

Final Report

From 18.10. 2016 up 18.01.2017

1/ Draft for EE guide book

My first task was write the Draft for EE guide book and recive the comments from relevant stakeholders. I prepared this draft up 29.11.2016 and presented this book in GIZ office for Mr. Robert, Mr.Tahir Zada and Mr. Maher. The content of this book was interesting for them and they recommended me to add the renewable energy part to this book. also we defined how we can organize our plan to present this book to public.

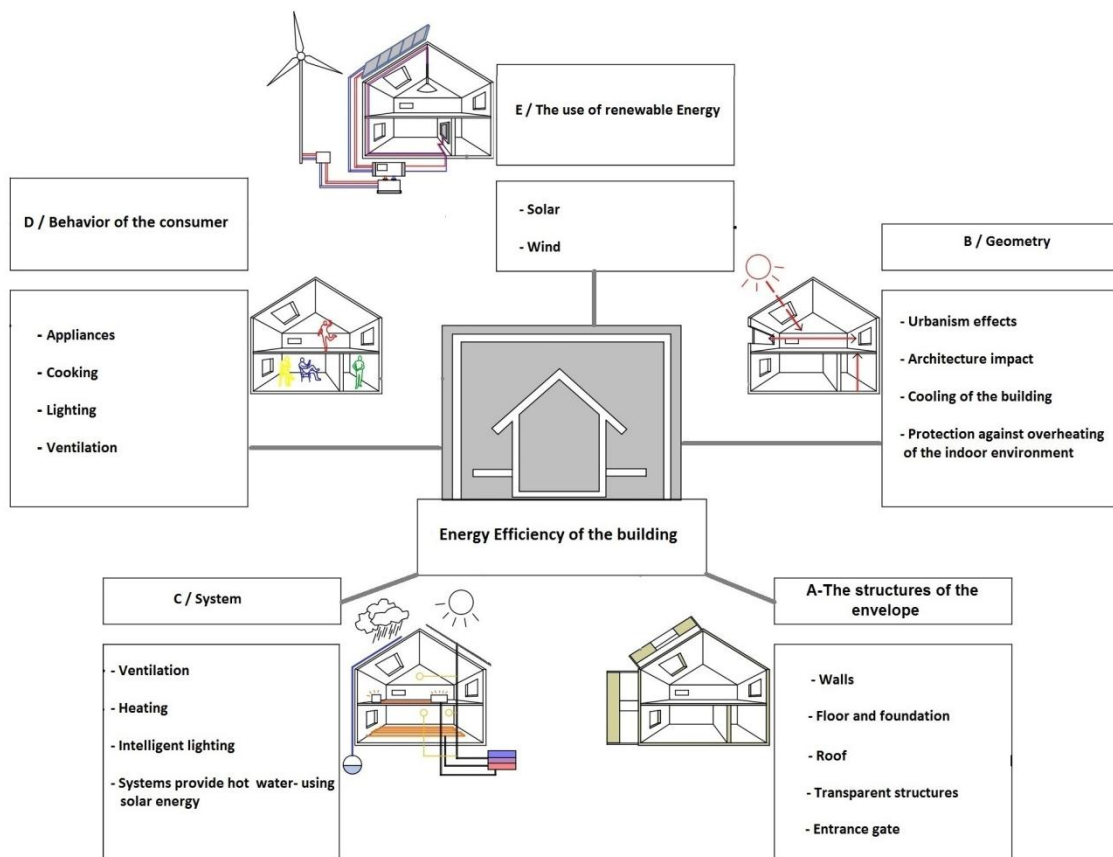
2/ Meetings

I had Conducting meetings and providing presentations on achievements on EE guide book to GIZ team, MEW-DM and other relevant partners.

The reaction of all partners and stakeholders was also very positive and agreed with this important topic for Afghan society. They promised to help me in my targets.

3/ Round tables workshops

I participated in round tables workshops and meetings with relevant partners and stakeholders in both KBL and MZR. The topic was how to achieve the EE in the buildings. The reactions of all partners and stakeholders were very positive and agreed with this important topic for Afghan society.



Picture 1 Energy Efficiency of the bulding

So far all policy and idea about EE focused on lighting and changing bulbs.

I tried to change the focus and I had to explain that the EE in building policy has to go through the Envelope, Geometry, System and Behavior of user and it will be not enough to only focus for lighting. because the lighting can create only 3% of Energy in Building. We have a lot of loss of energy in winter and a lot of energy income in Summer through envelope. The property of envelope layers structures is very important for EE in building. To my surprise, many participate in the meetings were for the first time acquainted with such an idea and after explaining always expressed their approval and support those ideas.



Picture 2 round tables workshops in Kabul



Picture 3 round tables workshops in Mazar-e Sharif

4/ Two days workshop

My another task was Conducting a two days workshop and showcasing and also collected all the comments from the relevant partners for the EE guide book. The topic of workshop was Energy Efficiency in Buildings Guidebook Development (Provide and explain 39 criterias

about reduce of energy in residential buildings). The agenda of program include **Presentation** on Energy Consumption in Buildings, **Group Work** (formation of groups, group discussions), **Group Presentation** (Presentation of the findings) , **Evaluation of the program**, **Closing Remarks** & thanks giving.

Participants were from: Kabul Municipality, MUDH, MEW, private sector, ANSA, Kabul University, Polytechnic University, Kardan University, Salam University (62 Participants)

After presentation we create 4 group works. in every group work were participants from particular authority. first group created state engineeris from different departments, second group was from Universities teachers. third group was from private sectors, forth group was from different NGO. they worked together and express their mind about every criteria. Every group collected their recommendations and wrote to paper. Then on behalf of each group came and presented their recommendations. we collected all these comments for every criteria and in end of program we prepared possibility for the voting by putting one vote to every criteria, if they accept the relevant criteria. the program was finshed by Mr.Tahirzada and all participants were very satisfied with this program.



Picture 4 Two days workshop in Kabul

5/ Practical Case Study in Kabul Municipality

During December 2016 I started the Practical Case Study and Calculations of Energy Efficiency in Buildings in Kabul Municipality for their 19 civil engineers.

The agenda of the workshop was: first day, **Presentation** about Energy Efficiency in the buildings (lecture about Energy Efficiency in Building and why in Afghanistan we don't have thermal comfort in buildings and why we have a big expense for heating and cooling in buildings + answers and questions).

Second day for the **Practical calculation** we created 4 groups. The task was the Review of their existing projects in terms of Energy Efficiency in the buildings and calculate the Heat loss and Total thermal power design Φ_{HL} in (kWh). We calculated that the mentioned building during 120 days heating season for the -10°C exterior temperature and $+20^{\circ}\text{C}$ interior temperature how many energy needs. The final result we had in kWh and then we multiplied it to the currency Afghani. We had the real cost of energy expended to achieve the thermal comfort throughout the entire building in the relevant building during 4 month of winter.

During Third day, we made Review of their existing projects in terms of Energy Efficiency in the buildings and add the heat insulation system with 10 cm thickness to the surrounding walls, add the 10 cm of heat insulation to the roof layers and also add the 5cm of heat insulation to the floor layers. also I recommend them to change the steal and wood windows from their project and replace it to the PVC windows. Then we again calculated the Heat loss and Total thermal power design Φ_{HL} in (kWh).



Picture 5 Practical Case Study in Kabul Municipality

We calculated that the The mentioned building during 120 days heating season for the -10°C exterior temperature and $+20^{\circ}\text{C}$ interior temperature how many energy needs. The final result we had in kWh and then we multiplied it to the currency Afghani. After some changing in structures of layers of envelope We had the real cost of energy expended to achieve the thermal comfort throughout the entire of building during 4 month of winter.

Then one engineer behalf of each group came and presented the energy consumption of their building with their primary suggestion and design and then after applied of

recommendation for EE. In every group the energy consumption for heating has been reduced by almost 200 -300 %

Evaluation of the work group results was very interesting for another's. I Talked about that how we can improve this process in the future and Establish future cooperation.

Many of the engineers for the first time conscious How can the thermal properties of envelope construction and windows have such a big impact on energy consumption for heating.

Many of the engineer's promised to will keep this EE ideas for their projects and also will ask the owners of building who come for planning permission to respect the EE ideas



Picture 6 Practical Case Study in Kabul Municipality

5/ Practical Case Study in Ministry of Defence in Kabul

During December 2016 I also started the Practical Case Study and Calculations of Energy Efficiency in Buildings in Ministry of Defence in Kabul for their 65 civil engineers.

The agenda of the workshop was: first day, **Presentation** about Energy Efficiency in the buildings (lecture about Energy Efficiency in Building and why in Afghanistan we don't have thermal comfort in buildings and why we have a big expense for heating and cooling in buildings + answers and questions).



Picture 7 Practical Case Study in Ministry of Defence

Second day for the **Practical calculation** we created 8 groups. The task was the Review of their existing projects in terms of Energy Efficiency in the buildings and calculate the Heat loss and Total thermal power design Φ_{HL} in (kWh). We calculated that the mentioned building during 120 days heating season for the -10°C exterior temperature and $+20^{\circ}\text{C}$ interior temperature how many energy needs. The final result we had in kWh and then we multiplied it to the currency Afghani. We had the real cost of energy expended to achieve the thermal comfort throughout the entire building in the relevant building during 4 month of winter.

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6/ Practical Case Study in Ministry of Urban Development and Housing in Kabul

During December 2016 I also started the Practical Case Study and Calculations of Energy Efficiency in Buildings in Ministry of Urban Development and Housing in Kabul for their 41 civil engineers.

The agenda of the workshop was: first day, **Presentation** about Energy Efficiency in the buildings (lecture about Energy Efficiency in Building and why in Afghanistan we don't have thermal comfort in buildings and why we have a big expense for heating and cooling in buildings + answers and questions).



Picture 9 Practical Case Study in Ministry of Urban Development and Housing in Kabul

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7/ Practical Case Study in North Afghanistan in Mazar-e Sharif

During January of 2017, I also started the Practical Case Study and Calculations of Energy Efficiency in Buildings For 61 civil engineers of sex province of the North Afghanistan in Mazar-e Sharif.



Picture 10 Practical Case Study in North Afghanistan in Mazar-e Sharif

The agenda of the workshop was: first day, **Presentation** about Energy Efficiency in the buildings (lecture about Energy Efficiency in Building and why in Afghanistan we don't have thermal comfort in buildings and why we have a big expense for heating and cooling in buildings + answers and questions).

Second day for the **Practical calculation** we created 10 groups. The task was the Review of their existing projects in terms of Energy Efficiency in the buildings and calculate the Heat loss and Total thermal power design Φ_{HL} in (kWh).

We calculated that the mentioned building during 90 days heating season for the -10°C exterior temperature and $+20^{\circ}\text{C}$ interior temperature how many energy needs. The final result we had in KWh and then we multiplied it to the currency Afghani. We had the real cost of energy expended to achieve the thermal comfort throughout the entire building in the relevant building during 4 month of winter.



Picture 11 Practical Case Study in North Afghanistan in Mazar-e Sharif

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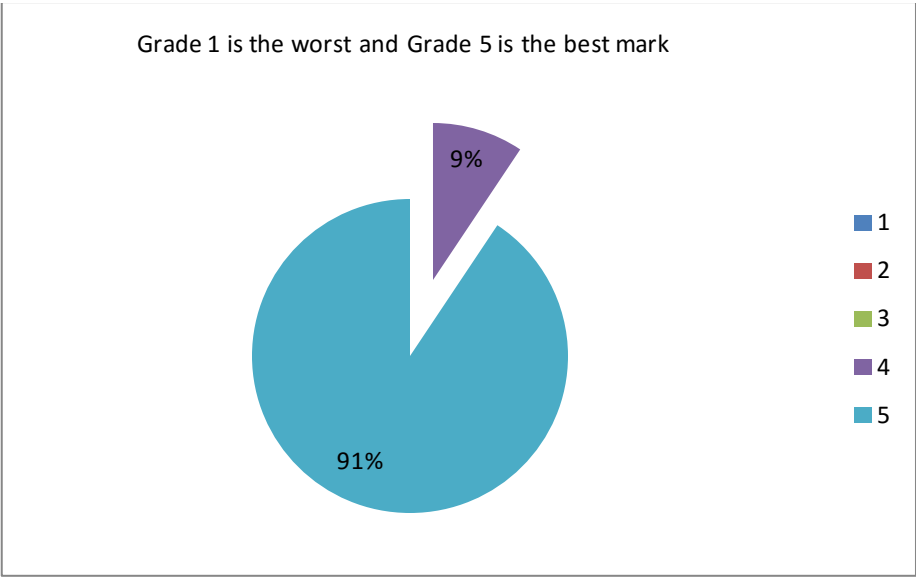
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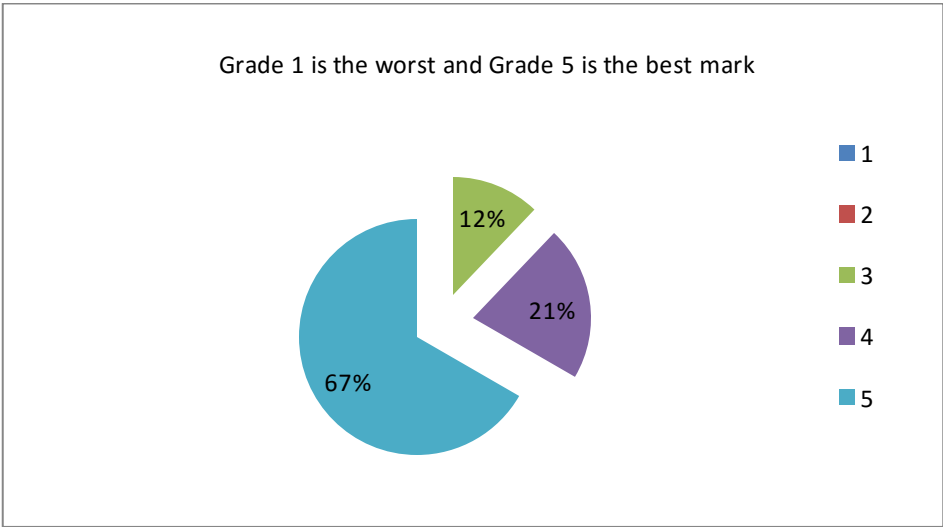
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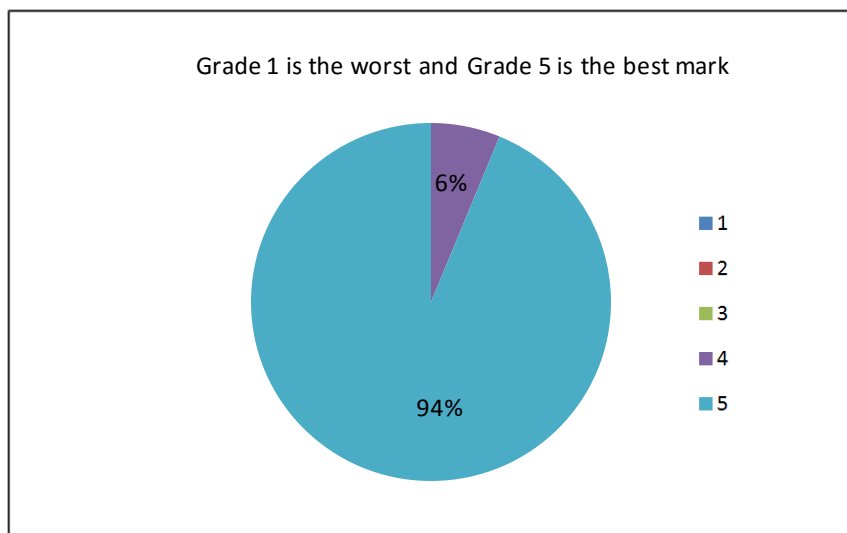
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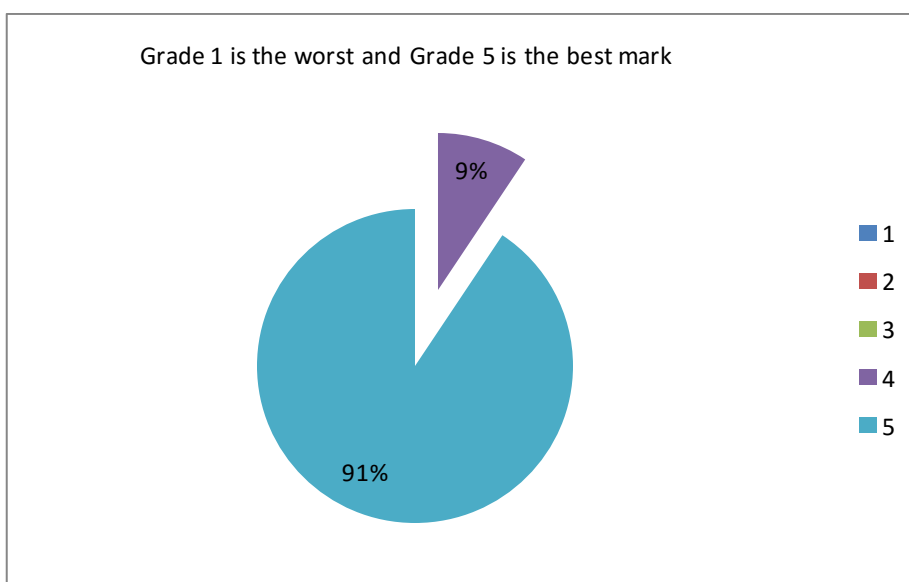
The content of this training was understandable for me.



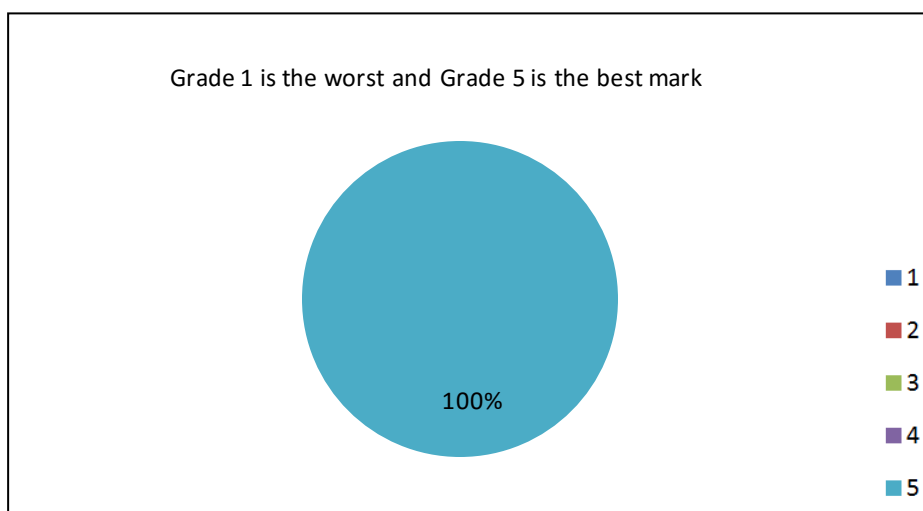
We can use the contents of this training for our practical jobs



This workshop was able create for me a new view for energy consumption in buildings



The contents of this training is valuable for me and for the building sector in Afghanistan.



What do you think about behaviour, lecture method and presented subject by
Dr. Eng. Mohammad Omar Temori

8/ Practical Case Study in Herat

During January of 2017, I also started the last Practical Case Study and Calculations of Energy Efficiency in Buildings For 76 civil engineers of Herat province.

The agenda of the workshop was: first day, **Presentation** about Energy Efficiency in the buildings (lecture about Energy Efficiency in Building and why in Afghanistan we don't have thermal comfort in buildings and why we have a big expense for heating and cooling in buildings + answers and questions).



Picture 12 Practical Case Study in Herat

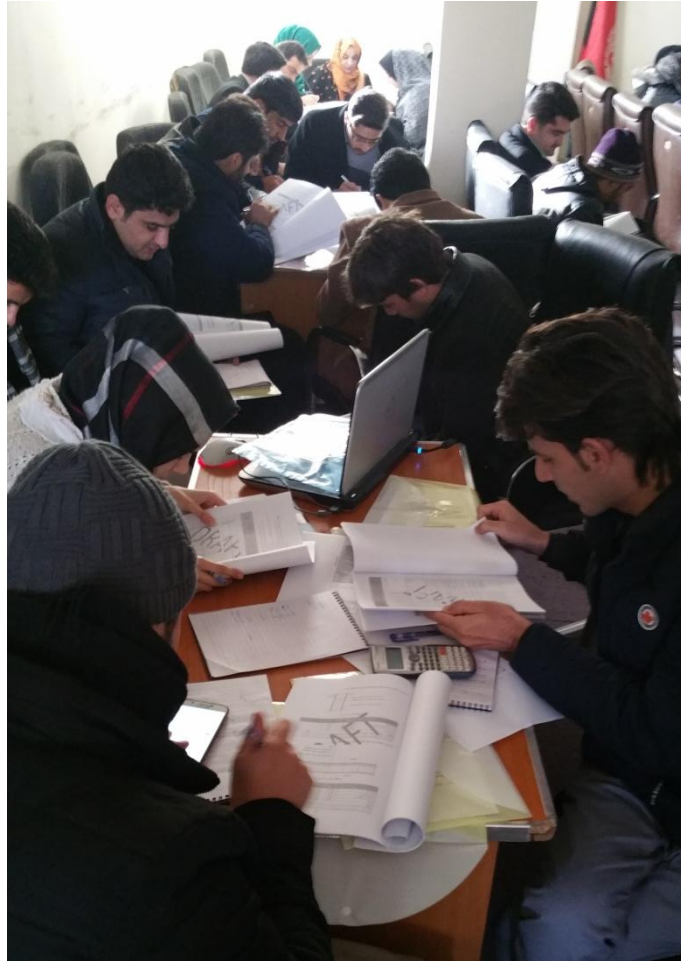
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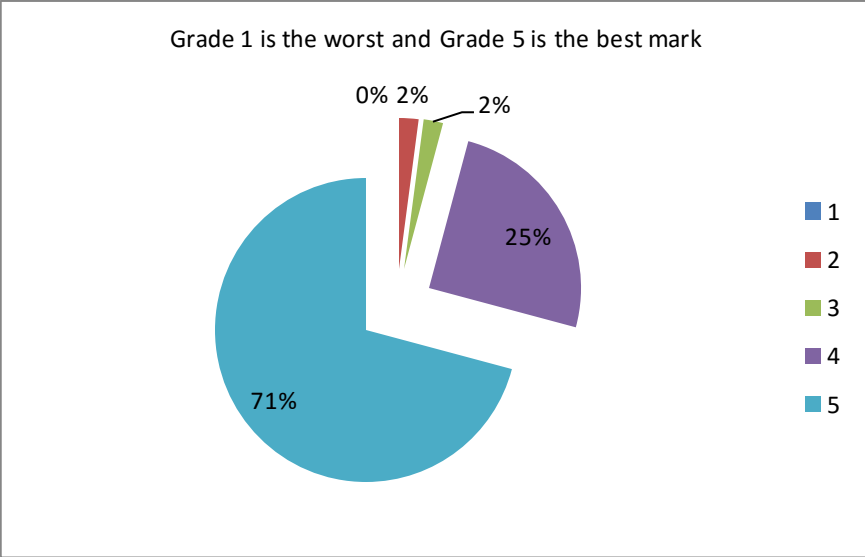
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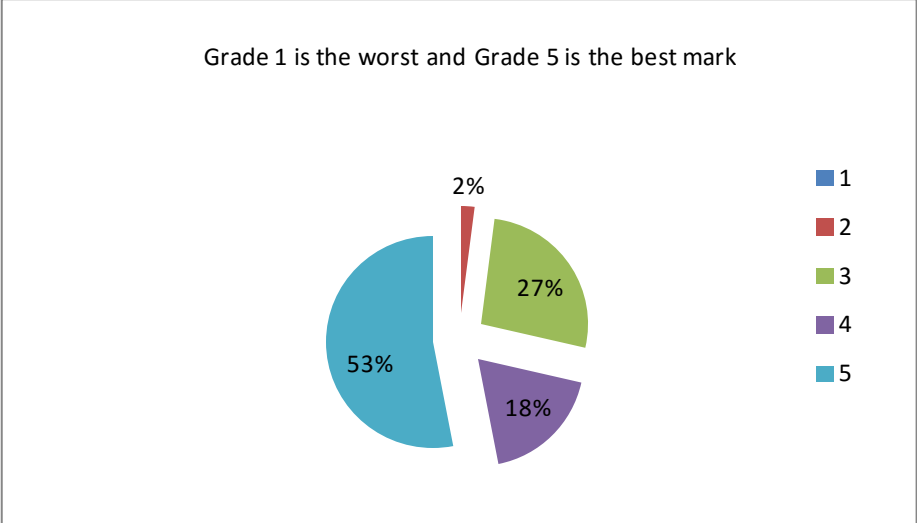
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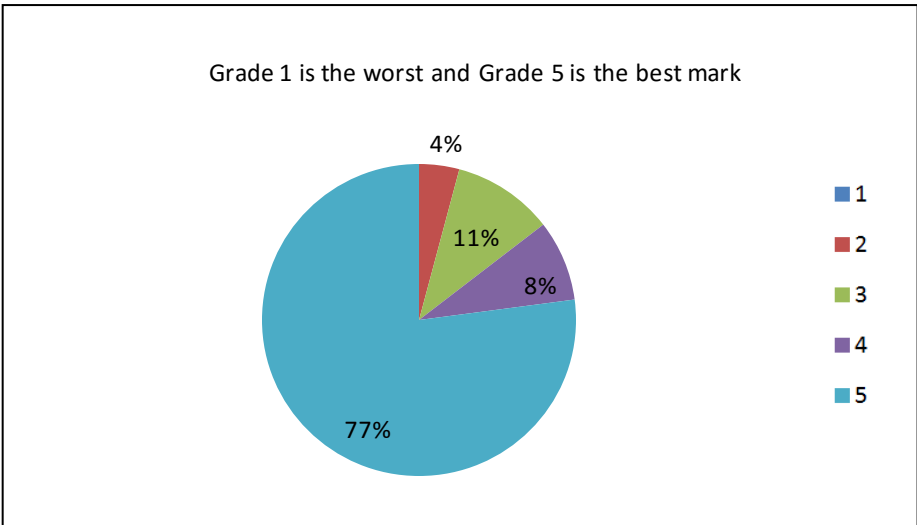
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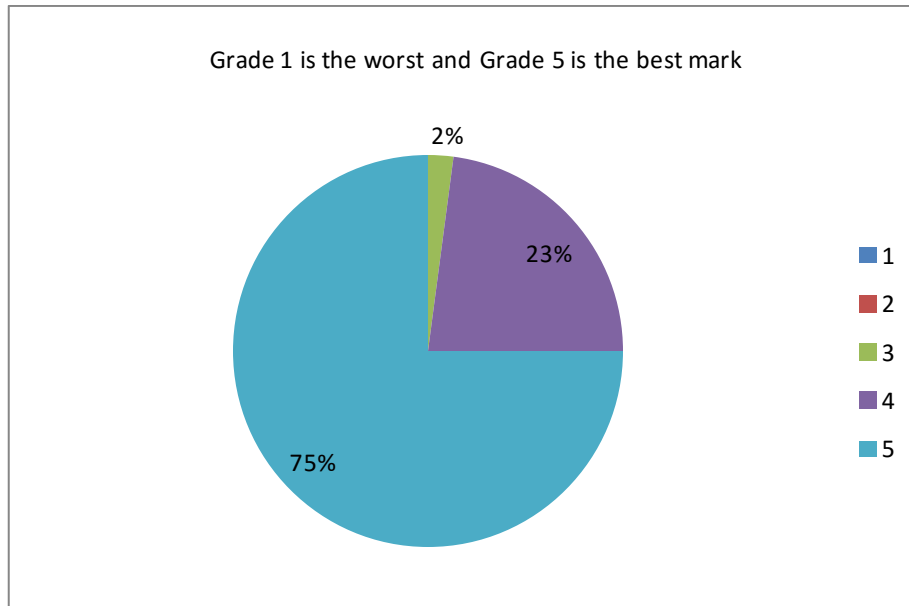
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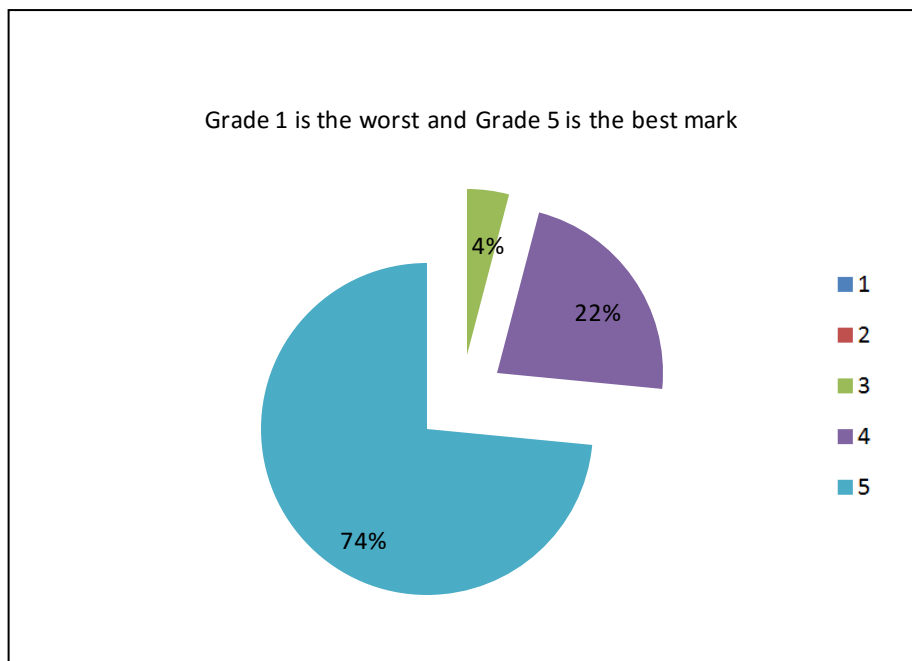
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What do you think about behaviour, lecture method and presented subject by
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9/ Awareness program

During December 2016 and January 2017 also I have **Awareness program** about Energy Efficiency in Buildings in MEW, MRRD, GIZ team, ANSA, RE&EE core team.

All these workshops and Awareness programs was successful and was a new for many participants. many of them for the first time understood the meaning of thermal comfort, thermal Resistance, thermal conductivity of material and also how the heat can transfer from warm place to cold place. many of these participants ask for the continue of this

program and were very satisfied. In the end of this workshop we had submit the certificate for all participants.



Picture 14 Awareness program in MEW, MRRD and ANSA

My Recommendations

Since AFG residential buildings consumed 71% of the total energy consumed by state. Most of this energy is consumed for heating and cooling in buildings. Insufficient knowledge of thermal performance of building structures, is the reason of this situation.

In order to achieve the energy efficiency of buildings in Afghanistan I want to recommend the following steps:

1 / continue of Workshops to increase the knowledge of the authorities concerned, building engineering, universities teachers and students, about: importance of building envelope in case of thermal properties, geometry of building, ventilation and heating system. all these issues have big impact on energy-saving in a building.

2 / creation of an energy efficiency department in universities in order to increase the theoretical knowledge of students,

3 / simple familiarization campaign for the public about basic principles of energy saving in buildings

4 / providing of teaching textbooks about building thermal technology for universities in the national languages,

5 / supply laboratories for detecting physical parameters of construction materials produced and used in Afg. The laboratory should be part of state institutions. the test results should be the basis for the development of standards in the construction industry.

6 / creation of a national database on properties of external environment for 34- provinces of Afghanistan (outdoor temperature, outdoor humidity, intensity of wind, snow, rain and sunshine)

7 / establishing standards related to energy savings in buildings (envelope structures of building, geometry of building, heating and cooling systems), which will create the technical basis for design new buildings and reconstruction of existing buildings.