

Case Study on Innovative Projects in Science Fair-2015, University of Yangon

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Abstract—Science Fair is University of Yangon (UY)'s main event of the year and paves a way for students to thinking about scientific/technological process. Even the undergraduate students can show off their business in Innovative Science. The demonstration of their own strength and idea improves their motivation. There are 28 science projects for competition and the most famous projects will be discussed in this paper. Evaluation of these projects is based on voting of the audiences and the statistics for suggestions of students and audiences are also presented. The strong motivation and interest on those projects enhances the University-business collaboration.

Keywords— Science Fair, Innovation, Science projects, University-business collaboration

I. INTRODUCTION

The Ministry of Education is the main provider of education in the Republic of the Union of Myanmar and is functioning with the vision to create an education system that will generate a learning society capable of facing the challenges of the Knowledge Age. The Ministry of Education is implementing short and long-term education development plan not only bringing about the enhancement of the quality of higher education, but also markedly increasing accessibility to higher education.

There are two main sub-sectors in the education sector - the basic education sector and the higher education sector. All basic education schools are under the supervision of the Ministry of Education. In higher education, there are 156 institutions specializing in varied fields such as arts and science, law, economics and business education, teacher education, foreign languages, engineering, computer studies

and culture and fine arts, etc. They offer a variety of programs –undergraduate, postgraduate diploma, master's degree programs and doctorate programs. Among these institutions, UY is a leading university in Myanmar.

(<http://www.yufund.org/>)

UY offers not only postgraduate degree programmes but also the undergraduate degree with the name of (COE) what literally means *Center of Excellence* in 2014 and accepted only 50 selectively excellent students for each field of studies. UY celebrates the Science Fair annually as a main event. It aims to provide a unique opportunity for students and the public who are interested in Scientific Technology, to get knowledge on the teaching aids, the laboratory equipments and the research instruments and to get interaction between the scientists and the supplier companies.

(Science Fair, Show Directory, 2014).

37 participants including Universities' Research Centre, Science Workshop, University of Yangon, Dagon University, Ministry of Science and Technology and other Technological Companies show off their products in 56 booths and share their knowledge in seminar rooms of the Universities' Research Centre.

There is a significant event of science projects demonstration and competition where the undergraduate students promote their skills in Innovative Science.

This paper will present the innovative research projects of undergraduate students in Science Fair-2015. There are 28 groups from eight science departments and the list of projects is given in Table 1.

TABLE 1

THE GROUP NAME AND PROJECTS TITLE IN SCIENCE FAIR-2015, UNIVERSITY OF YANGON

Sr No	Group Name	Code No	Projects Title
1	Zenith	SF-15001	Incredible Waves
2	YU Physics Group-2	SF-15002	Generating Electricity from Walking
3	I got 7	SF-15003	Electricity , Proving Laws and Fun
4	M 5	SF-15004	Synthesis of Bio-plastic Film from Cassava Starch
5	Halogens	SF-15005	Manufacture of Thanakha Shower Cream
6	Forward	SF-15006	Bleaching Fish Sauce with Activated Carbon for Low Cost
7	Lollipop	SF-15007	Utilization of gelation from Chicken Legs
8	Magic Lab	SF-15008	Magic Lab
9	Rosy Pink	SF-15009	Preparation of Facial Toner Based on Rose Water
10	Big Hero Six	SF-15010	Preparation of Hair Cream and Hair Gel Based on Henna Extract
11	Teenagers	SF-15011	Preparation of Dried Egg Powder and Mayonnaise
12	Polaris	SF-15012	Processing and Utilization of Mustard Seeds (Moan-Nhing) Ointment Formulation
13	4 Units	SF-15013	Formulation of Herbal Shampoo from False Daisy (Kyeik-Mhan)
14	Cryo Ice	SF-15014	Utilization of Processed Dry Ice (Solid Form of CO ₂) for Freezing of Food Product
15	The World's Greatest Chemist	SF-15015	Preparation and Utilization of Waterproofing Agent
16	Number 9	SF-15016	Secret Keyboard
17	The Bridge	SF-15017	University of Yangon News
18	Sixsis	SF-15018	Amazing Lava Ornament
19	Black Diamond	SF-15019	Nature Mineral Makeup and its Applications
20	Seven Angles	SF-15020	Plastic Bottle Mouse Traps
21	Koala	SF-15021	Making a Chitin Cleaning Mask
22	Bullet Proof	SF-15022	Production of Lip Gloss from Nature Ingredients Including Fish Scales
23	Hello Kittery	SF-15023	Making Cat Food from the Biological Product
24	Little Botanists	SF-15024	Disease Resistant Grafted Bougainvillea Plants
25	Botany First Year Girls	SF-15025	Simple Home-made Natural
26	Botany First Year	SF-15026	Egg shell Instead of Ground
27	May Thu Soe	SF-15027	Make Your Own Incredible-Colored
28	Future Geographer	SF-15028	Sky view

We can categorize the projects according to their fields of research as follows:

1. Energy education
2. Consumption product
3. Basic science
4. Computer science

The evaluation on those projects has been done according to the interest impression on them by voting of students, faculties and audience.

II. ENERGY EDUCATION PROJECTS

There are three renewable projects of physics students. Two of them will be discussed in this section.

A. Incredible Waves

The first energy project is **Incredible Waves** by Zenith group from Physics department. The students construct the model as shown in Figure 1 to generate electricity from wave energy. They use easily available materials such as expanded polystyrenes, a small dynamo etc. for their model. They understand the basic mechanical design concepts, energy conversion process and can also explain how to convert the energy of ocean surface waves to electrical energy. The presentation of this group has covered advantage of renewable energy over non-renewable types and the potential of future

electricity production for Myanmar possessing the long coastal regions. (Science Fair, Show Directory, 2015).

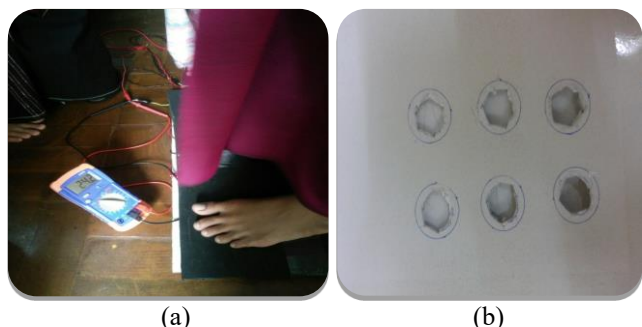


FIGURE 1 The prototype of the incredible waves project

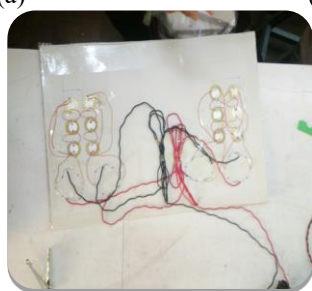
B. Generating Electricity from Walking

The project named **Generating Electricity from Walking** is demonstrated by YU Physics group. The project focuses on the energy generating from vibration using piezo electric effect. The students use the piezo discs of small piezo speakers. The impact on a piezo disc generates voltage because of electromechanical interaction between the mechanical and the electrical state in crystalline materials. The students mount some piezo disc on the card board and make suitable electrical connection among discs as shown in Figure 2. To optimize the

number of discs and connection scheme they make systematic measurements of electrical power to obtain energy to light a small bulb. Walking on the piezo mounted cardboard lightens the bulb connected to it. According to their presentation they will upgrade this research from lab scale to commercial level to be applied as electricity supplies for traffic signal and signs. (Science Fair, Show Directory, 2015).



(a) (b)



(c)

FIGURE 2 (a) The demonstration of generating electricity using piezo and (c) on the connector board

III. CONSUMPTION PRODUCT PROJECTS

The seventeen commercial product projects are shown by chemistry, industrial chemistry, geology, zoology and botany departments.

C. Synthesis of Bio-plastic Film from Cassava Starch

Synthesis of Bio-plastic Film from Cassava Starch project was presented by M-5 group from chemistry department. The purpose of this project is to synthesize the environmental friendly plastics which are biodegradable, to replace at the fossil-fuel plastics and to reduce the use of non-biodegradable plastics. The Fossil-fuel plastics that has been widely been used for different purposes have the lack of biodegradation property and they have been an environmental trepidation. Replacement of the bio-plastic is one of the best ways to solve these problems. Because of the use of renewable resources and biodegradability, bio-plastics are more environmental friendly. Although there are many types of Bio-plastic, starch-based plastics are cost effective. Potato, corn starch are abundantly used in synthesis of Bio-plastics but cassava starch is used in this project because plenty of cassavas can be obtained in Myanmar. The students demonstrated their project and

explained the procedures of the experiment as shown in Figure 3. (Science Fair, Show Directory, 2015).

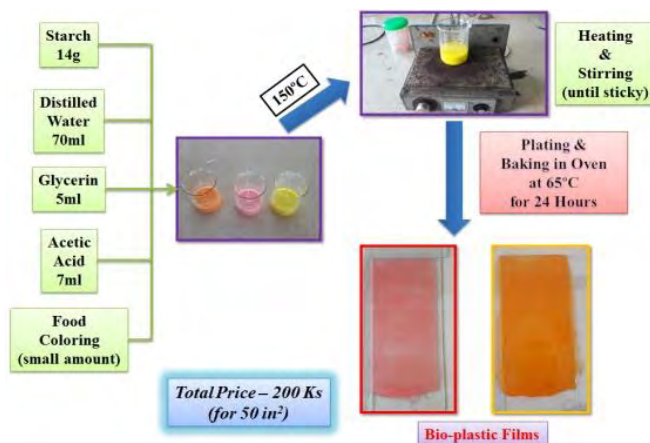


FIGURE 3 Synthesis of the **Bio-plastic Film**

D. Manufacture of Thanakha Shower Cream

The project of Halogens group from chemistry department is **Manufacture of Thanakha Shower Cream**. The Thanakha shower cream is mainly made of Thanakha (*Hesperethusa crenulata*) including ingredients of honey naturally pure, olive oil and vitamin E oil that help the skin of any type in role of moisturizing, smoothing and clearing deeply and removing of dead cells and acnes. Breeze of Thanakha refreshes the persons and reduces the stress dramatically. The Thanakha shower cream keeps trusty at high quality ingredients as shown in Figure 4 and can be produced with reasonable price. This project is very popular for female audiences and has a potential for commercial production. (Science Fair, Show Directory, 2015).



FIGURE 4 The ingredient of *Thanakha* shower cream

E. Utilization of Processed Dry Ice for Freezing of Food Product

This project is demonstrated by *Cryo Ice* group of second year industrial chemistry students. Carbon dioxide, in all its form, can be used for many purposes. It is important to use its capabilities correctly in order to achieve the desired effect and eliminate hazards. The solid form of carbon dioxide is extremely cold (-78.5°C), so it is used for freezing of food

products. The objectives of the Cryo Ice projects are to study the properties of carbon dioxide, to show how to make the dry ice at home, to conduct identification tests and physical properties of prepared dry ice, to utilize the solid CO₂ in food freezing (e.g. cryo-ice sphere and chocolate) products and to control the quality of these products. So, it is found that the dry ice gives more effectiveness in reducing temperature by mixing with 99% isopropyl alcohol and without using mechanical cooling and electricity. The production steps and samples of product are shown in Figure 5. (Science Fair, Show Directory, 2015).

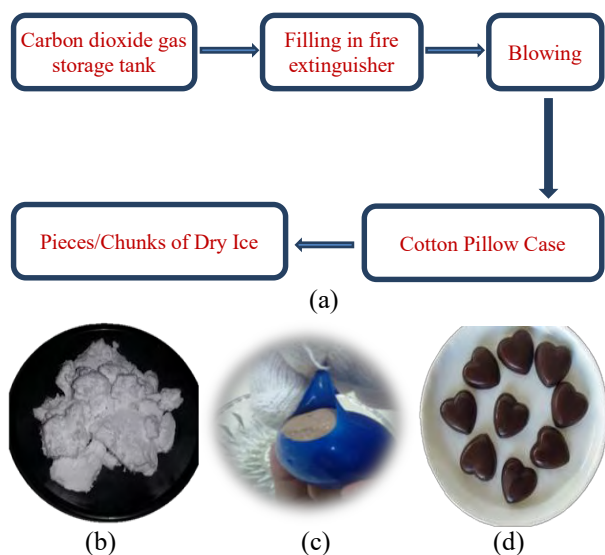


FIGURE 5 (a) Dry ice production steps (b) Home-made dry ice (c) cryo-ice sphere and (d) chocolate

F. Making Cat Food from the Biological Product

Hello Kittery group of zoology students makes cat food. The cat food is cheap and good for nutrient with no side effect because it is made from natural products. The ingredients of the cat food which are marine fishes, useless bones from markets are grained and mixed. Therefore it consists of natural food sources and ingredients that do not contain preservatives, artificial ingredients or synthetic chemicals. Making healthy cat food with effective and less side effects for the cats is the aim of this project. The demonstration of the cat food samples and ingredients are illustrated in Figure 6. (Science Fair, Show Directory, 2015).



FIGURE 6 The photograph of the cat food samples and ingredients

IV. BASIC SCIENCE PROJECTS

The five basic science projects are conducted by industrial chemistry, geology and botany students. Two of them will be discussed in this section.

G. Amazing Lava Ornament

The first basic science project is presented by Sixsis group of six geology female students. Rock becomes liquefied within the crust or upper mantle as the result of combined effect of temperature and pressure. The heat is provided by the decay of radioactive material. As a result of tectonic movements, the magma is forced upward. According to its composition and temperature, if the lava is basic, it is very mobile but if it is acid it is viscous.

Materials used are glass bottle, vegetable oil, food coloring, oxygen pipe (instead of fizz table) and light. It can be used as an ornament placed in the living rooms and bedrooms, dim-light decoration at the restaurants. It can be the romantic presents for the couples, pleasurable gifts for children. The purposed of the projects are exploration of tectonic movement in the magma chamber, based on the nature of lava flow and concerning with igneous rock formation and volcanic eruption as illustrated in Figure 7. (Science Fair, Show Directory, 2015).



FIGURE 7 The demonstration of the nature of lava flow

H. Disease Resistant Grafted Bougainvillea Plants

The second basic science project is **Disease Resistant Grafted Bougainvillea Plants** of Little Botanists group. Grafting is a horticultural technique used to join parts from two or more plants so that they appear to grow as a single plant. In this method, the upper part (scion) of one plant grows on the stock of the plant. Since, it is the asexual or vegetative methods of propagation, the new plant that grows from the scion. Also, these methods give the plant a certain characteristic of the stock; for example- hardiness and disease resistant as shown in Figure 8. (Science Fair, Show Directory, 2015).



FIGURE 8 The grafting of the stock

V. COMPUTER SCIENCE PROJECTS

There are three information technology projects of computer studies and geography students. In this section the two information research projects will be discussed.

I. *Secret Keyboard*

The *Secret Keyboard* project is developed by computer studies students. The students implement the android application program for mobile devices. This keyboard system consists of shortcuts for commonly used words and can encrypt and decrypt the text. (Science Fair, Show Directory, 2015).

J. *Skyview*

Future Geographer group from geography department developed the project named *Skyview*. The purpose of the project is to measure the temperature and moisture at a high altitude. The temperature and humidity sensors attached to the Arduino microcontroller data logger system are mounted on the air pressure based plastic bottle rocket. After launching the rocket, the controller starts to collect the environmental data and the rocket land safely using a parachute. The demonstration of plastic bottle rocket and its assembly in skyview project are given in Figure 9. (Science Fair, Show Directory, 2015).

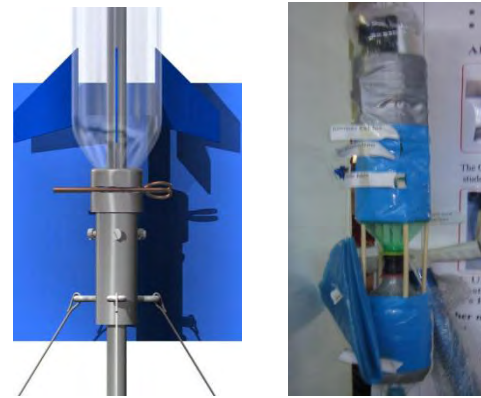
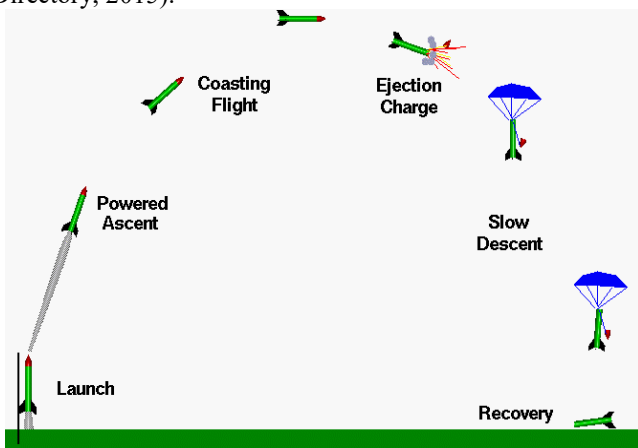


FIGURE 9 The demonstration of skyview project and its design

VI. DISCUSSION

The undergraduate students from the UY have strong interest in the project competition in Science Fair, 2015. Demonstration of their own particular strength and idea improves their motivation. All of the members are actively participated for their projects and the students' area was the most crowded place. Interacting with faculties, other audience and students provides extra motivation for learning to many students.

The next purpose of this event is to enhance the University-business collaboration. At present, Universities in Myanmar are trying to improve the University-business collaboration. Universities are an integral part of the supply chain to business (Pertuze et al, 2010). On the other hand, the university sector cannot achieve excellence in research and innovation by itself. The sponsors and supports from the business and industries are also important for Universities' Research and Development. (Santoro and Betts 2002), (Wilson, 2012)

In Science Fair events, not only students and researchers but also companies and industries were participated. The opportunities of non-formal face-to-face discussion between university and business sectors were achieved. The business men are interested in some projects and discussed the requirements to promote it to product level. Especially the cat food project has been got a sponsor to continue the research to be a product. Some other projects are in discussion to promote to business scale.

Two days evaluation for the projects was done by audience and the number of votes for each group is illustrated in Figure 10. Total number of vote is 3401 and it is the 65% of the peoples visited to the Science Fair. *Generating Electricity from Walking* project got the maximum vote and this group was awarded first prize. This project is simple and its low cost design makes attraction for audience. This design is based on energy harvesting technique but it is not possible to use to supply sufficient amount of energy for household uses because of low power production and its transient nature (Brennan et al, 2007). Although *Incredible Waves* project has a high potential the design is complex and less attractive in demonstration than the *Generating Electricity from Walking* project.

The dry ice production project and synthesis of bio-plastic film from cassava starch project were in second and third place respectively. All of these projects are based on the deep understanding of scientific method, level of scientific literacy and conceptual thinking for research. Moreover, the demonstration and presentation scale of these research groups are more attractive than others.

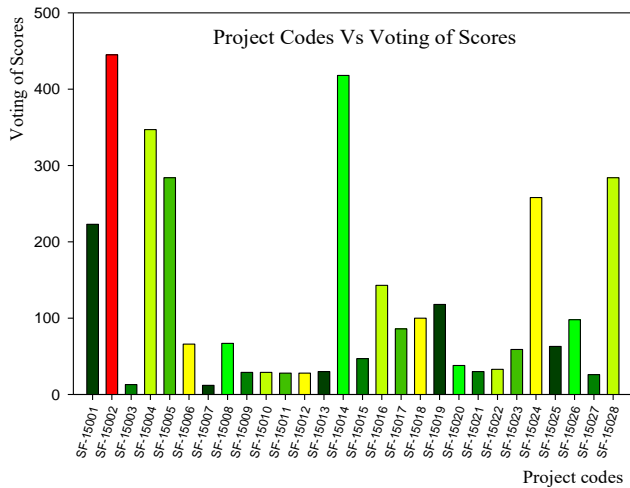


FIGURE 10 The number of votes for each project

The students were asked a series of questions regarding their suggestion on the projection competition. The questions are based on the motivation on the project, impact on their future research, collaboration with other fields of research, funding for projects and frequency of projects competition. The statistics for evaluation are given in Figure 11.

The students have strong motivation for their research and can carry the idea and experiences of current projects to their future works. The idea of the projects mostly based only on their field of specialization. Therefore, they cannot scope other areas of specializations and have low potential to collaborate with students from different specializations.

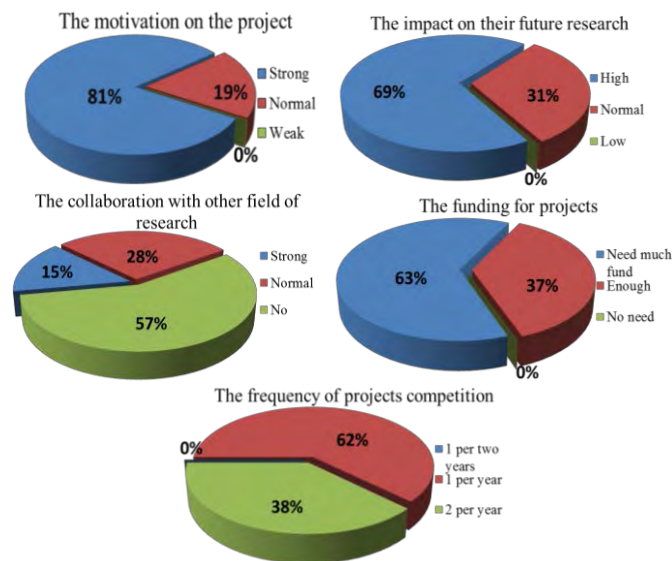


FIGURE 11 The evaluation on statistics of students suggestions

During the Science Fair event some audience were also interviewed to get their suggestion on the project demonstration and competition. The comments of the audience were collected on the points: the interest on the science projects, level of research for undergraduate students, the most interest research area, applicability, possibility to continue production scale, supporting for research and innovation and frequency of science projects competition. The evaluation on the audience results are illustrated in Figure 12.

From the evaluation results of students and audiences, it can be seen that both are strongly interested in Science Fair event and that leads to improve the University-business collaboration in near future. To be more effective on the project development the duration should be at least 1 year and the research funding should be covered for each project because the funding is not enough for some project and the cost depends on the type of project.

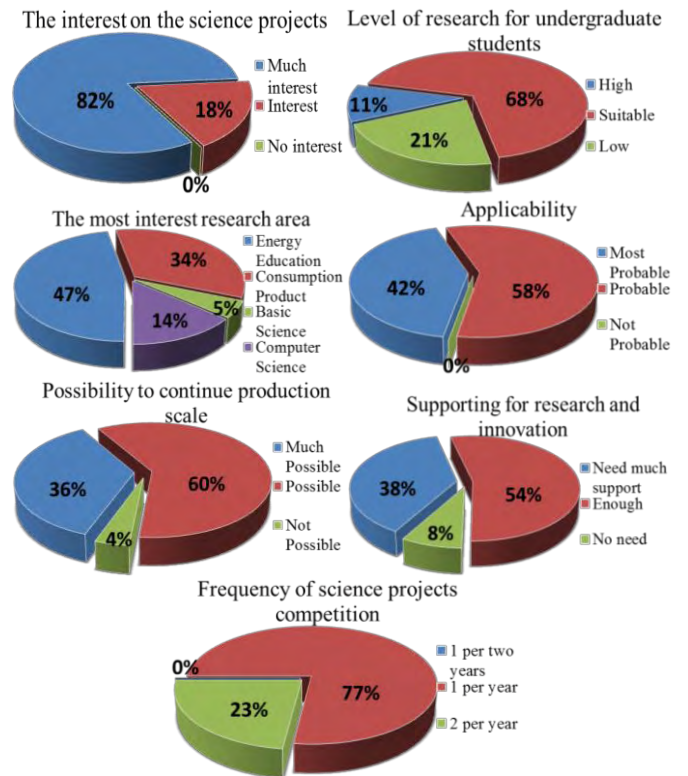


FIGURE 12 The evaluation results of audiences from project demonstration and competition

VII. CONCLUSION

This study focused on the impact of the innovative project competition in Science Fair, 2015, UY on academic and social activities of undergraduate students in UY, interaction of public and university environment and University-business collaboration. These events also explored the profile and academic activities of UY to the public and business persons and it enhances the linkage between Universities and Socio-economic community in teaching, leanings and research

activities. It also prepares youth for imparting the capacity to create new jobs through self-employment and entrepreneurship rather than increasingly scarce salaried jobs.

ACKNOWLEDGEMENT

The author would also like to acknowledge to the innovative science project groups, University of Yangon who gave the permission to use all required equipment and the necessary materials to complete this paper.

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