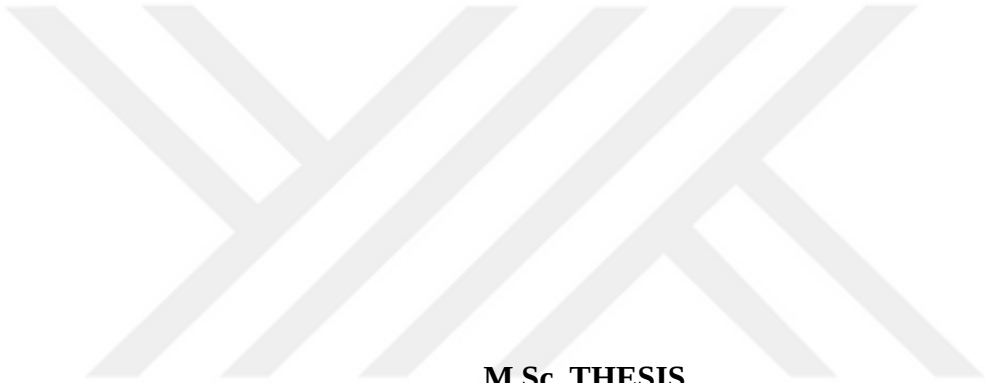


ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF
SCIENCE ENGINEERING AND TECHNOLOGY

**ENERGY CONSUMPTION AWARENESS
IN THE OPERATION OF EDUCATION BUILDINGS:
THE CASE OF HIGH SCHOOL STUDENTS**



M.Sc. THESIS

Eda ŞEN

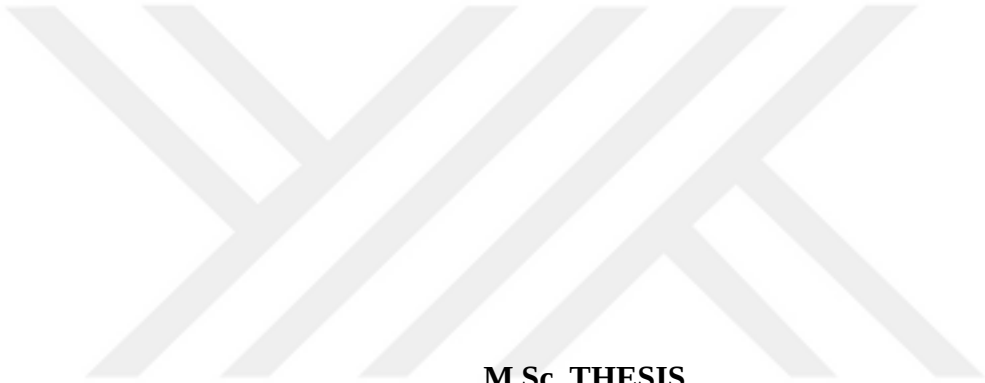
Department of Architecture

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Department of Architecture

Project and Construction Management Programme

Thesis Advisor: Prof. Dr. Hüsnü Murat GÜNAYDIN

JULY 2020

İSTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ

**EĞİTİM BİNALARININ KULLANIMINDA
ENERJİ TÜKETİM FARKINDALIĞI:
LİSE ÖĞRENCİLERİNİN DURUMU**

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TEMMUZ 2020

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Date of Submission: 15 June 2020
Date of Defence : 14 July 2020





To my family,



FOREWORD

This basis for this research originally stemmed from my passion for researching adaptation of sustainable behaviours into the people. As the world moves further into the more energy and resource consuming world, to reduce energy consumption for a better and sustainable future, there is a greater need to embed energy-saving behaviours.

In truth, I could not have achieved my current level of success without a strong support group. First of all, I would like to thank my thesis advisor Prof. Hüsnü Murat Günaydın and my family who supported me throughout the research process. Besides, I would like to thank my jury members, who have provided advice and guidance.

July 2020

Eda Şen
Architect



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ENERGY CONSUMPTION AWARENESS IN THE OPERATION OF EDUCATION BUILDINGS: THE CASE OF HIGH SCHOOL STUDENTS

SUMMARY

This thesis examines energy consumption behaviours of occupants in education buildings, the study focuses on the behaviours of high school students. Research also focuses on interdependencies between the building types and occupant behaviours. In this context, due to the low number of studies carried out in educational buildings than the residential and office buildings, this study bases its focus on education buildings and the behaviours of the occupants of the educational buildings. Since high school students are seen as adults of the future and consume more energy than adults according to the literature review, high school students are placed in the centre and compared with other education building occupants' behaviour and awareness. There are four objectives of this study. The first one is to assess the current energy-saving behaviours and awareness of the high school students. The second one is to understand the impact of the informative posters on the energy-saving behaviours and awareness of high school students. The third one is the comparison of the high school students' behaviours and awareness with the other occupants of these education buildings (university students, teachers/academicians, staff). The fourth one is to assess the knowledge level of these occupants regarding the energy issues of the buildings. As a methodology to achieve these objectives; energy consumption, building types, occupant behaviours, obstacles and tools to reduce energy consumption have been researched. Then the researchers prepared an informative poster with prominent information in the literature. In light of this information, an online survey study was prepared and applied to 203 educational building occupants via Google forms (high school students, university students, teachers/academicians and education building staff

In summary, while high school students define themselves as sensitive about energy consumption, they think that increasing their knowledge on energy consumption will positively affect their behaviour. High school students place 'lack of information' and 'human behaviour' among the top factors that cause energy consumption. They suppose that changing human behaviour will be more effective to reduce energy consumption than it is in reality. Despite this, they estimate the ratio of the consumed energy at the usage stage to the total energy consumption of the buildings as lower than it is. Therefore, how they interpret the relationship between the buildings, human behaviours and energy consumption should be researched more. The three determinant factors are seen as obstacles by high school students according to the survey results are in order of (1) the thought of how can I change great problems alone (19,2%), (2) habits, lifestyle (18,4%), (3) not being able to see the problems caused by behaviour in tangible ways (11,2%). Besides, the main three habits of the high school students on energy consumption are in order of (1) turning off unnecessary lights (23,52%), (2) shutting down the computer so as not to leave it standby position (14,7%), (3)

unplugging electronic devices when not in use (12,25%). The interesting result is that the percentage of those who are accustomed to taking short showers, although it is something that everyone can easily do to reduce energy and water consumption, is only 3,43%. Moreover, the prominent three factors that can motivate high school students to reduce energy consumption as follows; (20,5%) knowing that energy consumption harms the environment, (14,4%) the financial cost of the energy consumption, (14,4%) feeling of doing something good for the future. The belief of high school students on they can influence their social circle is less than the belief that their social circle can influence themselves. While high school students feel responsible for the energy consumption of 65% in their homes, this ratio is 44% for education buildings.

All of the education building occupant groups' (high school students, university students, teachers/academicians and education building staff) results on the knowledge and sensitivity level to the environmental issues are quite close. Besides, all four groups define energy consumption problems as 5th among the 10 problems in their lives. While high school students and teachers/academics groups indicate the 'school' as the second place that they pay attention, university student indicates 'dormitory' as the second place, the education building staff ranked the 'public spaces' in the second place by not including the school at all. Among the factors that cause global environmental problems shared with four occupant groups, high school students determined 'lack of information' as the most important factor, while university students chose 'human behaviour' as the most important factor. In addition to these groups, teachers/academicians find the energy and water consumption mostly important, while education building staffs consider energy consumption as the most impressive factor. The group who believes they can affect their social circle is the teacher/academician group with a ratio of 62.7%. The group believing that the social circle has the most impact on energy consumption was the staff of the education building with 64,2% ratio and in order of teacher/academician with 62,4%, high school students (56,7%) and university students (56,5%) followed them. All of the occupant groups feel more responsible in their homes than in education buildings on energy consumption. The group, which feels the least responsible for the energy consumption in educational buildings, emerges as high school students.

The levels of believing that the informative poster may be reflected energy consumption behaviours are indicated by education building staff as 80%, teachers/academicians 79%, university students 68% and high school students 58%. According to this ranking, the group with the lowest belief that the information in the poster may reflect on their behaviour is high school students. According to the high school students, the 5 most impressive items in the posters are as follows: (1) 100% of global warming is caused by human activities, (2) 1 high school age teenager consumes 20% more energy than 1 adult, (3) despite all the technological developments, energy consumption is expected to increase by 60% between 2010-2040, (4) the buildings are responsible for 40% of the world's energy consumption and (5) the fact that people don't care about their energy consumption behaviours in other environments like in their homes. If the information would be shared on social media to reduce energy consumption, while high school students put Instagram, Youtube and Whatsapp into their top three social media applications, university students put Instagram, Twitter and Web page into their top three. Besides, while teacher/ academicians preferred Instagram, Twitter and Facebook respectively, education building staff preferred Instagram, Pinterest and Twitter into their top three respectively.

The limitations of the study can be indicated as follows: the lack of access to a sufficient number of educational building staff, limited exposure time of participants to the informative poster, and the study includes only those who have been in educational buildings since high school.





EĞİTİM BİNALARININ KULLANIMINDA ENERJİ TÜKETİM FARKINDALIĞI: LİSE ÖĞRENCİLERİNİN DURUMU

ÖZET

Bu tez, eğitim binaları kullanıcılarının enerji tüketim davranışlarını incelemekte ve lise öğrencilerinin davranışlarına odaklanmaktadır. Araştırma aynı zamanda bina tipleri ve bina sakinleri arasındaki ilişkilere de odaklanmaktadır. Binalarda tüketilen toplam enerji dünyada tüketilen toplam enerjinin yaklaşık %40'ına eşittir. Ayrıca binaların tükettiği enerjinin yaklaşık olarak %80'i ise kullanım aşamasında tüketilmektedir. Teknolojik sistemler ise binalarda tüketilen enerjiyi ancak %42 oranında azaltabilmektedir. Bu nedenle bina kullanıcılarının farkındalıklarının artırılarak enerji tüketimi davranışlarının değiştirilmesi ve geliştirilmesi gerekmektedir. Binalarda tüketilen enerjinin kullanıcı davranışları ile ilişkisi literatürde de oldukça araştırılmış bir konu olmasına rağmen, genel olarak çalışmalar ofis ve konut binaları özelinde gerçekleştirilmiştir. Literatürde araştırma yapmak için eğitim binalarının kullanıcıları ve yapılarının kompleks olduğu, konut ve ofis binalarına göre çok daha az sayıda çalışmanın yer aldığı belirtilmiştir. Bu nedenle yapılan bu çalışma, eğitim binalarına ve eğitim binalarının sakinlerinin davranışlarına özellikle odaklanmaktadır.

Lise öğrencileri geleceğin yetişkinleri olarak görüldüğünden ve literatür incelemesine göre yetişkinlerden daha fazla enerji tükettiklerinden, lise öğrencileri tezin odak noktasına yerleştirilmiş ve diğer yetişkin olarak tanımlanan eğitim binası kullanıcılarının (üniversite öğrencileri, öğretmenler/akademisyenler ve eğitim binası personelleri) davranışları ve farkındalıklarıyla karşılaştırılmıştır. Bu çalışmanın dört amacı vardır. Birincisi, mevcut enerji tasarrufu davranışlarını ve lise öğrencilerinin farkındalığını değerlendirmektir. İkincisi, bilgilendirici posterlerin lise öğrencilerinin enerji tasarrufu davranışları ve farkındalığı üzerindeki etkisini anlamaktır. Üçüncüsü, lise öğrencilerinin davranışlarının ve farkındalığının bu eğitim binalarının diğer kullanıcılar ile (üniversite öğrencileri, öğretmenler / akademisyenler, personel vb.) karşılaştırılmasıdır. Dördüncüsü, bina sakinlerinin enerji konularıyla ilgili olarak bu bina sakinlerinin bilgi seviyesini değerlendirmektir. Bu hedeflere ulaşmak için metodoloji olarak; enerji tüketimi, bina tipleri, kullanıcı davranışları, enerji tüketimini azaltmaya yönelik engeller ve araçlar araştırılmıştır. Daha sonra literatürde öne çıkan bilgilerle bilgilendirici bir poster hazırlanmıştır, poster içerisindeki bilgiler grafiklerle zenginleştirilerek dikkat çekici ve akılda kalıcı hale getirmek amaçlanmıştır. Bu bilgiler ışığında, çevrimiçi anket çalışması hazırlanmış ve 203 eğitim binası sakinine (lise öğrencileri, üniversite öğrencileri, öğretmenler / akademisyenler ve eğitim binası personeli) uygulanmıştır. Hazırlanan bilgilendirici poster anket çalışmasının içerisine yerleştirilerek, katılımcıların ankete posterdeki bilgileri okuyarak devam etmeleri istenmiştir. Anket Eskişehir Özel Yeni Yol ve Yeni Çizgi Liseleri, Osmangazi Üniversitesi, Yıldız Teknik Üniversitesi ve İstanbul Teknik Üniversitesi bina kullanıcıları ile paylaşılmıştır. Ancak anket içerisinde bulunan eğitim binasına ilişkin soru yer almamaktadır. Ankete katılanların %70,4'ü kadın, %28,6'sı erkektir

ve %1'i cinsiyetini belirtmek istememiştir. Ayrıca ankete katılanların %38,9'u öğretmen/akademisyen, %30'u üniversite öğrencisi, %27,6'sı lise öğrencisi ve %3,4'ü eğitim binası personeli.

Özetle, lise öğrencileri kendilerini enerji tüketimi konusunda 10 üzerinden 7.15 olarak duyarlı olarak tanımlarken, artan bilginin davranışlarını olumlu yönde etkileyeceğini düşünmekte ve bilgi seviyelerini duyarlılık seviyelerinden daha düşük olarak tanımlamaktadırlar. Bunun yanı sıra dört eğitim binası kullanıcı grubunun kendilerinin enerji tüketimi konularına karşı duyarlı tanımlama seviyeleri yakın olmasına rağmen bu dört grup arasındaki en düşük seviye lise öğrencilerine aittir. Lise öğrencileri 'bilgi eksikliği' ve 'insan davranışını' enerji tüketimine neden olan en önemli nedenler arasına yerleştirmektedir. Lise öğrencileri insan davranışlarını değiştirerek enerji tüketiminin literatürde belirtilenden çok daha fazla azaltılabileceğini düşünüyorlar. Buna rağmen, kullanım aşamasında tüketilen enerjinin binaların toplam enerji tüketimine oranını olduğundan daha düşük olarak tahmin etmekte. Bu nedenle, binalar, insan davranışları ve enerji tüketimi arasındaki ilişkiyi nasıl yorumladıkları daha fazla araştırılmalıdır. Anket sonuçlarına göre lise öğrencileri tarafından engelleyici olarak tanımlanan üç faktör: (1) tek başına büyük problemleri nasıl değiştirebileceğim düşüncesi (%19,2), (2) alışkanlıklar, yaşam tarzı (%18,4), (3) davranıştan kaynaklanan sorunları somut yollarla görememek (%11,2). Ayrıca, lise öğrencilerinin enerji tüketimi ile ilgili ana üç alışkanlığı, (1) gereksiz ışıkları kapatmak (%23,52), (2) bilgisayarı bekleme konumunda bırakmamak için kapatmak (%14,7), (3) kullanılmadığı zamanlarda elektronik cihazların fişini çekmek (%12,25). Dikkat çekici sonuçlardan biri ise, herkesin enerji ve su tüketimini azaltmak için kolayca yapabileceği bir şey olmasına rağmen, kısa duş almaya alışkın olanların yüzdesinin sadece %3,43 olmasıdır. Ayrıca, lise öğrencilerini enerji tüketimini azaltmaya motive edebilecek öne çıkan üç faktör; (%20,5) enerji tüketiminin çevreye zarar verdiğini bilmek, (%14,4) enerji tüketiminin finansal maliyetini bilmek (%14,4) gelecek için iyi bir şey yapma hissiyatıdır. Bu konuda dikkat çekici sonuç lise öğrencilerinin enerji tüketiminin finansal sonuçlarından sorumlu olmamalarına rağmen finansal maliyeti motive edici ilk üç faktör arasında değerlendirmiş olmasıdır. Lise öğrencilerinin kendilerinin sosyal çevrelerini etkileyebileceğine dair inancı, sosyal çevrelerinin kendilerini etkileyebileceğine dair inancından daha fazladır. Lise öğrencileri evde kendilerini %65 oranında enerji tüketiminden sorumlu hissettiklerini belirtirken , eğitim binasında %44 oranında sorumlu hissettiklerini belirtmişlerdir. Çalışmada çıkan sonuçlar literatürde önceden bu alanda yapılan çalışmaları genel olarak desteklemektedir.

Dört kullanıcı grubunun da çevresel konulara ilişkin kendilerini tanımladıkları bilgi ve duyarlılık düzeylerine ilişkin sonuçları oldukça yakındır. Ayrıca, dört kullanıcı grubunun hepsi enerji tüketim sorunlarını yaşamlarındaki öncelikleri arasında 10 sorun arasından 5. sırada tanımlamaktadır. Ancak ankette hayatlarındaki ilk sıradaki sorunların ne olduğu sorgulanmamıştır. Lise öğrencileri ve öğretmen / akademisyen grupları 'okulu' enerji tüketim davranışlarına dikkat ettikleri ikinci yer olarak belirtirken, üniversite öğrencileri 'yurt'u ikinci olarak belirtmiş, eğitim binası personelleri 'kamusal alanları' ikinci sırada belirtmiştir. 4 kullanıcı grubuyla paylaşılan küresel çevre sorunlarına neden olan faktörler arasında, lise öğrencileri 'bilgi eksikliği' en önemli faktör olarak belirlerken, üniversite öğrencileri 'insan davranışını' en önemli faktör olarak seçmiştir. Buna ek olarak, öğretmenler / akademisyenler enerji ve su tüketimini daha önemli bulurken, eğitim binası personeli

enerji tüketimini en etkileyici faktör olarak görmektedir. Sosyal çevrelerini etkileyebileceklerine en çok inanan grup %62,7 oranıyla öğretmen / akademisyen grubudur. Bunu üniversite öğrencisi (% 58,6), eğitim binası personeli (% 55,7) ve lise öğrencileri (% 51,4) izlemiştir. Sosyal çevrenin enerji tüketimi üzerinde en fazla etkiye sahip olduğuna inanan grup %64,2 oranıyla eğitim binasının personelleri olmuştur. Bu oranı % 62,4 ile öğretmen / akademisyenler , lise öğrencileri (% 56,7) ve üniversite öğrencileri (%56,5) takip etmektedir. Tüm kullanıcı grupları kendilerini evlerindeki enerji tüketiminden okuldaki enerji tüketimine göre daha sorumlu hissetmektedir. Eğitim binalarındaki enerji tüketiminden en az sorumlu hisseden grup lise öğrencileri olarak ortaya çıkmaktadır. Enerji tüketiminin önceki yıllara arttığının tüm kullanıcı grupları genel olarak farkında olmasına rağmen, farkında olma oranının en düşük olduğu grup lise öğrencileri grubudur. Gerçek durumdaki enerji tüketimi ile ilgili tahminlerin sorgulandığı sorularda genel olarak bilme oranının en düşük olduğu eğitim binası kullanıcı grubu lise öğrencileri grubu olmuştur.

Bilgilendirici posterin enerji tüketimi davranışlarına yansıyabileceğine inanma düzeyleri eğitim binası personellerinin %80, öğretmenler / akademisyenlerin %79, üniversite öğrencilerinin %68 ve lise öğrencilerinin %58'dir. Lise öğrencilerine göre, posterdeki en etkileyici 5 madde şu şekildedir: (1) küresel ısınmanın %100'ü insan faaliyetlerinden kaynaklanmaktadır, (2) 1 lise çağındaki genç 1 yetişkinden %20 daha fazla enerji tüketmektedir, (3) tüm teknolojik gelişmelere rağmen, enerji tüketiminin 2010-2040 yılları arasında %60 artması beklenmektedir, (4) binalar dünya enerji tüketiminin %40'undan sorumludur ve (5) insanların evlerinde olduğu gibi diğer ortamlardaki enerji tüketimi davranışlarına dikkat etmemesidir. Enerji tüketimini azaltmak için bilgiler sosyal medyada paylaşılacak olursa, lise öğrencileri en çok tercih ettikleri üç sosyal medya platformunu Instagram, Youtube ve Whatsapp olarak belirtirken, üniversite öğrencileri Instagram, Twitter ve Web sayfalarını ilk üçte belirtmiştir. Ayrıca, öğretmen / akademisyenler sırasıyla Instagram, Twitter ve Facebook'u tercih ederken, eğitim binası çalışanları sırasıyla ilk üçe Instagram, Pinterest ve Twitter'ı koymuşlardır. Tüm kullanıcı grupları bilgilendirici postere ek olarak bilginin sosyal medyada da paylaşılmasının daha etkileyici olacağını düşündüklerini belirtmiştir.

Çalışmanın eksik tarafları; anket için yeterli sayıda eğitim binası personeline ulaşamaması, katılımcıların posterdeki bilgilere maruz kalma sürelerinin sınırlı oluşu, çalışmanın sadece lise çağından itibaren eğitim binalarında bulunan kişileri içermesi ve anketin yaşa ve bulunulan eğitim kurumuna bağlı ve açık uçlu soru içermeyişi olarak belirtilebilir. Gelecekte yapılacak araştırmalar için, posterin eğitim binasında fiziksel bir ortama asılarak ya da tüm kullanıcı gruplarının tercih ettiği gibi sosyal medyada (Instagram) paylaşılarak davranış değişikliklerinin gözlemlenmesi önerilir. Böylece bilginin posterler ve sosyal medya üzerinden paylaşılmasının arasındaki farklar karşılaştırmalı olarak incelenebilir. Sosyal medya olarak Instagram'ın kullanılması önerilir. Lise çağı öncesi öğrenciler de çalışmaya dahil edilebilir. LEED ve BREEAM gibi bina enerji sertifika sistemleri binaların tasarım aşamasında planlanan enerji tüketimlerini baz almaktadır, bu nedenle kullanım aşamasında kullanıcı odaklı olmadığı literatürde yer almaktadır. Gelecek çalışmalarda bina kullanıcılarının davranışlarının akreditasyon sistemlerine entegrasyonu üzerine bir araştırma yapılabilir, mevcuttaki gerçek durumu bilmenin, enerji tüketimini azaltmak için motivasyon eksikliği yaratıp yaratmayacağı araştırılabilir.



1. INTRODUCTION

The concepts of sustainability and environmental awareness are spreading rapidly among the different levels of society (Grunert and Juhl, 1995; Wang et al., 2014; Lee, 2014; Wong and Zhou, 2015; Joshi et al., 2019). The widely used definition of sustainable development is the one that “*meets the needs of the present without compromising the ability of future generations to their own needs* (WCED, 1987)”. Sustainability term in the research papers mostly have drawn attention to the relationship between people and the resources they use (Aarseth et.al., 2017). Besides, to provide sustainability; social, environmental and economic conditions should be in balance with each other (Aarseth et.al., 2017). The three dimensions as above mentioned of sustainable development can be affected by the building energy retrofits, however, while the economic and environmental relationship with building energy has been addressed quite often in the academic literature; there are fewer researches on the relationship between the social dimension and building energy in the academic literature (Jafari et.al., 2019).

1.1. The Importance of the Building Sector and Occupant Behaviour in Sustainability Issues

Sustainability and environmental awareness issues become more important to take a remarkable step forward to energy efficiency, it is vital to explore problematic areas and to learn how to achieve a more sustainable, less energy-consuming world. About 100% of the global warming observed since 1950 is due to human emissions and activities according to the Intergovernmental Panel on Climate Change (Allen et.al., 2014). CO₂ emission reduction is a global concern (Toth et.al., 2013) and the energy usage and the residential sector have seen one of the greatest contributors to CO₂ emission, thus, this area has a huge potential for saving energy (The European Environment Agency, 2008; van der Werff et al., 2019). Based on the literature, buildings are responsible for approximately 40% of global energy consumption (World

Business Council for Sustainable Development, 2009). Casals et.al. (2020) supports the information that the building sector is the largest part of the energy consumption (D'Agostino et.al., 2017) with its 38,9% rate of all the energy consumption in the EU (Gaglia et.al., 2019) and hence indicates this situation requires special attention. The energy consumption that buildings causes in developed countries is indicated as between 20%-40% of the total energy consumption (Newsham et.al., 2009). Besides, there is a differentiation on the annual growth rate in energy usage between the developing countries and developed countries; while the average annual energy usage growth rate of the developing countries is 3.2%, developed countries' average annual energy usage growth rate is 1.1% (Newsham et.al., 2009). For this reason, the impact of buildings' energy consumption should not be ignored to make the world more sustainable. At the international level, occupant behaviour has been identified as one of the six driving factors of energy use in buildings by International Energy Agency (IEA) and occupant behaviour has an important effect as like the efficiency of equipment on energy consumption according to the World Business Council for Sustainable Development (Santangelo and Tondelli, 2017).

There is a significant gap between the planned and actual energy consumption of buildings and also this discrepancy sometimes goes up to 300% more than the planned energy consumption estimation (Delzendeh et.al., 2017). Occupant behaviour seems to be one of the common problems alongside the design, materials, construction and site parameters in this area which causes the difference between the planned energy consumption at the design stage and the actual energy consumption (Yousefi, Gholipour and Yan, 2017). The difference between the expected and actual energy consumption in buildings is highly related to the occupant behaviour that is because they are occupants who consume energy, not the buildings (Santangelo and Tondelli, 2017). There are lots of research in this field that focus on the relationship between the occupant behaviours and energy consumption (Santangelo and Tondelli, 2017; Ding et.al., 2019; Moon et.al., 2019; Yousefi et.al., 2017; Corry et.al., 2015; Delzendeh et.al., 2017) There are significant basic differences in energy consumption behaviour of occupants in the public buildings and residential buildings; for instance, people who are acting in public places less care on the energy consumption of the buildings than occupants of residential buildings (Cottafava et.al., 2019). Given the above, there is a strong relationship between the building types and its occupants' behaviour.

The building type is one of the critical factors which have an impact on occupants' energy usage behaviours (Cottafava *et.al.*, 2019). Santangelo and Tondelli (2017) point out the residential sector is the significant target area to reduce energy consumption with its 75% of the total energy consumption ratio around buildings. Even if the residential sector has a huge share of the buildings energy consumption; Balvedi *et.al.*, (2018) indicate that most of the occupant behavioural studies are carried out in office buildings. Further, while most of the studies focus on office and residential buildings, there are few studies on student residences in this research area although universities are one of the large-energy consumers with the ratio %8 of the total energy consumption of the entire society (Ding *et.al.*, 2019). In the result of research which is conducted to investigate the relationship between the socio-demographic characteristics of the people and their behaviours; Vogianzi, *et. al.* (2018) list three important axes as rising education level, rising environmental awareness of young people and provision of financial incentives for the retrofit of energy-saving devices for the citizens with lower income.

Occupant behaviours have unpredictable and dynamic components which are influenced by the level of consciousness of people and the policies on sustainability and energy efficiency (Ding *et.al.*, 2019). It should be bearing mind that only left appliances in standby mode by people causes approximately 19 million tonnes of CO₂ per year in the EU (Consumer Guide on Standby Losses of Appliances, 2010; van der Werff *et al.*, 2019). Studies conducted on standby electricity consumption in many countries have shown that standby electricity consumption varies between 3% and 10% of the total electricity consumption of the residence (Şahin, 2012). Substantially contribution to the environment can be achieved by reducing the number of appliances in standby mode (van der Werff *et al.*, 2019). Therefore, it is crucial to change people's, occupants' and users' behaviours towards more sustainable energy behaviours to overcome environmental problems (Robin Matthews *et.al.*, 2018). Besides the environmental benefits, saving energy holds great benefits for economic growth, energy security as well and energy requirement could be decreased to half of the actual demand by 2035 via energy saving (International Energy Agency, 2012; Aguirre-Bielschowsky *et.al.*, 2018). The studies show that technological improvements directly contribute only 42% of energy saving in buildings thus there is need to adopt user behaviours towards more sustainable and energy-efficient ways to

increase this ratio (Zhao et.al., 2017; Casals et.al., 2020). Technology and user behaviours should be developed hand in hand to achieve remarkable energy efficiency (Socolow and Pacala, 2006; Aguirre-Bielschowsky et.al., 2018). People are not engaged in sustainable behaviours for the long term without tangible feedback (Pasini et.al., 2017). In recent decades, different strategies have been investigated about how to promote and embed energy-saving behaviours such as social norms, economic stimuli and provide feedback (Erell et.al., 2018, Casals et.al., 2020). In addition to these, to understand the correlation between occupants' behaviour and energy consumption; several tools, approaches and methods have been used by the researchers as such; Serious Game Approach, Eco-Feedback tool, web-based or social media applications so on. As a challenge in the Eco-feedback; while it can be functional in the short and medium-term, however, it stopped functioning in the long-term. Nevertheless, the results of these studies show that these mechanisms have had diverse levels of success to promote and embed sustainable behaviours (Johnson et.al., 2017; Casals et.al., 2020).

1.2. Background

Climate change is recognized by the international area and in the academic literature as a major and substantial environmental challenge/threat that humanity faced in modern times (Delzendeh et.al., 2017; Derqui et.al., 2020). About 100% of the global warming observed since 1950 is due to human emissions and activities according to the Intergovernmental Panel on Climate Change (Allen et.al., 2014). By the population growth and mass consumption cause, human-incurred changes have a rapid impact on the environment than the natural processes (Salonen et.al., 2018). In our world, revealing 2 billion tons of carbon dioxide gas in the early 1900s when we come to 2018, the amount has reached 36.2 billion tons, an increase of 16 times (Congar, 2018). The concerns of modern societies' has gradually increased on the energy and sustainability issues in recent decades so it is significant to know that the building sector can contribute to energy reduction with the massive adoption of energy-saving approaches (Rocchi et.al., 2018). In this scenario, the built environment plays a vital role in energy and resource consumption as well as in sustainable development (Sabnis and Pranesh, 2017). Global CO₂ emission which is related to the buildings continues

to rise by nearly 1% per year due to the population growth and increasing prosperity (BP Outlook, 2019). Increasing prosperity causes an increase in the power demand for heating, cooling, lighting or technological/electrical equipment (BP Outlook, 2019).

Buildings are responsible for 30% of final energy consumption and approximately 40% of total direct and indirect CO₂ emissions in the world (World Business Council for Sustainable Development, 2009; Javid et.al., 2019; Gaglia et.al., 2019; Casals et.al., 2020). Statistics reveal the magnitude of the energy problem: with the development of technology and electronic appliances, households increased their energy consumption by 74% from 1990 to 2010 (Department of Energy and Climate Change, 2011; Toth et.al., 2013). With the spread of the concept of sustainability in the construction sector, it is realized that current practices and processes are not sufficient for the objective (Thomson and El-Haram, 2019). Moreover, many statistics have shown that the building sector is still a major contributor to energy consumption in the world even though ‘going green’ and ‘environmental sustainability’ concepts have been rising in the architecture, engineering and construction (AEC) sector (Wong and Zhou, 2015). Based on the literature, there is a performance gap between the expected performance at the design stage and actual performance in the architecture, engineering and construction (AEC) sector (Corry et.al., 2015). According to various studies on the assessing energy consumption of buildings, it is clear that the energy consumed at the maintenance and operation phase is higher than the construction and preconstruction phases (Sabnis and Pranesh, 2017). For instance, there is a contradiction among the Low-Income Housing Projects’ aim and the actual situation. While the aim at the pre-construction phase is to create a more sustainable and economic housing project, the energy consumed during the operation and maintenance phase is much more than the expected values of the low-income housing project and this situation causes the projects to lose their economic aspect of sustainability (Marzouk and Azab, 2017).

The literature review shows that most of the energy efficiency-related research papers investigated the energy-related behaviours of the occupants of residential and office buildings (Santangelo and Tondelli, 2017; Balvedi et.al., 2018; Ding et.al., 2019). The energy-related behaviours of the educational buildings have been poorly investigated in the academic literature (Santangelo and Tondelli, 2017; Balvedi et.al., 2018; Ding

et.al., 2019). It is indicated that educational activities are complex and educational buildings include specific occupants and activities that make the investigation difficult which held in the educational buildings as a reason for this situation, it requires special attention (Allab et.al., 2017; Derqui et.al., 2020). Thus, it can be said that there is still so much room to investigate the occupants' energy consumption behaviour of the educational building.

The main problem focused on in this thesis is that even though the rising environmental awareness of young people and education level are located at the crucial axes of the literature by the researchers (Vogianzi et. al. 2018; Washington-Ottombre et.al., 2018; Kolbasov, 1992; Nasibulina, 2015), there are fewer studies on the occupants' behaviour of the educational buildings than the studies on the occupants' behaviour of the residential and office buildings (Santangelo and Tondelli, 2017; Balvedi et.al., 2018; Ding et.al., 2019). The role of the educational institutions on sustainable issues has been indicated in the literature, key conferences and declarations since the 1970s (Washington-Ottombre et.al., 2018). It is indicated that education is crucial for reaching sustainable development goals and improving the capacity of the people to address environment and development issues at the UN Conference 1992 (Kolbasov, 1992). Besides, the adolescent is seen as the most significant age group because energy-related behaviours get in shape in early adulthood, however, initial development of the energy-saving behaviours and in-school energy education evaluation have not been researched enough when compared with the general energy behaviour topics (Abrahamse et.al., 2005; Wilson and Dowlatabadi, 2007; Aguirre-Bielschowsky et.al., 2018; Gill and Lang, 2018; Ebersbach and Brandenburger, 2020). There are numerous studies which focus on the energy-saving behaviours of household or adult (Gram-Hanssen, 2005; Toth et.al., 2013) even though one teenager consume 20% more electricity than one adult and teenagers are seen as the adults of the future (Gram-Hanssen, 2005; Toth et.al., 2013). Thus, it is indicated that there is a lack of knowledge and studies which focus on the teenager's environment-related behaviours (Boeve-de Pauw et.al., 2011; Toth et.al., 2013). The learning activities which include energy-related behaviours are affected by formal and informal ways (Aziz et.al., 2013; Nasibulina, 2015). Further, it is indicated that educated young people have the capability to motivate their family, social circle in sustainable issues as well (Duvall and Zint, 2007; Gill and Lang, 2018; Knafo and Galansky, 2008; Toth et.al., 2013).

“The environmental impact of one’s own behaviour is difficult to grasp, partly because issues related to climate change are perceived as psychologically distant (Spence et al., 2012)”. In other words, one of the significant reasons for people's uninterested ongoing behaviours about the environment is that they do not consider and see what direct environmental consequences their behaviour causes in the world (Bonino et.al., 2012; Wai and Bojei, 2015). Therefore, there is a need to understand how to change and adopt people behaviours towards a more sustainable life. Besides, changing occupant behaviour is seen as the most cost-effective way to promote energy efficiency in the buildings (Nisiforou et.al., 2012; Giusti and Almoosawi, 2017; Kang et.al., 2012). Previous research in this field focused on the impacts of the different tools, approaches and pathways on the energy-related behaviours of occupants or product users such as education, feedback, gamification, information, instruction, reminders, rules, rewarding, punishments, sharing stories of the role models (Aguirre-Bielschowsky et.al., 2018; Gill and Lang, 2018; Ebersbach and Brandenburger, 2020; Casals et.al., 2020).

Two research gaps have been identified in the literature as follows: (1) the limited understanding of the energy-related behaviours of teenagers rather than adults and (2) the limited study conducted which aim to analyze the energy-related behaviour of occupants of education buildings. There have been less previous studies focusing on the high school students and their energy-related behaviours even though the young people and education are located at the crucial axes to change people's behaviour towards energy-efficiency. Besides, people need tangible information, feedback and results to change their behaviours towards energy-efficiency in the long term process. These factors constitute the purpose of the thesis. There are four objectives of this study. The first one is to assess the current energy-saving behaviours and awareness of the high school students. The second one is to understand the impact of the informative posters on the energy-saving behaviours and awareness of high school students. The third one is the comparison of the high school students' behaviours and awareness with the other occupants of these education buildings (university students, teachers/academicians, staff). The fourth one is to assess the knowledge level of these occupants regarding the energy issues of the buildings.

2.LITERATURE REVIEW

Buildings are responsible for approximately 40% of total direct and indirect CO₂ emissions in the world (World Business Council for Sustainable Development, 2009; Javid et.al., 2019; Gaglia et.al., 2019; Casals et.al., 2020). In particular, residential buildings are responsible for approximately 27% of the total final energy consumption in the EU (Gynther et.al., 2012; Erell et.al., 2018). With the increasing environmental awareness and energy costs, energy saving has become significant in the building sector, thus, energy efficiency standards have been identified in the certificate systems (e.g. LEED, BREEAM, Energy Star) and adopted by the great number of countries to promote energy-saving (Newsham et.al., 2009; Meier et.al., 2011; Erell et.al., 2018). The main features of the LEED accreditation are to have an integrated design approach with a credit system on the design features to increase sustainability which aims to a reduction on energy usage and improve the quality of the indoor environment (Newsham et.al., 2009).

2.1. Behavioural Aspects of Energy Consumption

The study conducted by Newsham et.al. (2009) examined the situation that energy performance credits in the LEED certificate are based on predicted energy performance at the design phase of the building, however, it is not based on energy performance at the operational state of the buildings (Newsham et.al., 2009). Newsham et.al. (2009) indicated that applying Post Occupancy Evaluation (POE) to determine operational problems can be effective to improve the energy performance level of the building. However, it is indicated that applying POE study is conducted and shared seldom. As a reason for the differences between the planned and actual energy performance of the buildings, the following factors have been identified by Newsham et.al. (2009); the different occupancy hours than in the design phase assumptions, the difference between as-built building and the initial building design, experimental technologies do not perform as predicted, the difference between the assumption and actual plug load, the building has not been commissioned

appropriately and there is a gap in the transfer of knowledge between the design team and the occupants (Newsham et.al., 2009). The study conducted by Newsham et.al. (2009) shows that while LEED buildings can provide 18-39% energy saving per floor area, it is observed that LEED buildings consume 28-35% more energy than their counterparts. In addition to this, it is indicated that the energy performance of LEED buildings has a weak correlation with the number of achieved energy credits at the design phase and the certification level of the buildings (Newsham et.al., 2009). Moreover, even though the LEED buildings have a capability to provide significant energy saving, there is a need to further studies to be done to embed more consistent success which covers the operational phase and end-users (Newsham et.al., 2009).

According to LEED standards, there is an assumption if the buildings constructed with appropriate standards and technical specifications, the energy consumption of the buildings will be less as planned (Erell et.al., 2018). However, this assumption remains weak because of the difference between the planned and actual energy consumption in the buildings (Lee et.al., 2016; Newsham et.al., 2009; Erell et.al., 2018). The reason for this situation is shown on computer-based modelling approaches which have limitations about the thermal comfort, heating, cooling, lifestyle and occupant behaviour (Erell et.al., 2018). Whilst the technological improvements in the building fabric and energy efficiency, they are seen as one of the most important factors which affect the reduction of energy consumption (Ekins, 2009; Gupta et.al., 2018). Even though technologies are applied to the houses to reduce energy consumption, occupants of the houses do not consume less energy as assumed (Calì, Osterhage, Streblow, & Müller, 2016; Gupta et.al., 2018). The reason for the difference in the energy demand is indicated as occupant behaviour which has an impact on energy consumption by a factor of three or more (Gram-Hanssen, 2011; Janda, 2011; Gupta et.al., 2018) It is anticipated that there will be a 60% increase in energy consumption across the world between 2010-2040 even though technological advances have been rising on energy efficiency (Estiri and Zagheni, 2019). It is indicated that the lifestyle, choices of households have an important impact on their energy consumption level (Erell et.al., 2018). For instance, some households consume energy for heating three times or more than their neighbours even if they are living in the totally same type of houses (Erell et.al., 2018). Besides, almost 37% of the energy consumption difference between the houses can be explained by the behaviours of occupants (Gill et.al., 2010;

Erell et.al., 2018). The approaches which aim to support behavioural change towards energy efficiency in the buildings are called ‘pro-environmental behaviour’ and ‘energy conservation’ in general in the literature.

A literature review has shown that there is a significant gap between the planned and actual energy consumption of buildings and also this discrepancy sometimes goes up to 300% more than the planned energy consumption estimation (Delzendeh et.al., 2017). The difference between the expected and actual energy consumption in buildings is highly related to the occupant behaviour that is because they are occupants who consume energy, not the buildings (Santangelo and Tondelli, 2017). The design and construction phases play a significant role on the energy consumption of the buildings, however, operation phase is the most crucial phase which can be affected by the occupants’ behaviours directly during the life cycle of the buildings (Jafari et.al., 2019). The measures implemented to reduce energy consumption in buildings are generally technologically based, however, there is also a need to examine user aspect behind the technological device that is because the devices are operated by people (Masoso and Grobler, 2010; Nisiforou et.al., 2012). *“From the view of the building life cycle, over 80% of energy is consumed during the operational stage* (Ding et.al., 2019)”. Building spaces are often utilized by the occupants changing the planned version according to their needs and it may cause unplanned energy usage more than expected in the design stage (Moon et.al., 2019). Therefore, occupant behaviour is considered as one of the parameters that can affect energy performance alongside the design, materials and construction and site parameters (Yousefi et.al., 2017).

Narrowing the energy performance difference between design intent and actual performance is a complex process which requires all stakeholders involvement (Moon, 2019). Energy consumption of buildings is influenced by three occupant behaviour related issues as such: building operation and maintenance, occupant activities and behaviour and indoor environmental quality in addition to physical factors: climate, building envelope and building services and energy systems (Yoshino et.al., 2017). To understand the dynamics of the energy performance of the buildings, Corry et, al. (2015) categorized parameters in more detailed; occupant behaviour and activities is the most significant parameter alongside the physical characteristics (e.g. type and surface area), its internal service systems and equipment, and its external environment

(e.g. solar radiation, wind velocity) parameters that can have an impact on the energy performance of buildings. At the international level, occupant behaviour has identified as one of the six driving factors (climate, building envelope, building energy and service systems, indoor design criteria, building operation and maintenance, occupant behaviour) of energy use in buildings by International Energy Agency (IEA) and occupant behaviour has an as important effect as the efficiency of equipment on energy consumption according to the World Business Council for Sustainable Development (Santangelo and Tondelli, 2017; Yoshino et.al., 2017). The aim of the actions taken by international organizations such as International Energy Agency (IEA), World Business Council for Sustainable Development and the United Nations is to increase the awareness of the importance of occupant behaviours for energy-saving because occupant behaviour plays a crucial role in reducing energy consumption and poorly understood by the built environment (Santangelo and Tondelli, 2017).

There is need for behavioural change to achieve an important decrease in energy consumption and make the world and life more sustainable as above mentioned. There are two main learning ways to increase awareness of environmental issues such as formal and informal learning (Sumane, et.al., 2018). In this context, education is seen as one of the most significant formal ways to let people understand the importance of energy-saving behaviours to provide a sustainable future and adapt their behaviours towards. However, it is indicated in the literature that informal learning ways are not used as a supporter for the formal learning ways enough (Sumane, et.al., 2018). Besides, behavioural change is accepted as one of the most cost-effective ways to reduce energy consumption.

2.2. Energy Consumption of Occupants and Building Types Relation

For the purposes of this thesis, the term 'occupants' refers to building users who live, work or get education temporarily or permanently inside the buildings and refers people who consume energy in any way inside the buildings. Santangelo and Tondelli (2017) point out the residential sector is the significant target area to reduce energy consumption with its 75% of the total energy consumption ratio around buildings. Therefore, residential buildings should be seen as one of the most significant contributors that cause energy consumption in the world (Yousefi et.al., 2017).

Different building types are used in the energy consumption and occupant behaviour related research papers in the academic literature in order of 36,44 % residential, 25,31 % offices, 7,8% commercial, 6,7% educational and 6,7% other types (Delzendeh *et.al.*, 2017). In contrast with this information, Balvedi *et.al.*, 2018 indicates that most of the occupant behavioural studies are carried out in office buildings, however, residential buildings also need to have occupant behaviour analysis to have more sustainable living spaces. The reason there are more researches on energy consumption in office buildings is originated that occupant behavioural patterns have greater diversity and it is harder to monitor residential sector on a large scale, however, it is possible to have detailed results for pilot small scale residential projects (Chang *et al.*, 2018). Recently, smart meter technologies provide opportunities to analyse occupant behaviour in different buildings via behavioural modelling or load forecasting tools which need huge data analysis as a new challenge in this area (Csoknyai *et al.*, 2019). Further, while most of the studies focus on office and residential buildings, there are few studies on educational buildings in this research area although universities are one of the large-energy consumers with the ratio %8 of the total energy consumption of the entire society (Ding *et al.*, 2019).

Human behaviour in buildings varies depending on the activities type, timing, characteristics of the people and the type of the building (Nisiforou *et.al.*, 2012). Energy consumption of buildings have a strong relationship with the various parameters as such: the thermo-physical properties of the building elements, technical details of construction, the climate of the location, the quality and maintenance of the installed HVAC system, and occupants' behaviour and activities towards energy utilization (Chen *et.al.*, 2015; Delzendeh *et.al.*, 2017) These parameters that have an impact on energy consumption have been categorized in the literature by Delzendeh *et.al.*, (2017) as in the order of 19,33% climatic (environmental, physical), 16,28% personal, 7,12% building/design features, 6,10% economy/regulations, 6,10% socio-personal, 2,4% arrival/departure of occupants and 2,3% type of activity. Besides, different kinds of occupants interactions have been used in the energy consumption and occupant behaviour related research papers in order of 17,31% electricity, plug load, 10,18% window opening, 8,15% use of fans/air conditioning, 7,13% occupancy/occupant's presence, 7,13% heating, 2,4% blinds, 2,4% hot water and 1,2% thermostat (Delzendeh *et.al.*, 2017).

There are significant basic differences in energy consumption behaviour of occupants in the public buildings and residential buildings, for instance, people who are acting in public places less care on the energy consumption of the buildings than occupants of residential buildings (Cottafava et.al., 2019). Also, high school students state that they do not feel responsible for energy consumption in education buildings when compared their thought of responsibility for energy consumption at home (Toth et.al., 2013). Behavioural change to consuming less energy can be categorized into psychological (education, information) and structural (new infrastructure, technology) strategies (Santangelo & Tondelli, 2017). In the result of research which is conducted to investigate the relationship between the socio-demographic characteristics of the people and their behaviours, Vogianzi et. al. (2018) list three important axes such as rising education level, rising environmental awareness of young people and provision of financial incentives for the retrofit of energy-saving devices for the citizens with lower income. In addition to all of these, the common point of many articles point out is that education has a comprehensive impact on the behavioural change towards sustainability (Kolbasov, 1992; Nasibulina, 2015; Santangelo and Tondelli, 2017; Vogianzi et al., 2018). Analyzing students' energy use behaviour, increasing their consciousness about the environment are quite important from the education point of view and to succeed on this, there is a need to educate students on sustainability issues to increase their awareness on energy consumption and its impacts on the environment (Desrochers and Mosher, 2017; Ding et.al., 2019).

2.3. Education for Sustainable Building Operation

Using renewable and sustainable sources of energy is one of the key points of the sustainable development that is because it provides independence on energy and sustainable security (Udo and Pawłowski, 2011). The energy independence is crucial due to the energy has an impact on almost all aspects of social and economic development, livelihoods, water, agriculture, population, health, education, job creation and gender-related issues (Duran et al., 2013; Mróz et.al., 2019). The role of the educational institutions on sustainable issues has been indicated in the literature, key conferences and declarations since the 1970s (Washington-Ottombre et.al., 2018). It is indicated that education is crucial for reaching sustainable development goals and

improving the capacity of the people to address environment and development issues at the UN Conference 1992 (Kolbasov, 1992). In the UN Conference (1992), the world leaders also emphasized that education is a determining factor of change towards a sustainable future (Kolbasov, 1992; Nasibulina, 2015). The Sustainable Development Goals agenda indicates there is a need to implement significant change in the area of education by all countries by 2030 (United Nations, 2018; Avelar *et al.*, 2019). Nasibulina (2015) emphasized that *“everything necessary for the achievement of sustainable development of society is rooted in a system of education where personality foundations are laid: quality of thinking, ability to model and build the future, moral values, ideals and spiritual appetite”*. The reason is that the educational level of the people has a substantial impact in dealing with complicated issues such as fostering sustainable development (Kolb, *et al.*, 2017). Education for sustainable development should be highlighted at all levels of education and society that is because education is a lifetime process which influenced by formal, informal and non-formal learning activities (Aziz *et.al.*, 2013; Nasibulina, 2015). Higher education institutions (HEIs) have a great influence on the students and their social circle, therefore, HEIs have to respond sustainability challenges as much as possible by providing an interdisciplinary area to strengthen their profiles to spread sustainability issues to the people (Korobar and Siljanoska, 2016). Educational buildings in particular higher education institutions can be seen as an accelerator to spread sustainability issues to the people via physical operations, research, public outreach, inter-university cooperation, partnerships with government and non-governmental organization and ecological literacy (Krasny and Delia, 2015).

Bearing in mind that educational buildings (school buildings and higher educational institutions) have specific occupants and activities as mentioned above which can have an important impact on the energy efficiency and occupant behaviour, therefore educational buildings require special attention on monitoring energy and sustainability issues (Allab *et.al.*, 2017). Physical operations have a strong relationship with the occupant behaviour to provide energy & waste reduction, recycling, operation and maintenance of the buildings and therefore occupants needed to be engaged to energy-efficient behaviours through informal learning as such education, research and demonstration (Krasny and Delia, 2015; Kim *et.al.*, 2019). Students spend approximately %25 of their time at educational buildings (Ghita and Catalina, 2015).

This information has shown that educational buildings can provide a good opportunity to reduce energy consumption and improve the environmental quality towards more sustainable ways through education of the students and their families on a broader scale (Allab et.al., 2017).

Knowing that the universities are significant innovators on research activities especially in sustainability issues, it can be said that educational buildings can have an important contribution to the spread of sustainability to the public (Mytafides et.al., 2017). By changing occupant behaviours at the educational buildings, 24.7% energy reduction can be achieved (Chen and Ahn, 2014). The two of the most consumed energy types at the educational buildings are heating and electricity (Irulegi et.al., 2017).

The educational activity is a complicated system which has an impact on the environment with its huge range of process and external costs, hence, it is indicated that using the student as an indicator can provide functional data to evaluate and compare the sustainable behaviours at the educational buildings (Derqui et.al., 2020). Statistics of 2018-2019 academic year of the Turkish Ministry of National Education indicate that there are approximately 26 million students (university students are included) and 1.244 million teachers (academicians are included) in Turkey (Turkish Ministry of National Education, 2019). The total number of students and teachers in Turkey is more than the population of 183 countries in the world (Countries in the world by population, 2019). The number of high school students in Turkey (5 million 649 thousand 594) is more than the population of the 129 countries in the world and this number equal to the 7% of the Turkey population (Turkish Ministry of National Education Statistics, 2019). Besides, it should be noted that almost one-third of the total population of Turkey spends most of the time at educational buildings. Economic limitations are the main concern and barriers to change current buildings into the new energy-efficient buildings, however, integrating sustainability efforts to educational buildings provide an opportunity to increase awareness of energy-efficiency (Kim et.al., 2019).

Many studies show that energy-using behaviours begin in childhood and systemically get in shape until early adulthood. However, initial development of the energy-saving behaviours and in-school energy education evaluation have not been researched

enough when compared with the general energy behaviour topics (Abrahamse et.al., 2005; Wilson and Dowlatabadi, 2007; Aguirre-Bielschowsky et.al., 2018; Gill and Lang, 2018; Ebersbach and Brandenburger, 2020). In the researches which investigate the energy and children, schools are located at the crucial axes generally to develop children's knowledge on the water conservation, recycling, caring environment, taking responsibility for the effects of energy generation and consumption, promoting and increasing energy-saving behaviours (DeWaters and Powers, 2013; Gill and Lang, 2018; Aguirre-Bielschowsky et.al., 2018). Alongside the schools, it is also indicated in the literature that the parents who behave environmentally aware in their daily routine are the most impressive way to engage energy-saving behaviours in their children (Ebersbach and Brandenburger, 2020). Besides, otherwise is possible as well, children educated in environmental programmes in school motivate their parents to engage in environmental behaviours such as energy-saving, decreasing the waste of the households and recycling (Duvall and Zint, 2007; Gill and Lang, 2018).

The electricity-related behaviours of the children which used regularly and most often are identified as follows lights, electric heaters, stereos, tv sets, computers, heater pump, microwaves (Aguirre-Bielschowsky et.al., 2018). Besides, there is still room for the energy-saving behaviours that children can do easily such as closing curtains, wearing extra clothing, unplugging electronics and taking short-medium showers by effective learning ways (Aguirre-Bielschowsky et.al., 2018). There are four interrelated factors which have an impact on the children's level of control on their energy usage: (1) material culture, (2) capability, (3) trust and (4) safety (Aguirre-Bielschowsky et.al., 2018). In addition to these, it is indicated that children should be more involved in energy-related issues to increase their environmental and energy-saving awareness them to see the consequences of their behaviours beyond its costs (Aguirre-Bielschowsky et.al., 2018).

The pathways to socialization for energy-saving behaviours of children identified by different researches as follows:

- (1) Modelling Behaviour (visible behaviours with clear consequences are a more effective way to understand) (Aguirre-Bielschowsky et.al., 2018).
- (2) Environmental education (Ebersbach and Brandenburger, 2020), conservation, explanation (Aguirre-Bielschowsky et.al., 2018), gamification (Casals et.al., 2020).

(3) Instruction, reminders (Aguirre-Bielschowsky et.al., 2018; Gill and Lang, 2018), short stories of positive role models (Ebersbach and Brandenburger, 2020), feedbacks (Gill and Lang, 2018)

(4) Rules (Aguirre-Bielschowsky et.al., 2018).

(5) Punishments (Aguirre-Bielschowsky et.al., 2018).

2.4. Occupant Behaviour

‘Occupant’ word is defined as *a person who lives or works in a room or building* and ‘behaviour’ is defined as *the way that a person, an animal, a substance, etc. behaves in a particular situation or under particular conditions* (Cambridge Dictionary, 2019). Hoes, 2009 defined occupants behaviour as “*the presence of people in the building and the actions occupants take (or not) to influence the indoor environment*”. “*Occupant behaviour has a direct impact on building energy consumption* (Balvedi et.al., 2018)”. “*Behavioural change is a complex process. Not only it consists in acquiring more information, but it also makes the information comprehensible, acceptable and adaptable in modified behaviours and perceptions* (Cottafava et al., 2019)”. Behavioural issues are not covered enough in academic literature even though the interaction of the buildings and their occupants has a significant role in the energy-saving issues (Irulegi et.al., 2017). Sustainable behaviours are commonly defined as the daily activities of people who care on environment issues in every aspect and concern the results of their behaviour (Wai and Bojei, 2015). Occupant behaviours have unpredictable and dynamic components which are influenced by the level of consciousness of people and the policies on sustainability and energy efficiency (Ding et.al., 2019). Human behaviours are non-uniform, hence, human behaviours for sustainability can be incurred in many different forms by people (Wai and Bojei, 2015). Thus, some of the researches focused on the socio-demographic characteristics of the occupants to investigate the relationship between users and their energy usage behaviour (Vogiatzi et.al., 2018). Numerous researches confirm the importance of occupant behaviour for the energy performance of buildings and occupant behaviour is considered as the main reason for the lack of impact of the technological solutions and not to have energy savings as planned at the design stage (Ding et al., 2019; Li and Froese, 2017).

Previous studies have emphasized that there is an interactive relationship between people and buildings on energy-saving issues (Balvedi et.al., 2018; Ding *et al.*, 2019; Li and Froese, 2017). Although there is an increasing awareness about the environmental issues, people continue to their regardless behaviours as-usual on the environmental manner that is because people focus on the direct impact rather than indirect consequences of their behaviours on the environment (Wai and Bojei, 2015). For this reason, enhancing occupants' capability to interact with the building should be the key to let people behave in more sustainable ways during the construction and use phase (Cottafava et.al., 2019). Energy monitoring and reporting are one of the most cost-effective, significant energy-saving ways which enable the technical solutions to reach their goals so behavioural change should be seen as a key solution (Nisiforou et.al., 2012). Further, there is a gap between the occupant's knowledge and action on environmental issues (Delmas et.al., 2013; Kollmuss and Agyeman, 2002; Saphores et.al., 2012; Erell et.al., 2018).

Morganti et. al. (2017) list environmental education, awareness on consumption and pro-environmental behaviour as the important areas on changing occupants behaviour. In other respects, based on the literature there are different perspectives about the behavioural change as such; economical, psychological, sociological and educational (Cottafava et.al., 2019). The concept of near or net-zero energy consumption buildings has become widely known (Csoknyai et.al., 2019). Striving to develop behavioural changes to reduce the energy consumption in buildings is considered as a more cost-effective and sustainable method (Ding et.al., 2019). Behavioural change has to be continuously incited otherwise it is going to provide short-term efficiency, therefore, policy changings and get informed are crucial on to change behaviours towards energy-saving and sustainable ways (Nisiforou et.al., 2012). Get informed and make a decision towards sustainability on the design stage of the buildings are significant to have more efficient and cost-effective buildings, however, most of the energy is consumed (one-third of the buildings global carbon emission) at the operation or use phase of the building (Wong and Zhou, 2015). Energy-efficient buildings have become popular during the last decade, thus, building design process and retrofit of existing buildings have become important to provide energy efficiency (Javid et.al., 2019). Retrofit solutions for existing buildings might reduce energy consumption, improve

occupants' comfort, cause less impact on climate change and reduce the environmental impact of the operational phase of the buildings (Javid et.al., 2019). To reducing energy and improve sustainability retrofitting existing buildings can provide huge contribution than to build new energy-saving buildings (Kim et.al., 2019) so occupant behavioural change can conduce to adopt current buildings into more energy-efficient systems. Behavioural change provides a huge opportunity to reduce energy consumption and it does not require an extra cost like technological solutions, besides, behavioural change has a significant impact in both new or existing buildings (Nisiforou et.al., 2012).

The aims of the study conducted by Giusti and Almoosawi (2017) were (1) to gather information about the energy consumption awareness of locals and foreigners while carrying out a preliminary survey of the energy consumption in selected residential houses, (2) to audit the houses and understand the factors (building characteristics, cultural factors, occupancy profiles, illumination and management of heating, cooling systems) which affect residential energy load, and (3) to estimate possible reduction on energy consumption in the houses by retrofitting (double glazing, roof installation), and change the type of management of the air cooling (AC) and domestic water heating (DWH) systems at Abu Dhabi residencials during the one year process. The model simulation provided following estimates about potential energy saving as such; energy consumption can be reduced considerably *by increasing the AC thermostat temperature to 24 °C, by switching off AC and DWH when these are not needed and by retrofitting villas with roof insulation* (Giusti and Almoosawi, 2017). According to these results, it is indicated that the occupant behaviour plays an important role in energy conservation in the residential sector of Abu Dhabi. Besides, following information was given as suggestion, energy-efficient technologies like AC can reduce energy consumption by up to 40%, and also investing the programmable thermostats, automated wireless motion/thermal sensors, smart home energy monitoring help to create a positive impact on the energy conservation. However, while the basic displays which can show historical or real-time information via PC/mobile phone are comparatively inexpensive than the wireless thermostats which require professional installation into the houses (Giusti and Almoosawi, 2017). Moreover, this study states that the most cost-effective solution is to change the behaviour of the occupants in a

way that is more sustainable (Giusti and Almoosawi, 2017). Another suggestion is that the education programmes which aim to embed sustainable behaviours should be targeting household (Giusti and Almoosawi, 2017). Another interesting output is that Abu Dhabi consumers pay very low electricity rates around the international standards and it is the cheapest in the UAE (Giusti and Almoosawi, 2017). This situation shows that the foreigner people tend to behave more sustainable on energy consumption than the local Abu Dhabi citizens (Giusti and Almoosawi, 2017). The paid amount for electricity rates by Abu Dhabi locals equal with only 0.5% of their income (Giusti and Almoosawi, 2017). There is a need to have socio-demographic data of the occupants (age, level of education, income, etc.) to ease the understanding of occupant's behaviour on energy conservation, otherwise, without changing occupant behaviour towards a more sustainable and energy retrofitting, residential will keep continuing to be responsible for a huge percentage of the future CO₂ emissions (Giusti and Almoosawi, 2017).

The study conducted by Erell et.al. (2018) aims to increase motivation for energy-saving behaviours by using peer influence. To achieve to create peer influence among the occupants, it should belong to a similar social norm target group (Goldstein et.al., 2008; Erell et.al., 2018). As a result of this study, most of the occupants in the study indicate that providing comparative data on energy consumption is the least effective way for them to promote energy efficiency (Erell et.al., 2018). As the reason for this situation, which is stated by the household, it was emphasized that neighbours had different demographic characteristics and this made the comparison unrelated even though the same neighbourhood and similar house types have been selected for this study (Erell et al., 2018).

A review paper which is prepared by Balvedi et al. (2018) focuses on occupant behaviour studies in residential buildings to reveal the challenges and potentials to improving the energy performance of buildings and collect the data under the three main current methods in (1) monitoring occupant behaviour, (2) developing occupant behaviour models, (3) applying occupant behaviour models in building performance simulations. (1) Monitoring occupant behaviour focus on the collection of data on occupancy, control of the window, blind openings, illumination system, heating,

cooling system and equipment use (Balvedi et al., 2018) While physical monitoring can be provided via image-based, threshold and mechanical, motion sensing, radio-based, human-in-the-loop, and consumption sensing; occupant investigation can be provided via the surveys, observations and interviews (Balvedi et al., 2018). (2) Developing occupant behaviour models were classified varies the aim of the study and grouped into occupancy and interactions with the devices of the building (e.g. window, blind, heating, cooling system) (Balvedi et al., 2018). (3) The application of occupant behaviour models generally focused on energy consumption predictions and evaluation of the specific interactions between occupants and building devices on energy consumption and it is indicated that these studies show that there is potential for energy reduction by increasing the awareness of the occupants (Balvedi et al., 2018).

The attention on the energy conservation and sustainable living style are increasing including the political, economic situation, greener lifestyles and philosophies (Bonino et al., 2012). Therefore, bearing in mind that the building sector and technologies on home automation have a crucial impact on the current and future energy efficiency of the buildings, another study on the residentials conducted by Bonino et al. (2012) reported the results of the online survey which comprehends almost thousand participants about feedback mechanism suggested by the research community, with the aim of understanding which feedback is more understandable by the household and more effective to promote energy-efficient behaviours.

Bonino et.al. (2012) provided a brief overview of household behaviour on (1) energy-saving behaviours, (2) energy-saving strategies then prepared an online survey to understand how the in-home energy display may affect the households' habits and how to promote energy-efficient behaviours. (1) Energy-saving behaviours comprehend buying energy-efficient equipment and repetitive behaviours such as turning off the lights when there is no need. (2) Energy-saving strategies (e.g. information, goal setting and commitment) may provide necessary information about how households can decrease their current energy consumption or how to select more environmental-friendly appliances. Then, they required occupants to watch and analyze two videos to evaluate the interaction of direct feedback and energy goal-setting visualizations of

households and their technology aware usage on energy-related issues at home. The results show that most of the occupants would like to have in-home displays in their home, they understand the importance of the direct feedback and goal setting visualization on energy-efficiency even though they feel the goal setting is the more useful way than having direct feedback (Bonino et al.,2012).

Another survey developed by Kang et.al. (2012) focuses on the observation and comparison of the households consciousness, knowledge and behaviours, before and after providing them with information and performing promotion energy-saving activities based on the government guidelines of Korea. The reason is that the government guidelines include energy-saving solutions and can encourage practices on energy-saving issues with households participation. This energy-saving effect of the household's participation is a cost-effective way to provide energy-saving behaviours and it is very popular in the developed countries. (Kang et al.,2012) . *First, the residents' level of consciousness, knowledge, and behaviour toward energy-saving improved after they were provided with relevant information and exposed to campaigns; thus, energy-saving results may be expected to increase via the boosting of the residents' awareness of energy-saving and their intention. Second, the level of the residents' consciousness, knowledge, and behaviour toward energy-saving were further improved if they had previously been exposed to information and relevant campaigns provided by the apartment complex, and the result confirms that consistent campaigns conducted by each apartment complex encouraged the residents to participate in energy-saving activities. Third, collective energy-saving activities driven by resident' participation help build the residents' pride in their apartment complexes, indicating that the collective activities of apartment complexes contribute to the establishment of a community spirit within the complex. (Kang et al.,2012).*

Zhang et.al. (2018) focus on rethinking occupant behaviour and its role in building energy performance through review. It is indicated the technology is not enough to achieve energy consumption targets, so there is a need to include occupants and their energy-saving behaviours in buildings (Zhang et al.,2018). According to the existing research, it is possible to achieve energy-saving in the range of 6%-25% at residential buildings and 5%-30% at commercial buildings (Zhang et al.,2018). Four existing

research gaps have been identified as following: *namely the needs for understanding occupant behaviour in a systematic framework; for stronger empirical evidence beyond individual buildings and at a larger city scale; for linking occupant behaviour to socio-economic and policy variables; and for evaluating the role of occupant behaviour in the effectiveness of building energy efficiency policy (Zhang et al.,2018).*

Teenagers have a significant ability to influence their parents, social circle and community (Knafo and Galansky, 2008; Toth et al.,2013). Approximately 25% of adults indicate that their main reason they behave more aware in social and environmental issues is their children (National Ethical InvestmentWeek, 2008). The study conducted by Toth et.al. (2013) shows that the listed energy-related items used by teenagers are household appliances (e.g.toaster, TV, kettle), lighting, computers (e.g. desktop, laptop), mobile phone and gaming devices. Besides, other energy-related items which mentioned less than above-mentioned items are water usage, heating, transport and food. (Toth et al.,2013).It is indicated by teenagers that they see the energy usage as a part of their lifestyle, they are using more than one electrical appliances at a time, however, they are leaving plugs plugged in, using the standby option and forgetting turn off the appliances they used (Toth et al.,2013). Bearing in mind that the teenagers spend their most of the time at the school and home, it is significant to shape their behaviours according to the locations where they energy consume most. However, it is indicated that teenagers do not feel responsible for energy consumption at school (Toth et al.,2013). This point of view could be linked with the fact that control over the entire energy consumption does not belong to one student (Toth et al.,2013).

The main sources of information about the environment and energy consumption indicated by the teenagers as media (e.g.Web, TV, adverts, brochure, newspaper), school (e.g.Science, Technology, English and Geography lessons), parents and guardians (Toth et al.,2013). In addition to these, their social circle (e.g.salesperson, grandparents and the parents of their friends) and general knowledge are indicated by a few teenagers as a source of information as well (Toth et al.,2013). The prominent factors affecting the energy consumption behaviours indicated by teenagers are as follows:

- Adverts on TV can be effective to remind teenagers that using appliances in standby mode consumes the same energy with the appliances on use and even more sometimes (Toth et al.,2013).
- Adverts on the web can be effective to show tools such as carbon footprint indicators to the teenagers hence teenagers may go online, use the tool to learn their energy usage and the way of reducing (Toth et al.,2013).
- The science lesson in the school, teenagers indicated that they discussed various types of sources of energy and environmental problems such as wind power, solar power, environmental effects and global warming (Toth et al.,2013).
- The parents and guardians are accepted by the teenagers as an influential factor to change their behaviours towards energy-saving behaviours (Toth et al.,2013).

The highlighted concerns on the impact of energy consumption behaviours indicated by teenagers are generated around the future generations, financial impact and environmental concerns (Toth et al.,2013). In terms of environment, CO2 emission, global warming and ozone layer problems are the main knowledge and concerns indicated by the teenagers (Toth et al.,2013). Besides, the financial impact of energy usage on the people is accepted by teenagers as the biggest factor which influences the people's energy-related behaviours (Toth et al.,2013). The main concern is that people care about the costs rather than the environment (Toth et al.,2013). This situation is valid for their parents most of the time. However, some teenagers point out that the fixed price rents which include all the bills have disadvantages for them to see and tackle their energy consumption with detailed information (Toth et al.,2013). And they added on to be able to see the impact of energy-related behaviours are seen as another source of information which can increase teenagers' awareness on the environmental issues (Toth et al.,2013). The green teen theme can be linked with the other themes such as energy use, the location of the energy use, impact of energy use and source of information on the energy use (Toth et al.,2013). It is indicated that the concern of the teenagers on the energy usage is not directly related to their energy-saving behaviours so there is need further research on this area (Toth et al.,2013).

The literature review so far shows that changing occupant behaviour in energy-saving issues is a complex process which is related to the level of consciousness of people on sustainability issues (Wai and Bojei, 2015; Cottafava et al., 2019; Ding et al.,2019). Besides, most of the papers mentioned that the occupant behavioural issues are not covered enough (Irulegi et al.,2017) in the academic literature even though the significance of occupant behaviour on the energy-saving is confirmed by the academicians (Santangelo and Tondelli, 2017; Li and Froese, 2017; Ding et al., 2019). The problem encountered most is that the differences between the planned and actual energy consumption in buildings (Yousefi, Gholipour and Yan, 2017; Santangelo and Tondelli, 2017). The importance of the occupant behaviours on energy consumption is clearly seen with the above-mentioned problem that is faced. Previous studies emphasized that there is an interactive relationship between the occupants and buildings (Masoso and Grobler, 2010; Nisiforou et al.,2012; Chen et al.,2015; Delzendeh et al.,2017), and the attention on the environmental issues is increasing, however, people continue to behave uncaringly about the environmental issues that is because they can not see the direct consequences of their behaviours (Bonino et al.,2012; Wai and Bojei, 2015).

Factors driving people to save energy are the combination of the economic results and environmental concern even though increasing energy consumption is a reality (Toth et al.,2013). As a reason for this problem is indicated that the electricity is untouchable, abstract and invisible and hard to notice by the user. (Darby, 2006; Toth et al.,2013). Bearing this information in mind, numerous studies aim to help users to reduce their electrical consumption by providing more visible, instant and comparative feedback (Bang and Gustafsson, 2009; Toth et al.,2013; Ma et al.,2018; Zhuang and Wu, 2019). However, it is indicated that providing social comparison has a risk when the least energy consumer feels there is nothing to save more (Toth et al.,2013). This situation may cause the disengagement of the least consumer in the long term for reducing energy consumption (Thøgersen & Grønhøj, 2010; Toth et al.,2013).

The literature review shows that changing occupant's behaviour to reduce energy consumption is the most cost-effective way (Nisiforou et al.,2012; Giusti and Almoosawi, 2017; Ding et al.,2019). It is indicated that the behavioural change has a

strong relationship with the economy, psychology, sociology and education (Cottafava et al.,2019). In particular, education is seen as one of the crucial ways to promote sustainable behaviours and to increase the consciousness of people (Washington-Ottombre et al.,2018). Moreover, the importance of education on environmental issues has been included in the key conferences and declarations since the 1970s (Washington-Ottombre et al.,2018). Furthermore, young people are seen as one of the most important target groups in terms of being people who will shape the future (Joshi et al., 2019). For all the reasons above, there is a need to understand what kind of tools were used and what kind of studies were conducted to change behaviour in different fields, their results and feedback. By this means, these consequences may help on how energy-saving behaviours can be adopted to the occupant of the educational buildings.

To summarize the reviewed studies, we can say that the research articles mostly focused on the relationship between the specific equipment and user behaviour on energy consumption in the buildings such as air cooling, domestic water heating, window opening, lighting etc. These physical monitoring and occupant investigations were conducted via motion sensing, consumption sensing, interviews and surveys(Giusti and Almoosawi, 2017). In addition, the importance of user behaviour is emphasized, since smart and energy-saving technologies used by people (Giusti and Almoosawi, 2017). Since the amount of money spent on electricity bills or natural gas bills is a tangible result, people can change their behaviours more easily according to the monetary data (Giusti and Almoosawi, 2017). Other studies focused on what kind of feedback can be more useful to change people's behaviour in residential buildings by preparing two different videos for occupants (Bonino et al.,2012). Thus, direct feedback and goal setting visualization were found the most useful way of feedback to promote energy-saving behaviours (Bonino et al.,2012). The importance of informing the household and performing promotion energy-saving activities was observed by giving information about energy-saving behaviours and by making a survey comparing before and after(Kang et al.,2012). In general, it can be said that there are more studies which are conducted in residential and commercial buildings than in educational buildings even though the young people and education are seen as one of the crucial factors to promote energy-saving behaviours and increase the awareness of people on

environmental issues. As a result, significant reductions can be achieved by changing occupants behaviour in different kinds of buildings.

2.5. Barriers to Saving Energy

The main barriers to energy efficiency for teenagers are stated as follows: lack of knowledge, lifestyle, feeling detached from the problem, not responsible for paying bills, habit, peer influence and effort (Toth et al.,2013). Teenagers stated that to not know how their behaviours affect the environment, how huge the environmental problems, obvious results or costs and numerous environmental problems which should be combatted generate the lack of knowledge on the environmental issues (Toth et al.,2013). In terms of lifestyles of teenagers, they indicate that trying to change their lifestyle and saving energy can be bothersome for some of them (Toth et al.,2013). Besides, feeling detached from the problem or feeling uninterested with environmental issues is one of the main barriers seen for teenagers because some of them think that they won't be able to see the consequences of their positive behaviours for the future (Toth et al.,2013). This situation shows that teenagers need smaller and quicker consequences related to their behaviours to take a step forward in a more motivating way for the environment. The financial results of energy-related behaviours have an important impact on people (Toth et al.,2013; Giusti and Almoosawi, 2017). However, teenagers think that it is their parents' responsibility so this causes uncaring behaviours on energy efficiency (Toth et al.,2013). In addition to this, the fixed rents which include the all bills lead to teenagers not knowing the results of their energy-related behaviours (Toth et al.,2013). In terms of habits, teenagers put forward an idea that energy-saving behaviours can be a habit rather than a conscious decision in some situations e.g. turning off the lightings (Toth et al.,2013). Another interesting barrier is peer influence on teenagers. Teenagers stated that behaving eco-friendly or saving energy seem "uncool" some of the time (Toth et al.,2013). They also state that adolescence is already a difficult process, and therefore sometimes they do not care about the environment as required (Toth et al.,2013). Further, the effort has been identified as the last barrier (Toth et al.,2013). For instance, teenagers discussed why TVs are designed with standby mode and emphasized that it would achieve energy

efficiency easier with the design which does not require an extra effort by the individual (Toth et al.,2013).

2.6. Tools for Behavioural Change

Ding et al.,(2019) indicates that over 80% of energy is consumed during the use-phase in the building life cycle. Occupants' behaviour plays an important role to determine the type of energy usage and environmental impact of the buildings during their use-phase (Corry et al.,2015). Trustworthy information for a rational choice is required when behaviour change is considered on an individual basis (Santangelo and Tondelli, 2017). The terms of intention and habit are considered as significant start points to change occupants behaviour towards a more sustainable living that is because habits have a strong relationship with the daily routinized behaviours (Cottafava et al.,2019). Occupants' behaviours should be put at the centre of the analysis to understand the relationship between energy consumption types and behaviours.

There are several organizations which aim to save energy by helping various user groups such as Greenpeace in Worldwide, Super Cool Biz in Japan and Student Switch Off in the UK (Toth et al.,2013). Further, various tools and approaches have been developed to provide instant feedback on the amount of energy usage to users such as Eco-Feedback (Ma et al.,2018; Zhuang and Wu, 2019), Flo (Shrubsole et al.,2011), Power Explorer (Bang and Gustafsson, 2009), Power House (Bång et al.,2006) and Power Agent (Gustafsson, Katzeff, & Bång, 2009) are the games which are developed for households; Serious Game (Csoknyai et al.,2019), Energy Wiz (Petkov, Kobler, et al., 2011) and Whatsapp (Foster et al.,2010) are mobile applications which provide a social comparison on energy consumption. It is indicated that these tools can have a positive impact on the behavioural change on energy consumption (Toth et al.,2013). Further, teenagers are aware that there are tools and devices (e.g. smart meters) developed to provide energy efficiency even though they are not using these tools and devices currently (Toth et al.,2013). The ways suggested for energy efficiency by teenagers are recycling, car sharing, using energy-efficient light bulbs, sharing information with neighbours and being in a competition on energy usage with friends(Toth et al.,2013).

Erell et.al. (2018) explained the tools for changing occupants behaviours in three main headings; economic stimuli, feedback mechanism and social norms.

Economic stimuli are based on the idea in general, monetary rewarding systems, and in particular, that people can be motivated easily for changing behaviours towards energy efficiency if the expected energy saving greater than the costs (Delmas et al.,2013; Erell et al.,2018). However, the concern on the economic stimuli is that people are likely to stop acting energy-efficient in the long term when positive rewards disappear (Erell et al.,2018). Besides, economic stimuli may have a negative impact on the people's pro-environmental behaviours even if it provides desired effects on energy efficiency in the short term process, in other words, people may focus on the costs rather than the real environmental problems (Abrahamse et al.,2005; Gneezy et al.,2011; Erell et al.,2018). So this situation may cause a decrease in environmental awareness.

Feedback mechanism appears in various ways in the literature such as direct feedback (real-time energy meters), indirect feedbacks (monthly bills), web-based visualizations, community workshops, comparative feedbacks, personalized home energy reports (Gupta et al.,2018; Erell et al.,2018). Even though the success of the studies varies, it is seen that studies which use the feedback mechanism as a tool to promote behavioural change on energy consumption issues in the residential can have a substantial impact (Steg, 2008; Ehrhardt-Martinez et al.,2010; Buchanan et al.,2014; Gupta et al.,2018). The importance of the type of feedback is emphasized as well by Erell et.al. (2018). For instance, using attractive visual graphics with advice on energy-efficiency provides 1.5%-3.5% of energy-saving (Allcott, 2011; Erell et al.,2018). Direct feedback can be provided to users to have real-time data about their energy consumption by using energy meters (Erell et al.,2018). These mechanisms may motivate and engage users to take a step. Besides, direct feedback mechanisms may include such strategies: commitment, goal setting and competitions (Erell et al.,2018). In the literature, it is indicated that the direct feedbacks which provide real-time data (5–15%) have a greater impact on the energy efficiency than indirect feedbacks (e.g. provided bills after a month) (0–10%) (Erell et al.,2018). Nevertheless, the frequency of the billing as well is significant to bringing behavioural change on the energy efficiency to the households (Erell et al.,2018). Daily or weekly billings can decrease

the energy consumption of the households approximately 3.8% (Ehrhardt-martinez, 2010; Erell et al.,2018).

Social norms can be linked with the comparative feedback mechanism because both of them aim to promote energy-efficient behaviours by showing what other people do on the energy-related issues (Erell et al.,2018). Besides, social norms can be accepted as a supporter of informal learning because and also people may be affected by the role models (Erell et al.,2018). Further, the norms based on the peer social group of people (family, friends, social circle) and/or a particular place (e.g. neighbourhoods, school, building, flat) have a more significant impact on the behaviour of occupants towards energy efficiency than impersonal ones (Goldstein et al.,2008; Peschiera and Taylor, 2012; Erell et al.,2018).

Csoknyai et.al. (2019) used the Serious Game approach to get informed people on sustainable while integrating playfulness into the learning process. Some authors have indicated their concerns that there is a weakness about the long-term user engagement for sustainable behaviours (Ma et al.,2018; Pasini et al.,2017). Another tool has been proved effective in residential context to promote saving energy by researchers is Eco-feedback tool which provides information on building energy consumption to its occupants via different methods such as the web-site, e-mail, billing, in-home display, however, even if the Eco-feedback system was functional at short and medium-term, the eco-feedback system stopped functioning in the long term (Zhuang and Wu, 2019; Ma et al.,2018). Providing feedback is significant because giving tangible benefit results to people, occupants engagement can be provided in more secure (Pasini et al.,2017). Thus, without tangible feedback, people are not engaged in sustainable behaviours for the long term (Pasini et al., 2017). Furthermore, informational feedback plays a leading role in changing behaviours towards less energy consumption in the policies and buildings while aiming to have systemic change rather than an only individual change (Santangelo and Tondelli, 2017). Besides, the Theory of Planned Behaviours aims to explain the relationship Web interfaces or social media applications also used for engaging users in an interactive way to rising their behaviour towards sustainability (Pasini et al.,2017). between attitude and behaviour and it indicates that there are three dimensions of TPB which convert intention towards

behaviour; attitude, subjective norm and perceived behavioural control (Nisiforou et al.,2012).

Many studies have shown that feedback is significant that people to behave more sustainable about their energy or resource usage so there is a need to increase the possibilities of people to monitor their energy consumption before they got a bill (Santangelo and Tondelli, 2017; Pasini et al., 2017; Karjalainen, 2011). Fischer (2008) indicates that feedback will be successful in case it is provided frequently, equipment/space-based breakdown and presented reasonably and using computerized and interactive tools (Fischer, 2008; Karjalainen, 2011). It is also indicated that the type and quality of the feedback are important to motivate people to make more sustainable decisions (Karjalainen, 2011). The different types of feedback are divided into three main groups by Darby (2001): direct feedback (self-meter-reading, interactive feedback), indirect feedback (frequent bills including historical or normative feedback) and inadvertent feedback (learning by association such as buying new energy-saving equipment). Besides, as above mentioned, the way of the quality/presentation of energy-related information is significant for people to control themselves on energy usage and behave more sustainably. In academic literature, there are some ways to get more attraction of people on sustainable issues such as (1) Comparative data (historical comparison with their own energy usage or other people's usage and normative comparison at national /regional level)(Karjalainen, 2011). However, there is a challenge when people see their energy consumption level below the average (Karjalainen, 2011). Thus, there should be a virtual reward system which has energy consumption levels for people to keep motivated (Karjalainen, 2011). (2) Goal setting: Occupants may be motivated to reduce energy consumption when they have a specific aim at a percentage level (Karjalainen, 2011). In addition to this, the tools which can be used for monitoring the energy consumption during the period can help people to reach their target (Karjalainen, 2011). (3) Presenting sustainable impact information: People are more familiar with the monetary units rather than scientific units (Karjalainen, 2011). Therefore, it is important to present the information to the people in a clear, understandable way. (4) Disaggregations: People have only can have total energy consumption data. The breakdown information on which equipment, time or room consume the most energy would be helpful for occupants(Karjalainen, 2011). By this means, occupants may know where to focus on in the first place. (5) Graphical,

numeric and textual presentations have a significant impact on achieved energy-savings, nevertheless, in the academic literature, there is not enough research which considers how to present energy consumption feedback (Karjalainen, 2011). Bearing in mind that the occupants paid more attention to the graphical data than the textual data, the bills should be simple, credible and should contain diagrams which do not require extra paper waste (Karjalainen, 2011). (6) Time scale energy consumption information can be provided on the specific period of time (hourly, daily, weekly, monthly or yearly) which the occupants have chosen in addition to the real-time measurement (Karjalainen, 2011). (7) Other social rewards can be used to motivate people to reduce energy consumption (Karjalainen, 2011). For instance, energy monitoring can provide foresight after a while to show how much energy will be consumed at the end of the specific behaviour.

In the literature, various approaches for different aims were used to promote behaviour change in other research areas as well. For instance, the effectiveness of Behavioural Incentive (BI) interventions in children were examined to reveal the potential positive impact to prevent the addictive behaviours such as smoking, alcohol consumption, unhealthy diets and physical inactivity (Corepal et al.,2018). It is indicated that childhood and adolescence are a significant process of people's life to shape their attitudes and lifestyle (Kelder et al., 1994; Corepal et al.,2018). The main ways implemented to children and adolescents to provide behavioural changes in the study are rewarding and punishing (e.g. access television or providing/ limiting money) (Corepal et al.,2018). The permanent behavioural change could be possible in case of BIs are in place for sufficient time to change behaviours to the habits, however, the length of the sufficient time is not clarified yet (Oliver and Brown, 2012; Corepal et al.,2018). And this study shows, as a result, BIs may be useful for supporting physical activities and healthy eating habits in young people (Corepal et al.,2018).

Another study conducted at the workplace, due to the increasing importance of the energy management, the Grounded Theory (GT) approach was applied and the energy awareness of the focus groups at the workplace was analysed to develop novel viewpoint into the design process and promote the behavioural change towards energy efficiency on everyday objects (Irizar-arrieta et al.,2019). With the acceptance of the significance of the persuasive feedback to promote behavioural change, Human-

Computer Interaction and Persuasive Technology areas are getting increasing attraction in the sustainability issues (Irizar-arrieta et al.,2019). Therefore, to overcome these problems, Irizar-arrieta et.al. (2019) proposed technological solutions such as Smart Grids, Internet of Things or Demand response (Irizar-arrieta et al.,2019). Changing user consumption habits is a challenging process (Carey et al.,2019). Therefore, purchasing behaviour of the consumers, the way they use, process and discard product are important factors to understand the level of sustainability of a society (Carey et al.,2019). That is because, the studies show that attitudes and behaviours are *affected by psychological, habitual, structural and cultural variables in a wider contextual, meso-societal and micro-individual spectrum* (Pothitou et al., 2016; Carey et al.,2019). Besides, it is indicated that the education and implementation of energy-saving technologies are not enough to decrease the environmental impact of product use (Carey et al.,2019). In another article, it is proposed that individual behavioural change is needed for providing sustainability even though much work has been done by the product designers to decrease the environmental impact in the design and implementation phases (Ehrenfeld, 2008; Carey et al.,2019). To achieve this aim, the eco-feedback strategy was proposed. By this way, users may have information about the environmental impact of purchased smart products and services and understand the designer's intention of usage thus they can change their behaviours accordingly (Carey et al.,2019). However, it is not a solution to design sustainable products without considering the consumer purchasing behaviour (Carey et al.,2019). It is also emphasized that getting an education on sustainable design solutions might be an improving way to better design strategies (Carey et al.,2019).

Global warming is currently is a huge problem that humanity faces and it is not only causing environmental and health problems but also it has an impact on the society, economy and the future generations, therefore, if the change does not happen on the consumption behaviours, the scarcity of natural resource may arise (Hodges et al., 2005; Kuo and Smith, 2018; Chiu et al.,2020). Another study was conducted by Chiu et.al. (2020) on the Design for Sustainable Behaviour (DfSB) to generate better design methods, to change consumer behaviour, reduce environmental impacts and provide more sustainable actions. *Previous studies have shown there is great potential in terms of economic benefits via changing user behaviour and product interactions* (McMahon

and Bhamra, 2012; Tukker et al., 2008; Chiu et al.,2020). *Design for Sustainable Behavior (DfSB)* advocates an approach based on psychological perspectives, such as *eco-feedback* (McCalley, 2006) and *persuasive technology* (Fogg, 2002) using *smart/intelligent products* (Chiu et al.,2020). In this study, The Theory of Planned Behaviour (TPB) and Persuasive technology were used integrated to originate recommendations about product usage to embed DfSB (Chiu et al.,2020). It is indicated that receiving information is not enough to cope with these problems, the sustainable behaviours have also a relation with the individuals' educational background, state of health and interpersonal relationship (Chiu et al.,2020). It is pointed out that users are willing to perform energy-saving behaviours and reduce energy consumption, however, the main problem is to not provide enough information and can not share energy consumption feedback (Abrahamse and Steg, 2009; Chiu et al.,2020). To this respect, Information and Communication Technologies (ICT) has become increasingly significant in sustainability issues. Using ICT equipment can provide an opportunity to have huge data analysis, understand energy consumption behaviours of individuals, help reduce Co2 emission levels, energy consumption and increase energy efficiency in a digitized way (Chiu et al.,2020).

TPB (Theory of Planned Behaviour) arises from TRA (Theory of Reasoned Action) of Ajen and Fishbein (1980) and aims to explicate the behaviour by integrating perceived behavioural control (Chiu et al.,2020). Besides, perceived behavioural control is described as the self-evaluation of the level of control perceived by the individual when the individual takes action (Chiu et al.,2020). While behaviour is affected by perceived behavioural control and behavioural intention according to the TPB, behavioural intention is determined by interdependent factors: perceived behavioural control, subjective norms and attitudes (Chiu et al.,2020). The study shows that when an individual has more perceived control over her/his act, there is a greater intention of an individual to behave positively so that perceived behavioural control may have an impact on behavioural intention and can influence individual's behaviour (Chiu et al.,2020). Another model that is used as an integrated way with the TPB is Comprehensive Action Determination Model (CADM) by Kl€ockner and Bl€obaum (2010) which demonstrates that situation, intention and habit have a direct impact on individual's ecological behaviour (Chiu et al.,2020). Further, DfSB refers

to the product design strategy to promote users to decrease environmental impact during the usage and behave in a more sustainable way (Chiu et al.,2020).

The results of the study conducted by Chiu et.al. (2020) show that DfSB strategies related to sustainability and energy consumption (providing information on personal power usage, providing comparative information on personal power usage and giving rewards) were quite effective and reducing the energy consumption of participants by more than %50 was achieved (Chiu et al.,2020). The output of this study is that providing comparative information on personal power usage has the greatest impact on energy consumption among participants and %67 of participants reduced their consumption accordingly. However, another interesting output of this study is that there is no considerable difference between ‘‘providing information on personal power usage’’ and ‘‘no information’’(Chiu et al.,2020). This research points out that the relevant information sharing on energy consumption in a real-time manner has the potential to affect social culture besides personal psychology in sustainability issues (Chiu et al.,2020). This research paper indicates the need for increasing the user group and timeframe to have more trustful details (Chiu et al.,2020). Further, it is also indicated that to find similar lifestyles is the challenging point of this research (Chiu et al.,2020).

The rapid development activities were undertaken by human beings is the most significant reason behind the serious environmental and social problems, and this situation has caused the global warming, scarcity of natural resources and led to the economic inequality among the different levels of society (Grunert and Juhl, 1995; Wang et al., 2014; Lee, 2014; Joshi et al., 2019). For these reasons, another study has investigated the psychological factors which forecast educated young people’s sustainable purchase behaviour. By this means, it is indicated that reducing the damaging effects of unplanned purchase behaviours on the environment and society can be achieved by promoting sustainable purchase behaviour (Joshi et al., 2019). It is emphasized that the educated and young people were selected for this research because it is indicated that they are the significant target group to bring the desired change in society (Joshi et al., 2019). The previous studies and the survey results show that the key psychological points of people’s sustainable purchase behaviours are the drive for environmental responsibility, perceived consumer effectiveness and

spirituality (Joshi et al., 2019). Drive for environmental responsibility is defined as the consumers' commitment, striving towards protecting the environment and as the intention to increase the quality of the environment at individual-level activities (Kumar and Ghodeswar, 2015). Previous studies show that high perceived consumer effectiveness can lead to socially and environmentally responsible behaviours (Gupta and Ogden, 2009; Mostafa, 2006; Joshi et al., 2019). The reason is that consumers need to be convinced that their behaviour could cause a remarkable change on environmental issues (Roberts, 1996; Joshi et al., 2019). Spirituality is defined by Pargement (1999) as “*a process through which people seek to discover, hold on to, and when necessary, transform whatever they hold sacred in their lives*”.





3.METHODOLOGY

The study utilized the following methodology to achieve the four goals of the study: The first one is to assess the current energy-saving behaviours and awareness of the high school students. The second one is to understand the impact of the informative posters on the energy-saving behaviours and awareness of high school students. The third one is the comparison of the high school students' behaviours and awareness with the other occupants of these education buildings (university students, teachers/academicians, education building staff). The fourth one is to assess the knowledge level of these occupants regarding energy issues of the buildings. The following methodology was followed to achieve these goals.

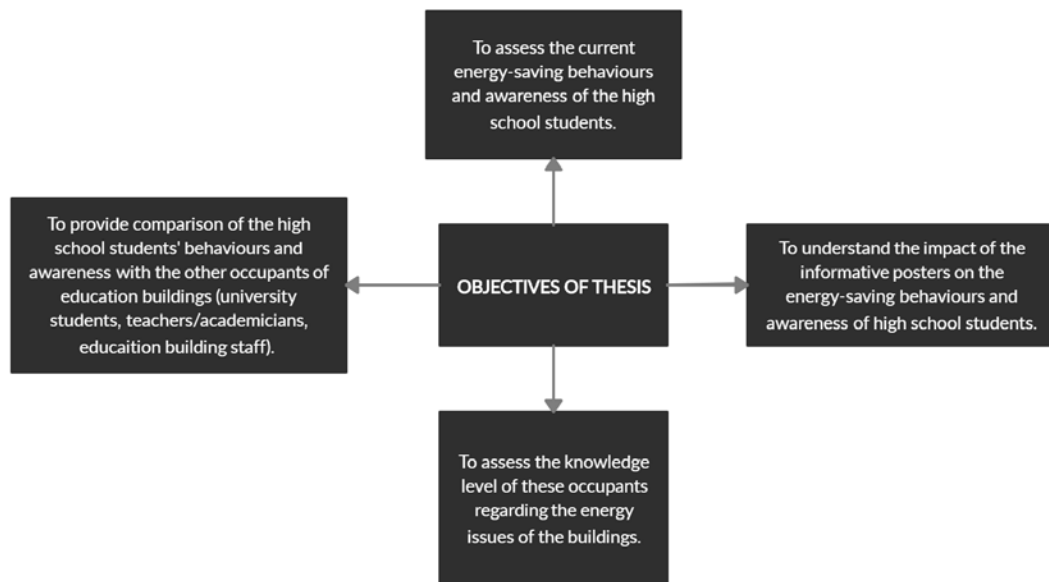


Figure 1 : Objectives of Thesis

1. A thorough literature review on the following subjects was conducted:
 - a. Behavioural aspects of energy consumption
 - b. The relation between the energy consumption of occupants and building types
 - c. Education for sustainable building operation
 - d. Occupant behaviour
 - e. Barriers to saving energy

f. Tools for behavioural change

2. An informative poster has been prepared to collect the significant data in the literature about the issues above and share with the education building occupants.
3. By the information in the literature, an online survey was prepared to measure the knowledge and awareness of the occupants of education buildings and to get their opinions. The informative poster was also included in the survey.
4. At the first step, the results of high school students were analyzed and evaluated. Then, comparative analysis and evaluation with other the occupant groups of education buildings (university students, teachers/academicians and education building staff) were made.
5. As a conclusion, the significant outputs, shortcomings and recommendations for future studies were written.

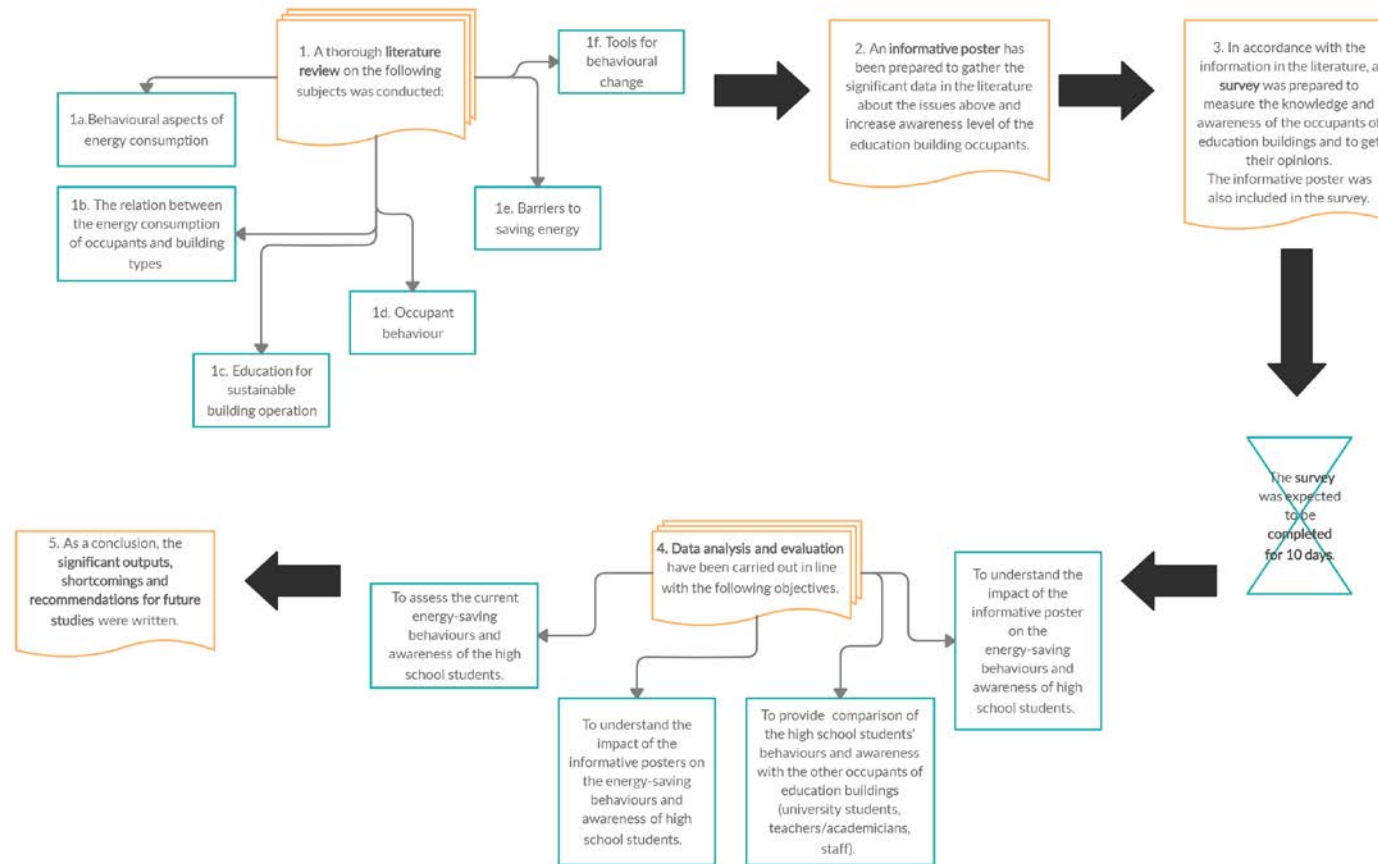


Figure 2 : Methodology Diagram

3.1. Target Group Selection

In the literature research, it was determined that the studies carried out in educational buildings are few compared to the studies conducted in residences and offices. For this reason, the education building and its users have been chosen as the target group. At the same time, high school students, who are defined as adults of the future due to their ages, were defined as the main target group, and it was found appropriate to examine them in comparison with the adults and education building occupants (university students, teachers/academics and staff of the educational building). The study was conducted with a total participation of 203 education building occupants from two private high schools (Yeni Yol-Yeni Çizgi) and Osmangazi University at Eskisehir, Istanbul Technical University and Yıldız Technical University in Istanbul.

3.2. Informative Poster

The informative poster (Figure 3) was created by gathering prominent information about energy consumption and human behaviour in buildings based on the literature review. In the literature review, since it was determined that numerical, eye-catching information was more impressive than a plain text (Pasini et al., 2017), graphics, visuals were used in the poster and numerical, tangible data were shared. The reasons for choosing the below information for the poster are that it contains numerical and tangible data regarding the energy consumption problem, there is information that directly concerns high school students and other occupants of education buildings, and they contain simple suggestions to implement in the daily life. The informative poster was placed in the online survey. The information contained in the poster is listed below.

1. 100% of global warming is caused by human activities (Allen et al.,2014).
2. Despite all the technological developments, energy consumption is expected to increase by 60% between 2010-2040 (Department of Energy and Climate Change, 2011; Toth et al.,2013).
3. Devices left in standby mode constitute 3% -10% of the energy consumption of the houses (Şahin, 2012).

4. The buildings are responsible for approximately 40% of the world's energy consumption (World Business Council for Sustainable Development, 2009; D'Agostino et al.,2017; Gaglia et al.,2019).
5. To reduce energy consumption; the level of education, awareness of young people and the provision of incentives for citizens to use energy-efficient systems by the government are important factors (Vogianzi et. al. 2018; Washington-Ottombre et al.,2018; Kolbasov, 1992; Nasibulina, 2015),
6. People less care about their energy consumption behaviours in other places than at home (Toth et al.,2013).
7. The energy-saving technological systems and devices used in buildings can only make a 42% contribution (Zhao et al.,2017; Casals et al.,2020).
8. 1 high school age teenager consumes 20% more energy than 1 adult (Gram-Hanssen, 2005; Toth et al.,2013).
9. Young people can positively influence their social circle (family, friends, etc.) on environmental issues such as energy consumption (Duvall and Zint, 2007; Gill and Lang, 2018; Knafo and Galansky, 2008; Toth et al.,2013).
10. Education building occupants spend 25% of their time in educational buildings (Ghita and Catalina, 2015).
11. The number of high school students in Turkey accounted for 7% of Turkey's population (Turkish Ministry of National Education Statistics, 2019).
12. The number of high school students in Turkey has a population of more than 129 countries around the world (Turkish Ministry of National Education Statistics, 2019).
13. Being independent on energy also has an impact on socio-economic development, water, agriculture, population, education (Duran et al., 2013; Mróz et al.,2019).
14. The energy consumed during the usage phase of the buildings is 3 times more than the energy planned during the design phase and this is completely caused by human behavior (Delzendeh et al.,2017).
15. The most cost-effective way to save energy is to change human behavior positively (Nisiforou et al.,2012; Giusti and Almoosawi, 2017; Kang et al.,2012).
16. Considering all life cycles of the buildings, 80% of the total energy consumption occurs during the usage phase(Ding et al.,2019).
17. By changing the energy consumption behavior of the users in the education buildings, a saving of 24.7% can be achieved (Chen and Ahn, 2014).

18. Turning off unnecessary lights reduces energy consumption (Bonino et al.,2012; Delzendeh et al.,2017).
19. Removing unused plugs reduces energy consumption (Aguirre-Bielschowsky et al.,2018; Delzendeh et al.,2017).
20. Not leaving electronic devices in standby mode reduces energy consumption (Consumer Guide on Standby Losses of Appliances, 2010; van der Werff et al., 2019).
21. Wearing extra clothing in cold weather reduces energy consumption (Aguirre-Bielschowsky et al.,2018).
22. Closing the curtains in cold weather reduces energy consumption (Aguirre-Bielschowsky et al.,2018; Delzendeh et al.,2017).
23. Taking short showers reduces energy consumption (Aguirre-Bielschowsky et al.,2018).
24. Failure to open windows too often while the heating system is active reduces energy consumption (Delzendeh et al.,2017).
25. 25% of parents indicated that they are affected by their children and therefore behave in a way to reduce energy consumption (National Ethical InvestmentWeek, 2008).
26. The energy consumed in homes has increased by 74% between 1990 and 2010 (Department of Energy and Climate Change, 2011; Toth et al.,2013).

3.3. Online Survey

The online survey study was applied to the occupants of the education buildings via Google Forms based on the information in the informative poster. In this thesis, the target group is the occupants of the education buildings. The survey was conducted with a total participation of 203 education building occupants from two private high schools (Yeni Yol-Yeni Çizgi), Osmangazi University at Eskisehir, Istanbul Technical University and Yıldız Technical University in Istanbul. 79 of 203 participants are teachers/academicians, 61 are university students (Bachelor, Ms.C, PhD), 56 are high school students and 7 are education building staff who live in Turkey. High school students, university students (Bachelor, Ms.C, PhD), teacher-academician and education building staff were determined as four main control groups for education building occupants. This is because high school students are seen as are the adult

consumers of tomorrow (Gram-Hanssen, 2005; Toth et al., 2013). Besides, educated young people can influence their social circle in sustainable issues (Gram-Hanssen, 2005; Toth et al., 2013; Duvall and Zint, 2007; Gill and Lang, 2018; Knafo and Galansky, 2008; Toth et al., 2013). Besides, there are differences between high school students with adults in the energy consumption behaviours in the literature (Gram-Hanssen, 2005; Toth et al., 2013) therefore other adult occupant groups within the education building, university students, teachers and staff, were also included in the survey.

The online survey was prepared in Turkish due to be held in Turkey. After the survey was completed, the graphics and comparative information were translated into English.

The survey study consists of 5 parts:

- 1- Personal information
- 2- Energy Consumption - General awareness
- 3- Energy Consumption - Individual awareness
- 4- Poster
- 5- Evaluation

In the first three sections, knowledge and awareness of energy consumption were measured without showing a poster to the participants. They were asked to read the poster in section 4. In the evaluation part, their ideas about the information in the poster and alternative methods for sharing information were questioned. The questions in the survey are as follows:

Section 1: Personal Information

1. Please mark your reason for being in educational buildings.
(High School Students - University Students – Teachers/Academicians – Education Building Staff).
2. Gender
(Female – Male – Don't want to indicate).
3. How much do you find yourself aware of the environmental problems caused by energy consumption? (0: I have no idea. – 10: I am quite knowledgeable.)
4. How sensitive would you describe yourself to environmental problems caused by energy consumption? (0: I am insensible. – 10: I am quite sensible.)

5. To what extent do you believe that increasing your knowledge and awareness of energy consumption will affect your energy consumption behaviours? (0: I don't believe it will have an impact. – 10: I believe it will have a quite important impact.)

6. In which order would you describe the problems caused by energy consumption on the environment among other problems you encounter in your life? (1: most important – 10: least important)

Section 2: Energy Consumption - General awareness

1. Please tick 3 main reasons below which cause global environmental problems.

Energy Consumption - Water Consumption - Human behaviour - Population Growth
-Technological Developments - Lack of Information on Environmental Issues -
Construction Industry - Environmental Policies - Irregular Urbanization - Natural
Disasters - Industrialization

2. Considering the developments in the technology and building sector in recent years, how do you think the situation of energy consumption is compared to the previous years?

I think it has increased compared to previous years

I think it is same compared to previous years.

I think it has decreased compared to previous years.

3. According to you, what percentage of the total energy consumption in the world originates from the buildings?

0%-10% / 10%-20% / 20%-30% / 30%-40% / 50%-60% / 60%-70% / 70%-80% / 80%-90% / 90% 100%

4. According to you, how much energy savings can be achieved by a behavioural change in education buildings?

0%-10% / 10%-20% / 20%-30% / 30%-40% / 50%-60% / 60%-70% / 70%-80% / 80%-90% / 90% 100%

5. What is the relationship between the energy consumption planned at the design stage of the buildings and the energy consumption during the usage phase?

I don't have an idea.

Planned energy consumption is less than the actual energy consumption.

Planned energy consumption is more than actual energy consumption.

Planned energy consumption is equal to actual energy consumption.

Section 3: Energy Consumption – Individual awareness

1. In which place do you mostly perform your energy consumption behaviours?

Home – Public place – School – Commercial building – Transportation - Dormitory

2. In which place do you pay attention to your energy consumption behaviours most?

(Turning off the lights, using bicycles instead of vehicles, etc.)

Home – Public place – School – Commercial building – Transportation - Dormitory

3. What do you think when you compare your daily energy consumption behaviour with other age groups?

High school teens are less aware of the importance of energy consumption but behave more sensitive than adults.

High school teens are less aware of the importance of energy consumption and behave less sensitive than adults.

High school teens are more aware of the importance of energy consumption but behave less sensitive than adults

High school teens are more aware of the importance of energy consumption and behave more sensitive than adults.

4. Please mark the three factors that can motivate you the most for less energy consumption.

Knowing that energy consumption harms the environment.

The financial cost of energy consumption.

To see the positive energy consumption behaviours of the social circle (my family, friends etc.).

To know what causes energy consumption on a global scale.

Comparison of energy consumption amounts.

Gamification, targeting and being in a race with a mobile application.

Feeling of doing something good for the future.

Perception of environmentalist behaviour as 'cool'.

Being 'trend' in social media.

Regular reminders and referrals (posters etc.)

Regular informative sessions (lectures, conferences etc.)

To have a reward-penalty system.

Determining this kind of behaviours as rule.

To learn the stories of role models on this subject.

Being informed on social media.

The fact that my child cares about environmental issues affects me.

The sense of being an example for the social circle.

5. How much influence do you think technology (energy-saving systems, tools, etc.) have on reducing energy consumption in buildings?

0%-10% / 10%-20% / 20%-30% / 30%-40% / 50%-60% / 60%-70% / 70%-80% / 80%-90% / 90% 100%

6. What is the percentage of the energy consumption in the usage phase of the buildings to the total energy consumption of buildings (design, construction, usage, maintenance, deconstruction)?

0%-10% / 10%-20% / 20%-30% / 30%-40% / 50%-60% / 60%-70% / 70%-80% / 80%-90% / 90% 100%

7. How much influence do you think you have on your social circle (family, friends, teachers, etc.) on energy consumption behaviours? (0: I think I don't have an impact – 10: I can be quite impressive for my social circle.)

8. How much influence do you think your social circle (family, friends, teachers, children etc.) has on your energy consumption behaviours? (0: I think they don't have an impact – 10: They can be quite impressive for me.)

9. Please mark the thoughts that hinder you in reducing the energy consumption below.

Not feeling responsible for the cost of energy consumption.

Sense of not belonging to the current environment (school, home, etc.).

The feeling of having more important problems than energy consumption.

Not finding the environmentalist behaviours as cool.

It requires effort.

Habits, lifestyle.

The thought of how I can change great problems alone.

Feeling away from the problems caused by energy consumption.

Not being able to see the problems caused by behaviours in tangible ways.

Being disinterested to the issue of energy consumption.

Not seeing energy consumption as a problem.

Not seeing an awareness of this issue in your friends.

Not seeing an awareness of this issue in the family.

10. Please mark the behaviours you are accustomed to doing from the following energy-related behaviours in your daily life at home, at school, etc.

Turning off unnecessary lights.

Turning off the heating/boiler when leaving the house.

Turn off the TV so that it does not leave it in the standby position.

Shutting down the computer so as not to leave it in the standby position.

Closing the curtains.

Wearing extra clothing before increasing heat when it is cold.

Unplugging electronic devices (chargers, etc.) when not in use.

Taking short showers.

To be aware of monthly electricity, natural gas and water bills.

Turning off the air conditioner when leaving the room.

11. To what extent do you feel responsible for energy consumption at home? (0: I don't feel responsible at all. – 10: I feel quite responsible.)

12. To what extent do you feel responsible for energy consumption at school? (0: I don't feel responsible at all. – 10: I feel quite responsible.)

Section 4: Poster

Please read the information in the poster below before continuing.

BUNLARI BİLİYOR MUYDUNUZ?

1950'den bu yana gözlemlenen küresel ısınmanın neredeyse % 100'ü Hükümetler Arası İklim Değişikliği Paneli'ne göre insan faaliyetlerinden kaynaklanmaktadır.

Evlerde tüketilen enerji 1990-2010 yılları arasında %74'lük bir artış göstermiştir.



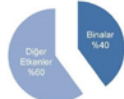
Enerji verimliliği alanındaki tüm teknolojik gelişmelere rağmen dünyadaki enerji tüketiminin 2040 yılında 2010'a göre %60'lık bir artış göstermesi beklenmektedir.

Türkiye'de yapılan bir araştırma evlerde bekleme modunda bırakılan elektronik cihazların, evde tüketilen toplam elektrik tüketiminin %3-%10'undan sorumlu olduğunu göstermektedir.



Bekleme modunda bırakılan elektronik cihazlar sadece Avrupa'da yılda 19 milyon ton CO₂ salınımına neden olmaktadır.

Binalar küresel enerji tüketiminin yaklaşık % 40'ından sorumludur.



Enerji tüketimini azaltmak için öngörülen 3 etkili yol;

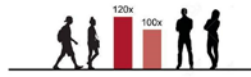
- ✓ Eğitim seviyesinin yükseltilmesi,
- ✓ Gençlerin çevre farkındalığının artırılması,
- ✓ Enerji tasarruf cihazlarının vatandaşlar tarafından kullanılarak yaygınlaştırılması için finansal teşviklerin devlet tarafından sağlanmasıdır.



İnsanlar evleri dışındaki yerlerde ve yapılarda enerji tüketimine daha az dikkat etmektedir.



Binalarda kullanılan enerji tasarrufu teknolojik sistemler sadece %42'lik bir katkı sağlayabilmektedir çünkü teknolojiyi de kullananlar yine insanlardır.



Yapılan çalışmalara göre 1 lise çağındaki genç 1 yetişkene göre %20 daha fazla enerji tüketmektedir.

Araştırmalara göre; gençlerin çevre konularında sosyal çevrelerini (aile, arkadaş vb.) pozitif anlamda etkileme kabiliyetleri vardır.



Yapılan bir araştırmadaki ebeveynlerin %25'i kendilerini enerji tüketimi konusunda dikkatli davranmaya iten faktörün çocuklarının bu konudaki farkındalıkları olduğunu belirtmiştir.



Zamanınızın ortalama %25'ini eğitim binalarında geçirmektesiniz.



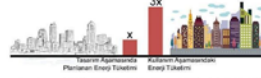
Türkiye nüfusunun yaklaşık %7'sini lise öğrencileri oluşturmaktadır. Türkiye'deki lise öğrencilerinin sayısı (5 milyon 649 bin 594) dünyadaki 129 ülkenin nüfusundan fazladır.



Enerji konusunda bağımsız olmanın sosyo ekonomik gelişim, su, tarım, popülasyon, eğitim, sağlık, iş gücü, cinsiyete bağlı konular üzerinde de etkisi bulunmaktadır.

Günlük hayatta uygulanabilecek çevre ve enerji dostu davranışlar:

- ✓ Gereksiz ışıkları kapatmak.
- ✓ Kullanılmayan fişleri çekmek.
- ✓ Elektronik cihazları bekleme modunda bırakmamak.
- ✓ Soğuk havalarda ekstra kıyafet giymek, perdeleri kapatmak.
- ✓ Kısa duşlar almak.
- ✓ Isıtma sistemi aktifken pencereleri çok sık açmamak.



Binaların kullanım aşamasındaki enerji tüketimi, tasarım aşamasında planlanan enerji tüketiminin zaman zaman 3 katına çıkmaktadır ve bunun nedeni insan davranışları olarak kabul edilmektedir.

Enerji tasarrufu sağlamanın en uygun maliyetli çözüm yolu bina kullanıcıların davranışlarını olumlu yönde değiştirmektir.



Binaların tasarım, inşaat, kullanım, bakım gibi süreçleri arasında %80'lik enerji tüketimi kullanım aşamasında gerçekleşmektedir.



Eğitim binaları içerisindeki kullanıcıların davranışları pozitif anlamda değiştirildiğinde %24.7'lik enerji tasarrufu sağlanabildiği gözlemlenmiştir.

Figure 3 : Informative Poster

Section 5: Evaluation

1. To what extent do you think the information contained in the posters prepared to create energy consumption awareness can reflect on your behaviour? (0:I think that information will not affect my behaviour. – 10: I think the information will have a quite positive effect on my behaviour.)

2. Please mark the five most remarkable items for you from the following information shared with you through posters.

100% of global warming is caused by human activities.

Despite all the technological developments, energy consumption is expected to increase by 60% between 2010-2040.

Devices left in standby mode constitute 3% -10% of the energy consumption of the houses.

The buildings are responsible for 40% of the world's energy consumption.

To reduce energy consumption; the level of education, awareness of young people and the provision of incentives for citizens to use energy-efficient systems by the government are important factors.

The fact that people do not care about their energy consumption like in their home in other environments.

The energy-saving technological systems and devices used in buildings can only make a 42% contribution.

1 high school age teenager consumes 20% more energy than 1 adult.

Young people can positively influence their social environment (family, friends, etc.) on environmental issues such as energy consumption.

You spend 25% of your time in educational buildings.

The number of high school students in Turkey accounted for 7% of Turkey's population.

The number of high school students in Turkey has a population of more than 129 countries around the world.

Being independent on energy also has an impact on socio-economic development, water, agriculture, population, education, health, workforce, gender issues.

The energy consumed during the usage phase of the buildings is 3 times more than the energy planned during the design phase and this is completely caused by human behaviour.

The most cost-effective way to save energy is to change human behaviour positively. Considering all life cycles of the buildings, 80% of the total energy consumption occurs during the usage phase.

By changing the energy consumption behaviour of the users in the education buildings, a saving of 24.7% can be achieved.

Turning off unnecessary lights reduces energy consumption.

Removing unused plugs reduces energy consumption.

Not leaving electronic devices in standby mode reduces energy consumption.

Wearing extra clothing in cold weather reduces energy consumption.

Closing the curtains in cold weather reduces energy consumption.

Taking short showers reduces energy consumption.

Failure to open windows too often while the heating system is active reduces energy consumption.

25% of parents indicated that they are affected by their children and behave in a way to reduce energy consumption.

The energy consumed in homes has increased by 74% between 1990 and 2010.

3. Please tick one thought you agree with the following thoughts.

I do not find it effective either to have an informative poster or to be informed on social media.

In addition to the informative poster, I prefer to share information on social media to reduce energy consumption.

I prefer the informative poster prepared to reduce energy consumption to be informed on social media.

I prefer to be informed on social media to reduce the energy consumption to the informative poster prepared.

4. If the information would be shared to reduce energy consumption through social media, which of the following social media applications would you prefer the most?

Facebook – Instagram – Reddit – Telegram – Twitter - Web Page – Whatsapp – Youtube LinkedIn – Zoom – Pinterest – Snapchat – Reddit – Medium – Tumblr – Periscope – Skype

The online survey was kept open for 10 days to ensure considerable participation. The results of the online survey were placed in the Findings and Analysis section below.

4. FINDINGS AND ANALYSIS

203 educational building occupants participated in the survey; 56 high school students, 61 university students, 79 teachers/academicians and 7 people are education building staff. It should be indicated that the survey results of the education building staff group cannot be generalized as much as the other occupant groups since the sufficient number of education building staff could not be reached for the survey. Besides, while 70,4% of the participants are women, 28,6% of the participants are men and 1% of the participants did not want to indicate their sex. It is observed that women are more willing to participate in the survey related to energy consumption and environmental issues than men.

Findings and analysis part consists of five sections. The first one is current energy-saving behaviours and awareness of the high school students, the second one is the impact of the poster on the energy-saving behaviours and awareness of high school students, the third one is the comparison of the high school students' behaviours and awareness with the other occupants of these education buildings (university students, teachers/academicians, staff, etc.), the fourth one is knowledge level of the occupants of education buildings regarding energy issues of the buildings and the fifth one is other findings of the study.

4.1. Current Energy-Saving Behaviours and Awareness of the High School Students

Of the 56 high school students surveyed, 59% were female, 37% were male and 4% did not want to indicate their gender. High school students identified themselves as having 6.53 out of 10 knowledge on environmental problems caused by energy consumption. High school students indicated their sensitivity level to environmental problems caused by energy consumption as 7.5 out of 10. Moreover, students stated that they believe that increasing the knowledge and awareness of energy consumption will significantly affect their behaviour as 8.22 out of 10. And, they indicated energy

consumption problems as 5th problem out of 10 among the other problems they face in their lives. According to the high school students, lack of information on environmental issues (14,16%), industrialization (12,98%), population growth (12,98%), water consumption (12,39%), human behaviour (11,21%) and energy consumption (11,21%) are the main factors that may cause global environmental problems respectively (Figure 4). While 89% of high school students are aware of the increase in energy consumption compared to previous years, 7% think that it is in the same situation and 4% think that consumption is decreasing compared to previous years.

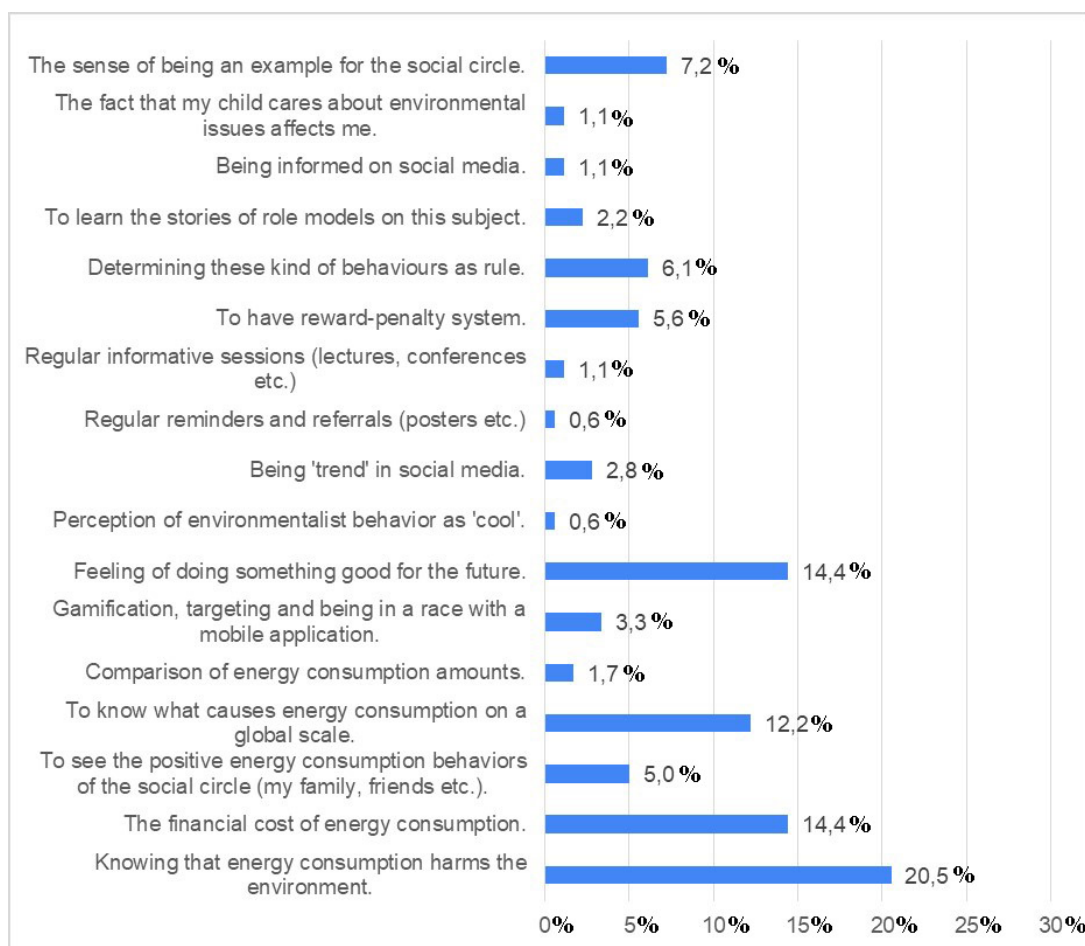


Figure 4 : Factors that may cause global environmental problems indicated by high school students.

The previous studies conducted on changing occupant behaviour in education buildings in the literature show that 24.7% of energy saving can be achieved (Chen and Ahn, 2014). However, high school students estimate this ratio averagely as

43.57%. This shows that they think that changing human behaviour can be very helpful in reducing energy consumption in buildings.

Buildings are responsible for approximately 40% of the total energy consumption of the world (World Business Council for Sustainable Development, 2009). Only 14% of high school students correctly predicted the ratio of energy consumption in buildings to total energy consumption (30-40%), while the majority (27%) think that this ratio is in the range of 60-70% and 16% of them think that this ratio is in the range of 50-60%. It is indicated that there is a significant gap between the planned and actual energy consumption of buildings and sometimes actual energy consumption three times more than the planned energy consumption (Delzendeh et al.,2017). While 44% of the high school students are aware of this situation, 33% of them indicated they don't have any idea on it, 16% of them think the actual energy consumption less than planned energy consumption and 7% of them think planned and actual energy consumption of the buildings are equal. High school students placed their schools in the second place while choosing their homes in the first place, where they consume the most energy and care about energy consumption the most.

As mentioned in the literature review, previous studies have shown that 1 high school age teenager consumes 20% more energy than 1 adult (Gram-Hanssen, 2005; Toth et al.,2013). According to the results of the survey, 41% of high school teenagers think they are more aware of the energy consumption importance but they behave less sensitive than adults, 23% of them think they are more aware of the energy consumption importance and they behave more sensitive than adults. Besides, 18% of them think they are less aware of the energy consumption importance but they behave more sensitive than adults and 18% of them think they are less aware of the energy consumption importance and they behave less sensitive than adults.

The prominent factors that can motivate high school students to reduce energy consumption as follows; (20,5%) knowing that energy consumption harms the environment, (14,4%) the financial cost of the energy consumption, (14,4%) feeling of doing something good for the future, (12,2%) to know what energy consumption causes on a global scale, (7,2%) the sense of being an example for the social circle, (6,1%) determining environmentalist behaviours as rule, (5,6%) to have a reward-penalty system, (5%) to see the positive energy consumption behaviours of the social

circle, (3,3%) gamification, targeting and being in a race with a mobile application, (2,8%) being ‘trend’ in social media, (2,2%) to learn the stories of the role models on this subject, (1,7%) comparison of energy consumption amounts, (1,1%) being informed on social media, (1,1%) regular informative sessions (e.g. lectures, conferences), and regular reminders and referrals (e.g. posters) (Figure 5).

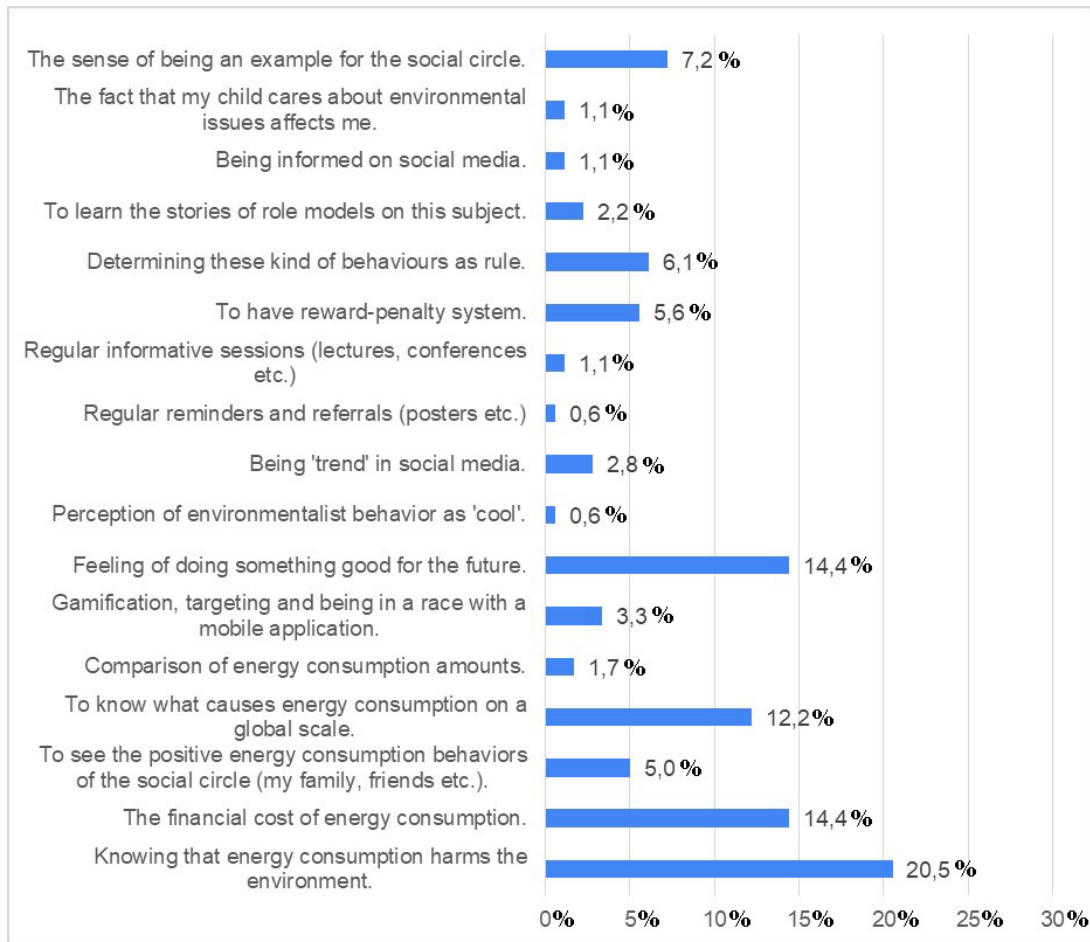


Figure 5 : Factors that high school students think will motivate them about energy consumption.

It has been observed in the literature review that using technological systems can reduce energy consumption in buildings by 42%. 17% of high school students correctly estimate this ratio (Figure 6). According to the 72% of the high school students, the ratio of the energy consumed during the usage phase of the buildings to the total energy consumption(design, construction, usage, maintenance etc.) mostly in the range of 40%-60% (Figure 7). However, literature reviews showed that 80% of the total energy is consumed during the usage phase of the buildings total life cycle (Ding et al.,2019).

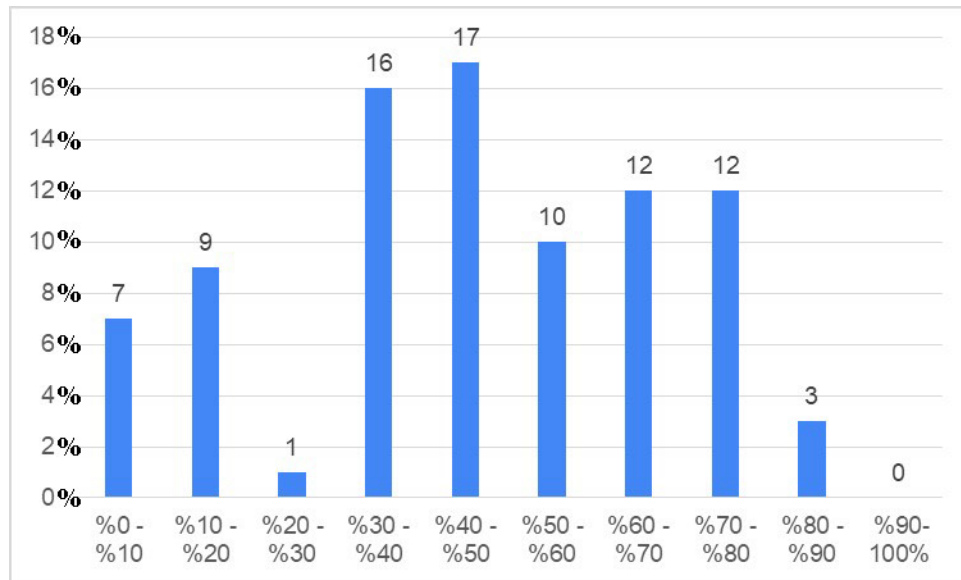


Figure 6 : Estimated percentage of high school students on the impact of technology (energy-efficient systems, tools, etc.) in reducing energy consumption in buildings.

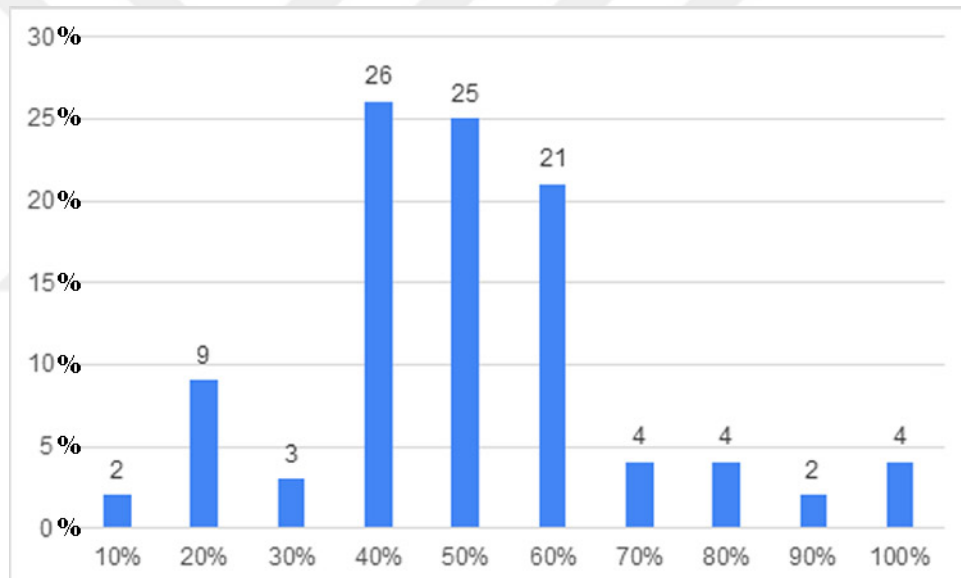


Figure 7 : The estimated ratio of the high school students on the energy consumed during the usage phase of the buildings to the total energy consumption (design, construction, usage, maintenance etc.).

Erell et.al. (2018) indicated the tools for changing occupants behaviours in three main headings; economic stimuli, feedback mechanism and social norms. Therefore, it is important to see what other people do. While high school students stated their effects on their social circle as 51,4% in terms of reducing energy consumption, they stated that their social circles' effect on themselves is 56,7%. The study showed that high school students think that the effect of others on them is more than their effect on

others. It can be concluded from this situation that they are not sufficiently aware of their capacity to influence their social circle.

The factors seen as obstacles by high school students are in order of the thought of how can I change great problems alone (19,2%), habits, lifestyle (18,4%), not being able to see the problems caused by behaviour in tangible ways (11,2%), the feeling of having more important problems than energy consumption (8%), being disinterested to the issue of energy consumption (6,4%), sense of not belonging to current environment (school, home etc.) (6,4%), not seeing an awareness of this issue in your family (5,6%), not seeing an awareness of this issue in your friends (5,6%), not feeling responsible of the cost of the energy consumption (5,6%), it requires effort (5,6%), not seeing energy consumption is a problem (3,2%) feeling away from the problems caused by energy consumption (3,2%) and not finding environmentalist behaviours as 'cool' (0,8%) (Figure 8). Besides, it has been questioned high school students' habits on energy consumption. According to the survey results, the main three habits of the high school students on energy consumption are in order of turning off unnecessary lights (23,52%), shutting down the computer so as not to leave it standby position (14,7%), unplugging electronic devices when not in use (12,25%), turn off the TV so that it does not leave it in the standby position (9,8%), wearing extra clothing before increasing heat when it is cold (8,33%), to be aware of monthly electricity, natural gas, water bills (7,35%), closing the curtains (7,35%), turning off the heating/boiler when leaving the house (6,86), turning off the air conditioner when leaving the room (6,37%) and taking short showers (3,43%) (Figure 9). The interesting result is that the percentage of those who are accustomed to taking short showers, although it is something that everyone can easily do to reduce energy and water consumption, is only 3,43%.

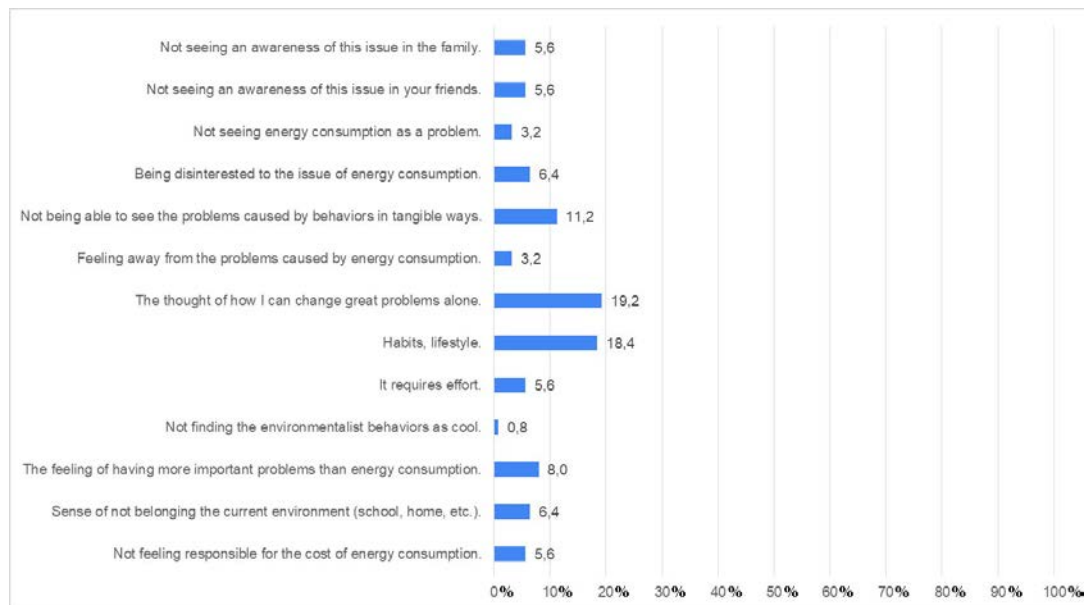


Figure 8 : Factors indicated by high school students as an obstacle to reducing energy consumption.

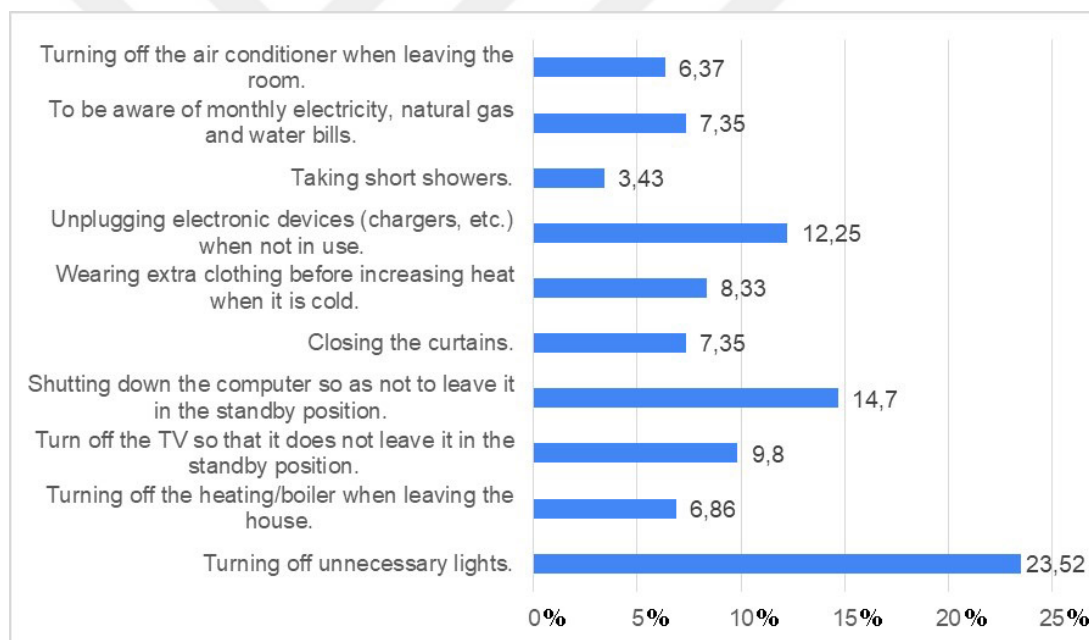


Figure 9 : Energy consumption behaviours of high school students get used to in their daily life.

Based on the literature, there are differences between the level of feeling responsible for energy consumption at home and education building. The results of the study support the previous studies in the literature because while high school students indicate their level of feeling responsible for energy consumption as 65%, they indicated their level of feeling responsible for energy consumption at education building as 44%.

4.2. Comparison of the High School Students' Behaviours and Awareness with the Other Occupants of Education Buildings (University Students, Teachers/Academicians, Education Building Staff)

203 educational building occupants participated in the survey; 56 high school students, 61 university students, 79 teachers/academicians and 7 people are education building staff. Besides, while 70,4% of the participants are women, 28,6% of the participants are men and 1% of the participants did not want to indicate their sex.

Occupant groups rated themselves as approximately 6.5 out of 10 on the knowledge of environmental problems arising from energy consumption (Figure 10). As for the sensitivity to environmental problems caused by energy consumption, teachers/academicians rated themselves 7.22 out of 10, university students rated themselves 7.21 out of 10, education building staff rated themselves 7.19 out of 10, while high school students rated themselves 7.15 out of 10 and high school students are ranked last among the 4 occupant groups (Figure 11).

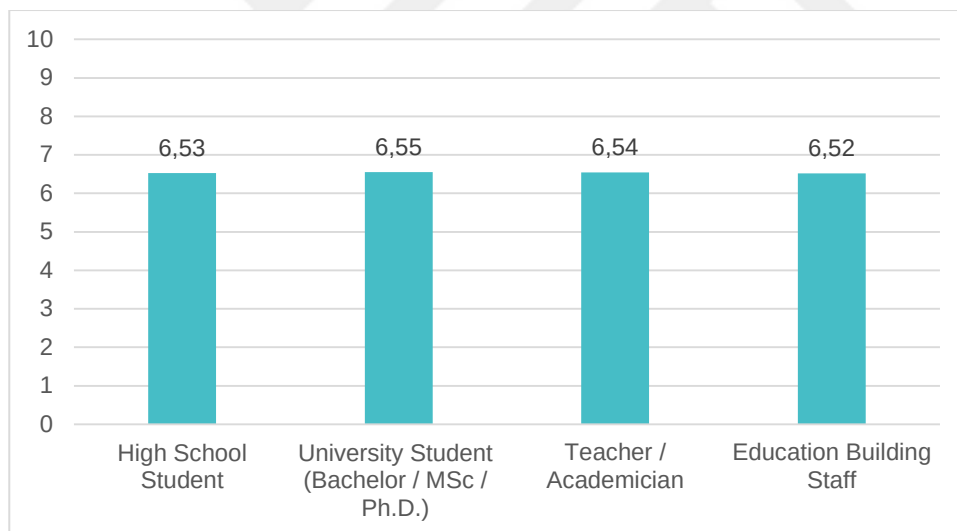


Figure 10 : The average scores that occupant groups give themselves to know environmental problems caused by energy consumption.

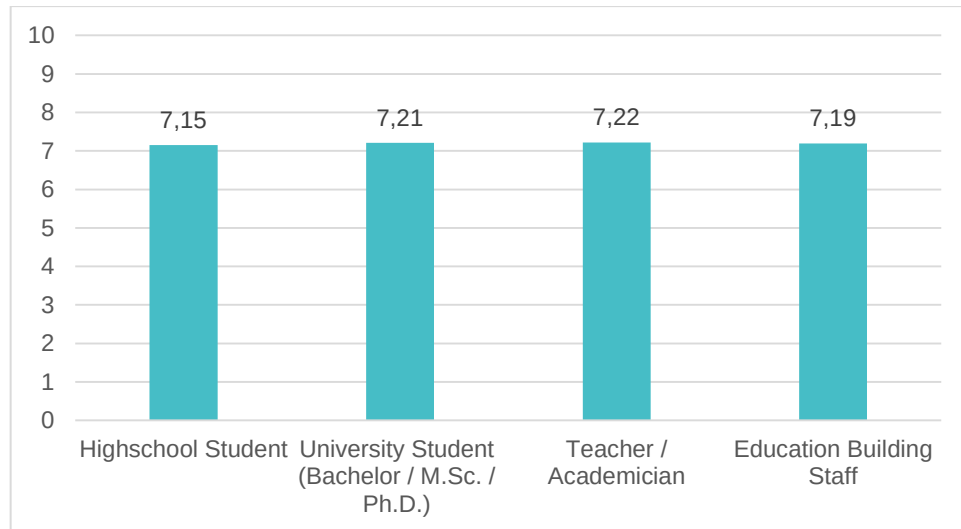


Figure 11 : The average scores that occupant groups give themselves to be sensitive to environmental problems caused by energy consumption.

The 4 occupant groups defined the problems related to energy consumption in the 5th place out of 10 among other problems in their lives. The effects of environmental problems caused by energy consumption on our lives (health and nature deteriorations, material loads, global warming, etc.) are serious on a global scale. However, the participants of the survey indicate energy consumption problems as 5th place among their prioritize in their lives.

Among the factors that cause global environmental problems shared with 4 user groups, high school students determined 'lack of information', 'industrialization' and 'population growth' as the most three important factors, while university students chose 'human behaviour', 'population growth' and 'energy consumption' as the most three important factors (Figure 12). In addition to these groups, teachers/academicians find the 'energy consumption', 'water consumption' and 'human behaviour' mostly important, while education building staffs consider 'energy consumption', 'water consumption', 'human behaviour', 'lack of information', 'irregular urbanization' and 'industrialization' as the most three impressive factors (Figure 12).

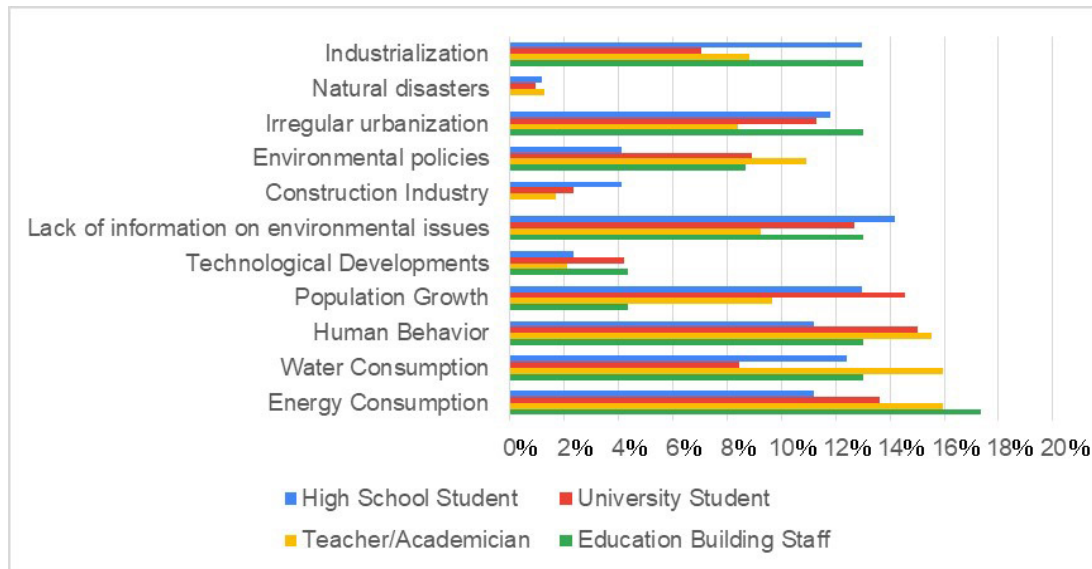


Figure 12 : Factors that may cause global environmental problems indicated by education building occupants.

Education building occupants indicate their homes as the first place where they consume the most energy, they indicate ‘school’ as a second-place they consume energy most (Figure 13). As the area where they pay the most attention to energy consumption behaviours, again, all groups indicated their homes as first place with the majority (Figure 14). However, while high school students and teachers/academics groups indicate the ‘school’ as the second place that they pay attention, university student indicates ‘dormitory’ as the second place, the education building staff ranked the ‘public spaces’ in the second place by not including the school at all (Figure 14). No user group has specified commercial areas as an area where they pay attention to their energy consumption behaviour (Figure 14). Considering the results, it can be said that the sense of ownership is important in paying attention to energy consumption.

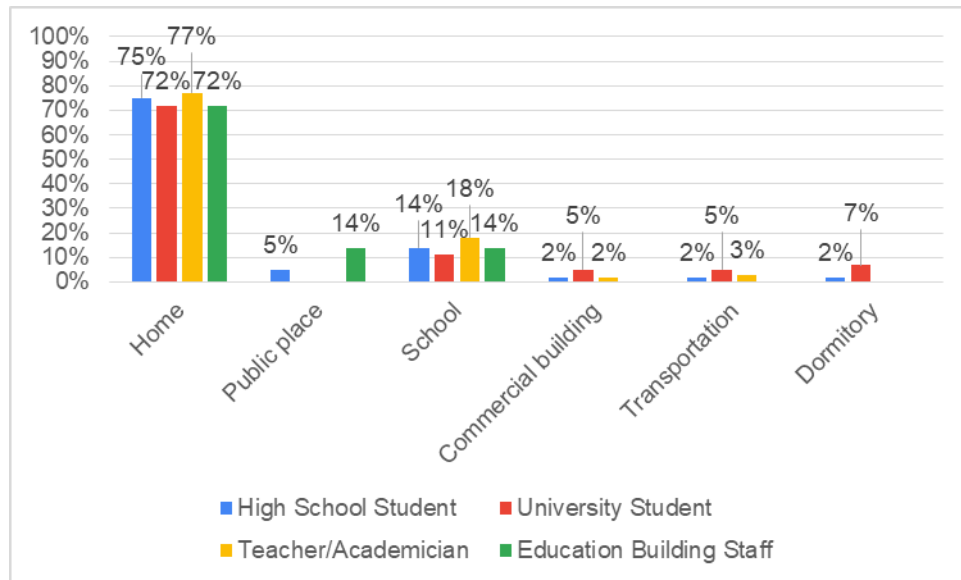


Figure 13 : Occupant groups and the place that they mostly perform their energy consumption behaviours.

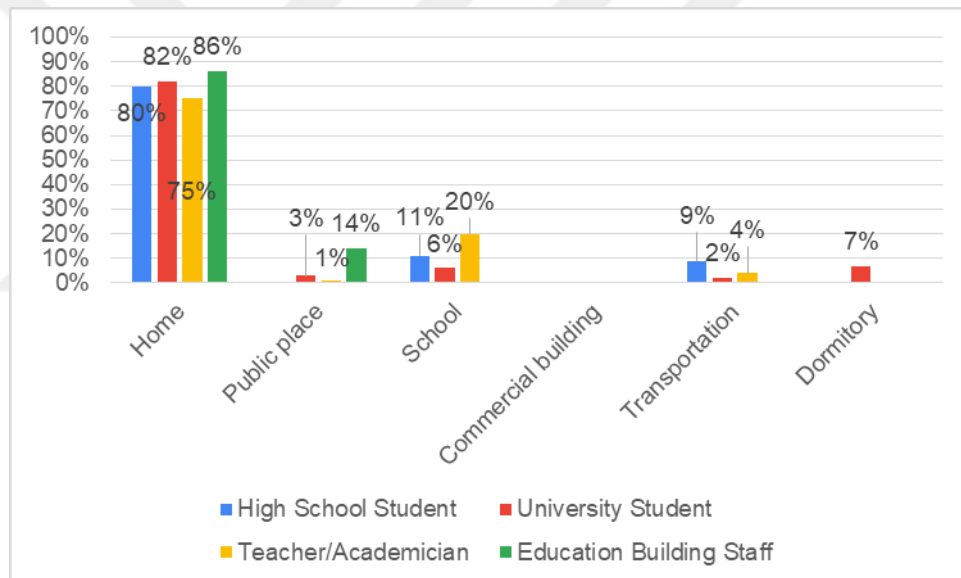


Figure 14 : Occupant groups and the place that they mostly pay attention to their energy consumption behaviours.

The survey participants were asked to mark three factors that could motivate them to reduce their energy consumption based on the literature. The prominent factors which can motivate high school students to reduce energy consumption are indicated as knowing that energy consumption harms the environment, feeling of doing something good for the future, the financial cost of energy consumption and to know what causes energy consumption on a global scale (Figure 15). Besides, university students indicate that knowing that energy consumption harms the environment, to know what causes energy consumption on a global scale and feeling of doing something good for the

future items can motivate them to reduce their energy consumption. Teacher/academicians indicate that to know what causes energy consumption on a global scale, knowing that energy consumption harms the environment and feeling of doing something good for the future can motivate them to reduce energy consumption (Figure 15). The last occupant group, education building staffs indicate the items can motivate them to reduce energy consumption as knowing that energy consumption harms the environment, feeling of doing something good for the future and to see the positive energy consumption behaviours of the social circle (my family, friends etc.) (Figure 15). The other factors that can have an impact on the education building occupants' behaviours can be seen in Figure 13 below.

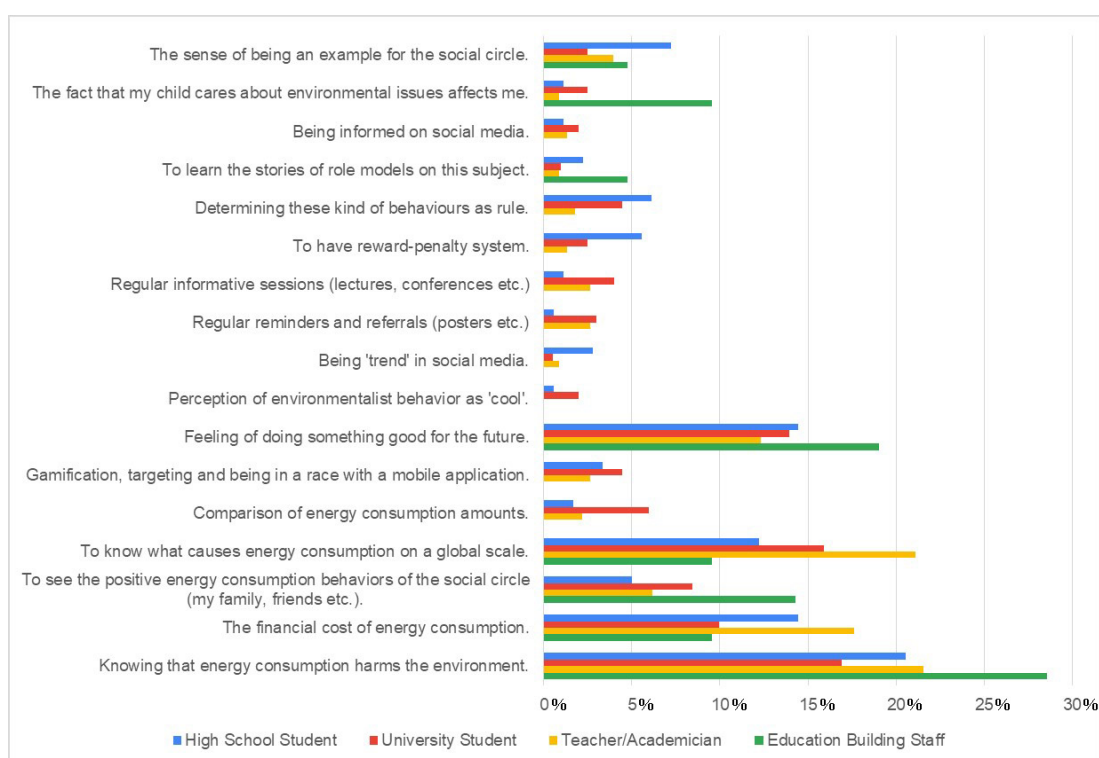


Figure 15 : Factors that education building occupants think will motivate them about energy consumption.

It has been seen in the literature that people can influence each other on environmental issues. Some factors affect people, such as social norms or to see what other people do on the same thing. Previous studies have also shown that 25% of families pay attention to be more respectful to the environment because of their children. For this reason, it has been questioned how individuals think this situation can be impressive for them. The group who believes they can affect their social circle is the teacher/academician group with a ratio of 62.7% (Figure 16). The fact that the prominent group was the group of teachers/academicians was an expected result because of their profession. This ratio followed by in order of university student (58,6%), education building staff (55,7%) and high school students (51,4%) (Figure 16). The group, who think they have the least impact on their social circle, has been high school students.

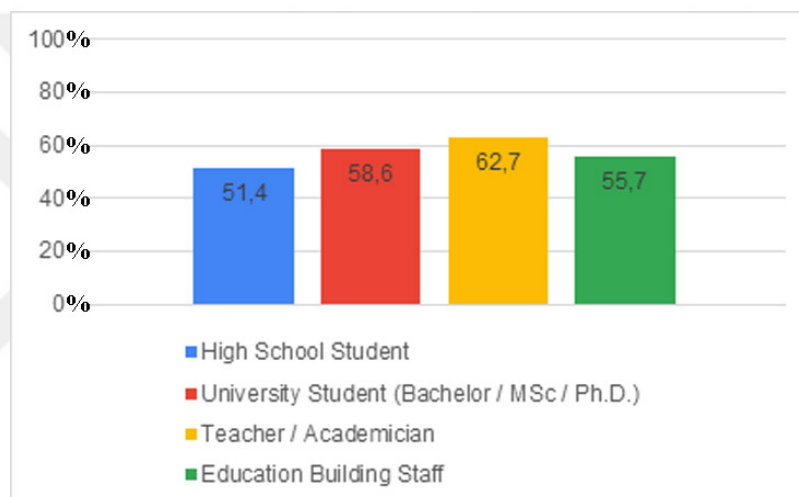


Figure 16 : Percentage of effects believed to have on the social circle (family, friends, teachers, etc.) on energy consumption behaviours.

The group believing that the social circle has the most impact on energy consumption was the staff of the education building with 64,2% ratio. And in order of teacher/academician with 62,4%, high school students (56,7%) and university students (56,5%) followed them(Figure 17). While high school students stated that they could be affected by their social circles by 56,7%, they think that they could affect their social circles by 51,4%. In the same way, while the education building staffs stated that they could be affected by their social circles by 64,2%, they think that they could affect their social circles by 55,7%. It can be thought that the situation that makes up this difference arises from the idea of how I can change something individually on environmental issues of the people mentioned in the literature.

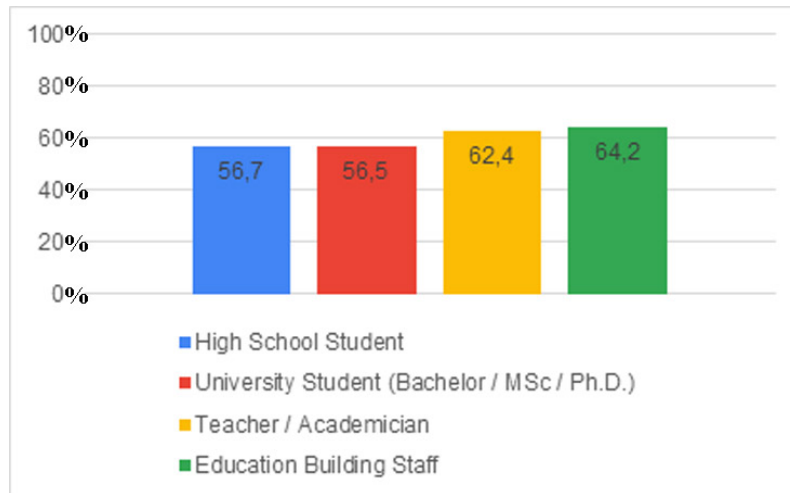


Figure 17 : Percentage of the impact that the social circle (family, friends, teachers, children, etc.) is believed to have on energy consumption behaviour.

In the literature, teenagers stated main barriers to reducing energy consumption as follows: lack of knowledge, feeling detached from the energy consumption problems, not financially responsible for paying electricity, water, natural gas bills, lifestyle, peer influence and requiring effort (Toth et al.,2013). According to the survey results, the main factors that are stated by all of the education building occupants as obstacles in reducing energy consumption are habits, lifestyle, the thought of how can I change great problems alone, feeling away the problems caused by energy consumption, not seeing an awareness of environmental issues in your friends and sense of not belonging the current environment (school, home etc.) (Figure 18). When we analyze the results specifically for high school students, three prominent preventive factors appear as in the order of the thought of how can I change great problems alone, habits, lifestyle and not being able to see the environmental problems caused by behaviours in tangible ways (Figure 18). Besides, the highest rate of feeling they have more important problems than the environmental problems caused by energy consumption and feeling disinterested to the issue of energy consumption belongs to high school students among the occupants of the education building (Figure 18).

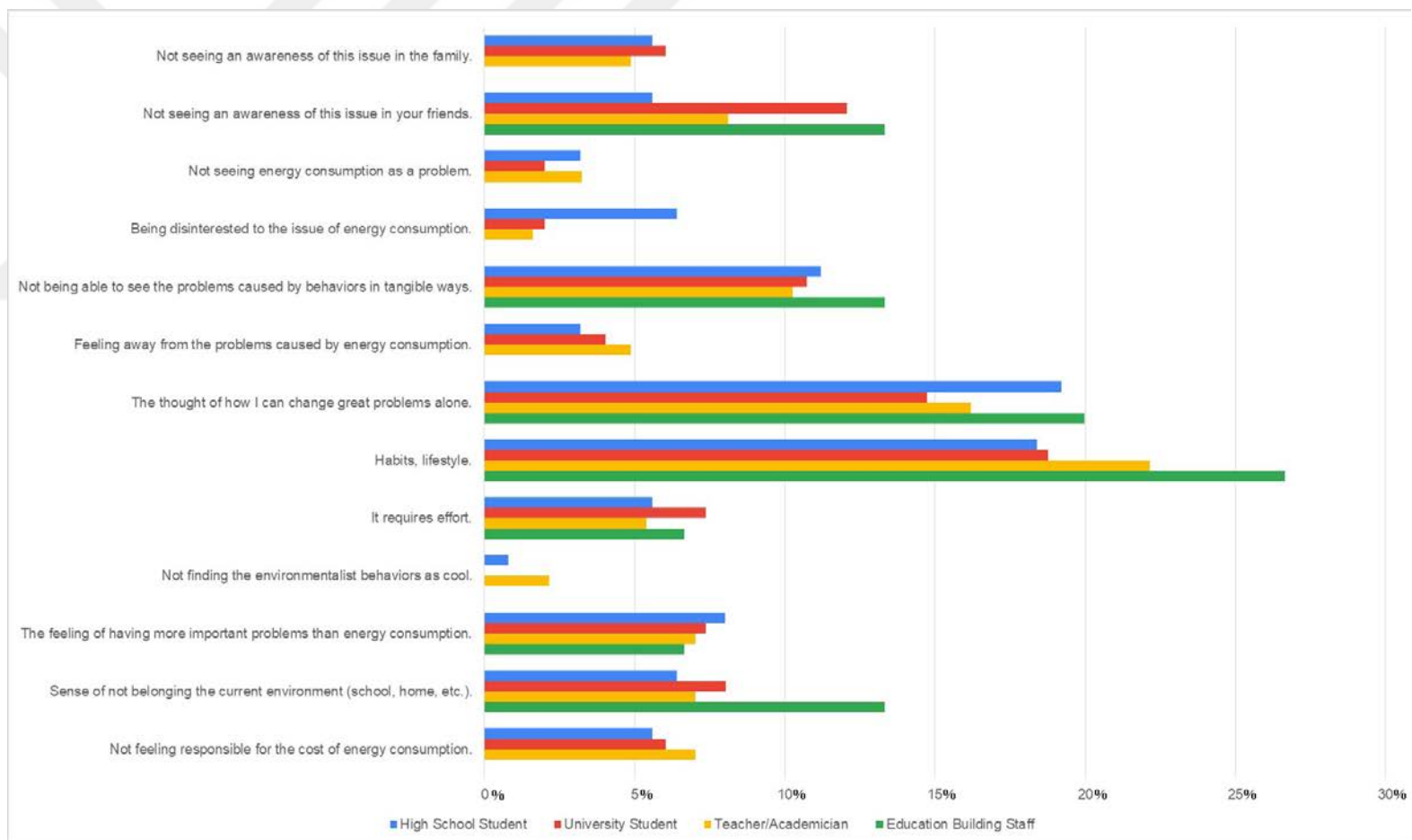


Figure 18 : Factors indicated by education buildings occupants as an obstacle to reducing energy consumption.

In contrast with the obstacles, there are also behaviours of education building occupants get used to doing in their daily routine to reduce energy consumption. The main factors indicated by all of the occupant groups among them are as follows; turning off unnecessary lights, to not leaving pc in standby mode, unplugging electronic devices when not in use, to be aware of monthly electricity, water and natural gas bills (Figure 19). The biggest habitual differences between high school students and other groups stand out as not being aware of monthly electricity, natural gas, water bills, and not having a habit of taking short showers.

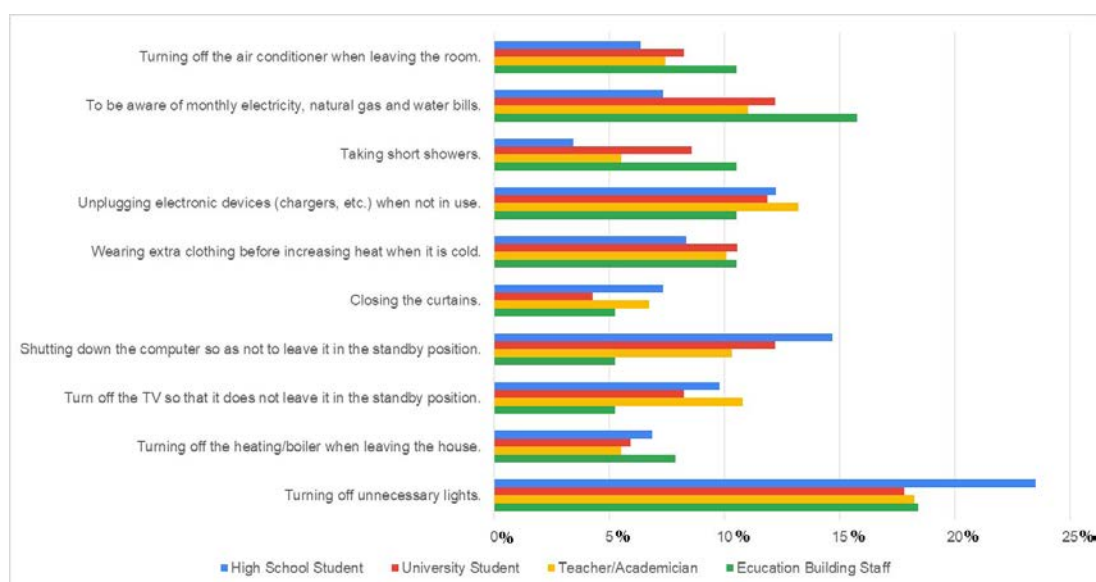


Figure 19 : Energy consumption behaviours of occupants of education building get used to in their daily life.

It is mentioned in the literature review that feeling financially or environmentally responsible for the place they live, work or get an education may be a motivating factor in reducing energy consumption. For this reason, it has been questioned to what extent the occupants of the education building feel responsible for energy consumption in their homes and educational buildings (Figure 20). The group that felt most responsible for the energy consumption in their homes was teacher/academician, education building staff, university students and lastly high school students, respectively. In this ranking, the fact that the occupants of education building groups in business life feel more responsible for energy consumption in their home than the students confirms the motivating effect of being responsible for financial expenses on energy consumption in the literature review (Figure 20). All of the occupant groups feel more responsible in their homes than in education buildings on energy consumption (Figure 20). The

group, which feels the least responsible for the energy consumption in educational buildings, emerges as high school students (Figure 20).

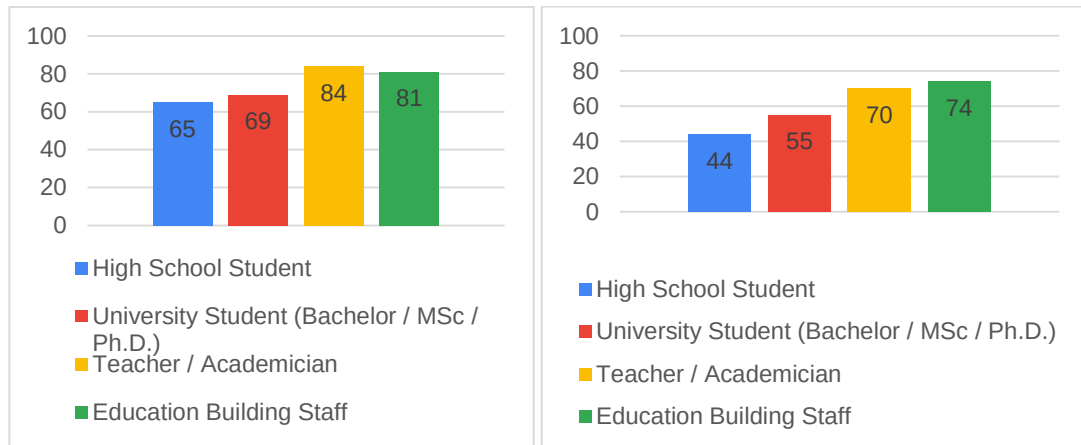


Figure 19 : Level of feeling responsible for energy consumption at home (left) and at education building (right).

4.3. The impact of the Poster on the Energy-Saving Behaviours and Awareness of High School Students

High school students think that the information contained in the posters prepared to create awareness of energy consumption may be reflected in their behaviours 58 out of 100. According to the high school students, the 5 most impressive items in the posters are as follows: (1) 100% of global warming is caused by human activities, (2) 1 high school age teenager consumes 20% more energy than 1 adult, (3) despite all the technological developments, energy consumption is expected to increase by 60% between 2010-2040, (4) the buildings are responsible for 40% of the world's energy consumption and (5) the fact that people don't care about their energy consumption behaviours in other environments like in their homes and other items may be seen in the below (Figure 21).

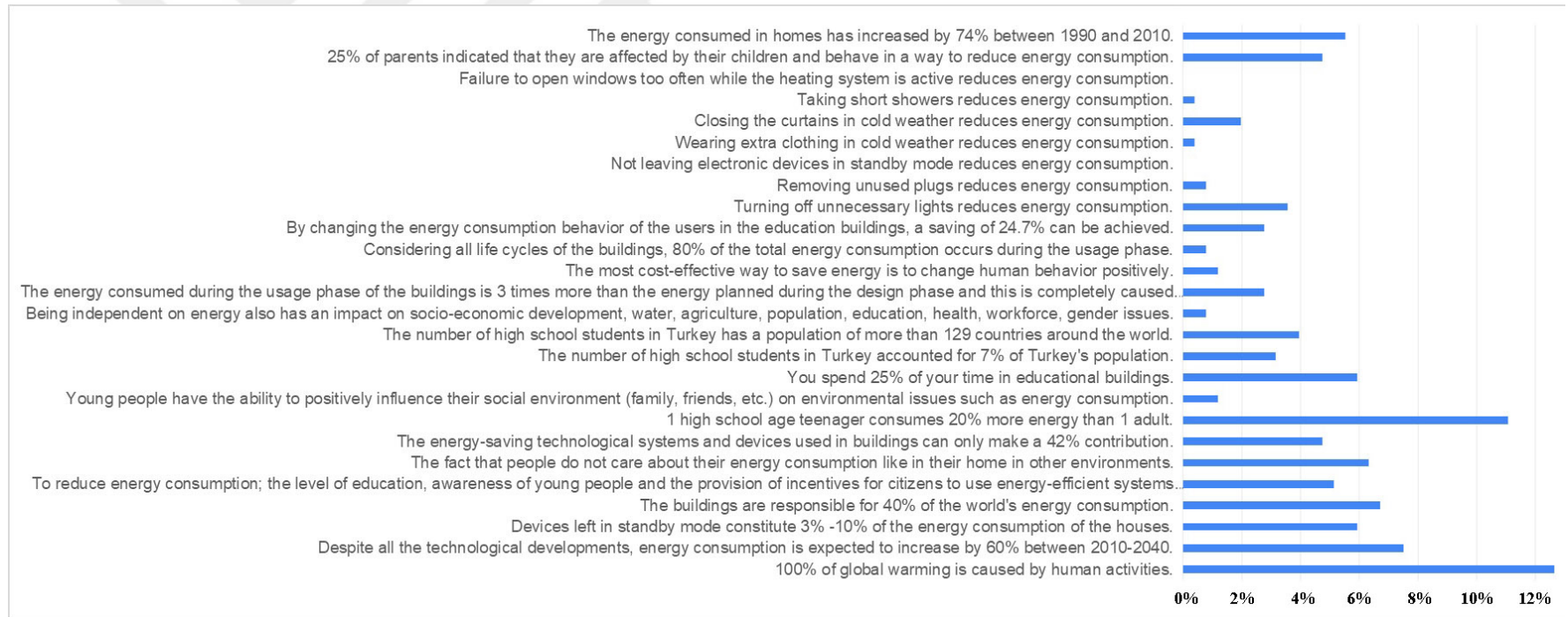


Figure 20 : Items that high school students find remarkable as a percentage shared through the informative poster.

High school students' preferences regarding the current method applied (informative poster) and social media have been questioned. 53% of the high school students indicate that in addition to the informative poster, they prefer information to be shared on social media to reduce energy consumption (Figure 22). 20% of the high school students indicate that they prefer the informative poster alone (Figure 22). 18% of high school students indicate that they don't find effective either to have an informative poster or to be informed on social media (Figure 11). Besides, 9% of them indicate that they prefer to be informed on social media instead of the informative poster (Figure 22). 48% of high school students stated that they would prefer Instagram if they would be informed on social media (Figure 23). Other preferred applications are as follows: Twitter (20%), Youtube (12%), Whatsapp (9%), a Web site (4%), Facebook (3%), Reddit (2%), Telegram (2%) (Figure 23).

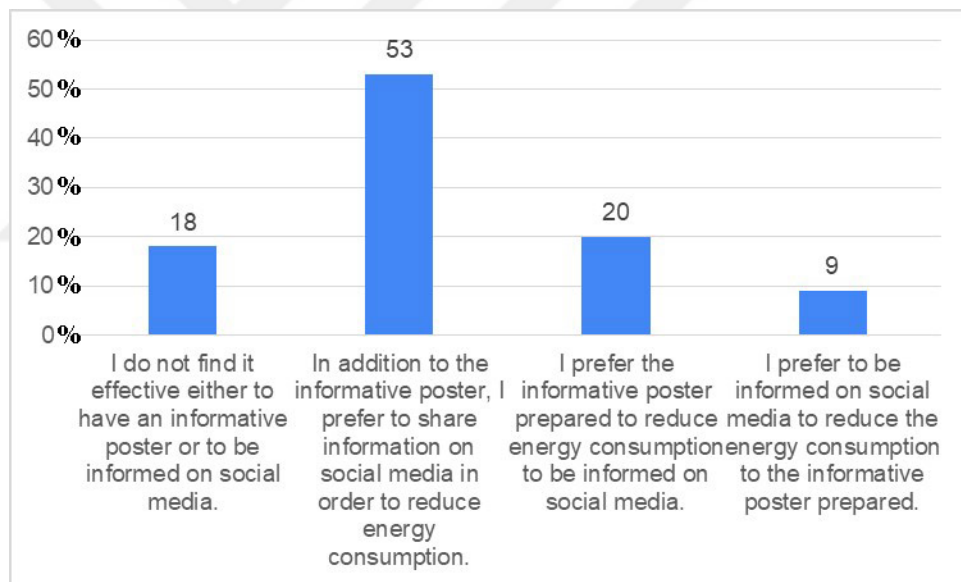


Figure 21 : High school students' preferences regarding methods (informative poster/social media) that can be used to reduce energy consumption.

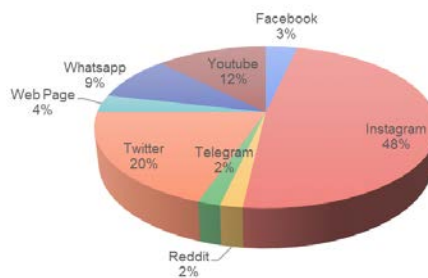


Figure 22 : Social media applications that high school students would prefer if the information would be shared to reduce energy consumption through social media.

The all education building occupant groups were asked to continue the survey after reading the information in the informative poster. Whether the information in the informative poster will positively affect their energy consumption behaviours was asked and it was asked to share which information could be more effective. And the thought of occupant groups has been compared in this context. The levels of believing that the informative poster may be reflected in energy consumption behaviours are education building staff 80%, teachers/academicians 79%, university students 68% and high school students 58% (Figure 24). According to this ranking, the group of occupants who found learning by reading the information at the lowest level was the high school students among the education building occupant groups. In this regard, it can be said that ways to convey this information and make it even more effective for high school students should be sought.

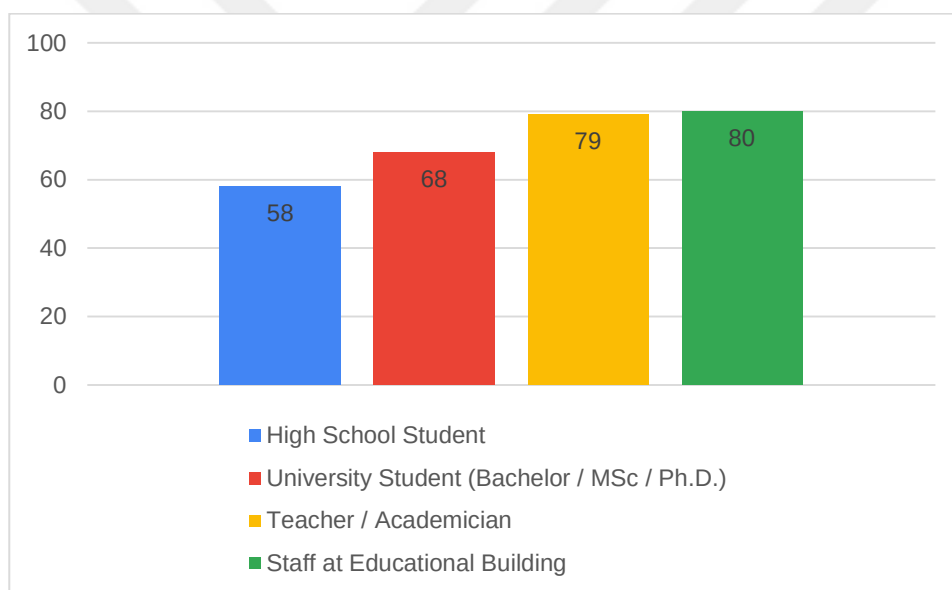


Figure 23 : The level of the belief that the information in the poster which is prepared to create energy consumption awareness may affect the behaviours.

The most remarkable of the information in the poster by all occupant groups is that 100% of global warming is caused by human activities (Figure 25). Other impressive information items that stand out are as follows; not leaving electronic devices in standby mode reduces energy consumption, 1 high school age teenager consumes 20% more energy than 1 adult, the buildings are responsible for 40% of the world's energy consumption, despite all the technological developments, energy consumption is expected to increase by 60% between 2010-2040, respectively (Figure23). When the answers of high school students are compared with other occupant groups, it is seen

that high school students find the items directly related to them more attractive than other occupant groups as follows 1 high school-age teenager consumes 20% more energy than 1 adult, you spend 25% of your time in educational buildings and the number of high school students in Turkey accounted for 7% of Turkey's population (Figure 25). Considering these results, it can be concluded that it may be more impressive to provide directly related information about the target group when it is desired to increase energy consumption awareness and draw attention to important points. Other items that high school students find more remarkable than other occupant groups are; the energy-saving technological systems and devices used in buildings can only make a 42% contribution, the fact that people do not care about their energy consumption like in their home in other environments and turning off unnecessary lights reduces energy consumption (Figure23).



Figure 24 : Items that education building occupants find remarkable in the shared informative poster.

4.4. Knowledge Level of the Occupants of Education Buildings Regarding Energy Issues of the Building

As a result of the survey, it was observed that, in general, all 4 occupant groups believed that increasing their knowledge and awareness about energy consumption would positively affect their energy consumption behaviours. All 4 occupant groups stated their belief levels around 8 out of 10 (Figure 26).

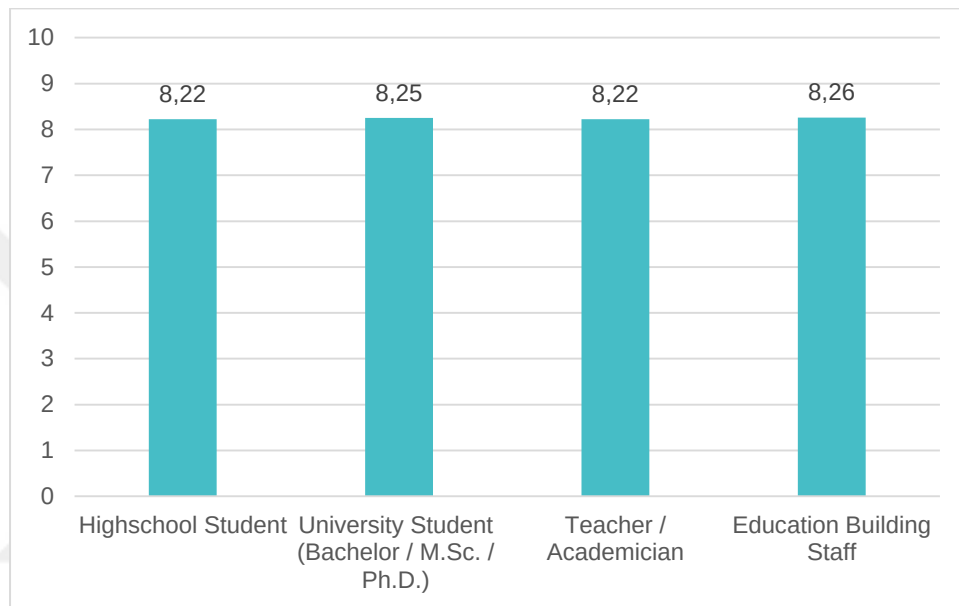


Figure 25 : The average scores given by occupant groups about their belief that increasing knowledge and awareness of energy consumption will affect their behaviour.

Statistics show that how big is the energy problem: with the development of technology and electronic appliances, households increased their energy consumption by 74% from 1990 to 2010 and it is anticipated this ratio is going to increase 60% more until 2040 (Department of Energy and Climate Change, 2011; Toth et al.,2013). It can be said that most of the education building occupants are aware of the energy consumption is increasing according to the previous year. However, the lowest rate of knowing the energy consumption situation around the world compared to other groups was observed in high school students (Figure 27).

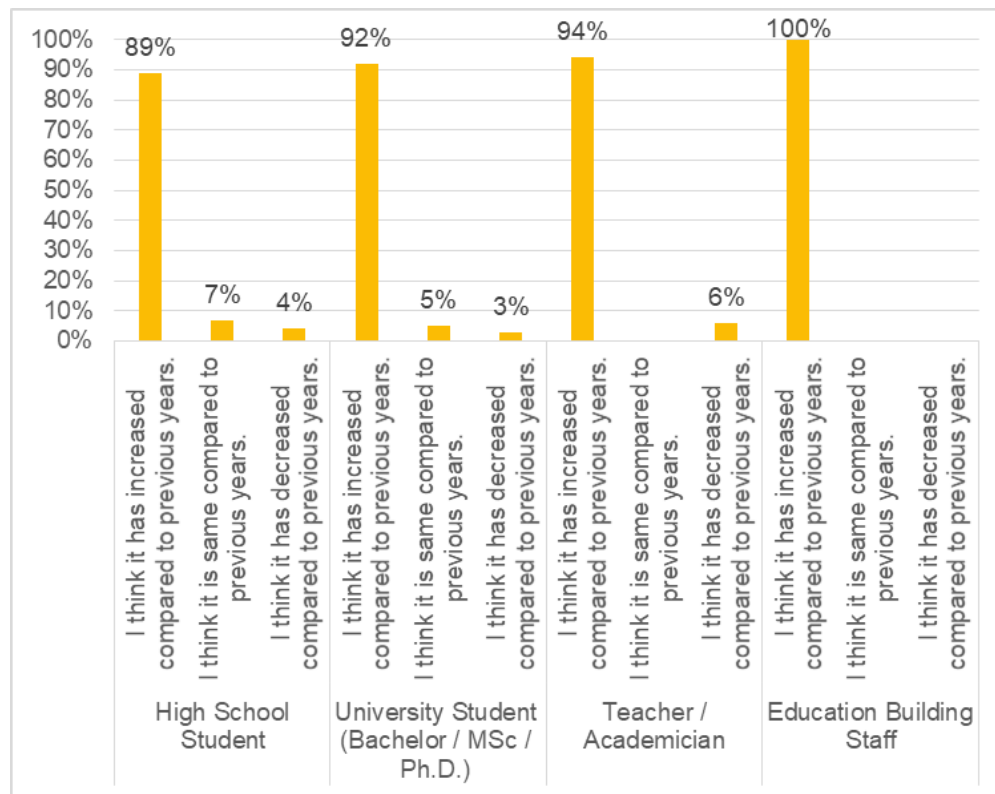


Figure 26 : Education building occupants' thoughts on energy consumption situation compared to previous years.

Based on the literature, buildings are responsible for approximately 40% of global energy consumption (World Business Council for Sustainable Development, 2009; D'Agostino et al.,2017; Gaglia et al.,2019). When the predictions about this situation were asked to the occupants of the education building, following answers were received; 14% of high school students, 25% of university students, 29% of teachers/academics and education staff accurately predicted this rate (Figure 26). The remarkable point among the answers given in this subject is that high school students hold the buildings more responsible than the energy consumption in the world (Figure 28). While 27% of high school students estimate this rate in the range of 60% to 70%, 16% estimated that it is in the range of 50% to 60% (Figure 28). Another important point is that 43% of the education building staff estimated this ratio in the range of %50-%60 (Figure 28). The previous studies conducted on changing occupant behaviour in education buildings in the literature show that 24.7% of energy saving can be achieved. The survey study showed that all user groups think that behaviour change can have a much more positive effect than it is. While high school students estimated this ratio averagely 43,57%, university student estimated average 37,95%,

teacher/academicians estimated average as 39,36% and education building staff estimated average as 52,14% (Figure 29).

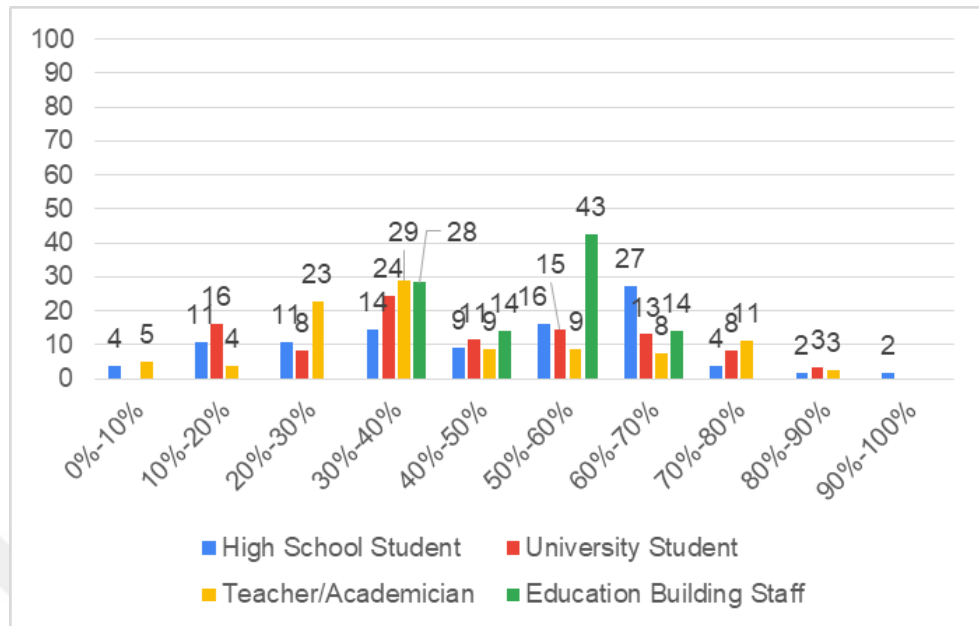


Figure 27 : Education building occupants' estimates of the ratio of energy consumption in buildings to total energy consumption in the world.

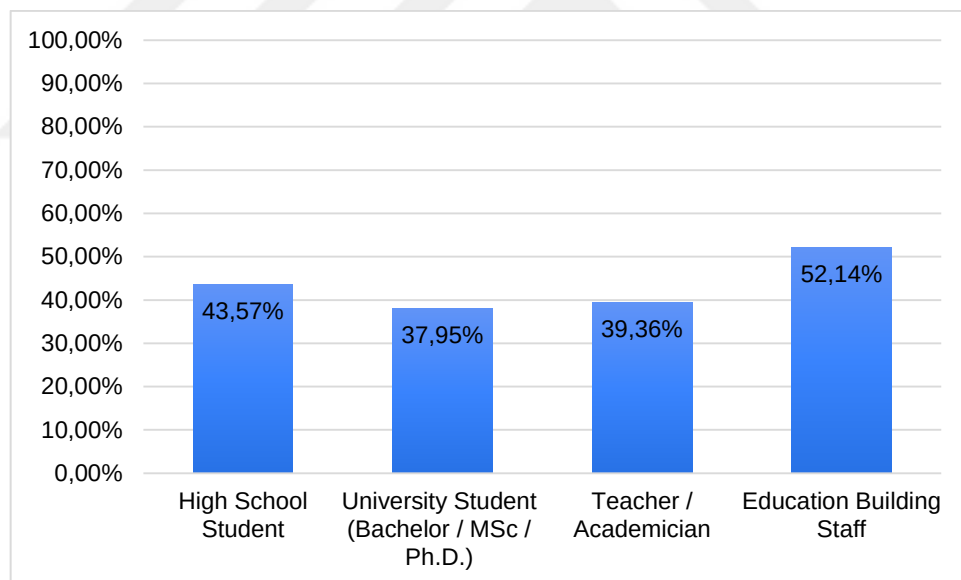


Figure 29 : Estimates of how much energy savings could be achieved if changing the behaviour of occupants in education buildings positively.

As previously mentioned there is a significant gap between the planned and actual energy consumption of buildings and also this discrepancy sometimes goes up to 300% more than the planned energy consumption estimation (Delzendeh et al.,2017). When asked about the predictions of occupant groups about this subject, although the majority of them were aware that the plans were insufficient to estimate actual energy

consumption, the lowest rate was observed with 44% in high school students (Figure 20). And 33% of the high school students and 31% of university students indicate that they have no idea about the situation (Figure 30). The teacher/academician group is located on the top among all occupant groups on knowing what the planned and actual energy consumption situation is with the ratio of 62% (Figure 30).

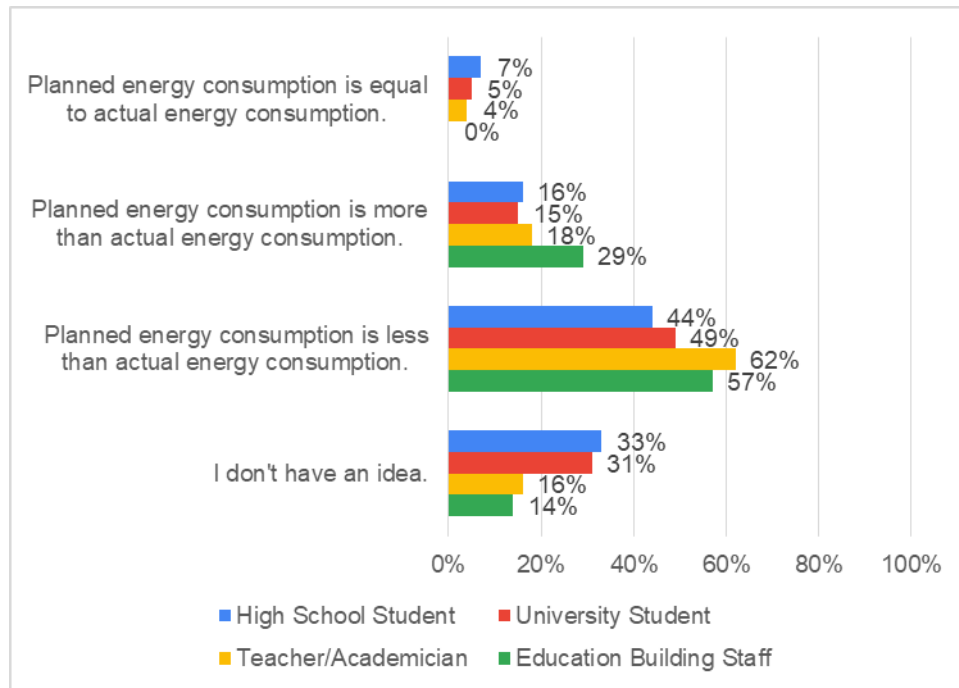


Figure 28 : Education building occupants' thoughts on the relation between planned energy consumption and actual energy consumption.

Previous studies have shown that 1 high school age teenager consumes 20% more energy than 1 adult (Gram-Hanssen, 2005; Toth et al., 2013). Based on this information, the opinions of the occupants of the education building on this issue were questioned and it was asked to learn how they saw themselves. As a result, 41% of high school students think they are more aware of the importance of energy consumption but behave less sensitive than adults (Figure 31). As a result, it can be said that 41% of high school students think that they cannot reflect what they know in their behaviours about energy consumption. Besides, 52% of adults (university students, teacher/academician and education building staff) indicate their opinion as high school teen are less aware of the importance of energy consumption and behave less sensitive than adults (Figure 31).

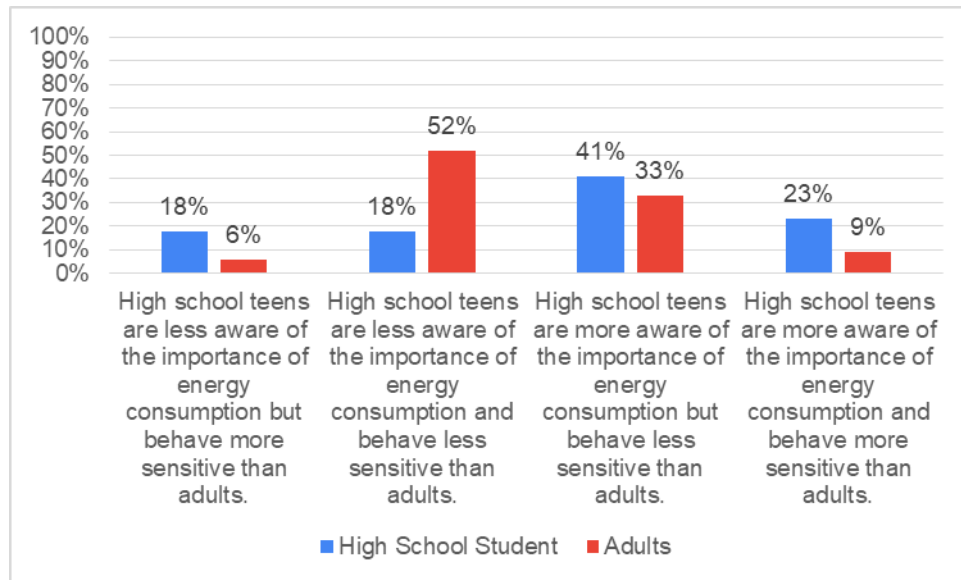


Figure 29 : Comparison of high school students and adults on energy consumption according to high school students and adults.

The previous studies show that energy-saving technological systems can directly contribute only 42% of energy saving in buildings thus there is need to adopt user behaviours towards more sustainable and energy-efficient ways to increase this ratio (Zhao et al.,2017; Casals et al.,2020; Socolow and Pacala, 2006; Aguirre-Bielschowsky et al.,2018). For this reason, the estimations of occupant groups on this issue were questioned to understand their trust in technology without changing human behaviour. According to the results, while the three occupant groups(high school students, university students and teacher/academicians) make almost true predictions on average, education building staffs think that technological systems can provide 59,28% energy-saving (Figure 32). This estimated ratio of the education building staffs is much more than it is. Based on the literature, 80% of the energy is consumed during the operation phase of the buildings. For this reason, the estimates of the occupants of the education building were questioned to understand their awareness of the importance of human behaviour on energy consumption in buildings. All occupant groups made predictions in the range of 44-56% (Figure 33). This estimated range is much less than the real situation. As a result, it can be said that the people who spend time inside of the buildings are not that much aware of the reality of the energy consumption situation during the operational phase of the building.

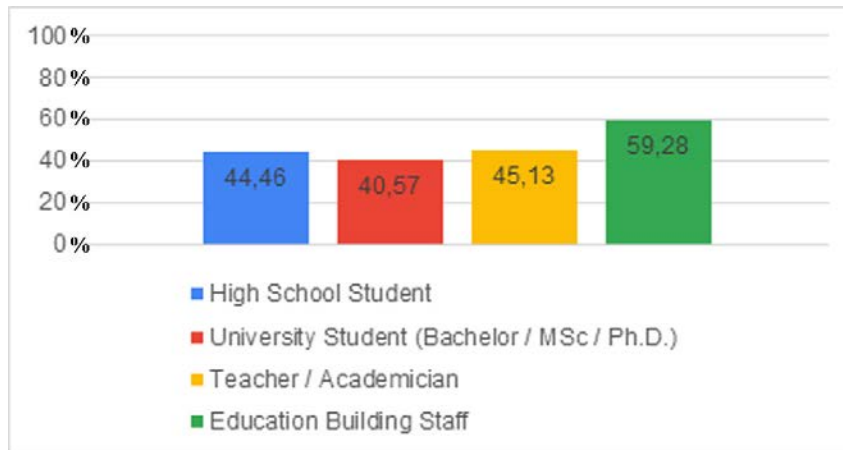


Figure 30 : Estimated percentage of the impact of technology (energy-efficient systems, tools, etc.) in reducing energy consumption in buildings.

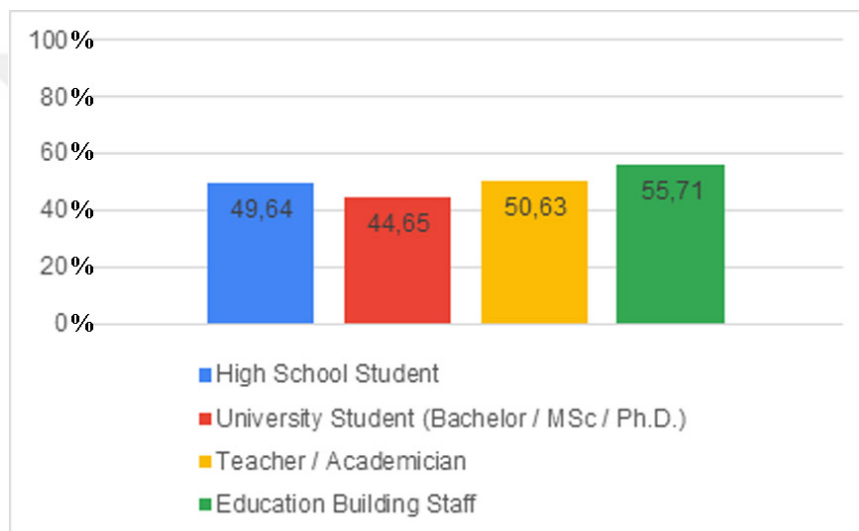


Figure 31 : The estimated ratio of the energy consumed during the usage phase of the buildings to the total energy consumption (design, construction, usage, maintenance etc.).

4.5. Other Findings of Study

In the literature, there are many methods applied to users to reduce energy consumption, one of them is the use of social media, which has an important place in everyone's daily life. Web interfaces or social media applications were used for engaging users in an interactive way to rising their behaviour towards sustainability (Pasini et al.,2017). For this reason, the participants were asked to state their preferences regarding the method used to create awareness of energy consumption. The vast majority of the four occupant groups stated that in addition to the informative poster, they would find it more impressive to share information on social media (Figure 34). The group that finds both methods (informative posters and social media posts)

most ineffective compared to other occupant groups to reduce energy consumption is the group of high school students (Figure 34).

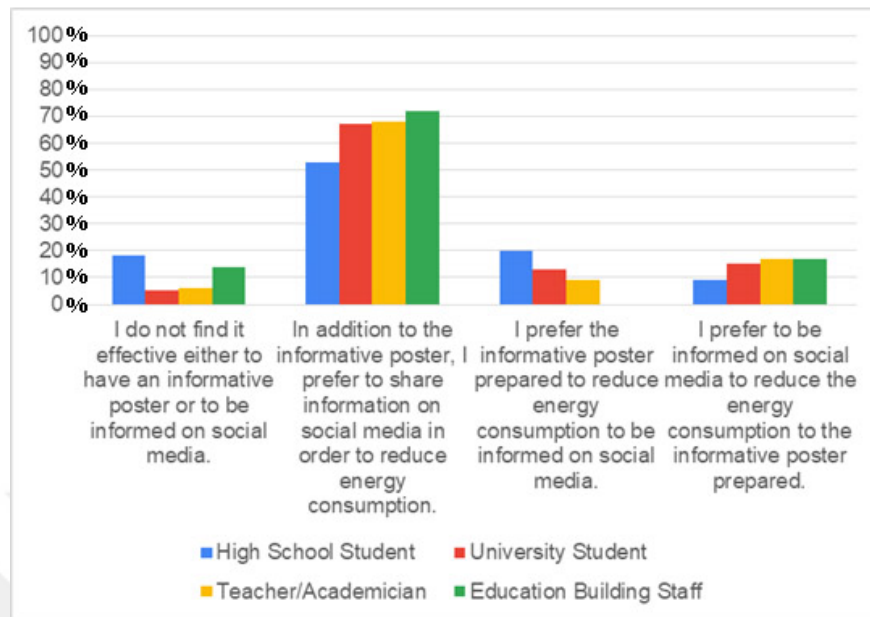


Figure 32 : Educational building occupants' preferences regarding methods (informative poster/social media) that can be used to reduce energy consumption.

As a final question, it was questioned which social media application would be preferred by education building occupants if the information would be shared on social media. The most preferred social media application for each occupant group is Instagram (51,7%). Generally, Twitter (20,2%), Whatsapp (9,9%), Youtube (6,9) and Facebook (5,4) followed to Instagram as other preferred applications, respectively. While high school students put Instagram, Youtube and Whatsapp into their top three, university students put Instagram, Twitter and Web page into their top three (Figure 35). Besides, while teacher/ academicians preferred Instagram, Twitter and Facebook respectively, education building staffs preferred Instagram, Pinterest and Twitter into their top three respectively (Figure 35).

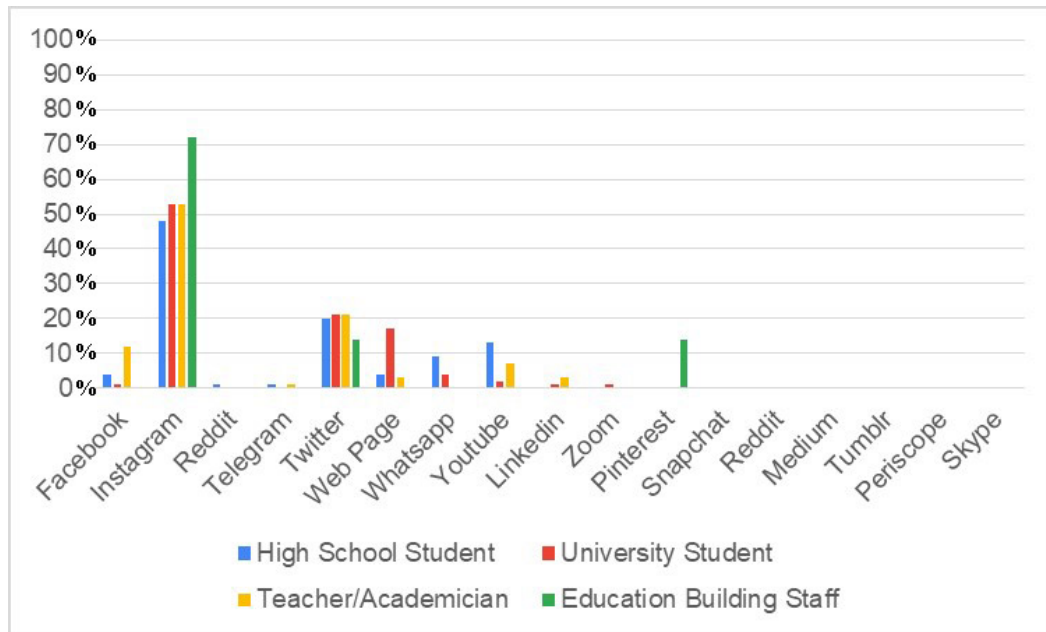


Figure 33 : Social media applications preferred by education building occupants if the information will be shared to reduce energy consumption through social media.

5.CONCLUSION AND RECOMMENDATIONS

203 educational building occupants participated in the survey; 56 high school students, 61 university students, 79 teachers/academicians and 7 people are education building staff. Besides, while 70,4% of the participants are women, 28,6% of the participants are men and 1% of the participants did not want to indicate their sex. It is observed that women are more willing to participate in the survey related to energy consumption and environmental issues than men. Among the occupant groups, (%38,9) teachers/academicians mostly participated in the survey.

5.1. Main Findings

The main findings on the **current energy-saving behaviours and awareness of the high school students are as follows;**

While they identified their sensitivity level to environmental problems caused by energy consumption as 7.15/10, they identified themselves as having 6,53/10 knowledge of environmental problems. It can be concluded that high school students do not have as much knowledge as they are sensitive to energy consumption. High school students believe that having knowledge of environmental issues and increasing awareness will affect their behaviours positively (8,22/10). Besides, high school students indicated a lack of information on environmental issues and human behaviours are int the main five factors which cause environmental problems. Moreover, most of the high school students (89%) are aware of the current energy consumption situation when it is compared with the previous years. In this regard, high school students can be seen as a logical target group to reduce energy consumption by increasing their knowledge and awareness in terms of their motivation, age and location they spend time.

Buildings are responsible for approximately 40% of the total energy consumption of the world (World Business Council for Sustainable Development, 2009). The previous studies conducted on changing occupant behaviour in education buildings in the literature show that 24.7% of energy saving can be achieved by changing human

behaviour (Chen and Ahn, 2014). While the majority of the high school students think that buildings are more responsible for energy consumption (60-70%) than they do, they think that changing human behaviour in reducing energy consumption (43,57%) will be more beneficial than it is. The first place the high school students care about their energy consumption is their home, the second one is the education building. While high school students indicate their level of feeling responsible for energy consumption at home as 65%, they indicated their level of feeling responsible for energy consumption at education building as 44%.

As mentioned in the literature review, previous studies have shown that 1 high school age teenager consumes 20% more energy than 1 adult (Gram-Hanssen, 2005; Toth et al.,2013). 59% of the high school students are aware that they behave less sensitive on the energy consumption issues than adults. However, 41% of them are not aware of the situation. The prominent factors that can motivate high school students to reduce energy consumption as follows; (20,5%) knowing that energy consumption harms the environment, (14,4%) the financial cost of the energy consumption, (14,4%) feeling of doing something good for the future and (12,2%) to know what energy consumption causes on a global scale. Literature reviews showed that 80% of the total energy is consumed during the usage phase of the buildings total life cycle (Ding et al.,2019). 72% of the high school students think that the energy consumed during the use phase of the buildings (%40-60) is less than it is. The study showed that high school students think that the effect of others on them (56,7%) is more than their effect on others (51,4%). It can be concluded from this situation that they are not sufficiently aware of their capacity to influence their social circle.

The main barriers to energy efficiency for teenagers are stated as follows: lack of knowledge, lifestyle, feeling detached from the problem, not responsible for paying bills, habit, peer influence and effort (Toth et al.,2013). The three determinant factors are seen as obstacles by high school students according to the survey results are in order of (1) the thought of how can I change great problems alone (19,2%), (2) habits, lifestyle (18,4%), (3) not being able to see the problems caused by behaviour in tangible ways (11,2%) (Figure 8). Besides, the main three habits of the high school students on energy consumption are in order of (1) turning off unnecessary lights (23,52%), (2) shutting down the computer so as no to leave it standby position (14,7%), (3) unplugging electronic devices when not in use (12,25%) (Figure 9). The interesting

result is that the percentage of those who are accustomed to taking short showers, although it is something that everyone can easily do to reduce energy and water consumption, is only 3,43% (Figure 9).

The main findings on the **comparison of the high school students behaviours and awareness with the other education building occupants (university students, teachers/academicians, education building staff** are as follows:

Compared to other user groups, high school students' level of feeling on having knowledge (Figure 13) and sensitivity level to environmental issues (Figure 14) were almost close. However, high school students ranked last in the ranking of feeling environmentally sensitive among the four occupant group of education buildings (7,15/10). The 4 occupant groups defined the problems related to energy consumption in the 5th place out of 10 among other problems in their lives. However, it has not been questioned what the other prior problems they faced in their lives. It is recommended to add this question for further research. Among the factors that cause global environmental problems shared with 4 user groups, high school students determined 'lack of information' as the most important factor, while university students chose 'human behaviour' as the most important factor (Figure 16). In addition to these groups, teachers/academicians find the energy and water consumption mostly important, while education building staffs consider energy consumption as the most impressive factor (Figure 16). As the area where they pay the most attention to energy consumption behaviours, again, all groups indicated their homes as first place with the majority (Figure 22). While high school students and teachers/academics groups indicate the 'school' as the second place that they pay attention, university student indicates 'dormitory' as the second place, the education building staff ranked the 'public spaces' in the second place by not including the school at all (Figure 22). Considering these results, it can be said that user groups pay more attention to energy consumption in places where they live.

It is indicated that the electricity is untouchable, abstract and invisible and hard to notice by the user. (Darby, 2006; Toth et al.,2013). Bearing this information in mind, numerous studies aim to help users to reduce their electrical consumption by providing more visible, instant and comparative feedback (Bang and Gustafsson, 2009; Toth et al.,2013; Ma et al.,2018; Zhuang and Wu, 2019). The motivation preferences of the occupants of the education building were similar to the literature review; The

prominent factors which can motivate education building occupants to reduce energy consumption are;

- (1) Knowing that energy consumption harms the environment
- (2) The feeling of doing something good for the future
- (3) The financial cost of energy consumption
- (4) To know what causes energy consumption on a global scale
- (5) To see the positive energy consumption behaviours of the social circle (my family, friends etc.) (Figure 24).

The norms based on the peer social group of people (family, friends, social circle) and/or a particular place (e.g. neighbourhoods, school, building, flat) have a more significant impact on the behaviour of occupants towards energy efficiency than impersonal ones (Goldstein et al.,2008; Peschiera and Taylor, 2012; Erell et al.,2018). Previous studies have also shown that 25% of families pay attention to be more respectful to the environment because of their children. The group who believes they can affect their social circle is the teacher/academician group with a ratio of 62.7% (Figure 27). This ratio followed by in order of university student (58,6%), education building staff (55,7%) and high school students (51,4%) (Figure 27). The group, who think they have the most impact on their social circle has been teachers' academicians and have the least impact on their social circle, has been high school students. This result of the teachers/academicians is similar to the literature in terms of their occupations and ages. The result, which is generally seen in occupants of education buildings, is that they think that their impact on their social circle is less than the impact of the social circle on themselves except for teachers/academicians. It can be said that this result occurred from the idea of 'how can I change great problems alone' similar to the literature review. Besides, the main factors that are stated by all of the education building occupants as obstacles in reducing energy consumption are habits, lifestyle, the thought of how can I change great problems alone, feeling away the problems caused by energy consumption, not seeing an awareness of environmental issues in your friends and sense of not belonging the current environment (school, home etc.) (Figure 29).

The main energy consumption habits of the education building occupants are as follows;

- (1) Turning off unnecessary lights,

- (2) To not leaving PC in standby mode,
- (3) Unplugging electronic devices when not in use,
- (4) To be aware of monthly electricity, water and natural gas bills (Figure 30).

The biggest habitual differences between high school students and other groups stand out as not being aware of monthly electricity, natural gas, water bills, and not having a habit of taking short showers. All of the four occupant groups feel more responsible about energy consumption at home than the education buildings (Figure 31). It can be said that this situation is related to a sense of belonging and financial results of energy consumption. However, in both cases, the group that felt the least responsible were high school students (Figure 31).

The main findings on the **impact of the poster on the energy-saving behaviours and awareness of high school students are as follows:**

The levels of believing that the informative poster may be reflected in energy consumption behaviours are education building staff 80%, teachers/academicians 79%, university students 68% and high school students 58% (Figure 32). In this sense, it can be thought that just giving information based on the literature via poster may not have sufficient effect on high school students to reduce energy consumption. 53% of the high school students indicate that in addition to the informative poster, they prefer information to be shared on social media to reduce energy consumption (Figure 11). Besides, they indicated mostly would prefer to use Instagram (48%), Twitter (20%) and Youtube (12%) for the information sharing about energy consumption. According to the high school students, the 5 most impressive items in the posters are as follows:

- (1) 100% of global warming is caused by human activities,
- (2) 1 high school age teenager consumes 20% more energy than 1 adult,
- (3) Despite all the technological developments, energy consumption is expected to increase by 60% between 2010-2040,
- (4) The buildings are responsible for 40% of the world's energy consumption,
- (5) The fact that people don't care about their energy consumption behaviours in other environments like in their homes (Figure 10).

By looking at these items, it is understood that high school students find information remarkable that is directly related to them, including the numerical data and the relationship between technology and energy consumption.

The main findings on **the knowledge level of the occupants of education buildings regarding energy issues of the buildings** are as follows:

In general, all educational building users strongly believe that increasing knowledge and awareness of energy consumption will change their behaviour positively. Most of the education building occupants are aware of the energy consumption is increasing according to the previous year. However, the lowest rate belongs to high school students. The previous studies conducted on changing occupant behaviour in education buildings in the literature show that 24.7% of energy saving can be achieved. The survey study showed that all user groups think that behaviour change can have a much more positive effect than it is. So, it can be said that they think changing behaviours may have a quite significant impact on energy consumption. However, learning the real situation may create a lack of motivation in this regard. That is because, it is indicated that providing social comparison has a risk when the least energy consumer feels there is nothing to save more (Toth et al.,2013). This situation may cause the disengagement of the least consumer in the long term for reducing energy consumption (Thøgersen & Grønhøj, 2010; Toth et al.,2013).

Based on the literature, buildings are responsible for approximately 40% of global energy consumption (World Business Council for Sustainable Development, 2009; D'Agostino et al.,2017; Gaglia et al.,2019). The remarkable point among the answers given in this subject is that high school students hold the buildings more responsible than the energy consumption in the world (Figure 18). There is a significant gap between the planned and actual energy consumption of buildings and also this discrepancy sometimes goes up to 300% more than the planned energy consumption estimation (Delzendeh et al.,2017). While all user groups predict this difference between the planned and reality to a large extent, the lowest estimation rate belongs to the high school students. Previous studies have shown that 1 high school age teenager consumes 20% more energy than 1 adult (Gram-Hanssen, 2005; Toth et al.,2013). 59% of high school students and 85% of adults think that high school students behave less sensitive than adults. The previous studies show that energy-saving technological systems can directly contribute only 42% of energy saving in buildings thus there is need to adopt user behaviours towards more sustainable and energy-efficient ways to increase this ratio (Zhao et al.,2017; Casals et al.,2020; Socolow and Pacala, 2006; Aguirre-Bielschowsky et al.,2018). High school students, university students and

teachers/academicians group almost have an accurate prediction on the technology's impact on the energy consumption in the buildings, only education building staff think the ratio is (59,2%) more than it is. Based on the literature, 80% of the energy is consumed during the operation phase of the buildings. All occupant groups made predictions in the range of 44-56% (Figure 26) which is quite less than it is. Although they believe that changing human behaviour can affect energy consumption in buildings much more than they do, it is remarkable that they underestimate the energy consumed in buildings during the usage phase of the buildings life cycle. Therefore, it can be concluded that people are not sufficiently aware that they can seriously affect energy consumption in buildings.

Other findings are; all of the occupant groups stated that they would find it more effective to share information on social media in addition to the informative poster. The remarkable point is that the rate of not finding both studies (informative poster and social media) effective belongs to high school students (18%) (Figure 34). Besides, all 4 groups stated that they would prefer Instagram most if the information would be shared on social media.

It is thought that the study will contribute to the knowledge of relations between energy consumption and occupant behaviours in the literature since it includes the occupants of the education buildings and individuals of high school age. In addition, the study shows that high school students prefer digital media for sharing information about energy consumption and Instagram application as a tool. Besides, high school students state that they do not have enough information about energy consumption and believe that the studies on energy consumption will yield positive results.

5.2. Limitations of Study

The imperfections of the study are that the number of staff of the education building participating in the survey is 7 and sufficient people could not be reached from this staff group when we compare with the other occupant groups of the education buildings. Age indicative question was not added to the survey. For this reason, the survey results of the staff group could not provide comprehensive data for the study. Besides, the total number of participants in the study were 203. It will be useful to provide more data for more efficient results. There is a need for more people and more time than ten days to have more comprehensive data. In the study, the ideas of

educational building occupants were learned and asked to evaluate themselves in the energy consumption issues. However, in their real-life, it is not known exactly whether they apply these behaviours or not. The poster was placed in the survey. In this regard, the exposure time of the participants to the information in the poster is limited. Besides, the four occupant groups defined the problems related to energy consumption in the 5th place out of 10 among other problems in their lives. However, it has not been questioned what the other prior problems they faced in their lives. It is recommended to add this question for further researches. The study includes only people who have been in educational institutions since high school. In the online survey, the age of the participants has not been questioned. It is recommended to add the age question in further studies.

5.3. Further Research Topics

For the further researches, behavioural changes can be observed if the poster is hanged on the wall or somewhere else in the education building in a physical environment or share in social media (Instagram) as preferred by all of the occupant groups. Age and school indicative question should be added to the survey. Besides, the effects of sharing information on posters and social media can be examined comparatively. It is recommended to use Instagram as social media. Further studies may also be based on pre-high school groups. Moreover, the literature review has shown that the study conducted by Newsham et.al. (2009) examined the situation that energy performance credits in the LEED certificate are based on predicted energy performance at the design phase of the building, however, it is not based on energy performance at the operational state of the buildings (Newsham et al.,2009). Therefore, a study can be carried out on the integration of occupant behaviours into accreditation systems e.g. LEED, BREEAM. In general, high school students think to change human behaviours have much more effect on energy consumption than it is. However, knowing the real situation can create disengagement to reduce energy consumption. Therefore, this issue can be researched more.

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APPENDICES

APPENDIX A: Online Survey Questions

APPENDIX B: Online Survey Answers



APPENDIX A

Kişisel Bilgiler

Bu anket İstanbul Teknik Üniversitesi Mimarlık Ana Bilim Dalı, Proje Yapım ve Yönetimi Yüksek Lisans programı dahilinde, eğitim binalarındaki kullanıcıların enerji tüketimi farkındalık, davranış ve düşüncelerini analiz etmek amacı ile hazırlanmıştır. Yaklaşık 5-10 dk. alacaktır.

* Gerekli

1. Eğitim binalarında bulunma nedeninizi işaretleyiniz. *

Yalnızca bir şıkki işaretleyin.

- ☐ Lise öğrencisiyim
☐ Üniversite (Lisans / Yüksek Lisans / Doktora) öğrencisiyim
☐ Öğretmenim / Akademisyenim
☐ Eğitim binası personeliyim

2. Cinsiyetiniz? *

Yalnızca bir şıkki işaretleyin.

- ☐ Kadın
☐ Erkek
☐ Belirtmek istemiyorum.

3. Kendinizi enerji tüketiminden kaynaklı çevre sorunlarına karşı ne kadar bilgi sahibi buluyorsunuz? *

Yalnızca bir şıkki işaretleyin.

	0	1	2	3	4	5	6	7	8	9	10	
Bilgisizim	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Oldukça bilgiliyim

4. Kendinizi enerji tüketiminden kaynaklı çevre sorunlarına karşı ne kadar duyarlı tanımlarsınız? *

Yalnızca bir şıkki işaretleyin.

	0	1	2	3	4	5	6	7	8	9	10	
Duyarsızım	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Oldukça duyarlıyım

5. Enerji tüketimi konusunda bilginizi-farkındalığınızı arttırmamanın, sizin enerji tüketimi davranışlarınızı ne ölçüde etkileyeceğine inanıyorsunuz? *

Yalnızca bir şıkki işaretleyin.

	0	1	2	3	4	5	6	7	8	9	10	
Etkisi olacağına inanmıyorum.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Oldukça etkileyici olacağına inanıyorum.

<https://docs.google.com/forms/d/1CbpuDITKxKn2JS73AoUPZUR26hrBvAMSAu7JLGVQaCw/edit>

1/10

Figure A.1 : Online Survey Questions

6. Enerji tüketiminin çevre üzerinde yarattığı sorunları hayatınızda karşılaştığınız diğer sorunlar arasında kaçınıcı sırada tanımlarsınız? *

Yalnızca bir şıkki işaretleyin.

	1	2	3	4	5	6	7	8	9	10	
En önemli sırada	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	En önemsiz sırada

7. soruya gidin

Enerji Tüketimi - Genel Farkındalık

7. Lütfen aşağıda verilen, size göre global çevre sorunlarına neden olan başlıca 3 nedeni işaretleyiniz. *

Uygun olanların tümünü işaretleyin.

- ☐ Enerji Tüketimi
- ☐ Su tüketimi
- ☐ İnsan Davranışları
- ☐ Nüfus Artışı
- ☐ Teknolojik Gelişmeler
- ☐ Çevresel Konulardaki Bilgi Eksikliği
- ☐ İnşaat Sektörü
- ☐ Çevre Politikaları
- ☐ Düzensiz şehirleşme
- ☐ Doğal Afetler
- ☐ Sanayileşme

8. Son yıllardaki teknoloji ve yapı sektöründeki gelişmeler düşünüldüğünde, enerji tüketiminin önceki yıllara göre ne durumda olduğunu düşünüyorsunuz? *

Yalnızca bir şıkki işaretleyin.

- ☐ Aynı durumda olduğunu düşünüyorum.
- ☐ Önceki yıllara göre arttığını düşünüyorum.
- ☐ Önceki yıllara göre azaldığını düşünüyorum.

9. Binalardaki enerji tüketimi, sizce dünya üzerindeki toplam enerji tüketiminin yüzde kaçını oluşturuyordur? *

Yalnızca bir şıkki işaretleyin.

- ☐ %0 - %10
- ☐ %10 - %20
- ☐ %20 - %30
- ☐ %30 - %40
- ☐ %40 - %50
- ☐ %50 - %60
- ☐ %60 - %70
- ☐ %70 - %80
- ☐ %80 - %90
- ☐ %90 - %100

Figure A.1 (continue) : Online Survey Questions

10. Sizce, eğitim binalarındaki kullanıcıların davranışlarını olumlu yönde değiştirmek yüzde kaçlık bir enerji tasarrufu sağlayabilir? *

Yalnızca bir şıkkı işaretleyin.

- ☐ %0 - %10
☐ %10 - %20
☐ %20 - %30
☐ %30 - %40
☐ %40 - %50
☐ %50 - %60
☐ %60 - %70
☐ %70 - %80
☐ %80 - %90
☐ %90 - %100

11. Sizce yapıların (konut, ofis, eğitim binası vb.) tasarım aşamasında planlanan enerji tüketimi miktarı ile kullanım aşamasındaki enerji tüketim miktarı arasında nasıl bir ilişki vardır? *

Yalnızca bir şıkkı işaretleyin.

- ☐ Planlanan ile gerçekleşen enerji tüketimi eşittir.
☐ Planlanan enerji tüketimi gerçekleşen enerji tüketiminden fazladır.
☐ Planlanan enerji tüketimi gerçekleşen enerji tüketiminden azdır.
☐ Fikrim yok.

12. soruya gidin

Enerji Tüketimi - Bireysel Farkındalık

12. Enerji tüketimi ile ilgili davranışlarınızı en çok hangi ortamda gerçekleştiriyorsunuz? *

Yalnızca bir şıkkı işaretleyin.

- ☐ Ev
☐ Okul
☐ Ulaşım
☐ Yurt
☐ Kamusal alanlar (park vb.)
☐ Ticari binalar (avm, ofis vb.)
☐ Diğer: _____

Figure A.1 (continue) : Online Survey Questions

13. Enerji tüketimi ile ilgili davranışlarınıza en çok hangi alanda dikkat ediyorsunuz?
(Işıkları kapatmak, araç yerine bisiklet kullanmak vb.) *

Yalnızca bir şık işaretleyin.

- ☐ Ev
☐ Okul
☐ Ulaşım
☐ Yurt
☐ Kamusal alanlar (park vb.)
☐ Ticari binalar (avm ofis vb.)
☐ Diğer: _____

14. Günlük hayattaki enerji tüketimi davranışlarınızı diğer yaş grupları ile karşılaştırdığınızda ne düşünüyorsunuz? *

Yalnızca bir şık işaretleyin.

- ☐ Lise çağındaki gençler enerji tüketimi öneminin yetişkinlere göre daha fazla farkında ve daha duyarlı davranış sergiliyor.
☐ Lise çağındaki gençler enerji tüketimi öneminin yetişkinlere göre daha az farkında ama daha duyarlı davranış sergiliyor.
☐ Lise çağındaki gençler enerji tüketimi öneminin yetişkinlere göre daha fazla farkında ancak daha az duyarlı davranışlar sergiliyor.
☐ Lise çağındaki gençler enerji tüketimi öneminin yetişkinlere göre daha az farkında ve daha az duyarlı davranıyor.

15. Sizi daha az enerji tüketimi için en çok motive edebilecek 3 faktörü işaretleyiniz.

Uygun olanların tümünü işaretleyin.

- ☐ Enerji tüketiminin çevreye zarar verdiğini bilmek.
☐ Enerji tüketiminin maddi açıdan yarattığı maliyet.
☐ Sosyal çevrem (ailem, arkadaşlarım vb.) olumlu yöndeki enerji tüketimi davranışlarını görmek.
☐ Enerji tüketiminin global ölçekte nelere sebep olduğunu bilmek.
☐ Enerji tüketim miktarlarımızın karşılaştırılması.
☐ Mobil bir uygulama ile oyunlaştırılması ve bu sayede hedeflerin konulması ve yarış içerisinde olmak.
☐ Gelecek için iyi bir şey yapıyor olma hissi.
☐ Çevreci davranışların "havalı" olarak algılanması.
☐ Sosyal medyada trend olması.
☐ Düzenli hatırlatmalar ve yönlendirmeler (afiş vb.)
☐ Düzenli bilgilendirmeler (ders, konferans vb.)
☐ Sonucunda bir ödül-ceza sisteminin olması.
☐ Bunun bir kural olarak konulması.
☐ Bu konudaki rol modellerin hikayelerini öğrenmek.
☐ Sosyal medya üzerinden bilgilendirmenin yapılıyor olması.
☐ Çocuğumun çevre konularını önemsiyor oluşu.
☐ Sosyal çevreme örnek olma duygusu.

Diğer: ☐ _____

Figure A.1 (continue) : Online Survey Questions

16. Binalardaki enerji tüketimini azaltma konusunda, teknolojinin(enerji tasarruflu sistemler, aletler kullanmak vb.) yüzde kaç etkiye sahip olduğunu düşünüyorsunuz? *

Yalnızca bir şıkkı işaretleyin.

- ☐ %0 - %10
☐ %10 - %20
☐ %20 - %30
☐ %30 - %40
☐ %40 - %50
☐ %50 - %60
☐ %60 - %70
☐ %70 - %80
☐ %80 - %90
☐ %90 - %100

17. Sizce bir binanın kullanım aşamasında tüketilen enerji toplamdaki enerji tüketiminin (tasarım, yapım, kullanım, bakım vb.) yüzde kaçını oluşturmaktadır? *

Yalnızca bir şıkkı işaretleyin.

- ☐ %0
☐ %10
☐ %20
☐ %30
☐ %40
☐ %50
☐ %60
☐ %70
☐ %80
☐ %90
☐ %100

18. Enerji tüketimi davranışları konusunda sosyal çevreniz (aile, arkadaşlar, öğretmenler vb.) üzerinde ne kadar etkiye sahip olduğunuzu düşünüyorsunuz? *

Yalnızca bir şıkkı işaretleyin.

	0	1	2	3	4	5	6	7	8	9	10	
Bir etkiye sahip olmadığımı düşünüyorum.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Oldukça etkileyici olabilece

19. Sosyal çevrenizin (aile, arkadaşlar, öğretmenler, çocuklar vb.) sizin enerji tüketimi davranışlarınız üzerinde ne kadar etkisi olduğunu düşünüyorsunuz? *

Yalnızca bir şıkkı işaretleyin.

	0	1	2	3	4	5	6	7	8	9	10	
Hiç bir etkileri olduğunu düşünmüyorum.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Oldukça etkili olduklarını düş

Figure A.1 (continue) : Online Survey Questions

20. Aşağıdaki enerji tüketimini azaltma konusunda size engel olan düşünceleri işaretleyiniz. *

Uygun olanların tümünü işaretleyin.

- ☐ Enerji tüketimi sonucundaki maliyetten sorumlu hissetmemek.
- ☐ İçinde bulunulan ortamı(okul, ev vb.) sahiplenememe duygusu.
- ☐ Enerji tüketimi konusunda daha önemli sorunlara sahip olma hissi.
- ☐ Enerji tüketimini azaltıcı davranışları "havalı" bulmamak.
- ☐ Çaba gerektirmesi.
- ☐ Alışkanlıklar, yaşam tarzı.
- ☐ Tek başıma neyi değiştirebilirim düşüncesi.
- ☐ Enerji tüketiminin yol açtığı problemlerden uzak hissetmek.
- ☐ Davranışların yol açtığı problemleri somut olarak görememek.
- ☐ Enerji tüketimi konusuna karşı ilgisiz olmak.
- ☐ Enerji tüketimini bir problem olarak görmemek.
- ☐ Arkadaşlarında bu konuyla ilgili bir farkındalık görmemek.
- ☐ Ailede bu konuyla ilgili bir farkındalık görmemek.

Diğer: ☐ _____

21. Aşağıdaki enerji ile ilgili davranışlardan günlük hayatınızda evde, okulda vb. yapmayı alışkanlık edindiğiniz davranışları işaretleyiniz. *

Uygun olanların tümünü işaretleyin.

- ☐ Gereksiz ışıkları kapatmak.
- ☐ Evden çıkarken kombiyi kapatmak.
- ☐ Televizyonu standby konumunda bırakmayacak şekilde kapatmak.
- ☐ Bilgisayarı standby konumunda bırakmayacak şekilde kapatmak.
- ☐ Perdeleri kapatmak.
- ☐ Soğuk olduğunda ısıyı arttırmadan önce ekstra kıyafet giymek.
- ☐ Elektronik aletlerin (şarj aletleri vb.) fişlerini kullanılmadığı durumlarda çekmek.
- ☐ Kısa süreli duşlar almak.
- ☐ Aylık elektrik, doğalgaz, su fatura tutarından haberdar olmak.
- ☐ Odadan çıkarken klimayı kapatmak.

Diğer: ☐ _____

22. Kendinizi evdeki enerji tüketiminden ne derece sorumlu hissediyorsunuz? *

Yalnızca bir şıkı işaretleyin.

	0	1	2	3	4	5	6	7	8	9	10
Hiç sorumlu hissetmiyorum.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Oldukça sorumlu hissetmiyorum.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

23. Kendinizi okuldaki enerji tüketiminden ne derece sorumlu hissediyorsunuz? *

Yalnızca bir şıkı işaretleyin.

	0	1	2	3	4	5	6	7	8	9	10
Hiç sorumlu hissetmiyorum.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Oldukça sorumlu hissetmiyorum.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Poster

Figure A.1 (continue) : Online Survey Questions

Lütfen devam etmeden önce aşağıdaki bilgileri okuyunuz.

BUNLARI BİLİYOR MUYDUNUZ?

1950'den bu yana gözlemlenen küresel ısınmanın neredeyse % 100'ü Hükümetler Arası İklim Değişikliği Paneli'ne göre insan faaliyetlerinden kaynaklanmaktadır.

Evlerde tüketilen enerji 1990-2010 yılları arasında %74'lük bir artış göstermiştir.



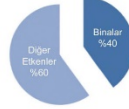
Enerji verimliliği alanındaki tüm teknolojik gelişmelere rağmen dünyadaki enerji tüketiminin 2040 yılında 2010'a göre %60'lık bir artış göstermesi beklenmektedir.

Türkiye'de yapılan bir araştırma evlerde bekleme modunda bırakılan elektronik cihazların, evde tüketilen toplam elektrik tüketiminin %3-%10'undan sorumlu olduğunu göstermektedir.



Bekleme modunda bırakılan elektronik cihazlar sadece Avrupa'da yılda 19 milyon ton CO2 salınımına neden olmaktadır.

Binalar küresel enerji tüketiminin yaklaşık % 40'ından sorumludur.



Enerji tüketimini azaltmak için öngörülen 3 etkili yol;

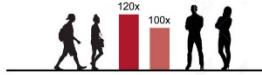
- ✓ Eğitim seviyesinin yükseltilmesi,
- ✓ Gençlerin çevre farkındalığının artırılması,
- ✓ Enerji tasarruf cihazlarının vatandaşlar tarafından kullanılarak yaygınlaşabilmesi için finansal teşviklerin devlet tarafından sağlanmasıdır.



İnsanlar evleri dışındaki yerlerde ve yapılarda enerji tüketimine daha az dikkat etmektedir.



Binalarda kullanılan enerji tasarruflu teknolojik sistemler sadece %42'lik bir katkı sağlayabilmektedir çünkü teknolojiyi de kullananlar yine insanlardır.



Yapılan çalışmalara göre 1 lise çağındaki genç 1 yetişkene göre %20 daha fazla enerji tüketmektedir.

Figure A.1 (continue) : Online Survey Questions

Lütfen devam etmeden önce aşağıdaki bilgileri okuyunuz.

BUNLARI BİLİYOR MUYDUNUZ?

Araştırmalara göre; gençlerin çevre konularında sosyal çevrelerini (aile, arkadaş vb.) pozitif anlamda etkileme kabiliyetleri vardır.



Yapılan bir araştırmadaki ebeveynlerin %25'i kendilerini enerji tüketimi konusunda dikkatli davranmaya iten faktörün çocuklarının bu konudaki farkındalıkları olduğunu belirtmiştir.



Zamanınızın ortalama %25'ini eğitim binalarında geçirmenizdir.



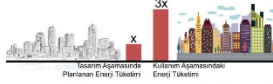
Türkiye nüfusunun yaklaşık %7'sini lise öğrencileri oluşturmaktadır. Türkiye'deki lise öğrencilerinin sayısı (5 milyon 649 bin 594) dünyadaki 129 ülkenin nüfusundan fazladır.



Enerji konusunda bağımsız olmanın sosyo ekonomik gelişim, su, tarım, popülasyon, eğitim, sağlık, iş gücü, cinsiyete bağlı konular üzerinde de etkisi bulunmaktadır.

Günlük hayatta uygulanabilecek çevre ve enerji dostu davranışlar:

- ✓ Gereksiz ışıkları kapatmak.
- ✓ Kullanılmayan fişleri çekmek.
- ✓ Elektronik cihazları bekleme modunda bırakmamak.
- ✓ Soğuk havalarda ekstra kıyafet giymek, perdeleri kapatmak.
- ✓ Kısa duşlar almak.
- ✓ Isıtma sistemi aktifken pencereleri çok sık açmamak.



Binaların kullanım aşamasındaki enerji tüketimi, tasarım aşamasında planlanan enerji tüketiminin zaman zaman 3 katına çıkmaktadır ve bunun nedeni insan davranışları olarak kabul edilmektedir.

Enerji tasarrufu sağlamanın en uygun maliyetli çözüm yolu bina kullanıcıların davranışlarını olumlu yönde değiştirmektir.



Binaların tasarım, inşaat, kullanım, bakım gibi süreçleri arasında %80'lik enerji tüketimi kullanım aşamasında gerçekleşmektedir.



Eğitim binaları içerisindeki kullanıcıların davranışları pozitif anlamda değiştirildiğinde %24.7'lik enerji tasarrufu sağlanabildiği gözlemlenmiştir.

Değerlendirme

24. Enerji tüketimi farkındalığı yaratılabilmek amacıyla hazırlanmış posterlerde yer alan bilgilerin davranışlarınıza ne derece yansıyabileceğini düşünüyorsunuz. *

Yalnızca bir çikki işaretleyin.

	0	1	2	3	4	5	6	7	8	9	1
Bilgilerin davranışlarını üzerinde hiçbir etki yaratmayacağını düşünüyorum.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Figure A.1 (continue) : Online Survey Questions

25. Sizinle posterler yoluyla paylaşılan aşağıdaki bilgilerden sizin için en dikkat çekici 5 maddeyi işaretleyiniz. *

Uygun olanların tümünü işaretleyin.

- ☐ Küresel ısınmanın %100'ünün insan faaliyetlerinden kaynaklanması.
- ☐ Enerji tüketiminin tüm teknolojik gelişmelere rağmen 2010-2040 arasında %60'lık bir artış göstermesinin beklenmesi.
- ☐ Bekleme modunda bırakılan cihazların evlerdeki enerji tüketiminin %3-%10'unu oluşturması.
- ☐ Binaların dünyadaki enerji tüketiminin %40'ından sorumlu olması.
- ☐ Enerji tüketimini azaltmak için; eğitim seviyesinin, gençlerin farkındalığının ve devlet tarafından enerji tasarruflu sistemlerin kullanımı için vatandaşlara teşvik sağlanmasının önemi.
- ☐ İnsanların evleri dışındaki yerlerde enerji tüketimine evleri kadar özen göstermemeleri.
- ☐ Binalarda kullanılan enerji tasarruflu teknolojik sistem ve cihazların sadece %42'lik bir katkı sağlayabilmesi.
- ☐ 1 lise çağındaki gencin 1 yetişkinden %20 daha fazla enerji tüketiyor oluşu.
- ☐ Gençlerin sosyal çevrelerini (aile, arkadaş vb.) enerji tüketimi gibi çevresel konularda pozitif yönde etkilime kabiliyetlerinin olması.
- ☐ Zamanınızın %25'ini eğitim binalarında geçiriyor olmanız.
- ☐ Türkiye'deki lise öğrencilerinin Türkiye nüfusunun %7'sini oluşturması.
- ☐ Türkiye'deki lise öğrencilerinin sayısının dünyadaki 129 ülkenin nüfusundan fazla olması.
- ☐ Enerji konusunda bağımsız olmanın, sosyo ekonomik gelişim, su, tarım, popülasyon, eğitim, sağlık, iş gücü, cinsiyete bağlı konular üzerinde de etkisinin bulunması.
- ☐ Binaların kullanım aşamasında tüketilen enerjinin tasarım aşamasında planlanan enerjiden zaman zaman 3 kat fazla olması ve bunun tamamen insan davranışlarından kaynaklanması.
- ☐ Enerji tasarrufu sağlamanın en uygun maliyetli yolunun insan davranışlarının pozitif yönde değiştirilmesi olması.
- ☐ Binaların tüm yaşam döngüleri düşünüldüğünde toplam enerji tüketiminin %80'inin kullanım aşamasında gerçekleşiyor oluşu.
- ☐ Eğitim binaları içerisindeki kullanıcıların enerji tüketimi davranışları değiştirilerek %24.7'lik bir tasarruf sağlanabiliyor olması.
- ☐ Gereksiz ışıkları kapatmanın enerji tüketimini azaltması.
- ☐ Kullanılmayan fişleri çekmenin enerji tüketimini azaltması.
- ☐ Elektronik cihazları bekleme modunda bırakmamanın enerji tüketimini azaltması.
- ☐ Soğuk havalarda ekstra kıyafet giymenin enerji tüketimini azaltması.
- ☐ Soğuk havalarda perdeleri kapatmanın enerji tüketimini azaltması.
- ☐ Kısa duşlar almanın enerji tüketimini azaltması.
- ☐ Isıtma sistemi aktifken pencereleri çok sık açmamanın enerji tüketimini azaltması.
- ☐ Ebeveynlerin %25'inin çocuklarından etkilenecek enerji tüketimini azaltıcı davranışlardan bulunuyor olması.
- ☐ Evlerde tüketilen enerjinin 1990-2010 yılları arasında %74'lük bir artış göstermiş olması.

26. Aşağıdaki düşüncelerden katıldığınız bir düşünceyi işaretleyiniz. *

Yalnızca bir şıkkı işaretleyin.

- ☐ Enerji tüketimini azaltmak adına hazırlanan bilgilendirici posterini sosyal medya üzerinden bilgilendirilmeye tercih ederim.
- ☐ Enerji tüketimini azaltmak adına sosyal medya üzerinden bilgilendirilme yapılmasını hazırlanan bilgilendirici postere tercih ederim.
- ☐ Enerji tüketimini azaltmak adına bilgilendirici postere ek olarak sosyal medya üzerinden de bilgi paylaşılmasını tercih ederim.
- ☐ Bilgilendirici posterini de, sosyal medya üzerinden bilgilendirilmeyi de etkili bulmuyorum.

Figure A.1 (continue) : Online Survey Questions

27. Sosyal medya aracılığı ile enerji tüketimini azaltmak adına bilgi paylaşımı yapılacak olsa aşağıdaki sosyal medya uygulamalarından hangisini en çok tercih edersiniz? *

Yalnızca bir şıkı işaretleyin.

- ☐ Twitter
☐ Instagram
☐ LinkedIn
☐ Facebook
☐ Pinterest
☐ Web sayfası
☐ Snapchat
☐ Reddit
☐ Telegram
☐ Whatsapp
☐ Medium
☐ Youtube
☐ Tumblr
☐ Periscope
☐ Zoom
☐ Skype

Figure A.1 (continue) : Online Survey Questions

APPENDIX B

Zaman damgası	İla bulunma nedeni	Cinsiyetiniz?	Kendinizi enerji tüketiminden kaynaklı çevre sorunlarına karşı ne kadar bilgi sahibi duyuyorsunuz?	Kendinizi enerji tüketiminden kaynaklı çevre sorunlarına karşı ne kadar duyarlı tanımlarsınız?	Enerji tüketimi konusunda bilginizi- farkındalığınızı arttırmış, sizin enerji tüketimi davranışlarınızı ne ölçüde etkileyeceğine inanıyorsunuz?	Enerji tüketiminin çevre üzerindeki yararlı sonuçları hayatımızda karıştırdığınız diğer sorunlar arasında kaçınıcı sırada tanımlarsınız?	Lütfen aşağıda verilen, size göre global çevre sorunlarına neden olan başlıca 3 nedeni işaretleyiniz.	Son yıllardaki teknoloji ve yapay zeka sektöründeki gelişmeler dikkatinizi çektiğinde, enerji tüketiminin çevreye ne kadar zarar verdiğini düşünüyorsunuz?	Binalardaki enerji tüketimi, sizce dünya üzerindeki diğer enerji tüketiminin yüzde kaçını oluşturuyor?	Sizce, eğitim binalarındaki kullanıcıların davranışlarını olumlu yönde değiştirmek yüzde kaçını etkiler?	Sizce, eğitim binalarındaki kullanıcıların davranışlarını olumlu yönde değiştirmek yüzde kaçını etkiler?	Enerji tüketimi ile ilgili davranışlarımızın en çok hangi alanda etkili olduğunu düşünüyorsunuz?	Özellik hayatındaki enerji tüketimi davranışlarımızı diğer yaş grupları ile karşılaştırıldığında ne düşünüyorsunuz?	Sizi daha az enerji tüketimi için en çok motive edenler 3 faktörü işaretleyiniz.	Binalardaki enerji tüketimini azaltma konusunda, teknolojinin (enerji tasarruflu sistemler, akıllı kullanan vb.) yüzde kaçını olumlu etkilediğini düşünüyorsunuz?	Sizce bir binanın kullanım alanındaki enerji tüketiminin (ısıtma, yapay ışık, klima vb.) yüzde kaçını olumlu etkilediğini düşünüyorsunuz?	Enerji tüketimi davranışlarımızın sosyal çevremiz (aile, arkadaşlar, öğretmenler, çocuklar vb.) sizin enerji tüketimi davranışlarımız üzerinde ne kadar etkili olduğunu düşünüyorsunuz?	Sosyal çevremizin (aile, arkadaşlar, öğretmenler, çocuklar vb.) sizin enerji tüketimi davranışlarımız üzerinde ne kadar etkili olduğunu düşünüyorsunuz?	Aşağıdaki enerji tüketimi azaltma konusunda size engel olan diğerleri işaretleyiniz.	Aşağıdaki enerji tüketimi azaltma konusunda size engel olan diğerleri işaretleyiniz.	Kendinizi evdeki enerji tüketiminden ne derece sorumlu hissediyorsunuz?	Kendinizi okuldaki enerji tüketiminden ne derece sorumlu hissediyorsunuz?	Enerji tüketimi farkındalığı yaratılabilir mi?	Sizinki posterler ya da broşürler	Aşağıdaki davranışlardan hangisini en çok tercih edersiniz?	Sosyal medya aracılığı ile enerji tüketimini azaltmak adına bilgi paylaşım yapabileceğiniz sosyal medya uygulamalarında n hangisini en çok tercih edersiniz?
4.26.2020 12:46:32	Üniversite (Lisans) kadın		8	8	9	6	Su tüketimi, Teknolojik Gelişmeler, Düz Önceki yıllara göre %30 - %40	%20 - %30	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin maddi açıdan yarı %40 - %50	%80	6	8	Tek başına enerji c Gereksiz sıklıkla	8	5	6	Enerji tüketiminin Enerji tüketimini	Instagram						
4.26.2020 12:52:55	Lise öğrencisiyim Erkek		8	8	10	6	İnsan Davranışları, Nüfus Artışı, Teknolojik Gelişmeler Önceki yıllara göre %30 - %40	%50 - %60	Planlanan enerji tti Okul	Ev	Lise çağındaki ve Mobil bir uygulamaya ile oynatıldığında %60 - %70	%40	10	7	Tek başına enerji c Bilgisayar standı	10	10	6	Enerji tüketiminin Enerji tüketimini	Instagram						
4.29.2020 11:52:51	Eğitim binaı per kadın		9	9	9	7	İnsan Davranışları, Teknolojik Gelişmeler Önceki yıllara göre %50 - %60	%40 - %50	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin global ölçekte ne %40 - %50	%60	5	8	Aşırı tüketim, yarı Gereksiz sıklıkla	10	10	8	Beklenen modun Enerji tüketimini	Instagram						
4.29.2020 11:57:40	Lise öğrencisiyim kadın		5	5	10	6	Su tüketimi, İnsan Davranışları, Nüfus A Önceki yıllara göre %60 - %70	%30 - %40	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %30 - %40	%20	4	5	Çaba gerektirmesi Gereksiz sıklıkla	5	4	10	Küresel ısınmanın Enerji tüketimini	Web sayfası						
4.29.2020 12:04:20	Lise öğrencisiyim Erkek		6	6	8	6	Su tüketimi, Çevresel Komutardaki Bilgi Önceki yıllara göre %20 - %30	%30 - %40	Planlanan enerji tti Ev	Okul	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %40 - %50	%40	4	5	Tek başına enerji c Gereksiz sıklıkla	4	5	6	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 12:06:19	Üniversite (Lisans) Erkek		7	6	8	6	Enerji Tüketimi, Su tüketimi, Çevre Poli Önceki yıllara göre %50 - %60	%40 - %50	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %30 - %40	%70	7	7	Enerji tüketiminin Gereksiz sıklıkla	7	6	7	Küresel ısınmanın Enerji tüketimini	Twitter						
4.29.2020 12:07:20	Üniversite (Lisans) Erkek		5	6	8	5	Su tüketimi, İnsan Davranışları, Nüfus A Önceki yıllara göre %30 - %40	%10 - %20	Planlanan enerji tti Okul	Okul	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %60 - %70	%80	8	6	İçinde bulunulan Gereksiz sıklıkla	7	7	7	Küresel ısınmanın Enerji tüketimini	Twitter						
4.29.2020 12:13:09	Eğitim binaı per kadın		9	10	10	3	Su tüketimi, Nüfus Artışı, Çevre Politika Önceki yıllara göre %50 - %60	%60 - %70	Planlanan enerji tti Kamusal alanlar	(Kamusal alanlar	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %40 - %50	%70	7	3	Aşırı tüketim, yarı Gereksiz sıklıkla	10	10	9	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 12:17:39	Öğretmenim / Ak kadın		10	10	10	7	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %30 - %40	%40 - %50	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin global ölçekte ne %50 - %60	%50	8	8	Aşırı tüketim, yarı Gereksiz sıklıkla	8	8	6	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 12:23:12	Lise öğrencisiyim kadın		8	8	10	1	Enerji Tüketimi, Çevresel Komutardaki B Önceki yıllara göre %40 - %50	%70 - %80	Planlanan enerji tti Ev	Ulaşım	Lise çağındaki ve Enerji tüketiminin maddi açıdan yarı %70 - %80	%60	4	9	Enerji tüketimi c Gereksiz sıklıkla	6	3	6	Küresel ısınmanın Bilgilendirici pos	Twitter						
4.29.2020 12:37:04	Öğretmenim / Ak Erkek		8	3	8	4	İnsan Davranışları, Nüfus Artışı, Çevresel Önceki yıllara göre %20 - %30	%30 - %40	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %20 - %30	%70	4	4	Aşırı tüketim, yarı Perdeleri kapatma	10	2	5	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 12:46:19	Öğretmenim / Ak Erkek		9	9	3	3	Enerji Tüketimi, İnsan Davranışları, Çev Önceki yıllara göre %0 - %10	%10 - %20	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %30 - %40	%80	5	5	Tek başına enerji c Gereksiz sıklıkla	10	10	9	Beklenen modun Enerji tüketimini	Facebook						
4.29.2020 12:48:01	Lise öğrencisiyim Kadın		7	8	9	1	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %60 - %70	%60 - %70	Planlanan enerji tti Okul	Ulaşım	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %70 - %80	%60	8	8	Davranışlarını yarı Gereksiz sıklıkla	8	10	10	Küresel ısınmanın Enerji tüketimini	Youtube						
4.29.2020 12:52:16	Öğretmenim / Ak kadın		7	7	10	8	Su tüketimi, Çevre Politikaları, Sanayile Önceki yıllara göre %20 - %30	%10 - %20	Planlanan enerji tti Okul	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %50 - %60	%50	2	8	Aşırı tüketim, yarı Gereksiz sıklıkla	10	2	9	Enerji tüketiminin Enerji tüketimini	Twitter						
4.29.2020 12:55:30	Üniversite (Lisans) Erkek		8	8	10	1	Enerji Tüketimi, İnsan Davranışları, Çev Aynı durumda oldu %70 - %80	%80 - %90	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin maddi açıdan yarı %60 - %70	%80	8	8	Aşırı tüketim, yarı Gereksiz sıklıkla	10	10	10	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 12:56:25	Lise öğrencisiyim Kadın		9	7	5	3	İnsan Davranışları, Nüfus Artışı, Sanayile Önceki yıllara göre %10 - %20	%40 - %50	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %80 - %90	%20	10	8	Tek başına enerji c Gereksiz sıklıkla	8	3	3	Küresel ısınmanın Bilgilendirici pos	Instagram						
4.29.2020 12:56:26	Üniversite (Lisans) Kadın		9	10	10	2	Nüfus Artışı, Çevre Politikaları, Düzensiz Önceki yıllara göre %60 - %70	%80 - %90	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %20 - %30	%80	10	10	Arkadaşlarında b Gereksiz sıklıkla	10	10	10	Beklenen modun Enerji tüketimini	Instagram						
4.29.2020 13:07:23	Öğretmenim / Ak Kadın		5	3	3	4	Su tüketimi, İnsan Davranışları, Sanayile Önceki yıllara göre %50 - %60	%30 - %40	Fikrim yok.	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %40 - %50	%20	9	5	İçinde bulunulan Gereksiz sıklıkla	5	5	5	Küresel ısınmanın Enerji tüketimini	Youtube						
4.29.2020 13:07:33	Üniversite (Lisans) Kadın		7	7	9	5	Enerji Tüketimi, İspat Sektörü, Sanayile Önceki yıllara göre %30 - %40	%30 - %40	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin maddi açıdan yarı %70 - %80	%40	6	7	Enerji tüketimi c Gereksiz sıklıkla	7	3	8	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 13:16:51	Öğretmenim / Ak Kadın		9	7	8	3	Enerji Tüketimi, Çevresel Komutardaki B Önceki yıllara göre %70 - %80	%60 - %70	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %50 - %60	%60	8	8	Enerji tüketimi k Gereksiz sıklıkla	5	6	9	Küresel ısınmanın Enerji tüketimini	Whatsapp						
4.29.2020 13:31:08	Üniversite (Lisans) Erkek		7	8	7	8	Enerji Tüketimi, İnsan Davranışları, Nüf Önceki yıllara göre %30 - %40	%0 - %10	Planlanan enerji tti Ulaşım	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %70 - %80	%50	7	6	Enerji tüketiminin Gereksiz sıklıkla	5	5	5	Küresel ısınmanın Enerji tüketimini	Youtube						
4.29.2020 13:33:49	Lise öğrencisiyim Erkek		3	5	7	6	Enerji Tüketimi, İnsan Davranışları, Düz Önceki yıllara göre %60 - %70	%40 - %50	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %30 - %40	%60	4	4	Aşırı tüketim, yarı Gereksiz sıklıkla	4	1	3	Küresel ısınmanın Enerji tüketimini	Youtube						
4.29.2020 14:16:47	Üniversite (Lisans) Kadın		7	5	9	6	İnsan Davranışları, Çevresel Komutardaki Önceki yıllara göre %30 - %40	%10 - %20	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin maddi açıdan yarı %20 - %30	%50	4	7	Enerji tüketimi c Gereksiz sıklıkla	9	5	7	Binalarda kullanı Enerji tüketimini	Instagram						
4.29.2020 14:17:06	Lise öğrencisiyim Kadın		7	5	10	6	Su tüketimi, Teknolojik Gelişmeler, Çev Önceki yıllara göre %60 - %70	%30 - %40	Fikrim yok.	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %60 - %70	%40	5	6	Enerji tüketimi c Gereksiz sıklıkla	9	7	4	Enerji tüketiminin Enerji tüketimini	Instagram						
4.29.2020 14:29:17	Üniversite (Lisans) Kadın		5	8	8	4	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %30 - %40	%20 - %30	Planlanan enerji tti Okul	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %20 - %30	%60	9	9	Enerji tüketimi c Gereksiz sıklıkla	9	4	10	Beklenen modun Enerji tüketimini	Instagram						
4.29.2020 14:32:16	Üniversite (Lisans) Kadın		8	8	10	2	İnsan Davranışları, Nüfus Artışı, Düzensiz Önceki yıllara göre %40 - %50	%20 - %30	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketim miktarlarımızın karşıla %30 - %40	%50	6	8	Enerji tüketimi k Gereksiz sıklıkla	10	7	6	Enerji tüketiminin Enerji tüketimini	Twitter						
4.29.2020 14:35:34	Lise öğrencisiyim Erkek		8	7	10	3	Nüfus Artışı, İspat Sektörü, Sanayile Önceki yıllara göre %70 - %80	%50 - %60	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %60 - %70	%50	8	9	Enerji tüketimi k Aylık elektrik, do	5	2	10	Küresel ısınmanın Enerji tüketimini	Whatsapp						
4.29.2020 14:37:28	Üniversite (Lisans) Erkek		7	7	8	3	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %20 - %30	%0 - %10	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %40 - %50	%10	3	1	Arkadaşlarında b Gereksiz sıklıkla	1	0	1	Enerji tüketiminin Enerji tüketimini	Twitter						
4.29.2020 14:44:09	Üniversite (Lisans) Erkek		8	9	9	8	Enerji Tüketimi, Nüfus Artışı, Çevre Poli Önceki yıllara göre %30 - %40	%40 - %50	Planlanan enerji tti Ev	Kamusal alanlar	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %50 - %60	%70	7	3	Aşırı tüketim, yarı Gereksiz sıklıkla	4	3	6	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 14:44:53	Öğretmenim / Ak Erkek		6	7	6	5	Enerji Tüketimi, Su tüketimi, Nüfus Artı Önceki yıllara göre %20 - %30	%30 - %40	Planlanan enerji tti Okul	Okul	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %30 - %40	%20	1	2	Enerji tüketimi c Gereksiz sıklıkla	5	4	5	Beklenen modun Enerji tüketimini	Facebook						
4.29.2020 14:50:10	Üniversite (Lisans) Erkek		3	5	7	4	Su tüketimi, Nüfus Artışı, Sanayile Önceki yıllara göre %10 - %20	%50 - %60	Fikrim yok.	Ulaşım	Lise çağındaki ve Sosyal çevremizin (ailem, arkadaşlarım %20 - %30	%50	4	3	Enerji tüketimi k Gereksiz sıklıkla	4	1	5	Binaların dışınd Enerji tüketimini	Twitter						
4.29.2020 15:04:49	Üniversite (Lisans) Erkek		5	5	9	4	İnsan Davranışları, Düzensiz şehirleşme, Önceki yıllara göre %80 - %90	%20 - %30	Fikrim yok.	Ev	Lise çağındaki ve Enerji tüketiminin global ölçekte ne %20 - %30	%20	6	6	Çaba gerektirmesi Gereksiz sıklıkla	9	6	5	Küresel ısınmanın Enerji tüketimini	Twitter						
4.29.2020 15:07:38	Öğretmenim / Ak Kadın		8	9	10	7	Enerji Tüketimi, İnsan Davranışları, San Önceki yıllara göre %30 - %40	%20 - %30	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Sosyal çevremizin (ailem, arkadaşlarım %20 - %30	%60	6	8	Enerji tüketimi k Gereksiz sıklıkla	10	5	10	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 15:13:04	Lise öğrencisiyim Belirtmek istemiy		8	9	10	3	İnsan Davranışları, Çevresel Komutardaki Önceki yıllara göre %20 - %30	%10 - %20	Fikrim yok.	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %20 - %30	%40	8	6	Enerji tüketimi k Gereksiz sıklıkla	10	8	10	Binaların dışınd Enerji tüketimini	Instagram						
4.29.2020 15:18:24	Öğretmenim / Ak Kadın		7	7	7	8	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %30 - %40	%10 - %20	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin çevreye zarar ver %20 - %30	%70	5	4	Davranışlarını yarı Gereksiz sıklıkla	7	3	8	Beklenen modun Enerji tüketimini	LinkedIn						
4.29.2020 15:46:48	Öğretmenim / Ak Kadın		5	5	10	1	Enerji Tüketimi, Su tüketimi, Nüfus Artı Önceki yıllara göre %0 - %10	%20 - %30	Planlanan enerji tti Ev	Ev	Lise çağındaki ve Enerji tüketiminin maddi açıdan yarı %30 - %40	%70	5	7	Aşırı tüketim, yarı Gereksiz sıklıkla	10	10	10	Küresel ısınmanın Enerji tüketimini	Instagram						
4.29.2020 15:50:53	Lise öğrencisiyim Kadın		3	5	5	5	İnsan Davranışları, Nüfus Artışı, Teknolo Önceki yıllara göre %60 - %70	%80 - %90																		

Figure B.1 : Online Survey Answers

4.29.2020 19:52:43 Eğitim binası perı Kadın	5	8	10	9	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %50 - %60	%10 - %20	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %60 - %70	%80	3	7	Enerji tüketimi k: Gereksiz ısıklar ı	4	2	3	Küresel ısınmanı Bılgılandırıcı pos Pinterest
4.29.2020 21:15:43 Üniversite (Lisans Kadın	9	9	10	3	Enerji Tüketimi, Nüfus Artışı, Çevresel İ Önceki yıllara göre %60 - %70	%50 - %60	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin global ölçekte neki %30 - %40	%30	7	7	Aşıkanklıklar, yaş Gereksiz ısıklar ı	10	8	9	Küresel ısınmanı Enerji tüketimini Instagram
4.29.2020 21:37:35 Üniversite (Lisans Kadın	7	8	10	6	İnsan Davranışları, Nüfus Artışı, Düzensi Önceki yıllara göre %10 - %20	%40 - %50	Fikirim yok.	Yurt	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%50	4	6	Aşıkanklıklar, yaş Gereksiz ısıklar ı	8	5	7	Küresel ısınmanı Enerji tüketimini Instagram
4.29.2020 21:39:47 Lise öğrencisiyim Kadın	5	6	10	5	Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre %10 - %20	%30 - %40	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%50	4	5	Aşıkanklıklar, yaş Gereksiz ısıklar ı	6	1	6	Küresel ısınmanı Enerji tüketimini Whatsapp
4.29.2020 21:39:54 Üniversite (Lisans Kadın	6	8	10	6	İnsan Davranışları, Nüfus Artışı, Çevrese Önceki yıllara göre %10 - %20	%30 - %40	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin global ölçekte neki %40 - %50	%40	8	8	Aşıkanklıklar, yaş Gereksiz ısıklar ı	7	6	6	Küresel ısınmanı Enerji tüketimini Instagram
4.29.2020 22:43:39 Lise öğrencisiyim Kadın	5	6	10	5	Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre %10 - %20	%30 - %40	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%50	4	5	Aşıkanklıklar, yaş Gereksiz ısıklar ı	6	1	6	Küresel ısınmanı Enerji tüketimini Whatsapp
4.30.2020 0:14:12 Öğretmenim / Ak Erkek	10	10	10	1	Su tüketimi, Çevresel Konulardaki Bilgi Önceki yıllara göre %30 - %40	%20 - %30	Planlanan enerji ti Ulaşım	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %20 - %30	%20	5	5	Tek başına neyi c Gereksiz ısıklar ı	10	10	10	Küresel ısınmanı Enerji tüketimini Whatsapp
4.30.2020 10:03:15 Öğretmenim / Ak Erkek	5	5	8	3	İnsan Davranışları, Nüfus Artışı, Çevre P Önceki yıllara göre %20 - %30	%10 - %20	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %50 - %60	%80	0	5	İçinde bulunulan Gereksiz ısıklar ı	10	1	5	Bekleme modund Enerji tüketimini Instagram
4.30.2020 11:33:24 Öğretmenim / Ak Kadın	8	6	7	6	İnsan Davranışları, İhsat Sektörü, Sanay Önceki yıllara göre %40 - %50	%20 - %30	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %40 - %50	%60	8	8	Tek başına neyi c Gereksiz ısıklar ı	4	4	8	Küresel ısınmanı Enerji tüketimini Twitter
4.30.2020 11:40:23 Üniversite (Lisans Kadın	8	5	8	7	Nüfus Artışı, İhsat Sektörü, Sanayilesm Önceki yıllara göre %50 - %60	%30 - %40	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %0 - %10	%60	4	7	Tek başına neyi c Gereksiz ısıklar ı	9	5	3	Küresel ısınmanı Enerji tüketimini Instagram
4.30.2020 11:47:11 Öğretmenim / Ak Erkek	3	5	8	4	İnsan Davranışları, Nüfus Artışı, Teknolo Önceki yıllara göre %70 - %80	%60 - %70	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %80 - %90	%80	5	5	Enerji tüketimi sc Gereksiz ısıklar ı	8	4	8	Küresel ısınmanı Enerji tüketimini Twitter
4.30.2020 11:49:49 Üniversite (Lisans Kadın	8	8	5	7	Su tüketimi, Nüfus Artışı, Çevre Politika Aynı durumda oldu %70 - %80	%70 - %80	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%80	7	7	Caba gerektirmesi Gereksiz ısıklar ı	5	1	2	Bekleme modund Bılgılandırıcı pos Twitter
4.30.2020 12:06:26 Üniversite (Lisans Erkek	5	7	9	3	Enerji Tüketimi, Nüfus Artışı, Sanayileş Önceki yıllara göre %40 - %50	%20 - %30	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%40	4	6	Enerji tüketimi k: Gereksiz ısıklar ı	10	6	6	Binaların dünyada Bılgılandırıcı pos Youtube
4.30.2020 12:30:49 Üniversite (Lisans Kadın	6	7	8	6	Enerji Tüketimi, İnsan Davranışları, Çev Önceki yıllara göre %30 - %40	%0 - %10	Planlanan enerji ti Yurt	Ev	Lise çağındaki pe Enerji tüketiminin global ölçekte neki %40 - %50	%20	4	4	Enerji tüketimi k: Gereksiz ısıklar ı	4	2	5	Küresel ısınmanı Enerji tüketimini Instagram
4.30.2020 15:10:14 Öğretmenim / Ak Erkek	3	5	8	4	İnsan Davranışları, Nüfus Artışı, Teknolo Önceki yıllara göre %70 - %80	%60 - %70	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %80 - %90	%80	5	5	Enerji tüketimi sc Gereksiz ısıklar ı	8	4	8	Küresel ısınmanı Enerji tüketimini Twitter
4.30.2020 15:57:03 Üniversite (Lisans Erkek	0	3	10	8	Nüfus Artışı, Çevresel Konulardaki Bilgi Önceki yıllara göre %30 - %40	%30 - %40	Planlanan ile sadece Yurt	Yurt	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %60 - %70	%30	7	10	İçinde bulunulan Kısa süreli dışlar	2	1	6	Binaların dünyada Enerji tüketimini Instagram
4.30.2020 16:22:11 Lise öğrencisiyim Kadın	5	6	10	5	Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre %10 - %20	%30 - %40	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%50	4	5	Aşıkanklıklar, yaş Gereksiz ısıklar ı	6	1	6	Küresel ısınmanı Enerji tüketimini Whatsapp
4.30.2020 16:43:58 Öğretmenim / Ak Kadın	5	7	8	5	İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre %30 - %40	%40 - %50	Planlanan enerji ti Ev	Ulaşım	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %40 - %50	%60	6	6	Enerji tüketimi k: Gereksiz ısıklar ı	5	7	5	Küresel ısınmanı Bılgılandırıcı pos Twitter
4.30.2020 22:09:50 Üniversite (Lisans Kadın	7	8	10	6	İnsan Davranışları, Nüfus Artışı, Düzensi Önceki yıllara göre %10 - %20	%40 - %50	Fikirim yok.	Yurt	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%50	4	6	Aşıkanklıklar, yaş Gereksiz ısıklar ı	8	5	7	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 11:26:18 Üniversite (Lisans Kadın	7	7	7	8	Enerji Tüketimi, Nüfus Artışı, Çevre Pol Önceki yıllara göre %30 - %40	%60 - %70	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %90 - %100	%50	8	8	Enerji tüketimi sc Gereksiz ısıklar ı	9	8	6	Enerji tüketiminin Enerji tüketimini Instagram
5.1.2020 15:09:35 Öğretmenim / Ak Kadın	10	10	10	5	Enerji Tüketimi, İnsan Davranışları, Düz Önceki yıllara göre %50 - %60	%20 - %30	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %0 - %10	%80	9	9	İçinde bulunulan Gereksiz ısıklar ı	9	9	10	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 15:20:23 Öğretmenim / Ak Kadın	8	9	4	6	Enerji Tüketimi, Su tüketimi, Nüfus Artı Önceki yıllara göre %30 - %40	%20 - %30	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%40	5	4	Bu konuda bana c Gereksiz ısıklar ı	8	4	7	Küresel ısınmanı Enerji tüketimini Facebook
5.1.2020 15:34:26 Öğretmenim / İsan Davr Önceki yıllara göre %70 - %80	6	10	8	6	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %70 - %80	%30 - %40	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %40 - %50	%60	9	7	Aşıkanklıklar, yaş Gereksiz ısıklar ı	8	5	8	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 15:41:38 Lise öğrencisiyim Kadın	6	8	10	4	Su tüketimi, İnsan Davranışları, Düzensi Aynı durumda oldu %20 - %30	%30 - %40	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%50	6	5	Aşıkanklıklar, yaş Gereksiz ısıklar ı	5	5	8	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 15:41:39 Lise öğrencisiyim Erkek	5	7	7	4	İnsan Davranışları, Nüfus Artışı, Çevrese Önceki yıllara göre %60 - %70	%20 - %30	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %0 - %10	%40	7	6	Enerji tüketimi sc Gereksiz ısıklar ı	8	7	5	Enerji tüketiminin Enerji tüketimini Twitter
5.1.2020 15:44:12 Lise öğrencisiyim Kadın	8	10	9	8	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %50 - %60	%40 - %50	Planlanan ile sadece Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %70 - %80	%60	10	10	Arkadaşlarında b Gereksiz ısıklar ı	7	5	10	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 15:46:37 Lise öğrencisiyim Erkek	6	8	7	7	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %10 - %20	%10 - %20	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %50 - %60	%40	7	6	Enerji tüketiminin Perdeleri kapatma	10	0	1	Küresel ısınmanı Bılgılandırıcı pos Instagram
5.1.2020 15:47:29 Lise öğrencisiyim Kadın	6	8	2	4	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %50 - %60	%20 - %30	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %10 - %20	%40	1	0	Tek başına neyi c Gereksiz ısıklar ı	4	1	0	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 15:50:13 Lise öğrencisiyim Erkek	5	5	7	6	Enerji Tüketimi, Çevresel Konulardaki B Önceki yıllara göre %0 - %10	%40 - %50	Planlanan ile sadece Ev	Ulaşım	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %10 - %20	%60	6	6	Sanayileşmeden c Gereksiz ısıklar ı	4	2	6	Binaların dünyada Enerji tüketimini Twitter
5.1.2020 15:50:32 Öğretmenim / Ak Kadın	5	8	10	8	Enerji Tüketimi, Su tüketimi, Çevre Poli Önceki yıllara göre %50 - %60	%70 - %80	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %40 - %50	%60	7	7	Tek başına neyi c Gereksiz ısıklar ı	10	10	10	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 15:52:06 Lise öğrencisiyim Erkek	4	7	8	10	İnsan Davranışları, İhsat Sektörü, Sanay Önceki yıllara göre %50 - %60	%0 - %10	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%50	6	5	İçinde bulunulan Gereksiz ısıklar ı	5	7	7	Bekleme modund Enerji tüketimini Instagram
5.1.2020 15:57:02 Lise öğrencisiyim Erkek	6	4	5	7	Enerji Tüketimi, Su tüketimi, Sanayileş Önceki yıllara göre %50 - %60	%20 - %30	Planlanan enerji ti Okul	Okul	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %20 - %30	%40	6	8	Aşıkanklıklar, yaş Gereksiz ısıklar ı	3	5	5	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 15:57:43 Eğitim binası perı Kadın	6	10	10	2	Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre %60 - %70	%50 - %60	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %50 - %60	%50	6	9	Enerji tüketimine Gereksiz ısıklar ı	10	10	10	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 16:04:34 Lise öğrencisiyim Kadın	6	8	10	7	İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre %60 - %70	%90 - %100	Planlanan enerji ti Kamusal alanlar (Ulaşım		Lise çağındaki pe Enerji tüketiminin global ölçekte neki %60 - %70	%50	1	6	Aşıkanklıklar, yaş Gereksiz ısıklar ı	8	1	2	Bekleme modund Enerji tüketimini Twitter
5.1.2020 16:07:29 Lise öğrencisiyim Erkek	6	6	7	8	Enerji Tüketimi, Su tüketimi, İnsan Davr Aynı durumda oldu %40 - %50	%40 - %50	Planlanan enerji ti Yurt	Ev	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %50 - %60	%30	5	6	İçinde bulunulan Evden çıkarken lo	6	6	7	Binaların dünyada Bılgılandırıcı pos Telegram
5.1.2020 16:08:38 Lise öğrencisiyim Erkek	6	5	0	7	Su tüketimi, Nüfus Artışı, Çevresel Kon Önceki yıllara göre %50 - %60	%40 - %50	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %60 - %70	%50	0	4	Aşıkanklıklar, yaş Gereksiz ısıklar ı	5	0	4	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 16:17:19 Lise öğrencisiyim Kadın	4	5	3	6	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %90 - %100	%80 - %90	Fikirim yok.	Ulaşım	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %50 - %60	%60	8	8	İçinde bulunulan Gereksiz ısıklar ı	6	5	3	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 16:22:30 Lise öğrencisiyim Erkek	6	7	5	4	Su tüketimi, Nüfus Artışı, Sanayileşme Aynı durumda oldu %60 - %70	%30 - %40	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %70 - %80	%40	5	8	İçinde bulunulan Gereksiz ısıklar ı	7	3	6	Küresel ısınmanı Enerji tüketimini Youtube
5.1.2020 16:24:49 Öğretmenim / Ak Kadın	9	7	7	6	Nüfus Artışı, Çevre Politikaları, Sanayile Önceki yıllara göre %20 - %30	%10 - %20	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %20 - %30	%20	7	7	Enerji tüketimi k: Gereksiz ısıklar ı	8	8	7	Küresel ısınmanı Enerji tüketimini Facebook
5.1.2020 16:33:10 Öğretmenim / Ak Kadın	8	8	10	8	Enerji Tüketimi, Su tüketimi, Sanayileş Önceki yıllara göre %60 - %70	%30 - %40	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %10 - %20	%30	5	5	Aşıkanklıklar, yaş Gereksiz ısıklar ı	10	10	9	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 16:33:48 Üniversite (Lisans Kadın	5	6	10	5	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %20 - %30	%40 - %50	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%30	5	4	Aşıkanklıklar, yaş Gereksiz ısıklar ı	5	5	8	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 16:39:09 Lise öğrencisiyim Kadın	3	6	8	3	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %30 - %40	%40 - %50	Planlanan enerji ti Kamusal alanlar (Ev		Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %60 - %70	%40	3	5	Tek başına neyi c Gereksiz ısıklar ı	5	0	6	İnsanların evleri c Enerji tüketimini Instagram
5.1.2020 16:40:45 Üniversite (Lisans Kadın	5	4	6	7	Enerji Tüketimi, Nüfus Artışı, Düzensi Önceki yıllara göre %50 - %60	%40 - %50	Fikirim yok.	Okul	Lise çağındaki pe Enerji tüketim miktarlarımızı karşıtı %40 - %50	%50	5	5	Aşıkanklıklar, yaş Televizyonu stanc	5	5	5	Bekleme modund Enerji tüketimini Zoom
5.1.2020 16:42:14 Üniversite (Lisans Kadın	1	1	2	2	Su tüketimi, İnsan Davranışları, Düzensi Önceki yıllara göre %40 - %50	%30 - %40	Planlanan enerji ti Ev	Yurt	Lise çağındaki pe Enerji tüketiminin global ölçekte neki %40 - %50	%50	1	2	Enerji tüketimi k: Televizyonu stanc	2	2	3	Bekleme modund Enerji tüketimini Whatsapp
5.1.2020 16:42:41 Lise öğrencisiyim Erkek	10	9	2	8	Enerji Tüketimi, Su tüketimi, Nüfus Artı Önceki yıllara göre %20 - %30	%10 - %20	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %70 - %80	%80	1	0	Tek başına neyi c Gereksiz ısıklar ı	8	0	0	Zamanımızda %25 Bılgılandırıcı pos Reddit
5.1.2020 16:43:06 Öğretmenim / Ak Kadın	8	9	9	1	Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre %30 - %40	%80 - %90	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %90 - %100	%90	6	10	Arkadaşlarında b Gereksiz ısıklar ı	5	5	7	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 16:44:55 Öğretmenim / Ak Kadın	4	4	10	4	Nüfus Artışı, Çevresel Konulardaki Bilgi Önceki yıllara göre %80 - %90	%30 - %40	Planlanan enerji ti Okul	Okul	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %80 - %90	%50	6	6	Aşıkanklıklar, yaş Gereksiz ısıklar ı	10	6	10	Bekleme modund Enerji tüketimini Instagram
5.1.2020 16:46:15 Üniversite (Lisans Kadın	8	8	9	7	Nüfus Artışı, Çevresel Konulardaki Bilgi Önceki yıllara göre %60 - %70	%20 - %30	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin maddi açıdan yarar %20 - %30	%50	7	0	Tek başına neyi c Gereksiz ısıklar ı	4	1	8	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 16:53:42 Lise öğrencisiyim Kadın	5	6	8	8	Enerji Tüketimi, Su tüketimi, Doğal Afet Önceki yıllara göre %30 - %40	%40 - %50	Fikirim yok.	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %40 - %50	%50	5	6	Enerji tüketimini Gereksiz ısıklar ı	9	4	5	Enerji tüketiminin Enerji tüketimini Instagram
5.1.2020 16:58:38 Üniversite (Lisans Erkek	8	8	10	8	İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre %30 - %40	%0 - %10	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Sosyal çevremi (ailem, arkadaşlarım %10 - %20	%60	7	8	Arkadaşlarında b Gereksiz ısıklar ı	8	6	9	İnsanların evleri c Enerji tüketimini Facebook
5.1.2020 16:58:49 Üniversite (Lisans Erkek	5	5	10	10	Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre %30 - %40	%10 - %20	Planlanan enerji ti Ev	Ev	Lise çağındaki pe Sosyal çevremi (ailem, arkadaşlarım %20 - %30	%30	3	3	Aşıkanklıklar, yaş Gereksiz ısıklar ı	10	8	7	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 17:00:54 Öğretmenim / Ak Kadın	8	8	9	3	İnsan Davranışları, Nüfus Artışı, Düzensi Önceki yıllara göre %60 - %70	%70 - %80	Planlanan enerji ti Okul	Okul	Lise çağındaki pe Sosyal çevremi (ailem, arkadaşlarım %80 - %90	%60	7	8	Aşıkanklıklar, yaş Gereksiz ısıklar ı	8	4	8	Küresel ısınmanı Enerji tüketimini Instagram
5.1.2020 17:03:41 Üniversite (Lisans Kadın	4	3	8	6	Enerji Tüketimi, Nüfus Artışı, Düzensi Önceki yıllara göre %10 - %20	%10 - %20	Planlanan ile sadece Ev	Ev	Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %0 - %10	%40	8	6	Caba gerektirmesi Gereksiz ısıklar ı	9	10	9	Küresel ısınmanı Enerji tüketimini Twitter
5.1.2020 17:05:29 Üniversite (Lisans Kadın	5	8	9	2	Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre %10 - %20	%10 - %20	Planlanan enerji ti Ticari binalar (av Ev		Lise çağındaki pe Enerji tüketiminin çevreye zarar verdi %30 - %40	%20	4	4	Aşıkanklıklar, yaş Bılgısayarı standı	6	5	7	Enerji tüketiminin Enerji tüketimini Instagram

Figure B.1 (continue) : Online Survey Answers

5.1.2020 17:06:30 Lise Öğrencisiyim Kadın	9	9	9	8 Su tüketimi, İnsan Davranışları, Çevresel Önceki yıllara göre : %80 - %60	%70 - %80	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %80 - %60	%100	9	9 Enerji tüketimi se Gereksiz ıskalan ı	9	9	8 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 17:07:02 Lise Öğrencisiyim Kadın	4	5	10	6 Enerji Tüketimi, Su tüketimi, Düzensiz y Önceki yıllara göre : %40 - %50	%60 - %70	Fikrim yok.	Okul	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %50 - %60	%70	6	5 Akıllı cihazlar, yas Gereksiz ıskalan ı	5	3	8 Küresel ısınmanın Enerji tüketimini Twitter
5.1.2020 17:07:11 Üniversite (Lisans Kadın)	9	7	8	7 İnsan Davranışları, Nüfus Artışı, Çevresel Önceki yıllara göre : %60 - %70	%50 - %60	Planlanan enerji tili Ev		Okul	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %70 - %80	%50	4	4 Akıllı cihazlar, yas Gereksiz ıskalan ı	10	9	8 Türkiye'deki lise i Enerji tüketimini Instagram
5.1.2020 17:07:12 Lise Öğrencisiyim Erkek	9	7	3	1 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre : %60 - %70	%70 - %80	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %40 - %10	%60	0	6 Akıllı cihazlar, yas Yok	9	0	0 Küresel ısınmanın Bilgi teknolojileri post Instagram
5.1.2020 17:10:10 Öğretmenim / Ak Kadın	5	6	8	4 Nüfus Artışı, İlaşt Sektörü, Sanayileşen Önceki yıllara göre : %30 - %40	%20 - %30	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %30 - %40	%30	6	6 Enerji tüketimi ki Gereksiz ıskalan ı	9	9	6 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 17:10:37 Üniversite (Lisans Erkek)	5	5	6	4 Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre : %60 - %70	%20 - %30	Fikrim yok.	Ticari binalar (av) Ev		Lise çağındaki je Enerji tüketiminin maddi açıdan yara %30 - %40	%40	5	5 Çaba gerektirmesi Gereksiz ıskalan ı	2	1	7 Enerji tüketiminin Enerji tüketimini Whatsapp
5.1.2020 17:11:12 Öğretmenim / Ak Erkek	9	10	10	10 Enerji Tüketimi, Su tüketimi, Doğal Afet Önceki yıllara göre : %50 - %60	%50 - %60	Planlanan ile gerçe Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %70 - %80	%60	8	8 Enerji tüketimini Televizyonu stanc	7	8	7 Bekleme modund Enerji tüketimini Twitter
5.1.2020 17:12:10 Öğretmenim / Ak Kadın	10	10	10	1 Su tüketimi, Çevresel Konulardaki Bilgi Önceki yıllara göre : %80 - %60	%50 - %60	Planlanan enerji tili Okul		Okul	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %50 - %60	%60	10	10 Davranışların yol Gereksiz ıskalan ı	10	10	10 Bekleme modund Enerji tüketimini Instagram
5.1.2020 17:15:19 Öğretmenim / Ak Erkek	9	9	9	3 İnsan Davranışları, İlaşt Sektörü, Düzey Önceki yıllara göre : %40 - %50	%40 - %50	Planlanan ile gerçe Okul		Okul	Lise çağındaki je Enerji tüketiminin global ölçekte neli %40 - %50	%50	9	9 İçinde bulunulan Gereksiz ıskalan ı	9	9	9 Enerji tüketiminin Enerji tüketimini Instagram
5.1.2020 17:15:43 Üniversite (Lisans Kadın)	8	10	8	8 Su tüketimi, İnsan Davranışları, Nüfus A Önceki yıllara göre : %10 - %20	%20 - %30	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %50	%40	5	4 Enerji tüketimi se Gereksiz ıskalan ı	8	8	10 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 17:18:57 Üniversite (Lisans Kadın)	8	6	10	6 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre : %40 - %50	%40 - %50	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %60 - %70	%50	4	7 İçinde bulunulan Gereksiz ıskalan ı	10	8	8 Enerji tüketiminin Enerji tüketimini Instagram
5.1.2020 17:19:17 Lise Öğrencisiyim Erkek	2	6	9	5 Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre : %60 - %70	%60 - %70	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %50	%20	4	4 İçinde bulunulan Gereksiz ıskalan ı	8	7	7 Küresel ısınmanın Enerji tüketimini Twitter
5.1.2020 17:24:23 Üniversite (Lisans Kadın)	5	7	10	4 İnsan Davranışları, Nüfus Artışı, Çevresel Önceki yıllara göre : %20 - %30	%20 - %30	Fikrim yok.	Okul	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %20 - %30	%60	7	3 Enerji tüketimi ki Gereksiz ıskalan ı	5	5	9 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 17:30:16 Öğretmenim / Ak Kadın	7	7	5	5 Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre : %10 - %20	%20 - %30	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %30 - %40	%80	6	6 Tek başına neyi i Gereksiz ıskalan ı	10	7	10 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 17:30:45 Üniversite (Lisans Kadın)	5	7	10	6 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre : %10 - %20	%40 - %50	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin mükemmelleşen karıştı %30 - %40	%30	3	8 Akıllı cihazlar, yas Gereksiz ıskalan ı	5	5	9 Küresel ısınmanın Enerji tüketimini Twitter
5.1.2020 17:33:16 Öğretmenim / Ak Kadın	7	9	9	8 Su tüketimi, Çevre Politikaları, Doğal Afet Önceki yıllara göre : %30 - %40	%40 - %50	Planlanan enerji tili Ticari binalar (av) Okul		Okul	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %50 - %60	%30	8	9 Akıllı cihazlar, yas Gereksiz ıskalan ı	7	7	6 Enerji tüketiminin Enerji tüketimini Twitter
5.1.2020 17:49:02 Lise Öğrencisiyim Erkek	5	4	9	8 Su tüketimi, İnsan Davranışları, Düzensiz Önceki yıllara göre : %70 - %80	%30 - %40	Planlanan enerji tili Ev		Ev	Lise çağındaki je Sosyal çevrem (ailem, arkadaşlarım) %40 - %50	%50	4	7 Enerji tüketimi ki Gereksiz ıskalan ı	6	2	5 Küresel ısınmanın Enerji tüketimini Facebook
5.1.2020 18:00:10 Lise Öğrencisiyim Erkek	6	6	10	8 Nüfus Artışı, Çevre Politikaları, Düzensiz Önceki yıllara göre : %60 - %70	%30 - %40	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %10 - %20	%100	7	5 Enerji tüketimi ki Gereksiz ıskalan ı	8	1	6 Enerji tüketiminin Bilgi teknolojileri post Twitter
5.1.2020 18:01:47 Lise Öğrencisiyim Kadın	3	6	5	9 İnsan Davranışları, Nüfus Artışı, Sanayileşen Önceki yıllara göre : %50 - %60	%40 - %50	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %20 - %30	%60	3	6 Enerji tüketimi ki Gereksiz ıskalan ı	7	4	4 Enerji tüketiminin Bilgi teknolojileri post Youtube
5.1.2020 18:07:32 Lise Öğrencisiyim Kadın	5	5	5	6 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre : %10 - %20	%50 - %60	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %50 - %60	%30	3	6 Enerji tüketimi ki Gereksiz ıskalan ı	5	7	6 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 18:10:24 Öğretmenim / Ak Erkek	4	8	6	3 Nüfus Artışı, Düzensiz şehirleşme, Sana Önceki yıllara göre : %60 - %70	%40 - %50	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %80 - %90	%60	8	3 Akıllı cihazlar, yas Gereksiz ıskalan ı	8	9	4 Küresel ısınmanın Bilgi teknolojileri post Instagram
5.1.2020 18:11:09 Öğretmenim / Ak Kadın	9	9	10	10 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre : %60 - %70	%60 - %70	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin global ölçekte neli %30 - %40	%50	9	10 Tek başına neyi i Gereksiz ıskalan ı	10	4	8 Küresel ısınmanın Enerji tüketimini Youtube
5.1.2020 18:12:32 Öğretmenim / Ak Kadın	9	8	7	6 Su tüketimi, Nüfus Artışı, Düzensiz şehi Önceki yıllara göre : %20 - %30	%10 - %20	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %10 - %20	%10	7	7 Enerji tüketimi se Gereksiz ıskalan ı	8	7	8 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 18:13:27 Öğretmenim / Ak Kadın	6	7	8	5 Su tüketimi, Nüfus Artışı, Çevresel Kon Önceki yıllara göre : %30 - %40	%10 - %20	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %30 - %40	%20	5	7 Enerji tüketimi se Gereksiz ıskalan ı	5	4	7 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 18:27:52 Üniversite (Lisans Kadın)	10	10	10	8 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre : %70 - %80	%30 - %40	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %50	%50	9	9 Davranışların yol Gereksiz ıskalan ı	10	10	8 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 18:29:09 Üniversite (Lisans Kadın)	7	7	9	6 Su tüketimi, Çevresel Konulardaki Bilgi Önceki yıllara göre : %50 - %60	%20 - %30	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin global ölçekte neli %60 - %70	%50	3	4 Tek başına neyi i Gereksiz ıskalan ı	10	5	7 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 18:29:41 Üniversite (Lisans Kadın)	9	9	10	9 Düzensiz şehirleşme Önceki yıllara göre : %70 - %80	%80 - %90	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %50 - %60	%90	7	5 Enerji tüketimi ki Gereksiz ıskalan ı	10	10	9 Küresel ısınmanın Enerji tüketimini Twitter
5.1.2020 18:30:49 Öğretmenim / Ak Erkek	8	8	9	3 Su tüketimi, Düzensiz şehirleşme, Sanayileşen Önceki yıllara göre : %20 - %30	%60 - %70	Fikrim yok.	Okul	Okul	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %60 - %70	%30	8	8 Enerji tüketimi ki Gereksiz ıskalan ı	8	8	6 1 lise çağındaki je Enerji tüketimini LinkedIn
5.1.2020 18:31:58 Üniversite (Lisans Kadın)	5	4	10	10 Enerji Tüketimi, Nüfus Artışı, Teknolojili Ayrı durumdaki Önceki yıllara göre : %10 - %20	%10 - %20	Planlanan enerji tili Okul		Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %10	%10	3	6 Enerji tüketimi se Bilgisayar standı	4	4	5 Enerji tüketiminin Enerji tüketimini Instagram
5.1.2020 18:37:07 Lise Öğrencisiyim Kadın	6	8	10	6 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre : %50 - %60	%30 - %40	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %50	%60	5	9 Çaba gerektirmesi Gereksiz ıskalan ı	10	8	8 Enerji tüketiminin Bilgi teknolojileri post Instagram
5.1.2020 18:44:19 Üniversite (Lisans Kadın)	7	6	6	1 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre : %60 - %70	%40 - %50	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %50	%60	7	3 İçinde bulunulan Gereksiz ıskalan ı	5	5	8 Küresel ısınmanın Enerji tüketimini Twitter
5.1.2020 18:45:55 Öğretmenim / Ak Kadın	7	10	10	8 İnsan Davranışları, Nüfus Artışı, Çevre P Önceki yıllara göre : %20 - %30	%30 - %40	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %20 - %30	%50	7	7 İçinde bulunulan Gereksiz ıskalan ı	9	8	9 Küresel ısınmanın Enerji tüketimini Twitter
5.1.2020 18:47:44 Üniversite (Lisans Kadın)	6	8	9	4 Enerji Tüketimi, Su tüketimi, Teknolojik Önceki yıllara göre : %50 - %60	%80 - %90	Fikrim yok.	Ev	Kamusal alanlar (Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %70 - %80	%70	8	8 Akıllı cihazlar, yas Gereksiz ıskalan ı	8	8	8 Bekleme modund Enerji tüketimini Instagram	
5.1.2020 18:59:00 Öğretmenim / Ak Kadın	3	4	6	7 Enerji Tüketimi, İnsan Davranışları, San Önceki yıllara göre : %20 - %30	%40 - %50	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %40 - %50	%40	6	6 Akıllı cihazlar, yas Gereksiz ıskalan ı	9	2	5 Küresel ısınmanın Enerji tüketimini Twitter
5.1.2020 19:04:23 Öğretmenim / Ak Kadın	6	7	10	3 Enerji Tüketimi, Su tüketimi, Nüfus Artışı Önceki yıllara göre : %30 - %40	%30 - %40	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %30 - %40	%40	9	8 Enerji tüketimi se Gereksiz ıskalan ı	9	8	6 Küresel ısınmanın Enerji tüketimini Whatsapp
5.1.2020 19:41:18 Üniversite (Lisans Kadın)	2	2	8	5 Su tüketimi, İnsan Davranışları, Çevresel Önceki yıllara göre : %50 - %60	%60 - %70	Fikrim yok.	Ev	Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %50 - %60	%80	5	5 Tek başına neyi i Gereksiz ıskalan ı	8	5	7 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 20:09:12 Üniversite (Lisans Erkek)	8	8	10	5 Su tüketimi, Çevresel Konulardaki Bilgi Önceki yıllara göre : %60 - %70	%60 - %100	Planlanan enerji tili Okul		Okul	Lise çağındaki je Enerji tüketiminin global ölçekte neli %30 - %40	%80	6	6 Akıllı cihazlar, yas Gereksiz ıskalan ı	6	7	5 Bekleme modund Enerji tüketimini Instagram
5.1.2020 20:27:16 Öğretmenim / Ak Kadın	5	7	9	9 Nüfus Artışı, Çevresel Konulardaki Bilgi Önceki yıllara göre : %70 - %80	%50 - %60	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %30 - %40	%40	6	3 Enerji tüketimi se Gereksiz ıskalan ı	10	9	5 Küresel ısınmanın Enerji tüketimini Whatsapp
5.1.2020 20:29:53 Üniversite (Lisans Erkek)	4	6	4	6 Enerji Tüketimi, Su tüketimi, Düzensiz y Önceki yıllara göre : %30 - %40	%10 - %20	Fikrim yok.	Ticari binalar (av) Ev		Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %10	%20	5	3 İçinde bulunulan Televizyonu stanc	5	6	5 Küresel ısınmanın Enerji tüketimini Twitter
5.1.2020 20:34:23 Lise Öğrencisiyim Erkek	4	5	2	4 Enerji Tüketimi, Su tüketimi, İlaşt Sekt Önceki yıllara göre : %40 - %50	%10 - %20	Planlanan ile gerçe Okul		Ulaşım	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %30 - %40	%40	3	2 Davranışların yol Bilgisayar standı	5	3	3 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 20:50:08 Öğretmenim / Ak Erkek	9	8	10	2 Su tüketimi, Düzensiz şehirleşme, Sanayileşen Önceki yıllara göre : %40 - %10	%30 - %40	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %50 - %60	%10	5	4 Tek başına neyi i Gereksiz ıskalan ı	10	5	10 Küresel ısınmanın Enerji tüketimini Youtube
5.1.2020 21:03:37 Öğretmenim / Ak Kadın	10	8	9	4 Enerji Tüketimi, İnsan Davranışları, Tek Önceki yıllara göre : %40 - %10	%50 - %60	Planlanan enerji tili Ev		Okul	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %50	%50	7	2 İçinde bulunulan Gereksiz ıskalan ı	9	9	9 Enerji tüketiminin Enerji tüketimini Telegram
5.1.2020 21:18:54 Üniversite (Lisans Kadın)	6	7	7	7 İnsan Davranışları, Nüfus Artışı, Çevresel Önceki yıllara göre : %50 - %60	%40 - %50	Planlanan enerji tili Ev		Ev	Lise çağındaki je Sosyal çevrem (ailem, arkadaşlarım) %40 - %50	%10	6	6 Arkadaşlarımda ki Gereksiz ıskalan ı	8	5	6 Enerji tüketiminin Enerji tüketimini Twitter
5.1.2020 21:26:59 Öğretmenim / Ak Kadın	4	6	10	8 Enerji Tüketimi, Su tüketimi, Çevre Poli Önceki yıllara göre : %40 - %50	%30 - %40	Planlanan enerji tili Okul		Okul	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %60 - %70	%50	3	7 Enerji tüketimi se Gereksiz ıskalan ı	9	7	8 Enerji tüketiminin Enerji tüketimini Twitter
5.1.2020 21:36:43 Üniversite (Lisans Erkek)	3	1	0	7 Enerji Tüketimi, İnsan Davranışları, Tek Önceki yıllara göre : %40 - %50	%40 - %10	Fikrim yok.	Ev	Ulaşım	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %40 - %10	%90	4	0 Enerji tüketimi se Bilgisayar standı	1	3	3 Küresel ısınmanın Enerji tüketimini Instagram
5.1.2020 21:39:34 Öğretmenim / Ak Erkek	7	9	9	5 Enerji Tüketimi, İnsan Davranışları, Tek Önceki yıllara göre : %30 - %40	%20 - %30	Fikrim yok.	Okul	Okul	Lise çağındaki je Enerji tüketiminin maddi açıdan yara %40 - %50	%20	6	5 Enerji tüketimi se Gereksiz ıskalan ı	9	9	7 Küresel ısınmanın Enerji tüketimini Facebook
5.1.2020 22:13:03 Öğretmenim / Ak Kadın	9	10	9	2 Enerji Tüketimi, Çevresel Konulardaki B Önceki yıllara göre : %30 - %40	%30 - %40	Planlanan enerji tili Ev		Ev	Lise çağındaki je Enerji tüketiminin çevreye zarar verdi %40 - %50	%50	3	1 Enerji tüketimi se Gereksiz ıskalan ı	10	10	10 Küresel ısınmanın Enerji tüketimini Facebook
5.1.2020 23:03:43 Öğretmenim / Ak Kadın	5</														

Figure B.1 (continue) : Online Survey Answers

5.2.2020 2:11:11	Öğretmenim / Ak Erkek	9	10	10	10	10 Enerji Tüketimi, Su tüketimi, Doğal Alet Önceki yıllara göre - %50 - %60	%50 - %60	Planlanan ile gerçe Ev	Ev	Lise çağındaki ke Enerji tüketiminin maddi açıdan yara %70 - %80	%60	8	8	Enerji tüketimini Televizyonu stanc	7	8	7 Bekleme modund Enerji tüketimini Twitter	
5.2.2020 3:26:15	Öğretmenim / Ak Kadın	10	10	10	10	1 Enerji Tüketimi, İnsan Davranışları, Çev Önceki yıllara göre - %30 - %40	%50 - %60	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %90 - %100	%10	5	5	Caba gerektirmesi Gereksiz şakları l	9	9	8 Kütresel ismmanu Enerji tüketimini Twitter	
5.2.2020 4:12:07	Öğretmenim / Ak Kadın	8	10	10	10	4 Enerji Tüketimi, Nüfus Artışı, Sanayileş Önceki yıllara göre - %70 - %80	%70 - %80	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %30 - %40	%80	5	5	Enerji tüketimi kç Gereksiz şakları l	10	10	10 Enerji tüketimini Enerji tüketimini Instagram	
5.2.2020 8:52:04	Öğretmenim / Ak Erkek	7	7	7	7	5 Su tüketimi, İnsan Davranışları, Nüfus A Önceki yıllara göre - %10 - %20	%20 - %30	Planlanan enerji tük Ev	Konusal alanlar (	Lise çağındaki ke Enerji tüketiminin global ölçekte nekt %20 - %30	%20	7	7	Ahşkanlıklar, yas Gereksiz şakları l	7	4	7 Kütresel ismmanu Enerji tüketimini Youtube	
5.2.2020 10:19:31	Öğretmenim / Ak Erkek	10	8	10	10	3 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre - %50 - %60	%0 - %10	Planlanan enerji tük Okul	Okul	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %50 - %60	%80	5	5	Ahşkanlıklar, yas Gereksiz şakları l	10	10	7 Enerji tüketimini Enerji tüketimini Facebook	
5.2.2020 10:48:24	Öğretmenim / Ak Erkek	8	10	10	10	5 Enerji Tüketimi, Çevresel Konulardaki B Önceki yıllara göre - %20 - %30	%30 - %40	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Düzenli hatırlatmalar ve yönlendirme %20 - %30	%30	5	4	Enerji tüketimi kç Gereksiz şakları l	10	8	10 Kütresel ismmanu Enerji tüketimini Youtube	
5.2.2020 10:49:37	Öğretmenim / Ak Kadın	8	8	10	10	5 İnsan Davranışları, Teknolojik Gelişmele Önceki yıllara göre - %30 - %40	%60 - %70	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %80 - %90	%80	8	8	Arkadaşlarında bç Gereksiz şakları l	7	6	7 Kütresel ismmanu Enerji tüketimini Instagram	
5.2.2020 10:52:45	Üniversite (Lisans Kadın)	5	7	8	8	4 İnsan Davranışları, Teknolojik Gelişmele Önceki yıllara göre - %70 - %80	%30 - %40	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Sosyal çevremim (ailem, arkadaşlarım %20 - %30	%50	5	4	Davranışların yol Gereksiz şakları l	8	8	8 Kütresel ismmanu Enerji tüketimini Whatsapp	
5.2.2020 11:28:43	Öğretmenim / Ak Kadın	8	8	8	8	8 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre - %70 - %80	%70 - %80	Planlanan enerji tük Ev	Ulaşım	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %70 - %80	%70	7	7	Ahşkanlıklar, yas Gereksiz şakları l	8	8	8 Kütresel ismmanu Enerji tüketimini Web sayfası	
5.2.2020 11:40:42	Öğretmenim / Ak Erkek	7	7	8	8	2 Nüfus Artışı, Çevresel Konulardaki Bilgi Önceki yıllara göre - %70 - %80	%0 - %10	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %40 - %50	%90	2	2	Ahşkanlıklar, yas Gereksiz şakları l	5	8	8 Kütresel ismmanu Enerji tüketimini Instagram	
5.2.2020 12:00:43	Öğretmenim / Ak Kadın	8	10	10	10	1 Su tüketimi, Çevre Politikaları, Düzensiz Önceki yıllara göre - %20 - %30	%40 - %50	Fikrim yok.	Her yerde	Lise çağındaki ke Enerji tüketiminin maddi açıdan yara %40 - %50	%50	9	9	Enerji tüketimini Gereksiz şakları l	9	9	10 Kütresel ismmanu Enerji tüketimini Instagram	
5.2.2020 12:01:10	Öğretmenim / Ak Kadın	8	10	10	10	1 Su tüketimi, Çevre Politikaları, Düzensiz Önceki yıllara göre - %20 - %30	%40 - %50	Fikrim yok.	Her yerde	Lise çağındaki ke Enerji tüketiminin maddi açıdan yara %40 - %50	%50	9	9	Enerji tüketimini Gereksiz şakları l	9	9	10 Kütresel ismmanu Enerji tüketimini Instagram	
5.2.2020 14:15:38	Öğretmenim / Ak Kadın	6	6	8	8	7 Enerji Tüketimi, Su tüketimi, Düzensiz ş Önceki yıllara göre - %40 - %50	%40 - %50	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Sosyal çevremim (ailem, arkadaşlarım %50 - %60	%40	7	8	Ahşkanlıklar, yas Gereksiz şakları l	7	8	9 Kütresel ismmanu Enerji tüketimini Whatsapp	
5.2.2020 15:57:42	Öğretmenim / Ak Erkek	9	10	10	10	2 Su tüketimi, Çevre Politikaları, Sanayileş Önceki yıllara göre - %20 - %30	%10 - %20	Planlanan enerji tük Ulaşım	Ulaşım	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %30 - %40	%40	8	5	Ahşkanlıklar, yas Gereksiz şakları l	8	9	7 Kütresel ismmanu Bilgielendirici pos Facebook	
5.2.2020 16:08:12	Üniversite (Lisans Kadın)	4	4	4	4	4 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre - %40 - %50	%10 - %20	Planlanan enerji tük Okul	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %40 - %50	%50	5	5	Enerji tüketimi kç Gereksiz şakları l	5	5	7 Kütresel ismmanu Enerji tüketimini Instagram	
5.2.2020 17:12:01	Öğretmenim / Ak Kadın	7	9	6	6	6 Enerji Tüketimi, Düzensiz şehirleşme, Si Önceki yıllara göre - %50 - %60	%50 - %60	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %50 - %60	%60	7	6	Caba gerektirmesi Gereksiz şakları l	10	9	7 Kütresel ismmanu Enerji tüketimini Twitter	
5.3.2020 16:10:01	Üniversite (Lisans Kadın)	7	7	10	10	7 Enerji Tüketimi, İnsan Davranışları, Tek Önceki yıllara göre - %80 - %90	%50 - %60	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin global ölçekte nekt %30 - %40	%80	10	10	Enerji tüketimi kç Gereksiz şakları l	4	2	10 Kütresel ismmanu Enerji tüketimini Instagram	
5.3.2020 16:22:22	Lise öğrencisiyim Kadın	5	7	10	10	3 Enerji Tüketimi, Nüfus Artışı, Çevre Pol Önceki yıllara göre - %30 - %40	%20 - %30	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Sosyal çevremim (ailem, arkadaşlarım %40 - %50	%40	4	7	Ahşkanlıklar, yas Gereksiz şakları l	5	5	5 Kütresel ismmanu Enerji tüketimini Instagram	
5.3.2020 16:23:08	Lise öğrencisiyim Kadın	8	9	10	10	5 Su tüketimi, Nüfus Artışı, Sanayileşme Önceki yıllara göre - %20 - %30	%30 - %40	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %0 - %10	%40	8	9	Tek başına neyi / Gereksiz şakları l	9	7	8 Bekleme modund Enerji tüketimini Instagram	
5.3.2020 16:42:28	Lise öğrencisiyim Erkek	5	7	10	10	6 Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre - %30 - %40	%30 - %40	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %70 - %80	%60	4	3	Enerji tüketimi kç Gereksiz şakları l	9	0	10 Kütresel ismmanu Enerji tüketimini Twitter	
5.3.2020 16:44:49	Öğretmenim / Ak Kadın	6	8	10	10	8 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre - %30 - %40	%30 - %40	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Düzenli hatırlatmalar ve yönlendirme %50 - %60	%30	7	4	İçinde bulunulma Gereksiz şakları l	10	10	5 Kütresel ismmanu Bilgielendirici pos Instagram	
5.3.2020 16:45:11	Öğretmenim / Ak Kadın	6	8	8	8	4 Enerji Tüketimi, Su tüketimi, Çevre Poli Önceki yıllara göre - %20 - %30	%10 - %20	Fikrim yok.	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %30 - %40	%70	7	7	Ahşkanlıklar, yas Gereksiz şakları l	8	4	9 Bekleme modund Enerji tüketimini Twitter	
5.3.2020 16:48:58	Öğretmenim / Ak Kadın	8	10	10	10	3 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre - %10 - %20	%10 - %20	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %50 - %60	%50	5	5	Enerji tüketimi kç Gereksiz şakları l	10	5	10 Kütresel ismmanu Enerji tüketimini Whatsapp	
5.3.2020 16:53:24	Lise öğrencisiyim Kadın	5	7	9	9	9 İnsan Davranışları, Nüfus Artışı, Çevres Önceki yıllara göre - %30 - %40	%20 - %30	Fikrim yok.	Okul	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %20 - %30	%20	3	5	Enerji tüketimi kç Gereksiz şakları l	1	0	2 Binalara dönüş Enerji tüketimini Twitter	
5.3.2020 17:03:28	Lise öğrencisiyim Kadın	3	3	7	7	6 Enerji Tüketimi, Nüfus Artışı, Sanayileş Önceki yıllara göre - %60 - %70	%30 - %40	Planlanan enerji tük Ticari binalar (avı Ev	Ev	Lise çağındaki ke Enerji tüketiminin maddi açıdan yara %20 - %30	%50	6	3	Enerji tüketimi kç Gereksiz şakları l	6	7	6 Kütresel ismmanu Enerji tüketimini Twitter	
5.3.2020 17:07:21	Öğretmenim / Ak Kadın	7	7	8	8	3 Enerji Tüketimi, İnsan Davranışları, Çev Önceki yıllara göre - %70 - %80	%40 - %50	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %30 - %40	%20	5	5	İçinde bulunulma Gereksiz şakları l	5	5	8 Bekleme modund Enerji tüketimini Instagram	
5.3.2020 17:28:29	Lise öğrencisiyim Kadın	4	4	5	5	4 Enerji Tüketimi, Nüfus Artışı, Sanayileş Önceki yıllara göre - %50 - %60	%70 - %80	Fikrim yok.	Ev	Okul	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %20 - %30	%50	8	9	Ailede bç komuyk Soğuk olduğunda	6	4	7 Enerji tüketimini Enerji tüketimini Facebook
5.3.2020 18:29:47	Öğretmenim / Ak Kadın	10	10	10	10	3 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre - %40 - %50	%70 - %80	Planlanan enerji tük Ev	Okul	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %70 - %80	%30	8	3	Enerji tüketimi kç Gereksiz şakları l	10	10	7 Enerji tüketimini Enerji tüketimini Whatsapp	
5.3.2020 18:33:28	Öğretmenim / Ak Kadın	9	9	6	6	4 Enerji Tüketimi, İnsan Davranışları, San Önceki yıllara göre - %30 - %40	%10 - %20	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %10 - %20	%20	4	4	Arkadaşlarında bç Gereksiz şakları l	10	10	10 Enerji tüketimini Enerji tüketimini Instagram	
5.3.2020 22:12:46	Lise öğrencisiyim Kadın	3	6	8	8	8 Enerji Tüketimi, Su tüketimi, Çevresel K Önceki yıllara göre - %60 - %70	%20 - %30	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %40 - %50	%40	1	3	Ahşkanlıklar, yas Televizyonu stanc	7	1	6 Kütresel ismmanu Enerji tüketimini Instagram	
5.3.2020 22:17:49	Lise öğrencisiyim Erkek	10	7	10	10	10 Enerji Tüketimi, Su tüketimi, Düzensiz ş Önceki yıllara göre - %0 - %10	%50 - %60	Planlanan ile gerçe Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %0 - %10	%10	10	10	Enerji tüketimi kç Gereksiz şakları l	10	10	10 Enerji tüketimini Enerji tüketimini Instagram	
5.3.2020 22:31:19	Lise öğrencisiyim Belirtmek istemiy	5	7	6	6	8 Su tüketimi, Nüfus Artışı, Çevresel Kon Önceki yıllara göre - %40 - %50	%50 - %60	Fikrim yok.	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %10 - %20	%20	3	2	Enerji tüketimi kç Gereksiz şakları l	4	1	3 Kütresel ismmanu Enerji tüketimini Youtube	
5.3.2020 22:33:25	Lise öğrencisiyim Kadın	4	7	6	6	7 Su tüketimi, Nüfus Artışı, Düzensiz geli Önceki yıllara göre - %20 - %30	%30 - %40	Fikrim yok.	Okul	Lise çağındaki ke Mobil bir uygulama ile oynlaştırılm %30 - %40	%50	7	7	Caba gerektirmesi Gereksiz şakları l	7	4	5 Kütresel ismmanu Enerji tüketimini Instagram	
5.3.2020 22:38:45	Lise öğrencisiyim Kadın	2	8	9	9	5 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre - %50 - %60	%30 - %40	Fikrim yok.	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %50 - %60	%40	7	8	Ahşkanlıklar, yas Gereksiz şakları l	4	3	5 Kütresel ismmanu Bilgielendirici pos Whatsapp	
5.3.2020 23:59:34	Lise öğrencisiyim Kadın	3	3	8	8	5 Nüfus Artışı, Teknolojik Gelişmeler, Düz Önceki yıllara göre - %60 - %70	%70 - %80	Fikrim yok.	Ev	Okul	Lise çağındaki ke Enerji tüketiminin maddi açıdan yara %70 - %80	%60	3	3	Ahşkanlıklar, yas Gereksiz şakları l	3	3	5 Binalarda kullanı Enerji tüketimini Twitter
5.4.2020 18:38:05	Lise öğrencisiyim Kadın	8	9	10	10	4 Enerji Tüketimi, Çevre Politikaları, Sana Önceki yıllara göre - %30 - %40	%70 - %80	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %40 - %50	%60	7	7	Caba gerektirmesi Gereksiz şakları l	10	10	10 Kütresel ismmanu Enerji tüketimini Web sayfası	
5.5.2020 20:02:03	Üniversite (Lisans Kadın)	9	10	10	10	8 Enerji Tüketimi, İnsan Davranışları, Çev Önceki yıllara göre - %50 - %60	%60 - %70	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %60 - %70	%50	7	4	Caba gerektirmesi Gereksiz şakları l	8	6	7 Kütresel ismmanu Enerji tüketimini Instagram	
5.8.2020 23:10:32	Üniversite (Lisans Kadın)	6	8	10	10	8 Enerji Tüketimi, İnsan Davranışları, Nüf Önceki yıllara göre - %20 - %30	%30 - %40	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %20 - %30	%60	8	9	Caba gerektirmesi Gereksiz şakları l	10	3	6 Enerji tüketimini Enerji tüketimini LinkedIn	
5.10.2020 15:31:34	Öğretmenim / Ak Kadın	9	9	10	10	8 İnsan Davranışları, Çevresel Konulardaki Önceki yıllara göre - %40 - %50	%10 - %20	Planlanan enerji tük Okul	Okul	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %0 - %10	%60	7	7	İçinde bulunulma Gereksiz şakları l	7	8	9 Binalara dönüş Enerji tüketimini Instagram	
5.10.2020 15:41:14	Üniversite (Lisans Kadın)	7	8	8	8	3 İnsan Davranışları, Çevre Politikaları, Di Önceki yıllara göre - %20 - %30	%10 - %20	Fikrim yok.	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %30 - %40	%30	7	7	İçinde bulunulma Gereksiz şakları l	8	8	7 Bekleme modund Enerji tüketimini Instagram	
5.10.2020 15:51:23	Öğretmenim / Ak Kadın	4	7	9	9	8 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre - %60 - %70	%50 - %60	Planlanan enerji tük Ticari binalar (avı Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %70 - %80	%60	4	7	İçinde bulunulma Gereksiz şakları l	8	4	9 Bekleme modund Enerji tüketimini Instagram	
5.10.2020 16:20:21	Öğretmenim / Ak Kadın	4	9	8	8	3 İnsan Sektörİ, Çevre Politikaları, Sanayi Önceki yıllara göre - %20 - %30	%10 - %20	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Sosyal çevremim (ailem, arkadaşlarım %40 - %50	%60	6	7	Enerji tüketimi kç Gereksiz şakları l	7	2	8 Kütresel ismmanu Enerji tüketimini Instagram	
5.10.2020 17:15:34	Öğretmenim / Ak Kadın	7	7	9	9	2 Nüfus Artışı, Çevre Politikaları, Düzensi Önceki yıllara göre - %40 - %50	%10 - %20	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Sosyal çevremim (ailem, arkadaşlarım %20 - %30	%50	6	7	Enerji tüketimi kç Gereksiz şakları l	10	6	6 Kütresel ismmanu Enerji tüketimini Instagram	
5.10.2020 17:28:05	Eğitim binası per Kadın	6	9	10	10	3 Enerji Tüketimi, Çevresel Konulardaki B Önceki yıllara göre - %30 - %40	%60 - %70	Planlanan enerji tük Okul	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %60 - %70	%40	6	5	İçinde bulunulma Gereksiz şakları l	8	6	9 Binalara dönüş Enerji tüketimini Instagram	
5.10.2020 17:57:14	Öğretmenim / Ak Erkek	9	10	4	4	3 Enerji Tüketimi, İnsan Davranışları, Çev Önceki yıllara göre - %30 - %40	%10 - %20	Planlanan enerji tük Okul	Okul	Lise çağındaki ke Enerji tüketiminin global ölçekte nekt %10 - %20	%20	6	4	Caba gerektirmesi Gereksiz şakları l	9	5	8 Enerji tüketimini Enerji tüketimini Whatsapp	
5.10.2020 18:22:34	Üniversite (Lisans Erkek	6	6	8	8	5 Enerji Tüketimi, Su tüketimi, İnsan Davr Önceki yıllara göre - %40 - %50	%80 - %90	Planlanan ile gerçe Ev	Ev	Lise çağındaki ke Enerji tüketiminin maddi açıdan yara %30 - %40	%50	3	3	İçinde bulunulma Gereksiz şakları l	7	5	1 Kütresel ismmanu Bilgielendirici pos Instagram	
5.10.2020 19:01:01	Öğretmenim / Ak Kadın	10	10	10	10	2 Enerji Tüketimi, Çevresel Konulardaki B Önceki yıllara göre - %30 - %40	%10 - %20	Planlanan enerji tük Ev	Ev	Lise çağındaki ke Enerji tüketiminin çevreye zarar verdi %40 - %50	%30	5	8	Enerji tüketimi kç Gereksiz şakları l	6	3	8 Kütresel ismmanu Enerji tüketimini Instagram	

Figure B.1 (continue) : Online Survey Answers



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