IBO 2014

FINAL REPORT

IBO 2014 Report Content

Contents

IBO 2014 Report Content 2

Preface 4

1. Organization 5

1.1. Organizing Committee 6

1.2. Scientific Committee 6

2. Facts and Figures 7

3. IBO 2014 7

3.1. Logo 7

3.2. Funding 8

3.3. Program 9

3.3.1. Ceremonies 11

3.3.2. Excursions 15

3.3.3. Educational Session 15

3.3.4. Evening Programs and Entertainments 15

Ice Breaking 15

Introduction to Lab Equipment 16

Beach Activity 16

Video Competition Voting 17

Gala Dinner 17

Farewell Party 17

3.4. Logistics and Infrastructure 17

3.4.1. Accommodation 17

3.4.2. Food and Beverage 20

3.4.3. Transport 21

3.5. Volunteers 21

3.5.1. Selection Process 23

3.5.2. Training 24

3.6. Media and PR 24

3.6.1. Using the Internet 25

3.6.2. Media and Other Publication Means 26

3.6.3. Publication and Documentation During IBO 26

3.7. Registration and Administration 27

3.7.1. Invitations 27
3.7.2. Online Registrations 27
3.7.3. Observer Invitations 27
3.7.4. Visa 28
3.7.5. IBO 2014 Registration in Denpasar 29
3.8. Miscellaneous 30
4. Exam 31
4.1. Exam Preparations 31
Exam Workshop 31
Practical Exam Try Out 31
IT Support 31
Subgroup Meeting 31
4.2. Practical Exams 32
4.2.1. Practicals Design 32
4.2.2. Setting up and Running the Practical Exams 33
4.3. Theoretical Exam 36
4.3.1. Running the Theoretical Exam 37
4.4. Statistical Analysis of the Obtained Scores 37
4.5. Exam Reception 45
4.6. Post-Event: Medals and Certificates 46
5. Appendix 49

Preface

IBO 2014 was a special IBO considering that IBO 2014 is the 25th IBO, the year's IBO must not be suspended because no country was ready after New Zealand retracted their proposal to host IBO 2014. In 2012, the IBO Advisory Board offers Indonesia the chance to host IBO 2014, six years earlier than our proposal to host IBO 2020. Therefore, the Indonesian Team for Biology Olympiad (TOBI) coordinated with the Ministry of Education and Culture to consider Indonesia's feasibility as a host country. The meeting yielded positive response from the minister that time, with a letter of support signed by then Indonesia's Minister for Education and Culture, Prof. Dr. Muhammad Nuh. Thus, Indonesia officially declared its readiness as the host of IBO in 2014.

After conducting surveys in several cities, we decided that Bali is an ideal place to host IBO. Bali is one of the world's most exotic destinations. Wonderful Bali never fails to warm the heart of visitors. As soon as you step off the plane, the island's breathtaking sceneries, aromatic smells, marvelous trinkets, interesting people and cultures directly welcome you. These make Bali an ideal place for meeting and with great pleasure Bali is proud to host the 25th IBO.

The Minister of Education and Culture officially opened IBO 2014 on the 6th of July 2014. During an intense week of 6-13 July, we believe that all of you would remember all those precious moments happened in Bali.

We thought that our job has already done by the IBO 2014 closing ceremony, yet the committee has to endure subsequent task and other problems. This final 25th IBO final report summarized all these experiences and we would like to share with other IBO members. Hopefully, this report would help future IBO hosts to avoid the possible pitfalls that we faced.

Finally, we would like to express our gratitude to the Indonesian Ministry of Education and Culture for their continuous support and all our counterparts who have contributed greatly to IBO 2014. Without you, the IBO 2014 couldn't be more fun.

1. Organization

In Indonesia, the Directorate General for Secondary Education under the Ministry of Education and Culture organizes the National Science Olympiads. It was inspired by the success Indonesia received after becoming the host country for the 2002 International Physics Olympiad at Bali. The organizing committee discussed the possibility of managing similar events on a national scale for Indonesia. A National Science Olympiad for high school students was then accomplished in the same year. This event received positive response from the Ministry of Education at that time and National Science Olympiad have since then been held in different provinces in Indonesia every year.

Biology, as one of the subjects tested in National Science Olympiad, have always been prepared by Institut Teknologi Bandung (ITB) in accordance with the syllabus of the International Biology Olympiad (IBO). Institut Teknologi Bandung was also involved with the training of Indonesian delegates for IBO every year in addition to serving as Indonesian jury members. Hence, its people were experienced in International Scientific Olympiads. TOBI (Indonesian Team for Biology Olympiad) was established as an organization responsible for the selection and training of Indonesian delegates for IBO every year. This organization consists not only of academic staff capable in managing and training for the Indonesian delegates, but also alumni of previous IBO delegates. TOBI is also responsible for communications between International Biology Olympiad and Directorate General for Secondary Education ever since Indonesia participated in the IBO.

When Indonesia was entrusted to host IBO 2014, TOBI sought government support and a separate project-based organization was formed specifically to be in charge of the IBO. A collaboration was established between Sekolah Ilmu dan Teknologi Hayati, Institut Teknologi Bandung (SITH ITB), and Directorate of High School Development, Ministry of Education and Culture, Republic of Indonesia. The project organization consisted of two committees—organizing and scientific—reporting to a steering committee. The heads of these committees were employed on a temporary basis for their skills in their specific area of work. The indispensable insider knowledge about the IBO was ensured by involvement of longtime members of the IBO, who among others held the position of chairman of the organizing committee and the head of scientific committee.

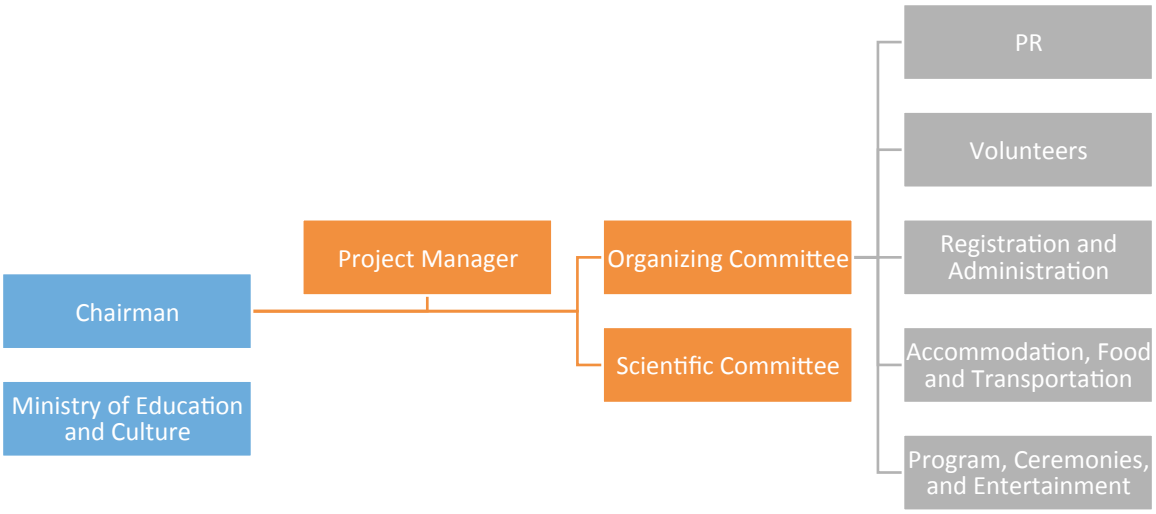


Figure 1.1. IBO 2014 organization chart

1.1. Organizing Committee

The chairman of IBO 2014 came from Institut Teknologi Bandung and coordinated directly with the Ministry of Education and Culture to arrange all administrative, operative, and scientific aspects of the IBO 2014 programs. The persons in charge on the organizing committee were as follows.

Chairman	:	Dr. Agus Dana Permana	Institut Teknologi Bandung
Member	:	Harris Iskandar, PhD.	Ministry of Education and Culture Indonesia
		Suharlan	Ministry of Education and Culture Indonesia

In order to implement the instructions from the Organizing Committee, Management team was structured. The persons in charge for all management aspects of IBO 2014 are as follows.

Head of Secretary	**:**	Intan Taufik, M.Si.	Institut Teknologi Bandung
Project Manager	**:**	Dr. Ahmad Faizal	Institut Teknologi Bandung
Treasurer	**:**	Fenryco Pratama, M.Si.	Institut Teknologi Bandung
Head of Scientific Committee	**:**	Prof. Intan Ahmad	Institut Teknologi Bandung

A total of 12 persons were in charge of event along with 10 persons from the Ministry as supporting staff.

1.2. Scientific Committee

The exams were organized by a scientific committee, which was composed of various people bringing complementary expertise. For a proper function of the large committee, it consisted of several subcommittees interacting in clearly defined ways. The members of the scientific committee responsible for the different practical exams are as follows

Cell and Molecular Biology	**:**	Dr. Maelita Ramdani Moeis	Institut Teknologi Bandung
		Dr. Anggraini Barlian	Institut Teknologi Bandung
Plant Anatomy and Physiology	**:**	Dr. Iriawati	Institut Teknologi Bandung
		Dr. Rizkita Rachmi Esyanti	Institut Teknologi Bandung
Animal Physiology and Systematics	**:**	Dr. Ramadhani Eka Putra	Institut Teknologi Bandung
		Daru Yuli Setyanto, M.Si.	Institut Teknologi Bandung
Ecology and Ethology	**:**	Dr. Devi Nandita Choesin	Institut Teknologi Bandung
		Dr. Lulu Lusianti Fitri	Institut Teknologi Bandung

Other than being experts in the designed practical exams themes, these members have a long experience in National and International Biology Olympiad. In preparation and implementation of theoretical exams, the committee was supported by scientific assistants, which vary in number depending on the requirement of each topic with a total of 48 persons.

2. Facts and Figures

The 25th IBO, the silver birthday of IBO, was hosted by Indonesian Ministry of Education and Culture and Institut Teknologi Bandung:

July 5-13, 2014

In Denpasar, capital city of Bali province, Indonesia

61 delegations

3 observer countries

239 students

210 jury members (jury and additional jury)

12 observers

17 visitors

91 volunteers

148 medals distributed—26 gold, 48 silver, and 74 bronze

23 certificates of merit

3. IBO 2014

3.1. Logo

The IBO 2014 logo represents the Bali Myna (*Leucopsar rothschildi*), also known as Bali Starling, Bali Mynah, or locally known as Jalak Bali. It is an endemic Indonesian bird species only found in Bali. In 1991, this bird was officially designated as the fauna symbol of Bali. Because of illegal poaching and habitat loss, the Bali Myna is critically endangered, with wild population hovering immediately above extinction for several years now.

The Bali Myna was chosen as a logo because it represents the beauty of Bali and Indonesia. This bird is also known to be courageous, reliable and smart, important characteristics for young scientists. The blue color in the logo represents both the sky and the sea which are usually associated with open spaces, freedom, and expansiveness. Red and white carried by the letter 'O' represents the Indonesian flag as the host country. The flying bird shows awareness and competitiveness. We are convinced that IBO 2014 in Indonesia will fly young scientists to reach higher goals and foster the spirit of friendship.

Figure 3.1. IBO 2014 Logo

The IBO 2014 Logo embodies the visual identity of IBO 2014 and cannot be used, whether in whole or in derived form, by external organizations, websites or other entities without permission.

3.2. Funding

IBO 2014 is fully supported by the Ministry of Education and Culture. Around more than 1,250,000 USD was spent on IBO 2014 with the highest expenditure on accommodation (46% of budget) and the lowest expenditure on Secretariat and Organizing Committee needs (1.40% of budget). The details of the IBO 2014 expenses is shown in Figure 3.2.

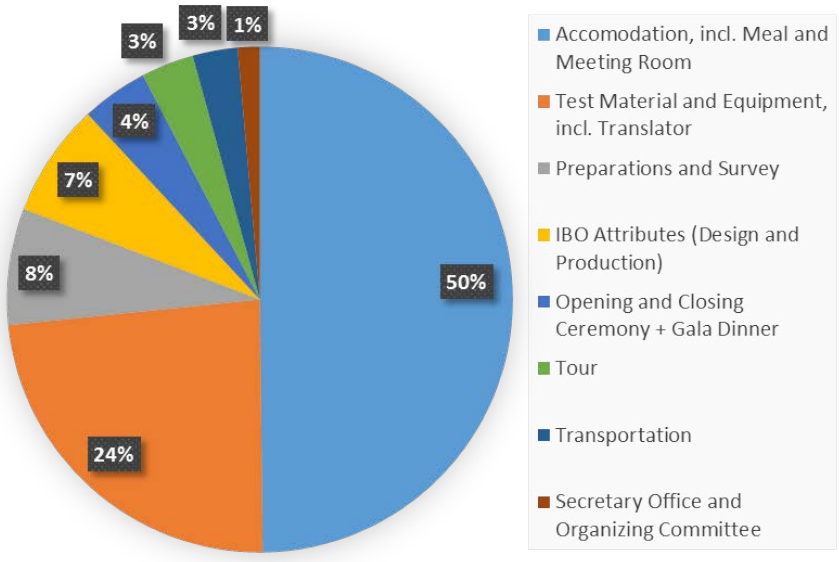


Figure 3.2. Expenses of IBO 2014 in percent of overall budget

The fee for IBO 2014 delegates was determined from calculating the average registration fees of previous IBOs. All the income gained from the fees were summed up to approximately 264,000 USD and covers around 21% of the total expenditure. The highest portion of registration fee came from additional juries (48.29% of total registration fee) whereas the lowest came from the observers (2.84% of total registration fee). Indonesia did not pay the fees for registration and additional jury as it was the host country. The details of income from registration fees are:

Table 3.1. Details of income from IBO 2014 registration fees

Item	Cost	Units	Quantity	Total
Participating Countries	USD 2,000	Team	60	USD 120,000
Observers	USD 1,500	Pax	3	USD 7,500
Additional Juries	USD 1,500	Pax	85	USD 127,500
Visitors	USD 1,500	Pax	6	USD 9,000

Institut Teknologi Bandung had also provided generous contributions such as laboratory rooms for practical and theoretical exam preparations, committee meetings, and secretary office.

3.3. Program

We adopted the IBO 2013 program as the guide to give more time for the jury's work and add a subgroup meeting five days before delegates' arrivals. A last minute change before the start of the week was also made when one of the invited countries, Afghanistan cancelled their participations. There was no change in program during the IBO except several late starts of the exams due to technical problems. A summary of the program is highlighted in the table below.

Figure 3.3. Delegation arrival and picking up at the airport

Table 3.2. IBO 2014 week program for jury and student

Day (2014)	Students	Jury/Observers
1-5 July		Subgroup Meeting (Team 12)
Saturday 5 July	Arrivals and Registration	
Sunday	Arrivals and Registration	
6 July	13:00 : Opening Ceremony	
Monday	Ice Breaking	Discussion and Translation of
7 July	Introduction to Lab Equipment	Practical Exams
Tuesday	**PRACTICAL EXAM**	Discussion and Translation of Theoretical Exams
8 July		14:00 : Uluwatu + Kecak Dance
Wednesday 9 July	Tour – Bali Safari	Discussion and Translation of Theoretical Exams
Thursday	**THEORETICAL EXAM**	Tour – Bali Safari
10 July	17:00 – 19:00 Student and Jury Meeting	
Friday	Free Time	Coordinator Meeting
11 July	14:00 : Uluwatu + Kecak Dance	Checking and Finalization of Scores
Saturday	Free Time	Educational Session
	13:00 : Closing Ceremony and Medal Presentation	
12 July	Gala Dinner	
Sunday, 13 July	Departure	

3.3.1. Ceremonies

The IBO week begins with the official opening ceremony on Sunday, 6 July 2014 and ends with the closing and medal ceremony on Saturday, 12 July 2014. These ceremonies were held in Bali Nusa Dua Convention Center (BNDCC). BNDCC have been known for its credibility in providing venues for international events such as ASEAN Summit and the East Asia Summit in 2011. The decoration was designed to give a traditional and festive impression for both ceremonies.

At the opening ceremony, the delegates were welcomed with Tari Sekar Jagat, a traditional Balinese welcome dance, and Tari Nusantara, a collection of traditional dances from all over Indonesia performed into a ten-minute medley. We were honored to have the highest representative from Ministry of Culture and Education, Prof. Dr. Muhammad Nuh the minister himself, to deliver his short speech and officially open the IBO 2014

week. He came late nevertheless due to unexpected circumstances holding back the opening ceremony although the program had accounted for the minister's late arrival. Government dignitaries may request on the spot changes to accommodate their schedule so that we recommend flexible schedules along with alternative program planning.

Figure 3.4. the Minister of Education and Culture officially opened the IBO 2014

Figure 3.5. IBO 2014 opening ceremony

We have also arranged the contemporary Bali dance and modern dance to perform between the medals announcements at the closing ceremony. A total of 148 medals—26 gold, 48 silver, and 74 bronze—were distributed on stage along with certificates. IBO 2014 thus was closed by the Vice Minister for Education, Prof. Dr. Musliar Kasim.

Figure 3.6. Mini clip of IBO 2014 excursion (top left – Ayodya beach; top right – Uluwatu temple; middle – Bali safari and Marine Park; bottom - IBO configuration on Bali theatre stage at Bali Safari)

3.3.2. Excursions

The excursions for IBO 2014 were chosen to highlight the natural and cultural signature of Indonesia. Thus, we brought the students and juries to Uluwatu Temple and Bali Safari and Marine Park.

In Uluwatu Temple, the students and juries enjoyed Kecak dance, the most famous Bali dance created in 1930's by a Balinese dancer, Wayan Limbak, and a German artist, Walter Spies. The dance is always performed just before sunset and continues under the darkness of nightfall. The dance was designed to incept the magical ambience of the traditional Sanghyang exorcism rituals with portions of the Hindu epic, Ramayana. Uluwatu lies high on a cliff top at the edge of a plateau 250 feet above the Indian Ocean, the invited delegates also had the chance to enjoy one of Indonesia's unique spots before sunset.

During the visit to Bali Safari, the students and juries were invited to witness Indonesia's marine and terrestrial animal diversity. Bali Safari and Marine Park is actively involved in ensuring the future survival of many Indonesian species through engaging education and conservation programs, such as the conservation of Bali Mynah, Sumatran Elephant, and Sumatran Tiger.

As fun as it might be, the excursions have several problems during execution. For example, without adequate preparation and coordination, students and juries will be forced to wait at the entrance of the excursion venue, which may take a long time. The solution was to ensure that the venue management is well informed about the venue and the activities that will be carried out during the visit. The activities might also drag out of schedule due to various conditions. Therefore, time needed for every movement must be taken into account, e.g. getting on the bus, getting off, moving towards parking lot, etc. In addition, country guides must be ensured to have their cellular phone fully charged every morning.

3.3.3. Educational Session

The educational session for IBO 2014 was prepared by Directorate General of Secondary Education as IBO week was coincidently arranged during the period of Indonesian high school teachers training program. The Directorate asked whether IBO 2014 Educational Session could be held along the training so that we arranged several country delegates to deliver some materials. Thus, we had juries from Japan, Netherland, Italy, and Denmark deliver some information about the international trend of Biology education and the story of IBO. Educational session was located in Goodway Hotel, Nusa Dua, and attended by one hundred biology high school teachers. The one-hour session was executed in a rush nevertheless as it was started around a few hours before the closing ceremony.

3.3.4. Evening Programs and Entertainments

We wanted to make the participants feel the fun atmosphere during IBO 2014 thoroughly. Therefore, we held some entertainment programs to relax the students and juries during their stay in the hotels. Some programs held after sunset after a day of activities although most were held during the day.

Ice Breaking

To lift the intense atmosphere between newly acquinted participants, we arranged an ice-breaking event on Monday, 7th of July 2014 from 08.30-12.00 a.m., right before the introduction of lab equipments in Aston Denpasar Ballroom. We held group ice-breaking (a group consists of 6 countries lead by a senior guide) for 30 minutes. The games were "Get-to-know-you Bingo", "Who's the longest?", and a four games relay. The ice breaking games involved both students and their guides. Some properties for the games were easy to prepare such as printed bingo card for the first game and stationaries for the four games relay. "Who's the longest?" even did not require special properties as it utilizes anything that the students bring from their room. These games required around 15 minutes to play except the four games relay which took around 30 minutes

including explanations. Special properties were needed in four games relay though, such as human-sized "hamster wheels", bamboo, chopsticks, and ping pong balls.

Figure 3.7 Four games relay: pencil-bottle, ping-pong game, hamster wheel, and chopstick games

During the indoor ice breaking games, an incident occurred where a girl fell and sprained her leg. This might be caused by the limited indoor space available, cramping all the participants. It would be better to have the ice breaking games outdoor with adequate space; therefore, all the students can run around without bumping to each other.

Introduction to Lab Equipment

On Monday afternoon, after the ice breaking games, the students were introduced to the various lab equipments that will be used for the practical exams. This session was held to reduce the amount of human errors and confusion during practical exams. Several members of the scientific assistants were assigned to answer confused students understand procedures and demonstrate the use of the the displayed instruments. The assistants were previously briefed on the possible questions coming from the students about the laboratory equipments.

Figure 3.8 Introduction to laboratory equipment used for practical exams

Beach Activity

Bali is famous for its beach so we did not want our participants miss it. Therefore, we arranged a beach activity on the morning of Friday, 11th of July 2014 around 09.30-12.30 a.m. right before student-jury meeting in Ayodya Resort Beach. During the allocated beach activity, the students could stroll around the park at Ayodya

Resort, go see the wildlife around Ayodya, swim on the beach, join in some games (volley ball, ping-pong, soccer), build sand-castle, play kite, and partake in other outdoor activities. In other words, it was a free time for all the participants and guides.

During the beach activity, it's hard to control the crowd that has dissipated to every corner of the beach. We were using a private resort, so the usage of megaphone was not possible. The guides had some difficulty in gathering all the students to take their lunch and get ready to go to Uluwatu. It's easier to control the crowd if using a megaphone to remind the students about the time. However, the hard work paid off as the students thoroughly enjoyed having free time for themselves and mingling with friends and the guides. Free time must be available so that the students can have a lot of time mingling with each other. However, it is important to place emphasis on all the guides need to be strict about time and to always watch the students.

Video Competition Voting

We allocated around one hour on Saturday, 12th of July 2014, for the IBO 2014 Bio Video Competition voting. The voting was held in Aston Denpasar Ballroom before the gadgets were returned to the students at approximately around 09.30-10.30 A.M. In this occasion, all videos submitted was being showed through a projector and students were given voting slips to cast their vote for the best video.

Gala Dinner

At the end of IBO week, we arranged a gala dinner at Taman Jepun BNDCC, right after closing ceremony. An outdoor gala dinner was definitely a great idea. However, a backup plan is necessary in case the weather interferes with the activity. In absence of such a plan, it is recommended for the activity to be held indoors.

Farewell Party

To close the week, we held a farewell party in Aston Denpasar Ballroom right after gala dinner on Saturday, 12th of July 2014. The party was designed to with a club ambient in mind, with lightings and music from a renowned DJ in Bali. Some midnight snacks were also provided. All the guides joined in and was reminded to keep an eye on the participants to ensure the event went safely. The party was held from around 22.00 until 02.00. Only half from the students attended the farewell party as it was held after a tiring day.

The first program of the day was usually held during the early morning which is a challenge for a lot of students. A lot of students did not wake up on time since they were up until late at night. This was the cause for the removal of several programs to ensure adequate time for the main events.

IBO 2014 was held in the renowned tourist area, Denpasar, Bali. A lot of time was used just for traveling from one place to the other. This was also the reason behind why our schedule for all the recreational activities was held in the morning, to ensure that all still fresh for the activities. On the other side, morning activities are difficult to be held on time, especially recreational activities. Not all students felt obligated to wake up on time to attend the events. Thus, a balance had to be considered. Recreational activities that are soothing and relaxing in nature could be held later in the evening.

3.4. Logistics and Infrastructure

3.4.1. Accommodation

According to the IBO rules, students and juries must be separated during IBO 2014 event to avoid any kind of cheating. This rule is necessary as the juries have full access to test materials, so students must be fully isolated from any kind of contact with the juries. In order to follow this rule, students were placed in Aston Hotel Denpasar while juries were placed in Ayodya Resort Bali.

These hotels were chosen to promote Indonesian tourism activities in Bali as they are known with their credibility in promoting Indonesian tourism to international guests from the hotel features and services. These hotels were also provided with large common rooms important for communal activities such as Jury Session, Evening Programs, or the exams itself. For example, theoretical and practical exams were held in the Ballroom of Aston Hotel Denpasar while jury discussion sessions were held in the Ballroom of Ayodya Resort Bali.

In Aston Hotel Denpasar, we rented three types of room: 2B2BR (four beds in a room), 2B1BR (two beds in a room) and single rooms. Most students were assigned to stay in 2B2BR type whereas committee members and volunteers were assigned to stay in 2B1BR type. This was arranged due differences in the number of students, volunteers, and committee members staying in the hotel. As many as 52 room type 2B2BR and 14 room type 2B1BR were used for students with one male student from Greece assigned to a single room due to special request. Overall, students represent 64% of the overall IBO parties staying in Aston Hotel Denpasar. Roommates were arranged based students' preferences. Some countries did not mind if there were different sex in their room as long as they belong to the same country whereas others requested to be roomed only with roommate of the same sex.

Accordingly, student guides were placed in Aston Hotel along with several other volunteers assigned to the students. Most rooms used were of type 2B1BR (44 rooms) with only one 2B2BR room rented for a group of four student guides. Medical staffs and media were also placed in the same hotel. In addition, there were 36 rooms of type 2B1BR rented for the committee members assigned to work in Aston Hotel Denpasar. The staying period of the committee members and the volunteers were varies with the earliest check in on the 1st of July 2014. Most of the volunteers arrived on the 2nd of July 2014 whereas the committee members arrived on the 5th of July 2014. Some of the committee members arrived on the 1st of July 2014 to manage some logistics needed for the practical exam and seating arrangement.

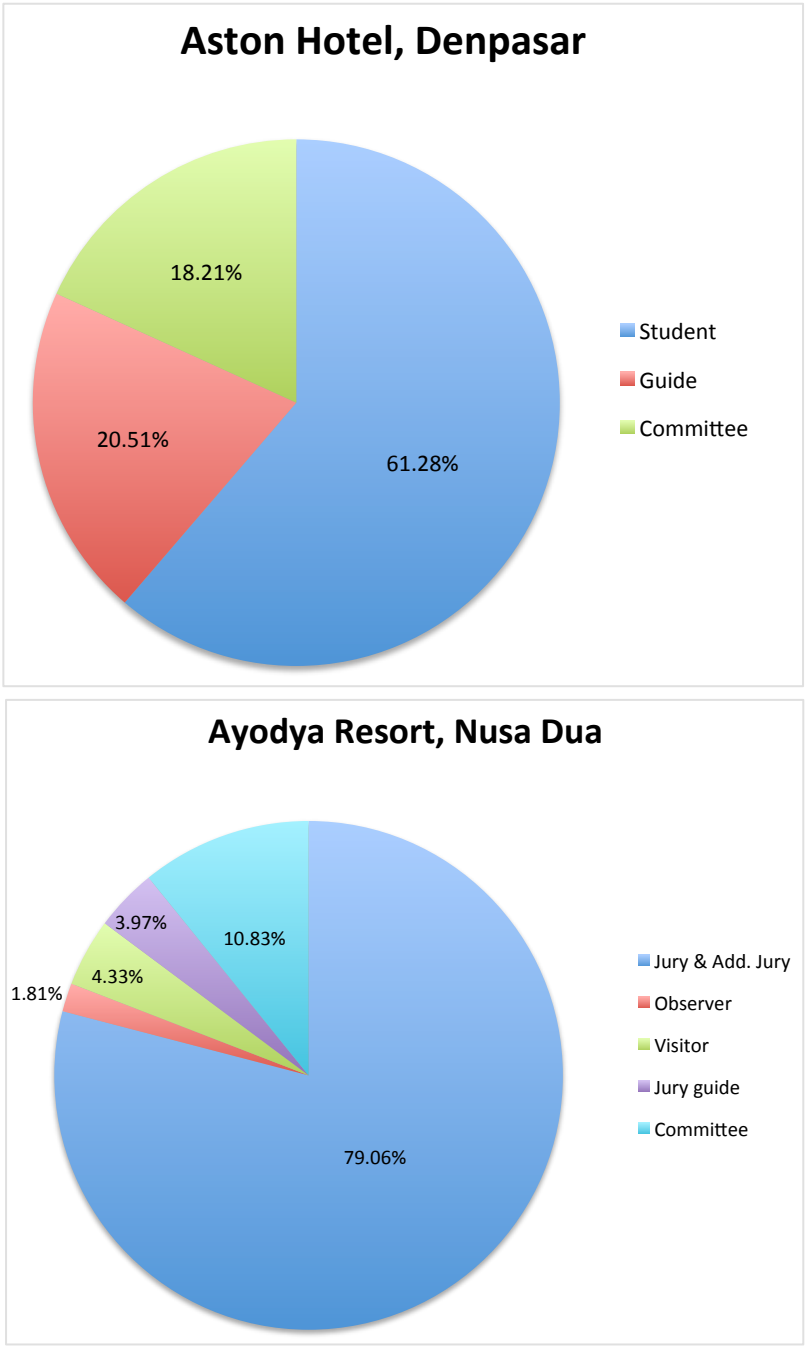


Figure 3.9. Designated accommodation in IBO 2014 with the number of persons shown before its percentage, separated with a comma.

Ayodya Resort Bali was designated for jury members, additional juries, observers, visitors, and several volunteers and committee members assigned to help out with the juries' activities. Some country delegations involved in subgroup meeting arrived on the 1st of July 2014, earlier than most juries who arrived on the 5th of July 2014. Rooms were arranged according to the juries' requests of preferred roommate. If there weren't any special preference, we arranged roommate based on sex, then country. By default, the juries were assigned for double room (two bed in one room) except for several members who preferred otherwise. For example, there

were three persons who asked for single occupancy and 40 persons asked for a single room (one bed in one room).

Most of the juries and students departed after the closing ceremony on the 13th of July. However, more than one third extended their stay to have holiday in Bali and the surrounding islands. The number of participants extending their stay and departed after the 13th of July are shown below.

Table 3.3. Extended and nonextended departure of IBO 2014 delegates

Date of Departure		Number of People
On-time (13 July 2015)		303
Extend	14 July	105
	16 July	12
	17 July	1
	18 July	10
	19 July	8
	20 July	9
	21 July	6
	22 July	4
	23 July	1
	28 July	7

Other than the hotel rooms, we also rented the common rooms in each of the hotels according to program needs. For example, we rented meeting halls for secretary office and for the practical and theory exams and ballroom for students' activity in Aston Hotel Denpasar. In Ayodya, we rented meeting halls for secretary offices and jury discussion sessions. The seating for jury discussion was arranged according to language cluster as shown in Appendix B. Other than the hotels, we also rented Bali Nusa Dua Convention Center (BNDCC) as venue for the opening and closing ceremony as it can hold the number of participants in IBO 2014.

3.4.2. Food and Beverage

Indonesian cuisines are seasoned with various spices that some participants may not like. We adjusted our food menu with international variations accordingly. Food and beverages were provided by the respective hotels according the food option requested by the participants during registration. In addition, there was no alcohol at hotel premises, and food with potential allergen was minimized.

By default, there were two types of diet provided during the event: halal and vegetarian. Aside from these two choices, a field to convey other dietary requirements or existing allergies were provided during the online registration and we have tried to cater to these requirements. The table below summarized the food preference/allergies of the delegates.

Table 3.4. List of special diets requested during IBO 2014 week

Food	Number of people
Vegetarian	28
No fish/seafood	2
Nut allergy	1
Lactose intolerant	1
Gluten intolerant	1
Other allergies	2

As the entire IBO 2014 took place during Ramadan, the Muslim fasting month, breakfast was ready before sunrise (provided in the evening of the previous day) and dinner was served just after sunset. However, we served morning breakfast, lunch, and snacks during the day for non-fasting participants.

3.4.3. Transport

We rented buses and private cars for pick-ups and transfers during IBO week. Transportation was arranged for every event, including necessary arrival and departure according to needs. The problem came when there was miscommunication between organizing team and transportation vendor, impeding the movement of participants and committee. We suggest a detailed daily briefing for the drivers to minimize miscommunication during transport. The transportation division should also have people on the field to oversee transportation and resolve issues which might arise during movement.

Every delegation arrived at Ngurah Rai International Airport, Bali. Country Guides escorted their assigned countries at the airport if the delegations arrived at 5-6 July 2014. Delegations who arrived earlier were picked up from their hotels. The juries and students were placed on separate buses as the students were accommodated in Hotel Aston Denpasar whereas the juries were accommodated in Ayodya Resort Bali.

The country guides were having difficulties finding the participants during the pick up process. We suggest country guides to be provided with the photos of their assigned delegation. Alternatively, we may request the country to bring a sign (e.g. flag) for easier identification. We also had a problem with shuttle busses taking a long time to arrive and busses are full. Our recommendation was to ensure the availability of extra busses at the airport. If the organizing country decides to use a shuttle system for pick up, arrival peaks should be known and allocation of enough buses should be ensured during that time.

For departure back to their home country, we arranged shuttle system by bus with route Aston --> Ayodya --> Airport --> Aston. However, problems arrived when the students did not know which bus they should take and could not communicate with their jury. We suggest a brief explanation towards the students and their juries about transportation for departure during the jury-student meeting session before closing ceremony to ensure the students and juries know how they would get to the airport.

3.5. Volunteers

Almost all volunteers were designated as guides. Guides were needed as field persons on IBO 2014 events. Their duty was as a person of contact between the committee and the participants. These were the Country Guides. Other guides in contact between the committees and the juries were called Jury Guides. Due to the huge number of guides, guides have their own coordinators who then communicate with the secretariat. Volunteers assigned for other divisions under the organizing committee coordinated with the secretariat through their own representative, as will be explained in the following.

Country Guide

Each of the 61 participating countries have mostly 4 participants students with at least one jury at company. Every country was provided with one country guide whereas countries with less than four student participants (Montenegro with 3 students and Costa Rica with 1 student) were grouped together and accompanied by one country guide.

Because of the high number of Country Guides (60 person, one for each country), a hierarchical structure was made to simplify coordination between guides and committees. Every group of 6 Country Guides were headed by a Seniro Guide who are responsible for every movement and coordination made by each Country Guides. Senior Guides report to the Chief Guide, responsible for every guide. Therefore, Chief Guides only need to

coordinate with 10 senior guides to communicate with 60 country guides. The chain of command of the country guides is shown below.

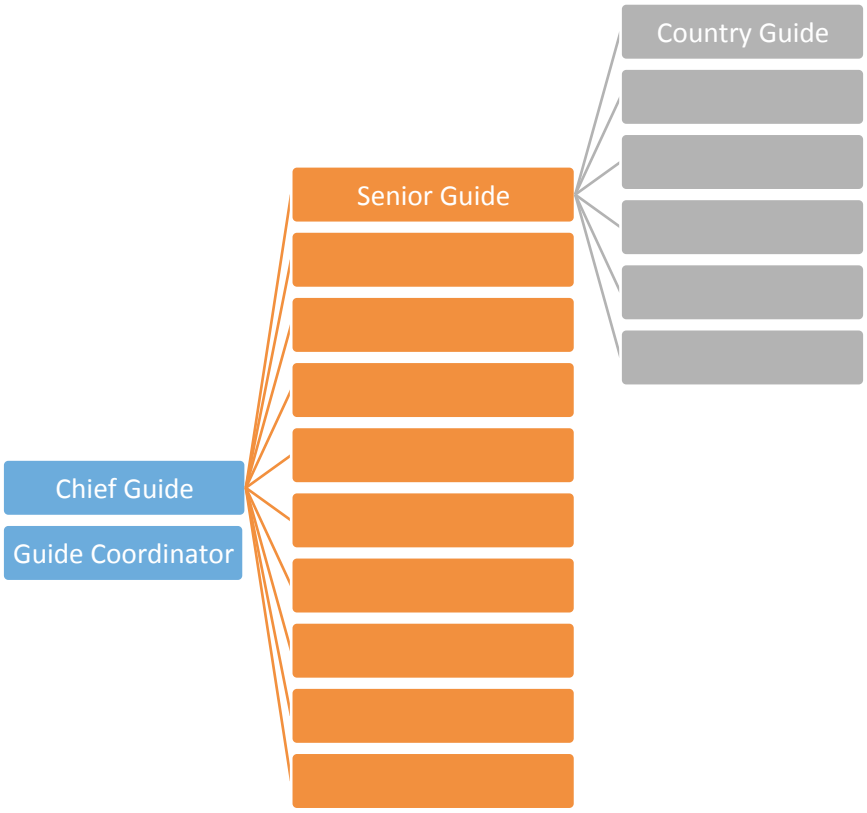


Figure 3.10. Coordination line of the country guides (the number of boxes representing each hierarchial position was kept into minimum to simplify the chart)

Jury guide

Juries were not accompanied by Country Guides. Instead, there are Jury Guides who were assigned to assist during jury discussion sessions. As well as Country Guides, Jury Guides also have hierarchical structure, though simpler because there were fewer persons. This few number of jury guides also enable the guides to work directly with the Secretariat at Ayodya Resort Bali to assist every agenda held for the juries. There were 10-13 jury guides with guide to jury ratio of 1 to 29. This made the allocation of guides based on jury buses (one guide one bus) and not by country or country groups. This causes difficulties in guiding the juries during excursions.

Secretariat

Two guides were assigned for secretariat purposes in Aston and Ayodya Hotel. Secretariat was the information and coordination center between the two hotels.

Medical Staff

Students of medical and nursing who were volunteering for IBO, including whom were selected as country guide and jury guide, were requested to be ready to respond to any medical issues that may ariseduring the event. They coordinated directly with their senior guides. Moreover, two licensed doctors were specifically assigned as medical staff who is on stand by for 24 hours to handle any medical issues that may be experienced by the committees or the participants. These doctors coordinated directly with the secretariat.

Anchor

Two anchors were selected to broadcast every agenda of IBO 2014. These anchors were a part of the documentation team who coordinated directly with the secretariat.

Newsletter

Two persons were selected to assist the making of IBO 2014 newsletter both in writing and designing. The newsletters were distributed among the participants, both students and juries, every day during breakfast in each hotels. Newsletter volunteers coordinated directly with the secretariat.

3.5.1. Selection Process

The guides of IBO 2014 are representatives of the people of Indonesia who will interact directly with the participants, either with the students or the juries. Therefore, a tight selection system was held to ensure the quality of the selected guides. The guides were selected through two rounds of selection: administrative and interview.

Call for registration of IBO 2014 guides were held between 7-28 February 2014 through IBO 2014 website. Applicants were required to submit necessary identity information (first name, last name, sex, religion, nationality, birthdate, height, weight, e-mail, phone number, t-shirt size, skype ID, hometown, university, department) along with organizational experience, interests and skills, recent photograph, and an introductory video in English. During the three weeks registration period, 193 applicants had registered.

These applicants were selected based on four criteria: nationality, English speaking proficiency (assessed from the introductory video), organizational experience, interests and skills. Indonesian nationality was important because the guides would have to guide participants in Bali and explain Indonesian language and culture. Therefore, we were forced to reject several applicants from Hong Kong, Canada, and Cambodia as they did not fulfill the requirement. Moreover, as the bridge between committees and participants, English speaking ability was an essential element for the guides. Several applicants have the ability to speak other languages such as Chinese, Japanese, and German, which give additional value on their application. However, proficiency in English was our first priority.

The last two criteria were our critical selection aspects. Organizational experiences of the applicants help us understand how they will commit in the event and their ability to implement the assigned tasks as guides. Moreover, it also reflects proactive and cooperative qualities of the applicants. Interests and skills were additional consideration so that the committee could assigned the candidate to necessary specific tasks they are excel the most during the event.

From 193 applicants, 124 were selected for the interview round. Guide candidates were invited to attend an English interview session. From these 124 who were invited to the second round, 65 came from Bandung, 28 from Jakarta, and 31 from neither Bandung nor Jakarta. Therefore, the location for interview session was adjusted: candidates from Bandung were interviewed at the IBO Secretariat at 7th floor Pusat Ilmu Hayati, Institut Teknologi Bandung on the 15th and 16th of March 2014 meanwhile candidates from Jakarta were interviewed at the Meeting Room of Directorate General of Secondary Education, National Education Departement, at Jl. R.S. Fatmawati on the 29th of March 2014. Candidates who came for neither cities were interviewed via Skype on the 29th of March 2014. Interview was done in English to assess the English speaking ability of the guide candidates. The candidates were tested on their general knowledge about Indonesia, their motivation to become guides, and any situational questions regarding the implementation of IBO 2014.

From 124 interviewed candidates, we selected 91 volunteers who would depart to Bali as guide. Based on the interview result and other considerations, these selected volunteers were allocated as follows:

- 70 country guide
- 11 jury guide
- 2 secretariat
- 2 anchor
- 3 newsletter
- 3 personel medic

A complete list of volunteer candidates and selected guides assigned for IBO 2014 was attached in Appendix C.

The result of interview selection was announced on 22nd of April 2014. We held a briefing session for volunteer on the 27th of April 2014 in Room TVST B, Institut Teknologi Bandung, to introduce the organizing committee to the guides. This briefing session was attended by guides from Bandung and Jakarta. The IBO 2014 program was also explained in this session. Guides who were unavailable to attend this briefing session could watch the recording video uploaded in YouTube (http://www.youtube.com/watch?v=NpqQLlFcbDs).

Several volunteers resigned before the event due to various circumstances. Fortunately, backups are available. We suggest preparation of extra volunteers to fill in possible vacancies and ensure the commitment of the selected volunteers.

3.5.2. Training

Selected guides were instructed to follow series of training in Bali from 2-5 July 2014. This training was focused on IBO 2014 implementation in detail, location orientation, and rules during IBO 2014. In the training, a session on Bali and Indonesia cultural lectures was also delivered by an Ambassdor for Bali. At the end of IBO 2014, we provided each volunteer with a stipend of USD 350 as a token of appreciation.

Figure 3.11. Training and briefing for IBO 2014 guides

3.6. Media and PR

IBO 2014 event was published in several types of media, from social media such as Facebook and Twitter, IBO 2014 website, national mass media, until promotional CD, banners and posters. The first official IBO 2014 invitation was proclaimed during IBO 2013 closing ceremony in Bern, Switzerland. Appendix D provides our invitation sample.

3.6.1. Using the Internet

We published IBO 2014 via social media and official website. Facebook and Twitter were used to promote IBO 2014 through Facebook Page "25th International Biology Olympiad - IBO 2014 in Bali" and Twitter account "@IBO_2014". At the end of IBO 2014 program, our Facebook Page had 1,531 likes whereas our Twitter account had 541 followers. However, we did not deactivate our social media accounts after the events so that allowing additional likes and followers. Thus, our Facebook Page now had 1,761 likes and our Twitter account had 568 followers (last checked 7th March 2015).

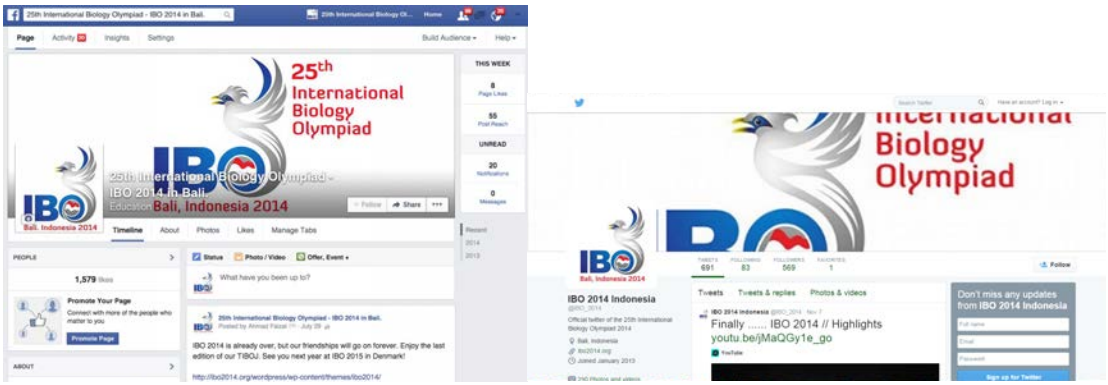


Figure 3.12. Facebook Page and Twitter account of IBO 2014

Our social media accounts were linked to IBO 2014 official website (http://ibo2014.org) as the main publication mean of IBO 2014 on the internet. Various information regarding IBO 2014 and Bali could be accessed in our website to help the participants preparing their trip. Participant could make an account and log in to the website in order to access any information necessary for IBO 2014 participation. Jury and participant registration for IBO 2014 started from May 2014.

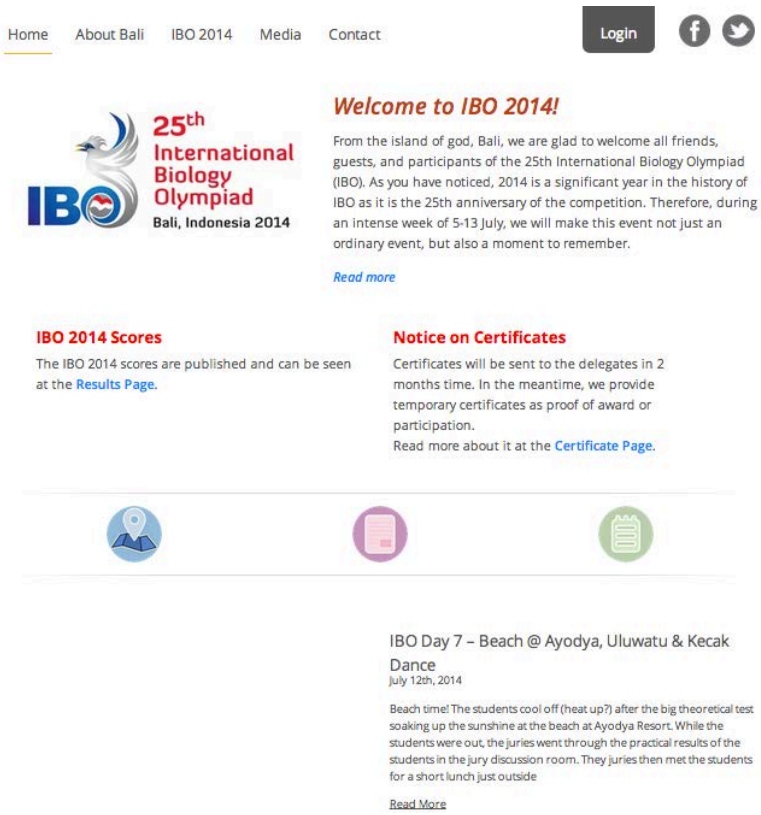


Figure 3.13. Home page of IBO 2014 website

Domain of the website (www.ibo2014.org) follows the convention of the previous IBO websites (www.ibo2013.org, www.ibo2012.org) to make it easier to find. The IBO 2014 website is made primarily to facilitate online registration and dissemination of information, including the daily newsletter, photos and videos. With that in mind, clarity and simplicity is emphasized on the design of the website.

Various information was added to the website, including visa information, travel advisory and attractions around Bali. The website was live from the beginning of 2013. It was also used as a portal for volunteer registration, which was open in January 2014 leading to the increase in number of unique visitors to the website.

Figure 3.14. IBO 2014 website visitor traffic

The website was most visited during the month of the IBO, specifically on the 12th (3,860), 13th (2,741), 14th (2,320) and also on the 22nd (3,040). The IBO 2014 medals results were released on the 13th, while the updated medal results was uploaded on the 22nd. We intend to maintain the website until four years since its establishment as a reference for future host countries.

3.6.2. Media and Other Publication Means

We also published IBO 2014 through mass media, particularly television, which was handled by the Directorate of High School Development, Ministry of Education and Culture. Posters and banners were installed around the office of Directorate General of Primary and Secondary Education, Indonesian Ministry of Education and Culture. Posters were also included on promotional media along with a CD that contained IBO 2014 promotional media. This media package were distributed to delegation leaders during IBO 2013 closing ceremony. Moreover, these posters and banners were used continuously to promote IBO 2014.

3.6.3. Publication and Documentation During IBO

Aside from the mentioned promotional media, IBO 2014 made newsletters and videos, which broadcasted every agenda during this one week event on a daily basis. We have daily video blog which can be seen in our YouTube account and daily newsletter distributed every morning to the participants. The newsletter was added with daily topics of flora and fauna. Moreover, we were covered by national media such as government's official national TV channel, "TVRI", and a national newspaper, "Kompas".

3.7. Registration and Administration

3.7.1. Invitations

The official invitation letters were sent on December 24, 2013 by email and a few cases with hard copies by request. The letters contained the delegation's specific login information to the registration system on our website and instructions on how to submit test questions. The IBO 2014 website gave all these and more information in either the public or the login section.

IBO coordinator of France informed us after the receipt of the invitation letters that they would not participate in the current IBO, but might participate again in future years.

During this period we noticed that some listed email addresses were incorrect, though we managed to contact all country coordinators. Some country coordinators has also been changed and did not informed the IBO CC. For this, we have provided the updated list and deposited it to IBO CC in Prague.

3.7.2. Online Registrations

The Participants are the team members of every countries who was limited to four students and two juries. However, every country representatives may send additional juries and visitors. New participant countries who could not yet send their students were called the observers. The observers may send their students to compete in the next IBO or after they are officially accepted as IBO members.

IBO 2014 registration could be done online through IBO 2014 website (http://ibo2014.org). The registration was limited to the invited countries. Countries that have participated at IBO 2013 in Bern, Switzerland, received invitations contained username and password needed for registration. Beside participant countries, we also sent the invitations to the Education Ministries of every country that have not yet become IBO members to participate as observer at IBO 2014. From 63 invitations sent to IBO member countries, 61 answered to participate. Meanwhile, from 28 observer invitations, three countries confirmed their attendance on IBO 2014. Registration may be done through correspondence with IBO 2014 Secretariat through info@ibo2014.org.

For registration, we asked country representatives to submit necessary data to our registration system in order to arrange the pick and delivery schedule, immigration, and administration needs for the participants. The data also needed for scheduling IBO 2014 program and making necessary attributes, such as nametag and yearbook. The required data was as follows:

- Personal Particulars (name, sex, passport number, passport scan, birthdate, e-mail, Facebook and Twitter accounts)
- T-shirt size
- Arrival and departures data (time, date, and flight number)
- Food options (halaal food, vegetarian food, fasting, allergies)
- Specific medical condition, if any
- Roommate preference
- Student declaration form
- Recent photograph

Any information regarding participation fee was also included in the registration system. Every country may download registration fee invoice which was automatically generated based on data submitted to the registration system.

3.7.3. Observer Invitations

Invitations to potential observer countries have been sent out only via e-mail. Besides the contacts listed at the end of the list of country coordinators provided on the website of the Coordinating Center in Prague, the following country groups have been invited:

- Contacts received from the organizers of IBO 2013.
- All Asian countries not yet members of the IBO. The invitation letter was sent to the contact address which was written on their educational ministry official website. We received a reply from Afghanistan and it had progressed until payment but we had no Afghanistan representatives attended IBO 2014.

Besides, several additional country representatives, teachers or other individuals have contacted us directly, showing their interest in participating as observers. None of these contacts has led to any serious attempt to participate. All additional contacts established in this process have been forwarded to the Coordinating Center.

In the end, three country observers, Syria, Luxembourg, Malaysia positively confirmed their attendance in IBO 2014.

3.7.4. Visa

Committee was also collaborated with Ministry of International Affair and Immigration Subdirectory of Indonesia to facilitate visa arrangement. Indonesian visa could be obtained when the participants have arrived in Indonesia through the immigration section or Indonesian embassy in their country. The committee had provided the participant countries with official invitations as a requirement to get Indonesian visa.

Passport holder of the following countries are eligible to enter and remain in Indonesia without visa for 30 days, with condition that the passport validity must be at least 6 months from the date of entry and must have return or onward ticket:

1.	Brunei Darussalam	6.	Laos	11.	Peru
2.	Cambodia	7.	Macao	12.	Philippines
3.	Chile	8.	Malaysia	13.	Singapore
4.	Ecuador	9.	Morocco	14.	Thailand
5.	Hong Kong	10.	Myanmar	15.	Vietnam

Nationals of the following countries may get visa on arrival for a staying of 30 days by paying USD 25 at the entry point (airport). Passport must be valid at least 6 months from the date of entry and must have return or onward ticket:

1.	Algeria	22.	Iceland	43.	People Republic of China
2.	Argentina	23.	India	44.	Poland
3.	Australia	24.	Iran	45.	Portugal
4.	Austria	25.	Ireland	46.	Qatar
5.	Bahrain	26.	Italy	47.	Romania
6.	Belgium	27.	Japan	48.	Russian Federation
7.	Brazil	28.	Kuwait	49.	Saudi Arabia
8.	Bulgaria	29.	Latvia	50.	Slovakia
9.	Canada	30.	Libya	51.	Slovenia
10.	Czech Republic	31.	Liechtenstein	52.	South Africa
11.	Cyprus	32.	Lithuania	53.	South Korea
12.	Denmark	33.	Luxemburg	54.	Spain
13.	Egypt	34.	Maldives	55.	Suriname
14.	United Arab Emirates	35.	Malta	56.	Sweden
15.	Estonia	36.	Mexico	57.	Switzerland
16.	Fiji	37.	Monaco	58.	Taiwan

17.	Finland	38.	Netherland	59.	Timor Leste
18.	France	39.	New Zealand	60.	Tunisia
19.	Germany	40.	Norway	61.	Turkey
20.	Greece	41.	Oman	62.	United Kingdom
21.	Hungary	42.	Panama	63.	United States

Other visitors must apply for visa at Indonesian embassies or consulates in their countries

3.7.5. IBO 2014 Registration in Denpasar

Re-registration was done after each participants arrived in their hotels. The most important part of this re-registration process was the handover of electronic devices and any means of telecommunication devices (cell phones, laptops, etc.) for the students to reduce any probability of fraud during the exams. Electronic devices were returned after theoretical tests were done. On the contrary, juries were given full access of internet and their communication means were not restricted.

Participants were also handled IBO 2014 attributes during re-registration process. These attributes were nametags, IBO 2014 backpack, IBO 2014 T-shirts, IBO 2014 8 GB USB, the book of 25 Years of IBO, IBO 2014 yearbook, and program book. We also provided male participants with udeng (Balinese male headwear) and female participants with selendang (Balinese traditional scarf) for free. These attributes were packed inside the IBO 2014 backpack and each attributes have its own purposes. Program Book were filled with IBO 2014 schedule, general information regarding Bali, and locations of every program during IBO 2014 whereas “25 Years of IBO” and IBO 2014 Yearbook were made for the following purposes.

Figure 3.15.Picking up the IBO 2014 participants at Ngurah Rai Airport

The “25 Years of IBO” book was a special attribute on this year’s IBO. This book contained throwbacks and memories of previous IBOs for the last 25 years. This book was prepared by the ex-president of IBO, Hans Morelis (Netherland), and Mary Oliver (Australia). As the host of IBO 2014, Indonesia was honored with the chance to fill the first four pages of this book. These pages were filled with greetings from Indonesian Ministry of Education and Culture, IBO 2014 chairman, and photos of Indonesia’s participation in IBO since 2000.

IBO 2014 Yearbook was designed to facilitate the introduction of every single person involved in IBO 2014. This yearbook contained the profiles of students, juries, observers, IBO steering committee, guides, scientific committee, and the organizing committee (including IT support, documentation team, design team, and members from Directory of High School Development). In this yearbook, the name, birthdate, an e-mail of every person were listed.

IBO 2014 T-shirts was differed in colors to identify the status of the wearer. Green t-shirts were allocated for the participants whereas juries had blue t-shirts, committee members had red t-shirts, and the guides had three colors of t-shirts (yellow, purple, and orange). The guides were obliged to wear different color each day. The T-shirts were made with specific sizes as submitted at the registration data. Another wears were udeng and selendang which distributed in gender-specific manner as souvenirs along with IBO 2014 USB. We suggest sizing chart for t-shirts that will be distributed to other countries since every country have different T-shirt sizes. We also suggest extra T-shirt for each size.

There were some problems with payments during re-registration process. One of them was the incomplete payment due to transfer fee. We suggest the next IBO host to accommodate transfer fee when deciding the total fee needed for IBO participants. Other problem was difficulties in changing currency for registration payment as most juried did not bring USD or local currency. IBO committee should always remember to take financial matter involving the participants as international currency has dynamic fluctuation which is prone to be overlooked.

3.8. Miscellaneous

Other than the mentioned aspects, we encountered special case in need for special treatment during IBO executions. For example, there was a Greece student experiencing diarrhea as he tried some international menu that might unusual for his body. His parents demanded that he was taken home despite our medical anticipations and he then had to depart earlier than the rest of the participants. Other problems were raised around technical implementation of the exams, which will be elaborated in the following section.

4. Exam

4.1. Exam Preparations

Both theoretical and practical exams were prepared by 24 teaching staffs from Sekolah Ilmu dan Teknologi Hayati, Institut Teknologi Bandung, who was also chosen as the members of scientific committee. Major reference for exam questions was *Biology* which was written by Neil A. Campbell and Jane B. Reece.

Theoretical exam tests the student's ability to answer questions regarding biological concepts. The content of theoretical exam were based on the syllabus that was elaborated in *A Guide to the International Biology Olympiad*: Appendix I.

Practical exams were designed to test student's ability to work on given practical problems, acquiring results, and analyzing results. All four practical exams were an opportunity to introduce endemic richness of Indonesia as the host country.

Exam Workshop

Workshop was aimed to facilitate the scientific committee to discuss the type and quality of theoretical and practical exams for IBO 2014. This workshop also selected theoretical test proposals from other countries. Institut Teknologi Bandung contributed its place in room 9311 at 15-16 June 2014 for this workshop. The workshop went well and the team received valuable inputs in formulating practical and theoretical questions according IBO standard.

Practical Exam Try Out

The scientific committee held a try out to test the materials for practical exam to ensure its readiness during the D-day. Moreover, this try out also predicted the exam duration which must not exceed 90 minutes per session. Several try outs were done with undergraduates from SITH ITB.

IT Support

For theoretical exam, we intended to use IT system in conjunction with laptop. This system was made based on the system used during IBO 2013 and prepared by a third party vendor. However, the system is not thoroughly tested before use in IBO so that errors occurred near the exam day. We suggest that the development of such system must be followed closely to ensure that the system met necessary requirements including international language support.

Collective decision was then made to use paper-based test due to the IT system failure. We recommend that IT Support provide fail safe redundancies and clear cut rules upon the use of the IT system. System should also be prepared before it is used by the other juries. As IT system did not meet specification, specification has to be made clear early on. Development has to be followed up closely. Network requirements has to be set up early if IT is planned to be used. We suggest that the software developed for IBO 2013 is adopted by IBO. A development team can be organized and funded. Hence, the software can be improved and used for subsequent IBOs.

Subgroup Meeting

Subgroup meeting were done at 1-5 July 2014 in Ayodya Resort Bali. Several members of subgroup meeting were several juries from different countries that were chosen for their expertise, each for every topics. This subgroup meeting was held to assist the revision of prepared theoretical questions and practical tasks. The participants of IBO 2014 sub-group meeting were the IBO 2014 scientific committee along with 12 juries. These people have involved since the beginning of IBO so that they have get used to IBO questions materials:

1. Poonpipope Kasemsap (Presiden IBO/Thailand)
2. Anindya Sinha (India)
3. Shirley Lim (Singapura)
4. Daniel Wegmann (Swiss/Scientific Committee IBO 2013)
5. Jan Cerny (Ceko)
6. Jens Olesen (Denmark/IBO 2015)
7. Alexander Rubstsov (Russia)
8. Matt Carlberg (Swedia)
9. Mary Oliver (Australia)
10. Kathy Frame (USA)
11. Alexander Friedmann (Russian translator)
12. Olga Waksmann (Russian translator)

Figure 4.1. Subgroup Meeting of IBO 2014

4.2. Practical Exams

The practical exams were designed not only to evaluate students' ability to solve practical biological problems but also to introduce the characteristics of Indonesian biodiversity. We also tested several important practical skills such as the ability to read, understand and follow protocols, handle specimens, solutions and equipment carefully, to further measure and observe accurately and attentively. All four exams were inspired by researches conducted by Institut Teknologi Bandung, as well as by equipment and tools available.

4.2.1. Practicals Design

In Practical Test 1, **Cell and Molecular Biology** (further referred as 'Cell'), students were given two tasks: confirmation of plasmid samples with restriction enzyme analysis and analysis of cell reproduction of *Paramecium*. Specifically, there were three plasmid samples with different restriction pattern that should be analyzed with one of the provided experimental design in the first part. In this part, we tried to test students' scientific thinking by evaluating their chosen protocols along with their ability to perform it with limited amount of reagent and time. In the second part, we provided the students data from an experiment that already been done on Paramecium cell reproduction and telomeres electrophoresis for certain generations. This part of the test was aimed to test students' ability to analyze available data and concluding the main points.

Practical Test 2, **Plant Anatomy and Physiology** (further referred as 'Plant'), was designed to assess factors that affecting plants adaptation to flooding stress. Through this theme, we gave the students three tasks: determination of plant pigment, determination of starch in plant extract, and observation of structural adaptation in plants. We used treated plants for these tasks. In the first task, we provided two leaf samples from the treated plants that need to be analyzed for pigments qualitatively using Thin Layer Chromatography (TLC) and quantitatively using spectrophotometry analysis. The spectrophotometry analysis was further used for the second task in determining starch content from two tissue extracts from the treated plants. For these two tasks, we tested the students with analytical questions related to their tasks—regression analysis were asked for the second task. After measuring the physiological parameters, students then asked to observe the anatomy and morphology of three plant specimens and identify main features of structural adaptations on these specimens.

In Practical Test 3, **Animal Anatomy, Physiology, and Systematics** (further referred as 'Animal'), we introduced Indonesian aquaculture through milkfish larvae (*Chanos chanos* Lacepede) and prawn as the tasks' objects. The milkfish larvae was given for two tasks: assessing the response of milkfish larvae toward changes in salinity and the toxicity of an insecticide through determining the insecticide's concentration at which 50% of the tested animals—milkfish larvae—die (measuring LC_{50}). We provided the students data from an experiment that was already been done and asked them several questions to test their analytic ability. Real specimens only came from the prawns for the anatomy and systematic part. Students were provided with six prawn specimens and instructed to identify them using simplified identification key and reconstructing their phylogenetic relationship using UPGMA.

Practical Test 4, **Ecology and Ethology** (further referred as 'Eco'), was designed to introduce Indonesian biogeography and biodiversity as an archipelago country. Through this theme, we gave the students three tasks: island biogeography, primary succession after volcanic eruption, and speciation in song birds. We provided three aerial photographs of certain parts of Indonesia for the first and second task. Using the photographs and area data, we asked the students to analyze the biogeography of five small islands near Halmahera Island. We also introduced Anak Krakatau through the aerial photograph, a volcanic island formed in 1927 after the eruption of Mount Krakatau in 1883. We asked the students to analyze primary succession on this island through given plant species richness and abundance data in five years. Along with the species list, we introduced three species of fig (*Ficus*) that present on this island and asked the students to analyze *Ficus* dispersal in relation to its fruit morphology. In the third task, we provided the students with spectrograms and oscillograms of nine individual songbirds. The students were asked to analyze all spectrograms and identify different groups of songbirds through the difference of syllable repertoires using student t-test. We also provided a record of each songs in an MP3 player.

4.2.2. Setting up and Running the Practical Exams

To keep the necessary equipment and materials for practical exams as few as possible, each practical was organized in four sessions with the students rotating through each exam. Therefore, we divided the delegates into four groups, each indicated with different lab coat colors (red, green, blue, and yellow). The exams were held in different locations along with the lunch break so that we booked eight meeting rooms in Aston Hotel Denpasar, four for exams and four for transits. The transit rooms were held to avoid communication between students from different groups during break times. Before the day of practical exam, we kept the room locked and guarded along with designating a restricted area with the help of hotel management so that students would not knowing the exam preparations. We also briefed the country guides for this matter.

Possibility of students copying experimental procedure from others by observing them was another thing to consider when arranging the setting of practical exam. We thus followed the tradition of previous IBOs to

organize the work places of these four practical exams in cubicles that were walled on three sides to shield the competitors off from each other. We continued previous IBO's method to use cubicle separators which were based on cardboard as we also did not use fire in the practical exams. This cardboards separated the students so that each have a working space as large as 1.08 m^2 (1.8 m x 0.6 m) with limited vertical view as high as 0.7 m from the surface of the table. Exception was made for Animal practical exam that occupied double this size for its lab materials and equipment.

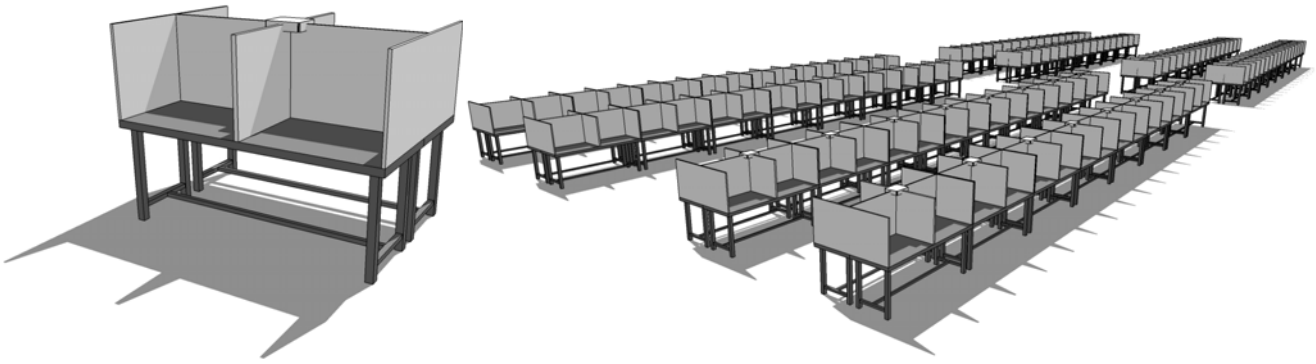


Figure 4.2. The schematic of exam table with cardboard separators (left) and its arrangement in four rooms (right)

Figure 4.3. The set up room for animal practical test

Figure 4.4. The set up room for cell (top) and eco practical test

Figure 4.5. The set up room for plant practical test

4.3. Theoretical Exam

We intended to develop different type of theoretical exam questions after IBO 2013. However, we did not have enough time for expert assessment so that we continue to use Multiple True False questions. The proportion of exam topics was arranged according IBO syllabus and the classification of topics could be seen as follow:

Theory 1:
A. Cell : No. 1 – 10
B. Plant : No. 11 – 18
C. Animal : No. 19 – 30
D. Genetic : No. 31 – 40
E. Ecology : No. 41 – 45
F. Ethology : No. 46 – 48
G. Biosystematic : No. 49 – 50

Theory 2:
A. Cell : No. 1 – 10
B. Plant : No. 11 – 17
C. Animal : No. 18 – 30
D. Genetic : No. 31 – 40
E. Ecology : No. 41 – 45
F. Ethology : No. 46 – 47
G. Biosystematic : No. 48 – 50

Most of the questions were prepared by our scientific committee while taking in submissions from other countries. There were 18 countries which had submitted their theoretical exam questions proposal:

- Argentina
- Armenia
- Australia
- Belarus
- Bulgaria
- Finland
- India
- Russia
- Singapore
- Spain
- Slovakia
- South Korea
- Switzerland
- Taiwan
- Thailand
- Turkey
- United Arab Emirates
- Ukraine

From as many as 73 questions, we used and further modified only 13 questions from India (1), Slovakia (1), Belarus (3), Thailand (1), Bulgaria (1), Finland (1), South Korea (3), Singapore (1), and Switzerland (1).

4.3.1. Running the Theoretical Exam

The theoretical exam was held in the same place with practical exam with the same cardboard separators still installed. The difference was only that there was no rotation needed as the exam materials were distributed directly into the exam rooms. Although we intended to start at morning, the theoretical exam was postponed until afternoon due to some technical problems.

One of the problems was translation. At the end of the translation period, we found that Uzbekistan had not yet submit their translations. We tried to communicate this to the juries from Uzbekistan but they seemed to have difficulties in using English and we have no translations for Uzbekistan afterwards. The IBO president then contacted Russian juries and asked their permission to have their translation for Uzbekistan students as they use the same language. We thus copied Russia's translation for Uzbekistan and delayed the theoretical exam.

Other problem was the distance from jury hotel to exam place. As we need around one and a half hour the latest to reach Aston Denpasar Hotel from Ayodya Resort Bali, the distribution of exam materials was further delayed. Not to mention the time needed to install the question files into each student's laptop.

The theoretical exams were held for three hours for each part with a one hour break in between. Starting from 13.00, thus the exams finished after the sun sets.

4.4. Statistical Analysis of the Obtained Scores

We calculated the descriptive statistic of each exam to see the distribution of obtained scores. Overall, practical exam 1 (Cell) turned out to be the easiest with a median score of 85% of maximum attainable score. Cell problem set tends to be easily solved by students compare to other exams. However, cell scores distribution is much different compare to others. It may be caused by deletion of practical part from this topic. Moreover, it has the largest variance among other topics despite it has the highest mean. Through boxplots comparison, we found that the lowest score was extreme (achieved by AZE03).

In contrast to the Cell, practical exam 2 (Plant) problem seems to be the hardest practical exam. Boxplot analysis shows that Plant practical exam has the lowest mean and distribution. However, the highest score attained was extreme (achieved by FIN03). Students' ability to solve problem set is balance in the other two practical exam, Animal and Eco, with Animal problems set is slightly easier solved than Eco problem set.

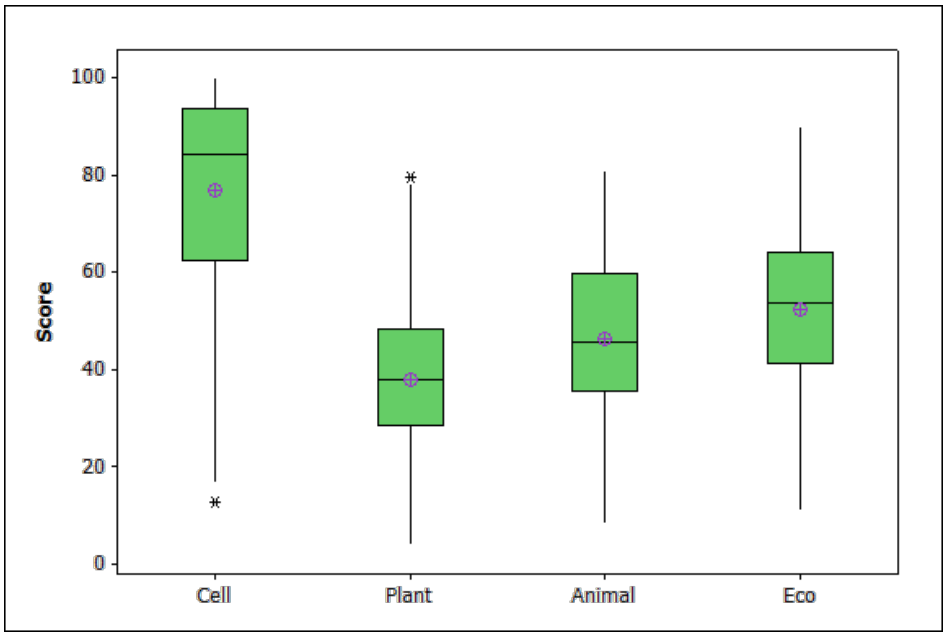


Figure 4.6. Boxplots Comparison among Practical Exams

For the two theoretical tests, the difference of distribution does not differ as many as practical tests. However, in Theory 1, boxplots comparison shows that mean value slightly less than median value. In other words, the scores of Theory 1 tend to assemble in higher values. The opposite happens for Theory 2, which mean value slightly more than median value, indicating that the scores tend to assemble in lower values. In conclusion, students are more master in Theory 1 than Theory 2.

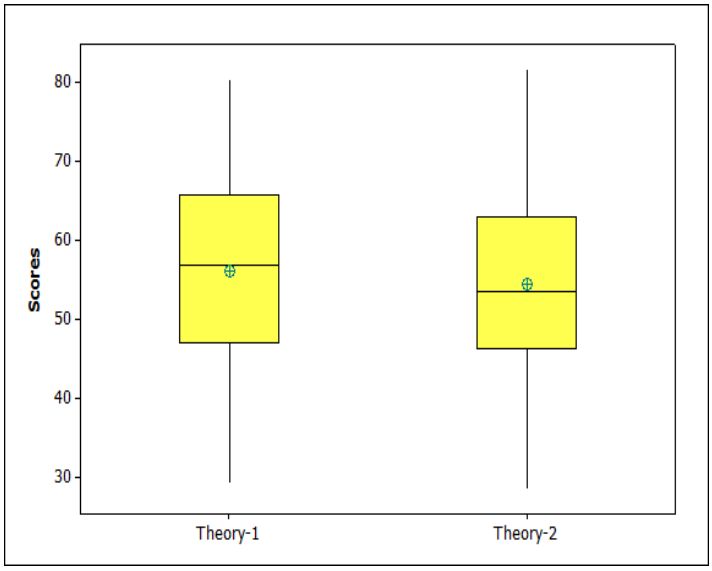


Figure 4.7. Boxplot comparisons between theoretical tests

Furthermore, we estimated the variance in data of practical exam using pairwise correlations between the individual exams and found that all were significant. Correlations involving Cell and Plant (both 0,56 on average) were lower than other comparisons (0,60 on average for Animal and 0,62 for Eco), suggesting that Cell and Plant scores were affected by more stochasticity.

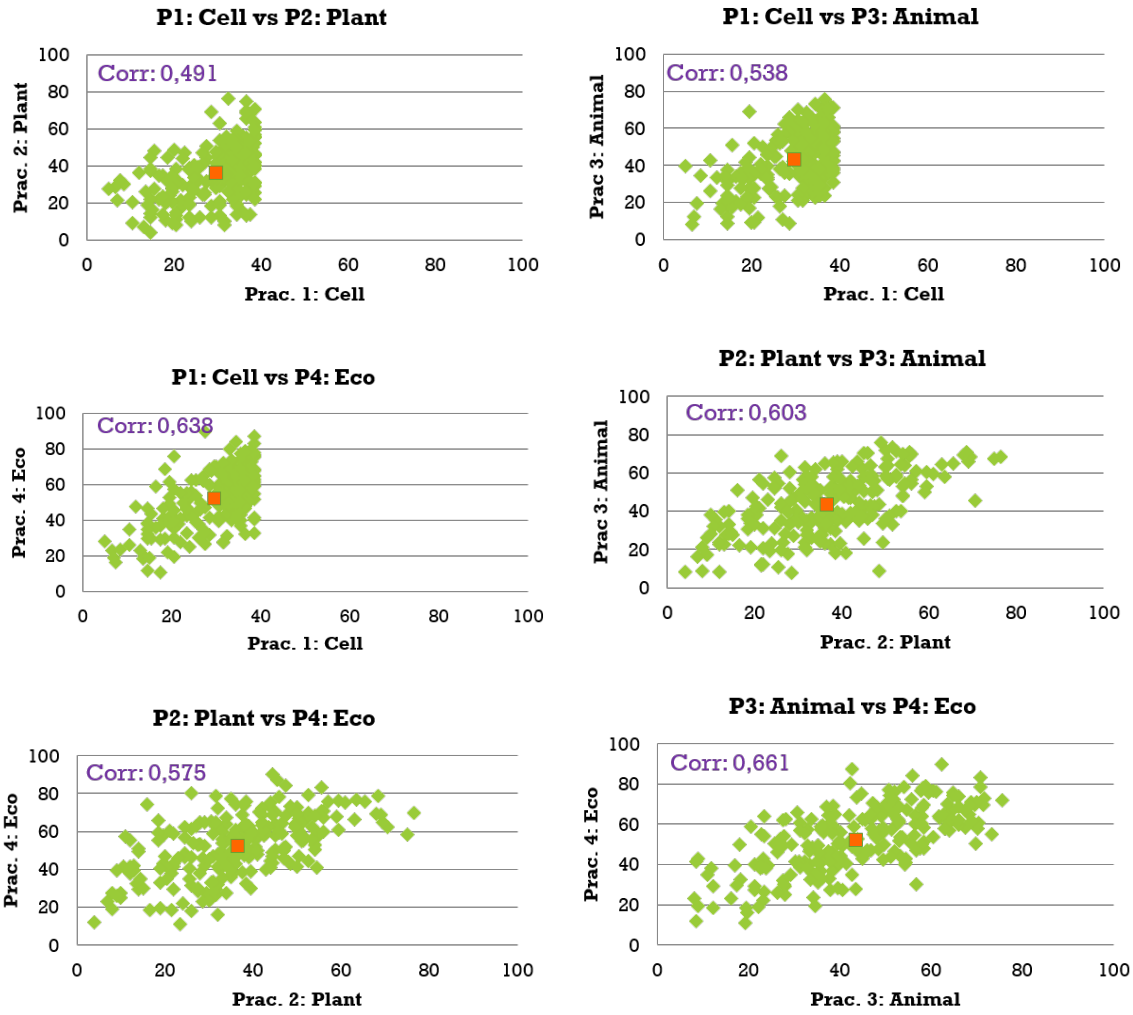


Figure 4.8. Linear Dependency between Practical Exams

We also measured the linear dependency between the two theoretical tests. As a result, we found that students who can solve Theory 1 will be able to solve Theory 2 as the correlation value between these tests was 0,820.

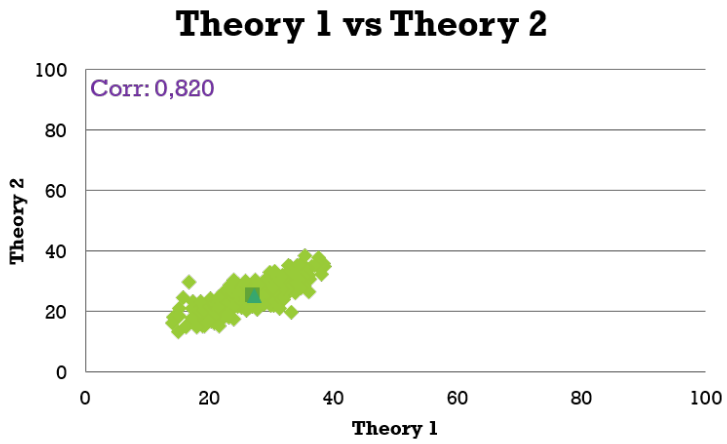


Figure 4.9. Linear dependency between theoretical test 1 and 2

We used t-score to determine students' rank by each scores' proportion (Theory 50% and Practical 50%). However, we should test in advance whether the students' scores were following normal distribution. This is a requirement for calculating t-score. Using Normality Test (Anderson-Darling Test), we found that all scores of theory and practical Exams (except Practical CELL) follow normal distribution with level of significance $\alpha \leq 4{,}5\%$. However, we assume all scores follow normal distribution as we had a large data sets. Therefore, t-score could be applied for scoring.

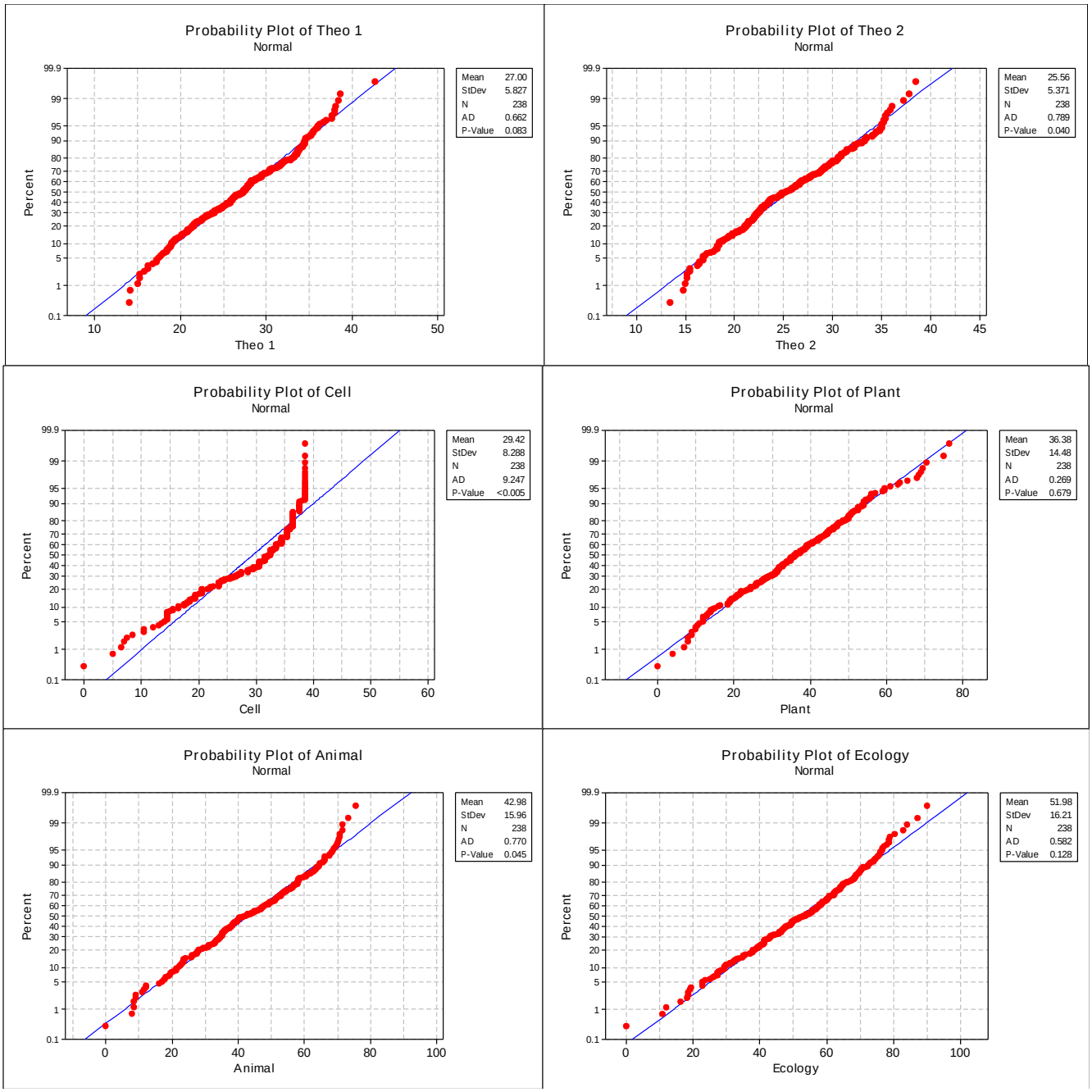


Figure 4.10. The result of Anderson-Darling Normality Test for theoretical and practical exams

We counted the average final t-scores of each countries to determine the country rank. We pooled the scores for practical and theoretical exam in order to count the t-scores of each. The t-scores was calculated first between the four practical exams and the two theoretical exams each independently, then we calculated the t-

score for the result for determining final ranks. This is necessary to keep the portion of theoretical and practical exams each 50%.

We calculated the correlation between sum of scores with final t-score to evaluate the relevancy of our approach. We found that t-score of practical exams is highly correlated with practical sum of scores ($\hat{\rho}$=0,998) and the same goes for the t-score and sum of scores of theory exams ($\hat{\rho}$=1). However, practical sum of scores has slightly bigger contribution than theory to final T-scores.

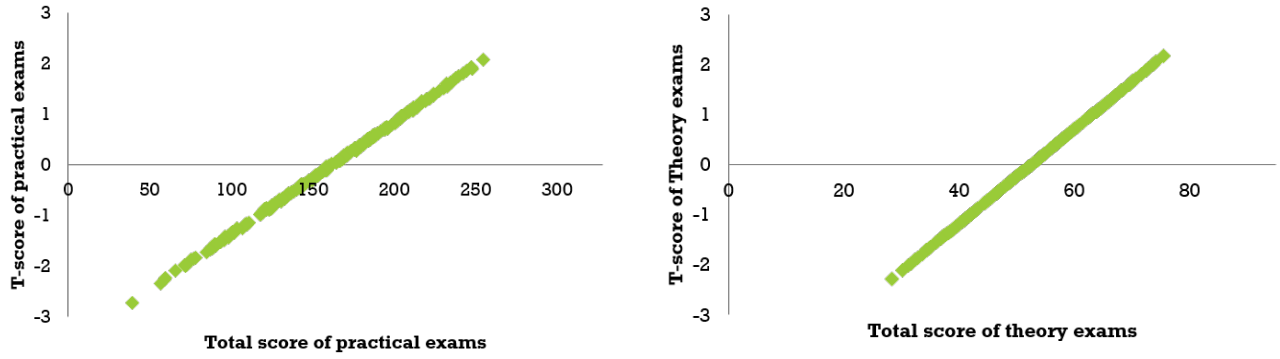


Figure 4.2. Linear dependency between t-score and sum of scores for practical (left) and theoretical exam (right)

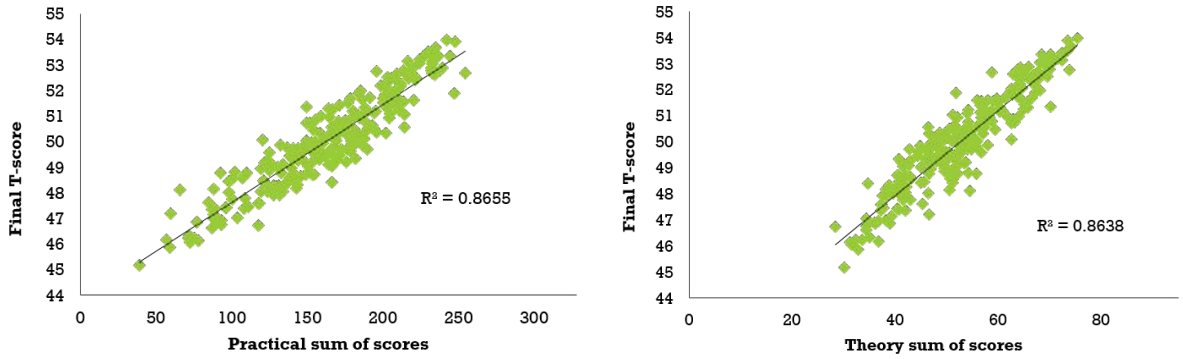


Figure 4.11. Linear dependency between final t-scores and sum of scores of practical (left) and theoretical (right) exam

The average of final t-score then was also tested for normality using Anderson-Darling Test and found to be normally distributed (p=0,697).

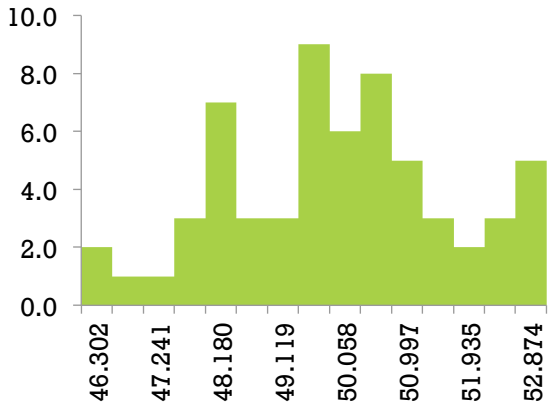


Figure 4.12. Histogram of average final t-score

We also ranked average final t-scores based on countries. The result can be seen as follow.

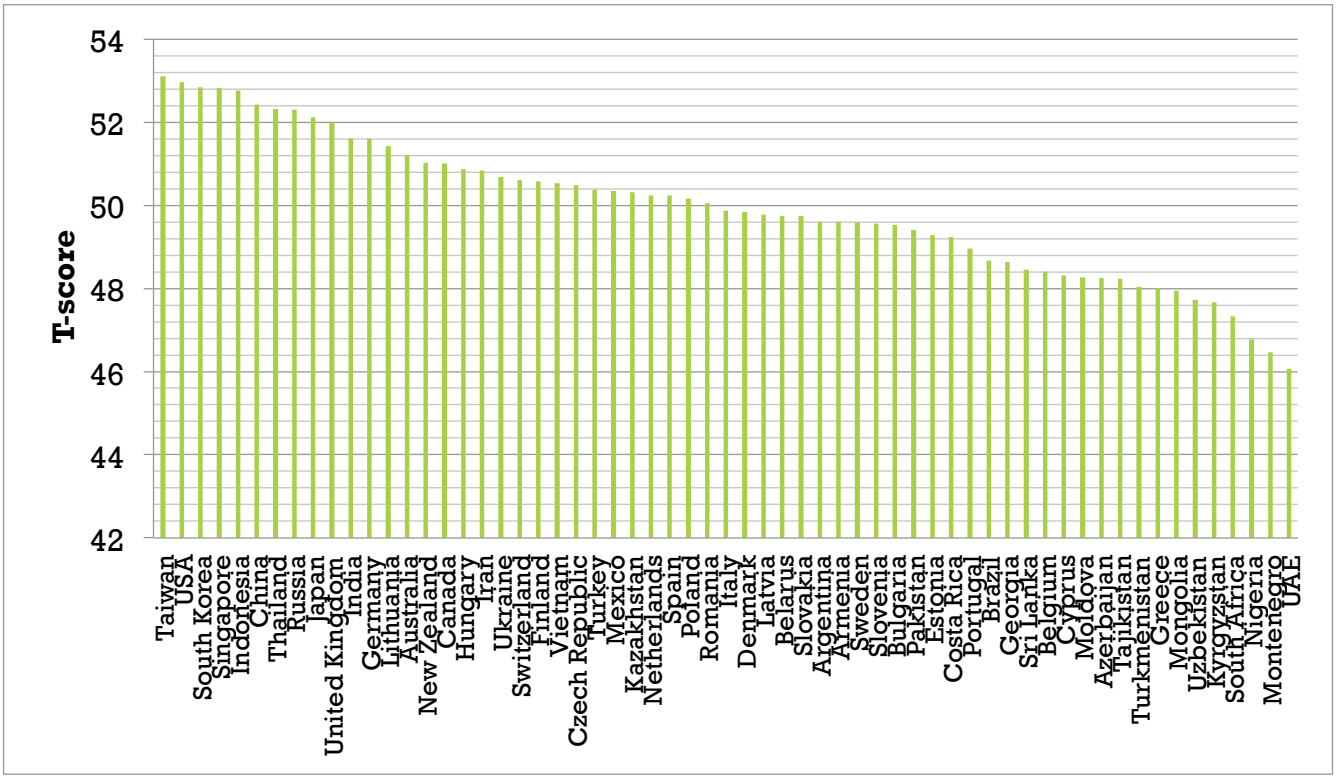


Figure 4.13. Country rank based on average of final t-score

Other than statistical assessment made to determine students' rank, we also assessed students' performance in theoretical exam in more detail. As each problem tested four questions, we could see the level of exam difficulties from the mode of the number of correctly answered questions. If there were more of score 4 in one problem relative to most problems, the problem would be considered easier than most problems. From the scores, we tried to determine which questions were considered more difficult and which were considered easier relative to most questions. Here, we graphed the number of students based on the score mode.

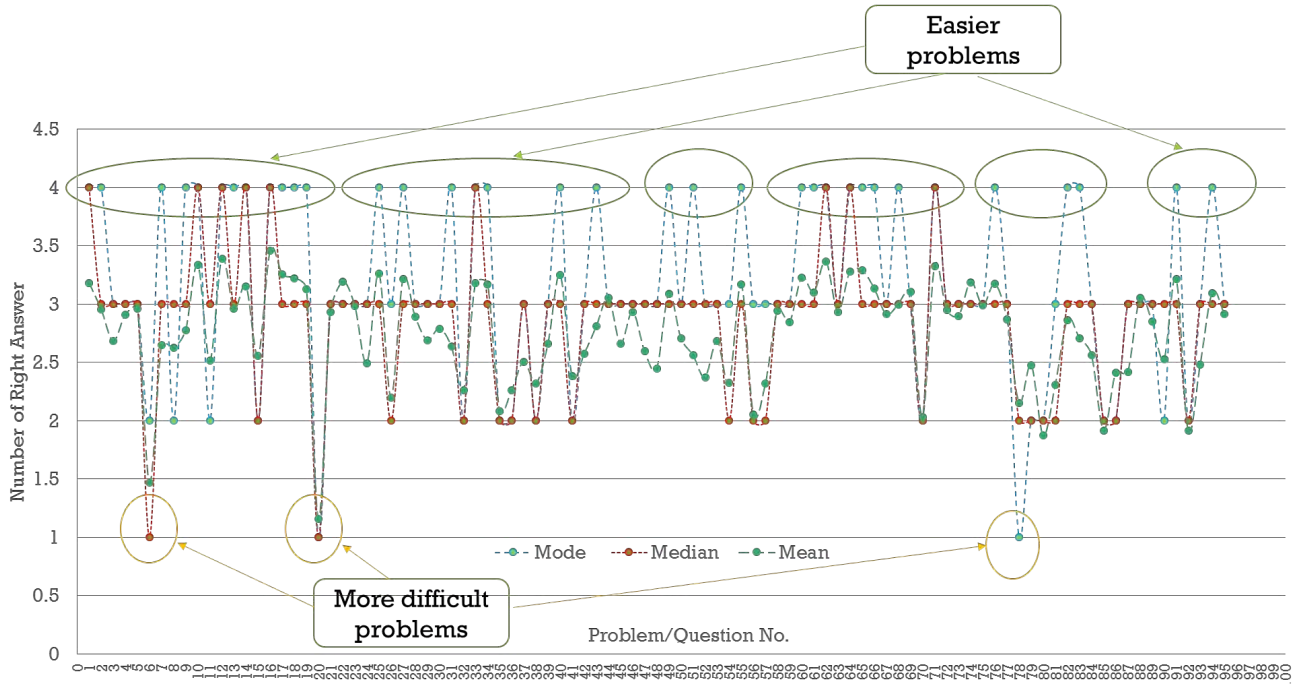


Figure 4.14. Possible difficult and easy questions in theoretical exam 1 and 2 based on number of students for mode values of each problem

From the modes, we found possibly the most difficult answer and the easiest problem. The most difficult problem was number 20 of theoretical exam 1. This question has mode value 1, indicating that most of students (50.6%) got only one answer right out of four. The easiest problem was number 16, also from theoretical exam 1. This problem has mode value 4 which means that most of the students (59%) answer with perfect score.

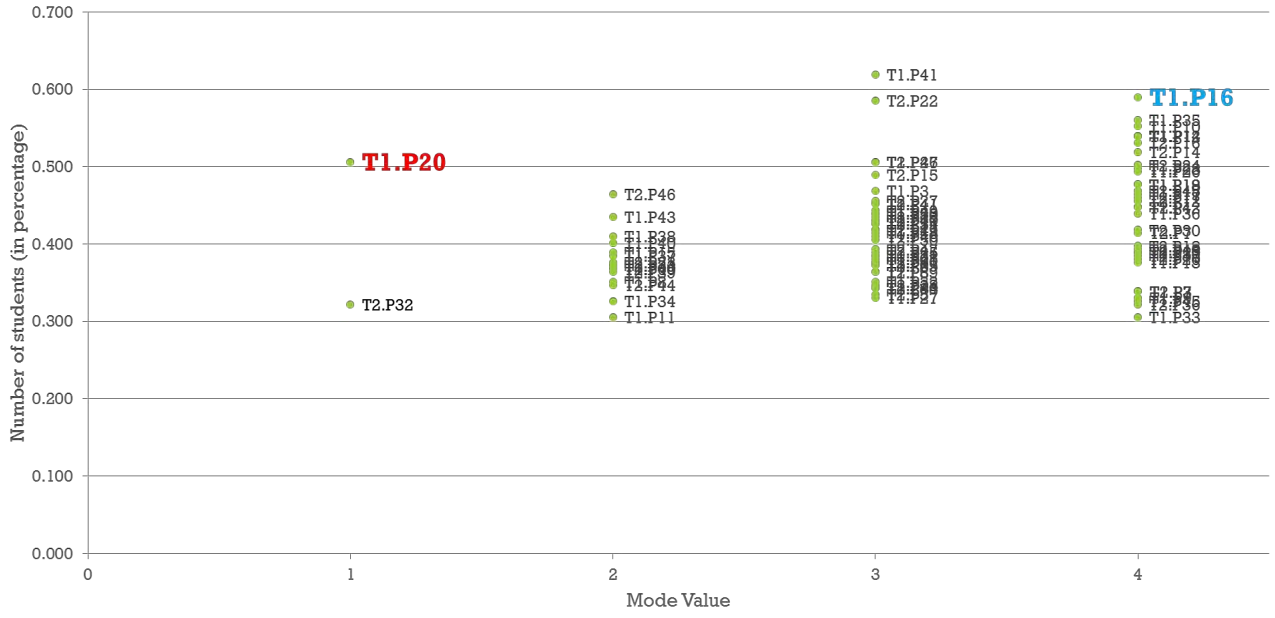
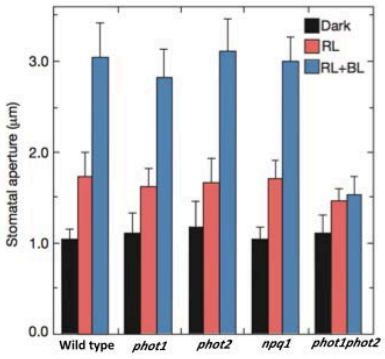


Figure 4.15. Possible most difficult and easies questions for theoretical exam 1 (T1) and 2 (T2) based on number of students for mode values of each problem

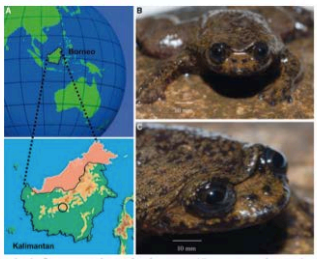
16. An experiment was conducted to study the effect of darkness, red light (RL) and combination of red and blue light (RL+BL) on stomatal aperture. Mutant *phot1* and *phot2* do not express phototropin, while mutant *npq* does not accumulate zeaxanthin. Stomatal apertures less than 1.25 μm are considered closed, while apertures greater than 2.0 μm are considered opened more widely.



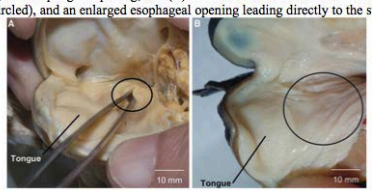
Indicate if each of the following statements is true or false

A. Stomatal apertures are closed if treated in darkness and slightly opened in red light illumination.
B. Blue light significantly increases stomatal aperture size in all tested plants.
C. It is likely that the blue light receptor is active in mutant *npq*.
D. The fact that single *phot* mutants respond to blue light and double mutants do not, suggests that *phot1* and *phot2* act redundantly as blue light receptors to mediate stomatal apertures.

20. *Barbuourula kalimantanensis*, an indigenous flat frog was found in Kalimantan, Indonesia in 2008 (A). The morphology of the frog (B,C) is shown below.



Comparison of (A) Typical frog mouth and pharynx (*Rana catesbeiana*), showing glottis (circled), tongue, and esophageal opening, and (B) *Barbourula kalimantanensis* showing tongue, lack of glottis (circled), and an enlarged esophageal opening leading directly to the stomach.



Indicate if each of the following statements is true or false.

A. The frog is more likely to have stereoscopic vission as compared to ponds frog (*Rana sp*).
B. Skin of this exceptionally flat frog is the only respiratory organ in and gas exchange occurs in the blood vessels located on the skin surface.
C. *Barbourula kalimantanensis* is expected to have a low metabolic rate.
D. *Barbourula kalimantanensis* most probably lives in fast flowing cold water, often close to waterfalls.

Figure 4.16. The easiest problem (left) and the most difficult problem (right)

Furthermore, we assessed the difficulties of each topic in theoretical exam. Using the average of right answers that each student can answer in a particular topic, we found that all subjects have similar distribution in both theoretical exam 1 and 2 except for topic Ethology. Students face difficulty in Ethology compare to other topics as the distribution of Theory 2 is in lower scores.

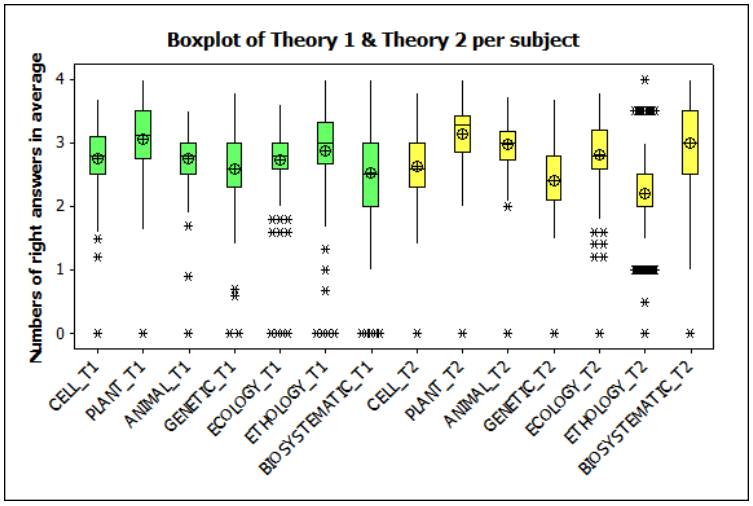


Figure 4.17. Distribution of scores for each topic in theoretical exams (note that green boxplots indicate theoretical exam 1 whereas yellow boxplots indicate theoretical exam 2)

We also examined whether there was any difference of the difficulties of each topics between theoretical exam 1 and theoretical exam 2. After ensuring that scores in every topic following normal distribution, we calculated the t-test for difference between the two theoretical exam. Our null hypothesis was that there is no improvement from Theory 1 to Theory 2. We graphed boxplots for the result as follow.

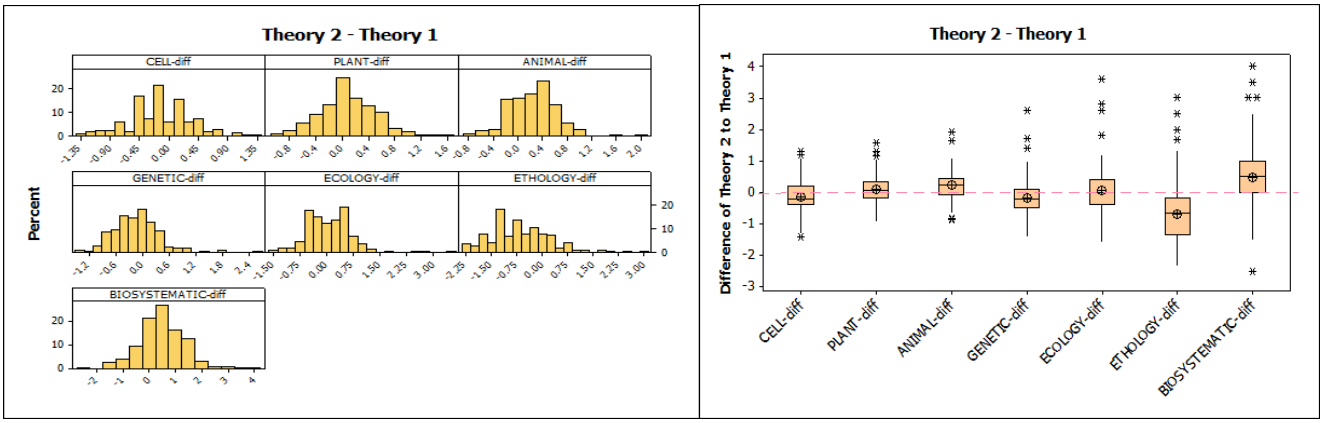


Figure 4.18. The histograms showing normal distribution (left) and the boxplots of difference of scores between theoretical exam 1 and 2 (Positive values show the improvement in Theory 2 compare to Theory 1)

4.5. Exam Reception

For translation of the exam questions, we intended to make it software-based to cut off some time. However, our software unfortunately did not support some language's features so that the translation goes manually.

From the jury discussion, some questions were deleted due to technical problems, incorrect solution, or other reasons. For example, due to the case that a student has arachnophobia, a question involving a picture of spider was deleted. After the exams, some juries demanded that the electrophoresis part of Cell practical exam was deleted due to inappropriate timing for the procedures as some students admitted that the bell was not well-sounded or the reagents were deficient.

Sometimes questions already decided upon by the consent of all the juries are again brought up and questioned by some juries during the jury discussions. To solve this, we recommend the implementation of house rules for jury discussion. Necessary time should be allocated to brief the juries about the rules before jury discussion to make sure that everyone agrees to abide by the rules.

For marking, we found that manual marking greatly increases the chance of human error and using a well developed IT system makes the marking process much easier. Moreover, moderation took so long and we finished until just before the closing ceremony. We tried our best to accommodate and re-check all complaints during moderation and finalized the score. However, in the closing ceremony we received feedback from other juries that score of many students were interchanged.

Responding to the feedback of interchanged scores, we went through the result and found the root of the mistake at 16 July 2014. There was a sorting mistake during compilation of the practical tasks, resulting in the switching of the practical task scores for the students. In more detail, the students were not included in the sorting when we sorted the scores based on country. This was caused by the entry form used by practical exam coordinators which was different with the one used for statistical calculations. It affected not only the students' rank within their country but also overall student ranks. The different sorting thus results in new rankings, not just a simple of switched scores between students in a country. Therefore, there was a change in medal type. There was also greater changes for UAE and Ukraine as the practical results of the two countries are apparently switched.

No	Country	Student_ID	Country Code	Student No.	Cell reference	
37	China	CHN01	CHN	1	=PRAC!H46	✓
38	China	CHN02	CHN	2	=PRAC!H47	✓
39	China	CHN03	CHN	3	=PRAC!H48	✓
40	China	CHN04	CHN	4	=PRAC!H49	✓
41	Costa Rica	CRC01	CRC	1	=PRAC!H50	✓
42	Cyprus	CYP01	CYP	1	=PRAC!H54	✗
43	Cyprus	CYP02	CYP	2	=PRAC!H51	✗
44	Cyprus	CYP03	CYP	3	=PRAC!H52	✗
45	Cyprus	CYP04	CYP	4	=PRAC!H53	✗

Figure 4.19. Example of sorting mistake

4.6. Post-Event: Medals and Certificates

Mistakes made during correction invalidated the rankings, medals and certificates. After we corrected the sorting system, we allocated ten days for sending this final sorting to juries for double correction. After the deadline at 21 July 2014, we did not accept additional feedbacks and we published the official result of final ranking at 23 July 2014.

Medals thus should be awarded based on a clear mathematical procedure without discussion by the jury. Where **n = number of competitors**, the maximum number of winners = **0.7n + 2**. From this number, we had the calculation breakdown as follow:

1. $w = \lceil 0.1n \rceil$

   The last gold medal winner is the one preceding the largest gap out of the three which follow the top w competitors

2. $x = \lceil 0.3n \rceil$

   The last silver medal winner is the one preceding the largest gap out of the three which follow the top x competitors

3. $y = \lceil 0.6n \rceil$

   The last bronze medal winner is the one preceding the largest gap out of the three which follow the top y competitors

4. $z = \lceil 0.7n \rceil$

   The last Certificate of Merit winner is the one preceding the largest gap out of the three which follow the top z competitors.

There was certainly disappointment among students, especially them who lost their medals or had it downgraded. However, we need to be fair. As this was a human error, we suggested a centralized system of data entry with credible security.

Although we had the sorting mistakes, we let the students have the medals they received at the closing ceremony. We asked them to return it nevertheless along with their certificates until the official result was published. To differ the invalid certificates and the official ones, IBO Steering Committee suggested that we changed the certificate's design. However, we found this unnecessary as the invalid medals had not yet IBO's official stamp so that we differ the certificates through the stamp's presence.

After the final rank was announced, we sent new official certificates of students and juries via normal mail to the address of each country coordinators. If the participants had already needed it before it arrived, we allowed them to download the certificate in IBO 2014 website directly using their account. We also sent the students' new medals through normal mail.

There were some problems as some countries require certificates to be presented to the government as a proof of their participation whereas juries' certificates not given out yet. Therefore, it is important to prepare the certificates beforehand along with extra certificate templates and medals for any unwanted changes.

Figure 4.20. Jury discussion room

Figure 4.21. IBO 2014 medal

5. Appendix

5.1 Pictures
5.2 Daily Video Blog
5.3 IBO 2014 Newsletter
5.4 Practical Exam (English)
5.5 Practical Exam (English)
5.6 Final Ranking
5.7 Jury seating arrangement
5.8 IBO 2014 Yearbook
5.9 Program book
5.10 25th years of International Biology Olympiad (front cover)

Editors

Ahmad Faizal
Anugerah Erlaut
Sabhrina Gita Aninta
Fenryco Pratama

Proof Reading

Agus Dana Permana
Ahmad Faizal

Pictures

LA Cinema

Organizer

Ministry of Education
and Culture
Republic of Indonesia

School Of Life Sciences
and Technology
Institut Teknologi Bandung

Secretariat

Indonesian Team for
Biology Olympiad