İstanbul Zaim Üniversitesi
IZUJED IZU Journal of Education
İZÜ EĞİTİM DERGİSİ

Received: Jun. 30, 2018
Revision received: Oct. 27, 2019
Accepted: May. 20, 2019

DOI: XXXXXXXXXXXXX
http://dergipark.gov.tr/izujed

A Discussion on the Effects of Religious Terminology in Physics Education for High School Students with a Religious Background

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ABSTRACT

In this paper we suggest that transmit of the knowledge from one person to the other and develop of certain capacities of the students during the teaching terms can be achieved by employing certain elements that already exist within the religious background of students as long as the target student population has that sort of background, and they are willing to incorporate that into their educational development. In our case, this is especially valid for certain parts of Turkey, where our studies took place and where religion plays an important role in daily life. However, the general universal concepts that we promote here can be applied to other parts of the globe by adjusting the terminology and concepts based on the student background.

***Keywords*:** Education, religion, physics, human, background.

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To cite this article: Koksal, K. & Ozdemir A. (2019). A discussion on the effects of religious terminology in physics education for high school students with a religious background. *Istanbul Sabahattin Zaim University Journal of Education*, *1*(1), 133-158.

İZÜ EĞİTİM DERGİSİ
IZUJED IZU Journal of Education
İstanbul Zaim Üniversitesi

Başvuru: 30 Haziran 2018
Düzeltme: 27 Ekim 2019
Kabul: 20 Mayıs 2019

DOI: XXXXXXXXXXXXX
http://dergipark.gov.tr/izujed

Dinî Bir Arkaplana Sahip Lise Öğrencilerinin Fizik Eğitiminde Dini Terminolojinin Etkileri Üzerine Bir Tartışma

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ÖZET

Bu çalışmamızda eğitim öğretim kapsamında bilginin kaynaktan hedef kitleye sağlıklı bir şekilde aktarımında rol oynayan olumlu ve olumlsuz faktörlerin önemi vurgulanmaktadır. Bu kapsamda özellikle dini bir arkaplana sahip öğrencilere fen bilimleri öğretiminde arka planın olumlu etkisinin olup olmadığını anlamaya çalıştık. Çalışmamıza konu olan hedef kitledeki öğrencilerin kendi bilişsel gelişimlerine katkı sağlayacağına inanmaları durumunda, sahip olukları dini arkaplanın eğitime entegre edilerek bilginin aktarımında ve öğrencilerin kapasitelerinin geliştirimesinde rol oynaması hedeflenmektedir. Bu durum Türkiye'de bazı bölgelerde geçerli olmakla birlikte, biz de çalışmamızı dinin günlük yaşama yön verdiği lokasyonlarda gerçekleştirdik. Bununla birlikte bu çalışmada tarif ettiğimiz genel evrensel konseptler öğrencilerin sahip oldukları altyapı ve kullanılan terminoloji göz önünde bulundurularak dünyanın farklı yerlerinde uygulanabilir.

Anahtar kelimeler: Eğitim, din, fizik, insan, arkplan.

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Atıf: Koksal, K. & Ozdemir A. (2019). A discussion on the effects of religious terminology in physics education for high school students with a religious background. *Istanbul Sabahattin Zaim University Journal of Education, 1*(1), 133-158.

Original Lecture (Turkish)

Uhrevi âlemin yapıtaşları olmak için yarışan ve zerre olarak tarif edilen maddeciklerden bir tanesi atomdur. Atomlar, kimyasal bir elemente izn-i ilahi ile özellik kazandıran zerrelerdir. Kâinatta sıvı, katı, gaz yahut plazma halinde bulunan her bir madde, yüklü ya da yüksüz atomlardan teşekkül etmektedir. Atomlar ortalama boyutları 100 piko metre (metrenin milyarda biri) olacak şekilde yaratılmışlardır. Gözlemlenebilir veya tanımlanabilir şekillere haiz olmadıkları için, boyutlarını tam olarak belirlemek mümkün olmamaktadır.

Atomlar kâinat yüzündeki mevcudatın tuğlaları, atomları bir arada tutan ilahi kanunlar ise çimento hükmündedir. Rububiyet ve hikmet, havada direksiz asılı duran bu görünmez zerreciklerden umum mevcudatın icadına sebebiyet vermektedir. Atomlar da daha küçük zerrelerden teşekkül etmektedir. Sani-i Hakîm bir atomun içerisinde tek bir çekirdek ile bir yahut birden fazla elektron derç etmiştir. Çekirdeği ise proton tabir edilen yüklü bir zerre ile nötron tabir edilen yüksüz bir zerreden husule getirmiştir. Hidrojen atomunun çekirdeğinde sadece tek bir proton bulunmakta iken, diğer atomlarda farklı sayılarda nötron ve proton bulunmaktadır.

Sani-i Hakîm atomun çekirdeği içerisinde iki zerre halk etmiştir: Biri pozitif yüklü proton, biri yüksüz nötron. Proton, çekirdek etrafında izn-i ilahi ile dönen elektronu kendisine çekerken, elektron kendisine bahşedilen ivme ile bir emr-i Rabbani neticesinde takdir edilmiş olan yörüngesinde kalır ve ancak takdir edilmiş olan yörüngelerde bulunabilir. Rabb-i Hakîm nötronları çekirdek içinde bulunan protonların arasında hâsıl olan itmeyi ve olası parçalanmayı engellemek için yaratmıştır. Nötron ve protonlar nükleon olarak adlandırılmaktadır. Birçok hikmete binaen elektron negatif, proton ise pozitif elektrik yükü ile yüklenmişlerdir. Atomun kütlesinin %99.94'ü nükleonlara, %0.04'ü ise elektronlara verilmiştir. Elektronlar ve protonların eşit olduğu durumlarda atom yüksüz, eşit olmadığı durumlarda ise atom iyon olarak adlandırılmaktadır.

Kudret-i ilahinin bir tecellisi olan elektromanyetik kuvvet, atom çekirdeğinde mevcut proton ile atom çevresinde hareket ettirilen elektron arasında husule gelen çekime verilen isimdir. Nötron ve proton arasında vaz edilmiş olan çekim ise nükleer kuvvet olarak

adlandırılmaktadır ki elektromanyetik kuvvete göre daha güçlüdür. Proton ve elektron arasında cari olan elektromanyetik kuvvet, protonlar arasında da vaz edilmiştir. Protonlar arasında elektromanyetik kuvvetten husule gelen itme, nükleer kuvvetten husule gelen çekime galip geldiğinde, nükleonlar bir kanun-u ilahi ile çekirdeği terk eder ve böylece nükleer bozunma husule gelir. Kâinatta cari olan ve bugün fiziğin çoklukla üzerinde durduğu, kudret-i ilahinin tecellisi olan 4 temel kuvvetten ikisi elektromanyetik kuvvet ve nükleer kuvvettir. Hikmeten bu iki kuvvet kendisi de bir zerre olan atomu ayakta tutmak için gayet ehemmiyetlidir. Bu iki kuvvetin kâinat üstünde bir anlık sönüme uğraması kâinatın sonunu getirecekti. Dolayısıyla bu iki kuvvet arkasında kudret-i Rabbani gibi kayyumiyet-i mutlaka görünmektedir.

Sani-i Hakîm çekirdekte derç edilmiş olan protonların sayısına göre, o atoma ve ilgili elemente bazı kimyasal özellikler vermiştir. Nötronların sayısı aynı elementin izotoplarını belirler. Hikmet-i ilahi elektron sayısı ile atomun manyetik özellikleri arasında da bir ilişkiyi netice vermiştir. Bir atom bir başka atom ya da atomları izn-i ilahi ile çekebilir. Bu çekim moleküllerin husule gelmesinde esastır ve kimyasal bağ olarak adlandırılır. Atomların bir arada bulunabilme kabiliyeti kimya ilminin çalışma alanı içerisindedir. Fiziki ve astronomik gözlemlere göre, kâinat tamamıyla atomlardan yaratılmış değildir. Karanlık madde olarak tabir edilen madde, atomlardan husule gelmiş olan maddelerden daha fazla bulunmakla birlikte, karanlık maddenin hangi tip zerreciklerden yaratıldığı fennen meçhuldür.

Karanlık madde, fennen kabul edilmiş ve her şeyin atomdan oluşması gerektiği tezini çürüten gözlemlerden bir tanesidir. Atomlar dışında bildiğimiz ve bilmediğimiz parçacıkların bir araya getirilerek izn-i ilahi ile başka mevcutların yaratılması elbette mümkün görünmektedir. Bu konuda Risale-i Nur Sözler mecmuasında; nardan, nurdan, ateşten, ışıktan, karanlıktan, havadan, savttan, rayihadan, elektrikten (bildiğimiz ama zerre olarak kabul etmediğimiz maddeler), esir maddesinden (bilmediğimiz zerrecikler) hayat sahiplerinin yaratılmakta olduğu ifade edilmektedir.

İslam fen âlimlerinden, dönemin fizik-kimya profesörü olan Cabir bin Hayyan 8. Yüzyılda atom ile ilgili şu ifadeyi kullanmıştır. "Madde yoğun bir enerjidir. Yunan fizikçilerinin maddenin bölünerek, nihayet bölünüp parçalanamaz en küçük bir parçada son bulduğuna ve eşyanın bu sayısız parçalardan meydana geldiğine dair iddiaları yanlıştır. Cüz-i layetecezza (atom) adı verilen ve parçalanamaz kabul edilen bu nesne de parçalanır ve bundan enerji hâsıl olur. Bu öyle bir güçtür ki, Allah göstermesin, Bağdat gibi bir şehri bile yok edebilir" (Döğen, Ş. "Müslüman ilim öncüleri ansiklopedisi", 1992). Bu ifade ile Hayyan atomun daha küçük yapıtaşları olduğunu ve parçalanabildiğini ifade etmiştir. Cabir bin Hayyan`dan da anlaşılacağı üzere, Yunanlılar atomdan bahsetmişlerdir. Atomla ilgili gerçek bilimsel tespitler ise elektron, çekirdek ve nükleonların deneysel olarak keşfi ile mümkün olmuştur. Elektronun deneysel olarak fark edilmesi fizikçi J.J. Thomson'ın katot ışınlarının parçacıklardan meydana geldiğini düşünerek kütlesini ölçmesi ile mümkün olmuştur. Sani-i Hakîm katot ışınlarının kütlesi ile en hafif atom olan hidrojen kütlesi arasında 1800 katlık bir fark takdir etmiştir. Daha sonra radyoaktif materyallerden ve fotoelektrikten elde edilen parçacıklarla, metal telden akan akımı taşıyan parçacıkların aynı olduğu deneyle gösterilmiştir.

Introduction

Nowadays, different educational methods and techniques are being attempted in order to achieve more effective results in education and for increasing cognitive motivation (White & Greenberg, 2016, p. 23). Physical sciences form a special case in this respect as these disciplines have a close natural tie with other fields and with other courses in terms of the subjects that are being taught (Wilson, 1981). Physical sciences are also closely linked to personal and social issues in a distinct way that when teaching the relevant subjects, personal ideas, beliefs and views can be used to promote learning. This can be clearly seen when the ways adopted by the teachers of physical sciences for specific cases are observed more closely (Güneş, & Karaşah, 2016, p. 3). It is clear that the main aims in this process are to successfully transmit the knowledge from one person to the other and to make sure that the students develop certain capacities during

the teaching terms. In this paper we suggest that these aims can be achieved by employing certain elements that already exist within the religious background of students as long as the target student population has that sort of background, and they are willing to incorporate that into their educational development. In our case, this is especially valid for certain parts of Turkey, where our studies took place and where religion plays an important role in daily life (Aydınalp, 2006, p. 309). However, the general universal concepts that we promote here can be applied to other parts of the globe by adjusting the terminology and concepts based on the student background.

When we define someone as an "individual person", we also refer to that person's past or the personality that was developed during his/her past lifetime. In this respect, it can be thought that the reaction shown by the students to new things they learn in school environment can be shaped by and may vary based on their personalities and their lifestyles. For this reason, it should be noted that an educational method which ignores some of the factors affecting the learning process may result with a decreased level of motivation, impetus and academic success in long run (Barbara & Hough, 1992).

One may expect this to be limited to social sciences education, as social sciences are perceived as being more relevant to daily social life. However, it would be misleading to limit this issue to social sciences education as physical sciences are also closely related to life, both at an individual and social level. This fact has also been emphasized by the educational curriculum of certain European countries (Ito, Gutiérrez, Livingstone, Penuel, Rhodes, Salen & Watkins, 2013). Teaching physical sciences in a way that they can relate what they learn to their daily lives and presenting the information through a multidisciplinary perspective is expected to motivate the students, allow them to see the connection between different subjects, and help them understand how to effectively use and transfer that information to other parts of their lives.

The main idea that we promote is that religion cannot be simply excluded from the physical sciences education system because of the widespread assertion that scientific and religious thoughts clash and cannot be matched or exist in the same context. Just on the contrary,

we claim that religious thought can be used to motivate students to learn more about science, and develop themselves further in terms of scientific thought and knowledge. It should be noted that this does not mean that scientific methodology should be abandoned or disrespected. In fact, the students should learn how to objectively evaluate scientific data and trained about the basic concepts of modern scientific methodology. What is suggested here is to incorporate elements of religious thought into physical science teaching to motivate the students and help them think in a different way that would encourage further research and personal development, and make sure that the students see these scientific ideas as a part of their daily, natural life.

The Physical Sciences education model adopted and promoted by European scholars almost completely excludes religious or spiritual thoughts from the educational system. This is of course a direct result of scientific methodology that rightfully aims at achieving objective results from the available evidence and that tries to eliminate any sort of personal intervention that might risk the final result to become disputed. However, using pure scientific methodology for research does not mean that personal ideas cannot be or should not be included when interpreting the final results and when teaching these results to others or sharing them with people, as long as it is clearly indicated that certain ideas and interpretations that are presented belong to the person or the community who transmits this information to the other. In fact, the development of scientific thought and ideas very much include making claims, producing hypotheses and discussing these with the general public and therefore it is an essential part of critical thinking.

It has already been suggested that traditional physical sciences teaching methods and courses fail to invoke curiosity about the natural world surrounding the students (Aikenhead, 2005a), and motivate them to further research and try to understand the world they are living in (Aikenhead, 2005b). This is mainly because the students cannot relate what they learn with the natural world and their daily lives which make them feel that the knowledge they acquire during these courses are rather meaningless and useless, and are simply abstract concepts that they need to learn as a part of their educational progress and nothing more. However, including and

integrating concepts that are more familiar to the students to the overall syllabus can motivate the students in a very different way. These concepts can be religious or spiritual, can be cultural, can be artistic or can be related to any other subject related to everyday life, but here we suggest religious and spiritual beliefs and feelings have even a higher level of impact especially for certain communities where religion plays an important role in daily life. For students, who claim to be religious or who have a religious background, religion is already a part of their natural world as they build their lifestyle on and interpret life through this belief system. Therefore, religious concepts can actually be used in such cases to teach physical sciences in order to achieve a higher success rate in teaching as the students would not be isolated from their daily lives and their concept of natural world. However, this should be achieved carefully and in a way that would not violate personal rights of the students, block critical thinking or oppress different ideas.

The Major Trends in Physical Sciences Teaching

Although it is claimed that basic subjects in science have been presented with an objective perspective; scientific experiments, observations and theories which allowed scientific realities to be tested, have been transferred to the readers after being filtered through the way of thinking, the belief system and the perception of individual explaining the subjects (McLeish, 2014). It can be seen from their published works that scientists, who made important contributions to physical sciences through theory, experiment, philosophy and education, including Newton, Einstein and Feynman, have treated facts according to their faith, perception and thinking systems (Guillen, 2006). This fact is also valid for science teachers and science courses, and there are some discussions about an equitable approach to science teaching. For instance, Southerland indicates that “If the cultural knowledge, habits of mind, and religious commitments of teachers, school administrators, and textbook authors become accepted as the standard, then all

deviations are either ignored or devalued" (Southerland & Scharmann, 2013, p. 59).*

It is also claimed that scientific truths have been explained at scientific platforms, in books and papers by using an objective and impartial tongue. Nevertheless, in reality, the style of explanation of the scientific truths seems to have been isolated from the divine wisdom and mostly reflects a materialistic point of view (Barbour, 2004, p. 15-16). Any person who presents a scientific truth has to exhibit a language, a method and a style. This style will have to include the faith, thinking and the perception system of this person as it is almost impossible to isolate those from that person's identity. Particularly, it can be seen that even scientists, whose faith system is based on the acceptance of the statement that "the events occurring in the universe have to be the works of art of a Person who governs the universe", feel the need of retreating from their own way of explanation, and they force themselves to explain the subjects in a materialistic point of view. In fact, scientific books and papers published in international platforms, as well as all scientific instructions in international education journals and books reflect this kind of aspects, and scientific truths have been transferred to students through a materialistic perspective.

When a student takes a lecture, which is designed through a materialistic philosophy, he becomes the object of the philosophy of the lecturer before the lecture itself. In this case, it becomes impossible for the student to distinguish the philosophy of the lecture style and the facts that are presented through the lecture. If we imagine that the philosophy of the lecture and the facts provided during the lecture are a bowl and soup respectively, the bowl would correspond to the philosophy and the soup would represent the lecture. In this respect, one cannot present a lecture without a philosophy like one cannot serve the soup without a bowl. It is clear

* Color blindness and basket making are not the answers: Confronting the dilemmas of race, culture, and language diversity in teacher education (Cochran-Smith, 1995); See also for murther details: "Resisting unlearning: Understanding science education's response to the United States' national accountability movement" (Southerland, Smith, Sowell, & Kittleson, 2007, pp. 45-77).

that serving the soup without a bowl is not possible; you cannot serve the lecture without a philosophy.

As a basic example, one can say that either “the electron is rotating around the nucleus” or “the electron is rotating around the nucleus with divine will”. Even though the truth does not change in two statements, the second one is an indication of an explanatory style which is combined with the faith system behind it, whereas the first one is the product of a materialistic thinking system which neglects the involvement of an agent or a subject. To claim that the first has a direct and an objective style is no different than claiming that a bowl is not required serving the soup to the people.

There have been some attempts by Christian and Muslim scholars, who try to combine subjective lecture styles with scientific truths in their publications, in order to overcome the materialistic point of view mentioned above. A major Islamic work as an example of these attempts is the Risale-i Nur published by Said Nursi in the beginning of the 20th century in Turkey. As a statement in the Risale-i Nur; “aspect and intent change the nature of the things” (Nursî, 2015, p. 72). In this case, it is important how you perceive scientific truths and what your intentions are. In physics the mass is described as the resistivity against inertia, whereas in chemistry the mass is known as the stable quantity of matter. The truth does not change in both statements, but physics and chemistry (or different disciplines) can look at the same facts through their different aspects. This aspect and the intention can change the color of the fact. In biology, water is described as the source of life, but in chemistry, water is a compound formed by two different atoms. Therefore, each represented fact wear a cloth designed by the person telling the fact, and through which the listener and reader recognizes, understands, and perceives the fact.

In this work, we aim to investigate the effects of using religious terminology and adopting a religious perspective during a physics lecture on the comprehension of the high school students. The title of the lecture was decided to be “atom” as this is a basic subject of physical science. We prepared two different lectures with different styles to be presented to different classes of students, limiting each presentation to a single page in order to keep it simple. In the first lecture, we explained physical properties of atom at high school

level, using the well-known traditional presentation style. In the second lecture, we explained the same subject in the frame of religious terminology and through an intensive religious perspective. The reactions of the students to two different lecture styles were observed and these were analyzed to reach certain assumptions. The text of the example lecture that we used during the study can be seen in the appendix.

The Profile of High School Students involved in the research (The students from Eastern Turkey)

The science education in modern Turkey was designed in the frame of a secular and materialistic perspective and philosophy like in the most of the world (http://mevzuat.meb.gov.tr/). According to the materialistic philosophy, the science education should exclude the religious references and any subjective terminology (Novac, 1965; Roy, 1951). Today, the studies on the science education in Europe and USA show that there are some suspicions about the objectivity of the presentation style of physical sciences (Education, Audiovisual and Culture Executive Agency, 2011, p. 64). Similarly, the science education methods used in Islamic countries have some problems because of the teaching style of the concerned subjects, as will be explained below.

The cultural and religious background of the students living in west and east part of Turkey shows different properties (Aydınalp, 2006, p. 309). The students from the east part of the country come from a strong traditional cultural structure and have a deep religious background (Okyar, 2014, p. 194). Unfortunately, many religious students can wrongly believe that their religious background is a kind of obstacle during the process of acquiring scientific information (Berry, et al. 2016).* Some teachers, as a part of the perspective called “difference blindness” prefer to ignore the students’ differences such as ethnicity, habits, prior knowledge, and beliefs (Cochran-Smith, 1995; Southerland, Smith, Sowell, & Kittleson, 2007; Southerland, Gallard, & Callahan, 2011). On the other hand, some other teachers were forced to explain to their

*"How students view the boundaries between their science and religious education concerning the origins of life and the universe".

students that science is not against traditional beliefs and religion, and felt the necessity to talk about certain religious arguments following the actual science lecture to avoid any misunderstandings. These kinds of necessities have been inspiring and forcing us to redesign science lectures through a more suitable perspective in order to avoid students to fall into a dilemma, which would involve using religious terminology. In fact, it can be expected that scientific information[**] enriched with theological subjects well-known by the students can be more instructive for those with a religious background (White, & Greenberg, 2016). Some studies on the effects of cultural background on the learning procedures of European students in science education show that using "culture-based education" is quite effective and instructive throughout the educational process (Evans & Fisher, 2000). Like in the most of the world, education is being provided by secular public high schools, but informally madrasah (theological school attached to the mosque)-type education has also been continuing in Eastern Turkey for a very long time (Işıkdoğan, 2012, p. 45). In fact, the majority of parents living in the region prefer their children to go to a madrasah, if not to a mosque,[*] in addition to a public school because they don't believe that a desired religious education is provided by public schools (Çarkoğlu & Toprak, 2006). It is quite clear that this is a result of prejudice against and resistance to the materialistic and secular perspective imposed during the lectures provided at secular public schools. Because students studying in public schools also have this prejudice against the teaching system, the process of learning scientific information becomes incomplete and inefficient, as the student is forced to choose between scientific knowledge and traditional beliefs (Çarkoğlu & Toprak, 2006).

In order to better evaluate the dilemma the students have to face and the need for a culture-based education, we decided to observe and comprehend the tendencies and experiences of students from the region about the contradictions between science lectures and their traditional beliefs with a short experimental visit to a high school. The school was chosen randomly except for being a high school

[**] The examples of these theological subjects will be given in next section.

[*] For Quranic studies provided by imams.

focusing on Physical Sciences. Students who were lectured using a traditional and a culture-based method were interviewed randomly to get their opinions about the lectures. The average age of the students was 15 and they were all from eastern Turkey. The majority of the students have indicated that strong belief is the most important character a person should have and we took this as a sign of the level of strong religious background of the students.

The Science Lecture Enriched with the Idea of Divine Wisdom in Science that Leads to Interiorizing Religiosity

When the science lectures are given to the students, who have a religious consciousness, the efforts for eliminating the suspects for the inconsistency or conflict between religion and science remains inconclusive due to the materialistic perspective usually adopted by these lectures. The primary element, which leads a person to a belief system, is possessing religiosity (Giussani & Zucchi, 1997, p. 34). Religiosity is a feeling, which is based on the belief of a "Creator", and the person is able to improve his/her own belief system or accept an existing one with the help of this feeling. When it comes to Islam, the phrasing style of science lectures has a great importance for the Muslims who believe in Allah and believe that the power of Allah is always present all around the universe. Consequently, as the curriculum offers contents in contradiction with the religiosity of the students, this gives rise to a root conflict in the inner belief world of the students. However, a science lecture with a method revealing the religiosity, may lead to enrich and strengthen the belief world of the students. Therefore, a change is the phrasing style may isolate the feeling of inconsistency and conflict between the religion and science.

While a Muslim student sees the universe as a creation materialized by the power of a Creator, the materialistic perspective used when explaining the subjects of natural and physical sciences is inclined to explain everything in the frame of cause-and-effect-relationship and laws. For instance, according to this perspective "gravity" is a law, and things fall down on earth because of it; here the gravity is a reason and the falling down is a result.

In the frame of such a point of view, the reason of an event arising in the universe is simply described or explained by a law. However,

three requirements are ignored for the realization of any event in the universe when this perspective is adopted, which are wisdom, willing and power. For example, a driver is expected to know (wisdom), wish (willing) and be able (power) to drive a car, as laws and rules would not be enough to move the car all by itself. Like in this example, the popular trend for the interpretation of the realities and laws in natural and physical sciences is to accept that events are related to wisdom of some sort but unrelated to any willing and power. According to this perspective, the wisdom is reduced to simple laws and the owner of wisdom is simply ignored. This is the main cause of the conflict between the students' religiosity and the lecture style of natural and physical sciences.

We believe at this stage that the suggested method is able to eliminate a religious student's suspects about the inconsistency or conflict between religion and science by modifying the lecture style of the scientific truths. It should be indicated here that this does not include modifying the scientific truths in any way. The aims of the suggested methods can be listed as follows:

- The student should learn the whole scientific information provided during the lecture.
- In the end of the lecture, he/she should be able to answer the questions about the scientific truths.
- The style of the lecture should not be in conflict with the religiosity of the student.
- The perspective should not include phrases which are against the student' belief (i.e. materialistic philosophy).
- When explaining scientific laws, certain words reminding the wisdom, willing and power, which are necessary for the realization of the event related to the law, should be used.
- Phrases used during the lecture should remind the students that every event needs a subject, everything belongs to an owner and everything happens by the power of a Creator.
- The student should not lose track of the information that is intended to be provided about the scientific truths because of the religious terminology.

- Phrases which would evoke ideas like things have a consciousness and which would ignore the true subject, such as "the properties of a chemical element depend upon the electronic structure of the atom", should be corrected by referring to the true subject.
- A scientific event should be explained in terms of more appropriate expressions, which would answer why and how the event happened in the frame of divine wisdom, knowledge, willing and power, instead of expressions such as interaction, repulsion and attraction which unfortunately, obfuscate and obscure the importance and detail in behind of the events, evoking the idea that the event is very simple.

Interviews with Students about Effects of the Science Lecture Enriched with the Idea of Divine Wisdom

The aim of the interviews was to observe the effects of a lecture which was written in the frame of religious terminology (in terms of "mana-i harfî")* as indicated in previous sections. For this purpose, we have randomly chosen students from 1st grade students who were given science lessons from Hikmet Kiler Science High School in Bitlis Province. The students were less familiar with the atom concept before the lecture. It was understood that the majority of the students were from eastern Turkey and they have a strong religious background. It was also observed that the understanding and comprehension capability of the students were superior than the local standards.

After determining two identical classes with almost the same number of students, the atom subject was presented with the classical perspective to one class (Group A) and the example lecture (see appendix) was presented to the students of the other class (Group B). The students were asked not to take notes and listen to the lecture very carefully in order to grasp their full attention. The texts have been read by the same person for two times and then the

* Mana-i Harfi: All the creatures and the whole universe is to look at the account of God and to look upon them with the art and work of Allah. Because they do not make sense on their own; but if they point to someone else, it becomes meaningful.

students were asked questions both about the presented subject and their feelings about the way the lecture was presented.

The interviews aimed at gathering information about the students' personal profiles including their religious background, how well the students understood the presented subject, and how they felt about the lectures, trying to determine the negative and positive effects of both lectures.

Firstly, we asked questions about the lecture subject to determine the level of understanding the basic properties of the atom by the students. The percentage of correct answers was slightly above %50 for both groups of students (50% for Group A and 54% for Group B). This low success rate is dependent on some parameters such that; 1) the students were lectured about this subject at such a detailed level for the first time, 2) the students were not allowed to take notes, 3) The subject has only been read for two times without any explanation, any stress or writing on the whiteboard (the reason for using this format was to minimize the number of unforeseen parameters affecting the success rate). It is also true that the text read to Group B had many religious terms which have a possibility to lead to some confusion in the mind of students, but as the level of success is almost the same, this seems to have not affected the students in a negative way.

The students were also asked questions about their feelings concerning the lectures to better understand the possible positive or negative effects and reactions. Actually, we found the answers given by the students at this point to be quite unpredictable and surprising. Students of Group B mostly appreciated the style of the lecture because they found it to be attractive, fluent, and refined, and familiar because of their personal backgrounds. However, the majority of students of Group A did not appreciate the traditional style of the lecture, finding it boring and hard to memorize. These students also expressed their interest in a different lecture style, with one of the major reasons being the technical terminology, which is mostly in Ancient Greek, being hard to comprehend and hard to keep in mind.

Results and Discussion

This small scale experimental research aimed at evaluating whether using a language, which does not exclude local customs and beliefs, when teaching science classes can have a positive effect on the level of success of teaching the subjects. Although, our experimental study could not fully demonstrate a clear difference and the success rates were relatively similar for both the traditional lecture and the lecture that was enriched with the idea of divine wisdom, our interviews with the students have shown that the students are willing to have classes taught in alternative ways and methods and this would motivate them to learn more about the subjects.

When we look at the results, one of our observations is that, as the proposed method is not decreasing the success rate of the students, it may lead to a meaningful success over time if used efficiently. The most important reason behind the expected increase in success rate is the interest it evokes for the students who have a strong religious background and are familiar to the words directed to them during the lecture. Furthermore, this method is eliminating the feeling of contradiction between religion and science, as the information presented about the atom was based on a synthesis of scientific facts and some religious principles which are well-known by the students. It means that the students have been lectured by new quantitative subjects with the aid of some information familiar to the students. We observed that the drawback of some unfamiliar religious words has not affected the quality of the lecture significantly. We believe that the points expressed in the previous sections may motivate the students significantly to understand the science lecture.

As indicated earlier in the aims of the proposed method, the student is expected to learn the whole scientific information provided during the lecture. We observed that the success in learning the lecture designed using the suggested method is same with that of the traditional style. In fact, we had some suspects about the level of understanding and comprehension of the new-style-lecture, because it is a new and unfamiliar kind of method for the students. It is also true that using a lot of religious terms may lead to some confusion in the mind of the students, but as the level of success is almost the same, this seems to have not affected the students in a negative way.

From the eye of a physicist (auth. K.K.), I believe that the majority of students have taken sufficient information about the "atom" for a student of their level. I also claim that the level of negative effect due to religious words is lower than that of Ancient Greek or technical words. During the example lecture, I did not observe any sign of boredom, which I could sense in the class where the traditional lecture was presented. Actually, in my and my colleagues' physics lectures at the university we often encounter similar problems which lead to students losing motivation. I also tried to observe the effects of the proposed lecture style on my M.A. students in the past. When the students are very bored because of the heavy language and complicated philosophical phrases of traditional physics chapters (especially quantum mechanics), I managed to motivate the master students by introducing an attractive and soft language which is enriched with the "Idea of Divine Wisdom", and with religious words. I believe that it is not hard to give the required information and the philosophy of the subject to the students using the proposed style, even without using any visual aid or material.

Another aim of the lecture is to avoid conflict in the mind and to provide a harmony with the religiosity of the student. There should be some observable traces that can help understand the existence of the conflict in the student's mind. The student interiorizing the lecture or the information can be one of these traces as someone who digests the information and is fully engaged with the subject would feel more eager to comment on and can explain the details of that subject. We observed that when terms related to the religious background of the students such as "the will of God" and "divine laws" is used, most of the students were more stimulated and eager to make comments and explanations about the subject. For example, we postulate that phrases in the text like "Atoms are like bricks that form the existence of the universe and the divine laws that hold them together is like cement. The lordship and the divine wisdom cause the existence of these invisible particles that hang in the air without any support. Atoms are consisted of smaller particles. The creator has formed one nucleus and one or more electrons within the atom. On the other hand, the nucleus has appeared as something that is formed out of the charged particles called the protons, and the uncharged particles called the neutrons..." would allow students to comprehend the philosophy, the real chronology and the divine

subject behind the physical events, and may help the students to seek and find answers to their questions by forming associations with their daily lives and personal backgrounds.

We already knew that local students, who are more religious, were feeling excluded from science teaching when we first started working on this initiative project, and our aim was to investigate different methods of teaching to help these students form some sort of affinity and sympathy for the scientific courses. Our solution was to devise a course enriched with the "Idea of Divine Wisdom", which would present scientific facts using a language including traditional and religious elements that would help the students develop intimacy and connections with the taught subject. Our experimental study has shown that this approach did not have any negative effects and can be used in long-run after being professionally developed for educational purposes, which we believe would increase the learning capacity and success of local students with a religious background. However, it is necessary to expand the scope of this initial work, transforming it into a multi-disciplinary project that would include psychologists, pedagogues, educational experts, and sociologists in order to construct an innovative and holistic platform that would further develop this approach. The reason for not adopting this kind of multidisciplinary holistic approach from the very beginning of the study was the premature form of our ideas which we only developed into what is presented here during the course of the experimental study, and we believe that it will be possible for the results presented in this preliminary study to be successfully developed into a systematic educational approach once a multidisciplinary project is started.

Acknowledgements

We would like to thank Dr. Tevfik Emre Şerifoğlu (Bitlis Eren University, Department of Archaeology) for all his contribution, his valuable advice during the application of the project and for editing certain parts of this article. We are also grateful to Sadettin Hakseven, who was the headmaster of Bitlis Fen Lisesi at the time of the visit, for allowing us to work with the students of this high school, and to all the students who volunteered to take a part in this experimental research.

Appendix

The Example Lecture (English): Atom (in the frame of religious terminology)

Atoms are one of the micro materials that compete to become the building blocks of the universe hereafter and described as a particle. Atoms are particles that give a character to chemical elements with the will of God. All materials in the universe, which are in the liquid, solid, gas or plasma form, are made out of atoms that are charged or not charged. The atoms were created to have an average size of 100 picometers (one-billionth of a meter). As they don't have shapes that can be observed or identified, it has not been possible to determine their exact size.

Atoms are like bricks that form the existence of the universe and the divine laws that hold them together is like cement. The lordship and the divine wisdom cause the existence of these invisible particles that hang in the air without any support. Atoms are consisted of smaller particles. The creator has formed one nucleus and one or more electrons within the atom. On the other hand, the nucleus has appeared as something that is formed out of the charged particles called the protons, and the uncharged particles called the neutrons. The nucleus of the Hydrogen atom only has one proton, whereas other atoms can have different numbers of protons and neutrons.

The creator allowed two particles to come into being within the atomic nucleus: One is the positive charged proton and the other is the uncharged neutron. While the proton attracts the electron, that moves around the nucleus with the will of God, towards itself, the electron stays on its orbit that was bestowed upon it through divine will and from which it cannot move out with the acceleration it gained. The supreme creator has created neutrons to prevent the repulsion between the protons in the nucleus and a probable split that may result from this. The neutrons and the protons are called the nucleons. As a result of many mysteries, the electrons are negatively, and the protons are positively charged. 99.94% of the overall mass of the atom is formed by the nucleons, whereas the 0.04% is formed by the electrons. Atoms are defined as uncharged when the electrons and protons have the same number and the atom is called an ion when they are not equal in number.

The electromagnetic force, which is a reflection of the divine power, is the name given to the force of attraction between the protons that exist in the nucleus and the electrons that are moved around the atom. The attraction formed between the neutrons and the protons is called the nuclear force, and this is stronger that the electromagnetic force. The electromagnetic force that was created between the protons and the electron is also created between the protons. When the repulsion caused by the electromagnetic force between the protons is stronger than the attraction caused by the nuclear force, the nucleons leave the nucleus as a result of divine law, and atomic disintegration occurs. Two of the four basic forces that are a reflection of divine power and that exist in the universe, which is one of the main subjects of Physics today, are the electromagnetic and the nuclear forces. As another mystery, these two forces are also very important for the existence of atoms that are also particles themselves. A momentary quenching of these two forces in the universe may actually end the universe as it is. Therefore, one can definitely see the eternal existence of God in these two forces, like the power of the master.

The creator gave certain chemical characteristics to the atom or to the relevant element based on the number of protons present in the nucleus. The number of neutrons determines the isotopes of the same element. The divine power has also designated a relationship between the number of electrons and the magnetic characteristics of the atom. An atom can attract one or more other atoms to itself with divine will. This attraction is fundamental for the formation of molecules and is called a chemical bond. The ability of atoms to stay together is a phenomenon that is studied under the science of chemistry. According to physical and astronomical observations, the universe has not been created only with atoms. Although the majority of materials in the universe are formed of what is called the dark matter and not by atoms, the type of particles that form the dark matter is something still scientifically unknown.

The observations of the dark matter have provided one of the proofs against the scientifically accepted theory that everything must be made out of atoms. It looks possible that other particles that we know or don't know about can be gathered together with divine will to create other forms of existence. In the Words volume of the Risale-

i Nur Collection (http://www.erisale.com/) it is stated that the owners of life are created from flame, divine light, fire, light, darkness, air, sound, scent, electric (material that we know that exist but we don't accept as particles) and ether (particles that we don't know) (https://en.wikipedia.org/wiki/Luminiferous_aether).

A Muslim scientist called Jabir ibn Hayyan (Geber), who was a professor of Physics and Chemistry at his time, made this explanation about atoms in the 8th century: Material is a form of dense energy. The argument of Greek physicists who claim that materials can be split into smaller particles until the smallest particle that cannot be divided anymore is reached, and that all beings are formed of these numerous particles is wrong. This thing that is called Cüz-i layetecezza (atom) and that is accepted to be indivisible can actually be divided and energy would be achieved as a result of this. This would form such a power that -God forbidding- even a city like Baghdad can be destroyed" (Klein, 2007). With this statement, Hayyan indicated that atoms have smaller building blocks and can be divided. As can be understood form what Jabir ibn Hayyan said, Greeks also talked about atoms. However, the earliest observations concerning atoms only occurred after the experimental discovery of electrons, nucleus and nucleons.

It only became possible to realize the existence of electrons through experiment when physicist J.J. Thomson measures the mass of cathode rays as he thought that they were made out of particles. The creator ordained a 1800 times difference between the mass of cathode rays and the mass of the lightest atom, which is hydrogen. It was later shown through experiments that electrons are not different from the particles that can be acquired from radioactive materials and photoelectric, or the particles that carry the current that flows through a metal wire.

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