding and continuing contributions and substantial impact in the area of science education. Since his major contributions throughout his career, he was given recognition by the NSTA in the year 2017 and awarded the distinguished Service to Science Education Award.

### The Contributions to Turkish Science Education

The goal of promoting science education all around world was held by Norm. In his career, Norm was a Visiting Research Professor at National Changhua University of Education, Taiwan; a Fulbright Scholar at the University of Pretoria, South Africa; Honorary Professor at the Hong Kong Institute of Education; Guest Professor at the Beijing Normal University, China; and Distinguished Foreign Expert at the State Administration of Foreign Affairs, China. These positions are the indicators of his commitment in the field.

Norm was a prominent figure in Turkey and one of the most famous science educators for the people who were studying on NOS. 157 thesis on NOS (including master and doctorate) were completed between 1998-2020 in Turkey. After 2007, a dramatic increase was observed in the number of nature of science studies in Turkey (Erdas, Dogan & Irez, 2016). A large portion of these studies used the instrument of VNOS by (Lederman et al., 2002) to evaluate individuals' understanding about NOS.

Approximately 7% of the citations of Norm's most cited works have been given from the Turkish scientific articles and thesis by the end of February 2021.

After the publication of the VNOS instrument in 2002, an analytical framework was presented to evaluate individuals' understanding of NOS. Consequently, the number of studies on the examination and development of individuals' views of NOS in Turkey has always increase after VNOS. The research on NOS in Turkey has been of great importance to the understanding of NOS and the integration of the NOS into the Turkish science curriculum. As per the research findings and discussions, it is necessary for the Turkish science curricula to be changed to include NOS and their aspects to promote scientific literacy (Ministry of National Education, 2013). An example of NOS effect can be seen in the biology curriculum with an emphasize on the importance of understanding aspects of NOS in the science classrooms as one of the outcomes of the 9th grade studies.

### The First Meeting

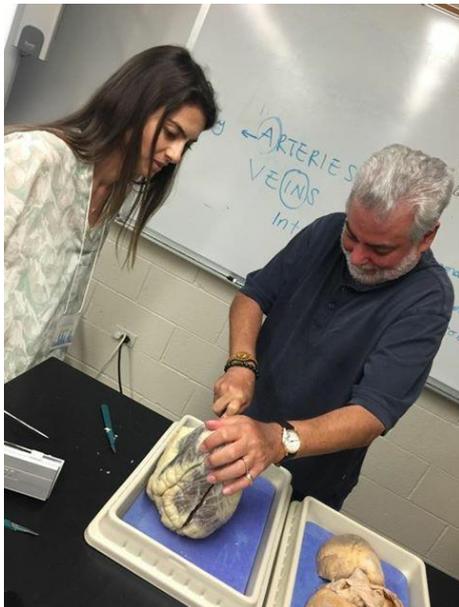
In 2014, I got a scholarship from Turkish Higher Education Council as a doctoral student to spend a year abroad for improving my research skills and ideas. Although either NOS or scientific inquiry is not my primary research interest, I really wanted to work with Norm Lederman. Because he had several valuable studies about pedagogical content knowledge, though as not as popular as NOS. I believed that I could learn something from the famous man. I first met him on Skype in 2014. Even today, I remember how excited I was. Norm's first question was what was my research question and why I choose him.

Norm was an excellent and inspiring mentor in academic life of his students (Figure 2.). Because he was very intellectual and experienced and had incredible amount of energy. He supported his students and colleagues and was always ready to answer their questions. He always encouraged me to do much better in my academic life (Figure 3.).

I would like to say it was a privilege and an honor to have worked with Norm.

**Figure 2**

Norm performing a brain dissection



**Figure 3**

Norm and Judy giving a party at their home



### References

Abd-El-Khalick, F., & Lederman, N. G. (2000). Improving science teachers' conceptions of nature of science: A critical review of the literature. *International Journal of Science Education*, 22(7), 665-701.

- Abd-El-Khalick, F., Bell, R. L., & Lederman, N. G. (1998). The nature of science and instructional practice: Making the unnatural natural. *Science Education*, 82(4), 417-436.
- Erdaş, E., Dođan, N., & İrez, S. (2016). Bilimin doğasıyla ilgili 1998-2012 yılları arasında Türkiye’de yapılan çalışmaların değerlendirmesi. *Kastamonu Eğitim Dergisi*, 24(1), 17-36.
- Lederman, N. G. (1992). Students' and teachers' conceptions of the nature of science: A review of the research. *Journal of Research in Science Teaching*, 29(4), 331-359.
- Lederman, N. G., Abd-El-Khalick, F., Bell, R. L., & Schwartz, R. S. (2002). Views of nature of science questionnaire: Toward valid and meaningful assessment of learners' conceptions of nature of science. *Journal of Research in Science Teaching*, 39(6), 497-521.
- Lederman, N., & Druger, M. (1985). Classroom factors related to changes in students' conceptions of the nature of science. *Journal of Research in Science Teaching*, 22(7), 649-662.
- Ministry of National Education (MNE). (2013). *Ortaöğretim Biyoloji Dersi (9-12. Sınıflar) Öğretim Programı*. Ankara: MEB Basımevi.
- Schwartz, R. S., Lederman, N. G., & Crawford, B. A. (2004). Developing views of nature of science in an authentic context: An explicit approach to bridging the gap between nature of science and scientific inquiry. *Science Education*, 88(4), 610-645.

## Norman Lederman: Test the Assumptions

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The sudden and unexpected passing away of Norm G. Lederman saddened the global science education community, especially the ones who knew him personally. I am among them. I am writing this short piece in order to express my feelings about this great educator and researcher. In 1996, the year that I began my doctoral studies at Penn State, I was first introduced to Norm's scholarly works. He was very active, together with his doctoral students, and working passionately on involving teaching the nature of science in grade school as an integral component of scientific literacy. That was what fascinated me, since I was, for personal reasons, deeply interested in learning about the history and philosophy of science. The idea that it could even be taught to pupils was intriguing to me. And in the next year at the 1997, NARST Meeting that was held in Chicago, I had a chance to listen to Norm's presentation. It was all fabulous.

During 2007 ESERA Conference in Malmö, I conducted an interview with Norm Lederman on "The Past, Present and Future of the Nature of Science Research" (Taşar, 2007). The most important thing that I took away from this interview was Norm's suggestion to new researchers to "test the assumptions" that are assumed to be true but no research has yet been conducted. He said that because there was no research yet on teachers' classroom practices about teaching the NOS. He indicated that we are just assuming that if we teach the NOS to teachers, they'll simply go and teach those related understandings to students. But we do not know if that is true.

Below is an excerpt from my interview with Norm that is being published for the first time:

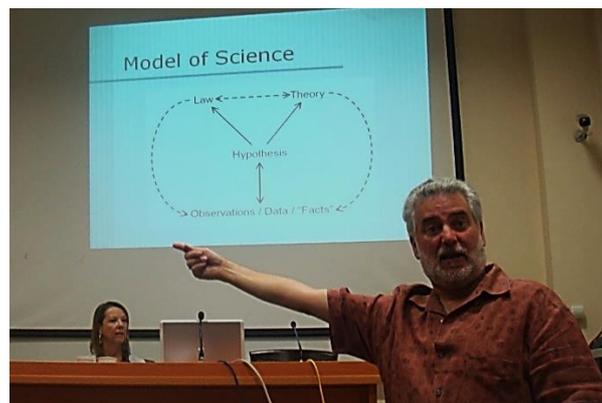
*There was a study in 1957 that was actually done by Margaret Meed and Rhoda Métraux. It was in Science magazine. It was more of students' perceptions of scientists. It was more like the Draw-A-Scientist Test. But, it's '63, it's when Cooley and Klopfer started asking the question about whether we were doing a good job in teaching nature of science or not. Because it's being a curriculum goal that they developed the TOUS exam, T-O-U-S testing something about understanding of science, Test on Understanding of Science, TOUS. And, they used that to see whether students understood the nature of science and they found out that they did not. And so, that was the beginning of a lot of people doing research. And initially, it was studying students and then they started studying teachers, found out that teachers didn't have a good understanding and so they felt that "okay, if teachers don't understand it, how could we expect the students to understand it?" And then people spent a lot of time thinking about teaching nature of science to teachers. And, so there were curriculum projects that were out there, professional development. And sometimes it worked, sometimes it didn't. There was also a lot of curriculum development. And, they found that certain curriculum was effective and a lot were not. But they found that even in the curriculum that was effective with one teacher it worked, with another teacher it did not work. We always think that the teacher must be important. But, at that point in time rather than focusing on what the teacher did, they just stayed focused on the teacher knowledge. And, I think at that time, it was, that put things back of it. Because the assumption still was that if the teacher knew it, somehow the students would know it. So, if I would have been back then, would have focused on helping teachers', teach it. But they just focused on 'can teachers understand it'. There was a guy named John Trent in about 1966 wrote an article and said if the teacher was important then we should work more with show the teachers how to teach nature of science and nobody paid attention to it. But he said something you know 30 year, 40 years ago that we are now paying attention to it now. The assumption for up until the early 80's was that a teacher's understanding automatically influenced*

*students' understanding, a teacher's understanding influenced her teaching behavior. In '83 in my dissertation, I studied whether there is a relationship between students and teachers, and it showed that there was not a relationship, the correlation was about .20. Second, that was the first study, I know that actually tested that assumption. Prior to that, articles would begin with, it is assumed that a teacher's understanding reflects her teaching. I was able to find in that study things that did influence students. But the things that influenced students were not necessarily related to the teachers' understandings of nature of science. So, that eventually led to studies where people looking at "how do you still get teachers understand?" but then you also "how do you teach them to teach it to students?" People assumed another second bad assumption that if kids did science that was the best way to teach the nature of science. And so, they were teaching teachers to get their students involved in doing science which is not a bad thing but there was never any explicit attention to nature of science, so the kids, did the investigations learn, whatever they learned from that but they didn't do well on nature of science.*

Afterwards, in 2009 I was the chair of the ESERA 2009 Conference Organization Committee. Then, we worked with Norm and Judy to deliver a NOS workshop in parallel at Bahçeşehir University mainly for teachers, research assistants, and junior faculty (Figure 1). They were both very happy to do it.

**Figure 1**

Norm and Judy Lederman giving a nature of science workshop at Bahçeşehir University during their visit to Istanbul for ESERA 2009 Conference



Later in 2014, as the president of ISER, I again invited Norm and Judy to deliver a NOS workshop at the ISER Conference that was held in Cappadocia (Figure 2). We talked about it during the 2013 NARST Meeting in Puerto Rico. Norm and Judy enthusiastically gave the workshop to an equally enthusiastic audience.

**Figure 2**

Norm Lederman explaining teachable aspects of the nature of science (AKA Lederman seven) in a workshop that he delivered together with Judy Lederman during their visit to Cappadocia for ISER 2014 Conference



My final face to face encounter with Norm was in Bologna during the ESERA Conference in 2019 (Figure 3). Shortly after, we began to hear the news about the covid-19 virus and its fast spread becoming a global pandemic. Almost all countries closed normal life. And, as educators, we began to teach online. Then I figured out that I could invite my long-time world renowned colleagues to join my virtual doctoral NOS class. Both Norm and Judy happily accepted my invitation and we had a memorable interaction together (Figure 4).

**Figure 3**

I had chances to get together with Norm at conferences around the world. The latest was in Bologna during ESERA 2019 Conference before the covid-19 pandemic broke out



**Figure 4**

On April 22, 2020 the Lederman's kindly joined my doctoral level 'The Nature of Science in Science Education' course via Zoom



Norm G. Lederman, as I knew him, was a gentle and generous colleague and friend. I respected and admired him and his works deeply and frequently used the kinds of things that we all learned from him in my writings and teachings. His legacy will live on.

**References**

- Cooley, W. W. & Klopfer, L. E. (1963). The evaluation of specific educational innovations. *Journal of Research in Science Teaching*, 1(1), 73-80.
- Mead, M. & Métraux, R. (1957). Image of the Scientist among High-School Students. *Science* 126(3270) 384-390. <https://doi.org/10.1126/science.126.3270.384>
- Taşar, M. F. (2007). Reflection and Remarks on the Conversation "The Past, Present and Future of the Nature of Science Research" with Norman Lederman. *Eurasia Journal of Mathematics, Science and Technology Education*, 3(4), 383-386. <https://doi.org/10.12973/ejmste/75417>