

How to organize the iGEM Pub Quiz

Origin and Background

For our educational program, we aimed to engage more and different groups of people into synthetic biology. We categorized all people into high school students, university and the general public, hoping we could do at least one activity for all of these groups. For the general public we decided to go for a pub quiz, because it is a fun way to learn new things in a nice and accessible environment. No iGEM team from Eindhoven has done this before, so we were happy to launch the very first edition and we hope that future (Eindhoven) teams will continue organizing such an event, because we it was a great success. We saw a lot of smiles during the evening and are convinced that we learned people some new things. To help future teams organizing, we have listed everything we have encountered and will share our experiences, so that you could benefit from it the way you like.

Overview

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2. Location
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1. Target Group & Amount of people

Think about your target group right from the beginning, since it will give you an idea about what the level of questions needs to be and you can brainstorm with that in the back of your head. It will prevent you from doing a lot of unnecessary work and having to alter the questions because you feel they would be too hard or too easy. After you have identified your target group, you should think about the amount of people you wish to invite, so that you can start arranging a location, a proper invitation and promotion strategy.

We decided to keep the pub quiz rather small and invite our friends and family. We wanted to give them an opportunity to meet our team personally and learn more about synthetic biology in a small and close environment while they represent the general public. Next to that, we felt it was good to do it for a small group for the first edition, so that we could learn from our approach and implement feedback before scaling the event to a broader and greater public. We decided to let the education subgroup prepare the event as a team of three, so that the rest of our members could also join the pub quiz and help their friends and family with the questions. This was not only fun for our other team members, but it also resulted in better understanding in synthetic biology and a confidential learning environment. There was a clear correlation between the results of teams with and without an iGEMer on board.

2. Location

As soon as you have the bigger picture and the amount of people in mind, you can start thinking about the location. Look into the options you have weigh all pros and cons of the locations. Make sure to look into accessibility, possibilities to use materials like a beamer and a microphone and discuss prices for food and drinks.

We held our pub quiz in the pub at our university, so that our friends and family could see our campus and the café in which we often get a drink after working hours. We simply made a reservation for forty-five people, which was hour estimated amount of people, for the date and timeframe we had in mind. We had a meeting with the manager of the bar to make sure we were on the same page and knew what to expect from each other. Approximately one week before we held the pub quiz we sent him a message with an overview of everything we had arranged and decided upon. In this mail we included: date and time, actual number of people, payment method, photography, organization, food, decorations and usage of beamer and microphone. It was really nice for both parties to have this overview so everyone knows what to expect from each other and there were no uncertainties during the day, so everyone could just relax and enjoy the quiz.

3. Invitation and promotion

As for the invitation, we kept it quite informal, since the people we invited were all in our close bubble. That is why we just sent them a WhatsApp message supported with small flyer with information. People could just register themselves via one of our team members, who then informed the education team, so they could count the total number of people for the pub. In our flyer we also made the promise that the first drink would be on our costs. We could not afford more, because the pub quiz was not originally budgeted in our expenses. We had to see what other costs we could potentially bring down and what would be available for the pub quiz. We managed to give them one drink. We did not wanted to ask money from participants to organize, because we feel education activities should be free of costs in our opinion in order to involve more people. As for promotion, we did not have to do a lot, since we already have close contact with the participants. In case we plan on doing another edition with unknown general public, we would print flyers and hang them at places where people will walk by frequently. Next to that, we would insert a QR-code on the flyer that guides towards a registration platform and we would ask the pub to help us with promotion.



Figure 1: invitation flyer

4. Budget plan

Whenever you organize something, you always have to deal with managing the costs. We asked our finance captain what the budget was, but it was hard to tell, since it was not in the original planning of finances. Together we decided to budget maximum two hundred euros for it and kept in our mind that we should minimize some expenses at other cost centers. Since we decided to keep the event rather small, we did not make a complete budgeting plan, but we discussed on how we would spend the two hundred euros.



Figure 2: drinking voucher guests

We figured it would be most important to keep our promise from giving them their first drink. We created drinking vouchers for the participants and included a maximum amount of money. When deciding on the amount, we looked at what they could get and what it would maximally cost us. We ended up with going for €3,75 where most soft drinks and common wines and beers could be bought from and the costs could never exceed and acceptable amount of €165,-. Next to drinks, we also wanted to provide them with snacks and luckily we could arrange that we were allowed to bring a small amount ourselves. Next to that, the bar did not ask for compensation for usage of the beamer and microphone, which was really nice. We used the rest of our budget to give out a prize to the winning group, which ended being €10,- for each member of the team. Not that much, but appreciated.

5. Organization and planning

It is good to communicate up front who will be responsible for what during the event. We entitled one person to host, one person to photography and one person to head organizer. The head organizer was the first point of contact for the people behind the bar and the participants. This person was responsible for the check in and walked by the tables to let people sign themselves up in their group. Participants were asked to come up with a team name and needed to indicate whether or not they allowed photos being taken. Nobody disagreed, but if someone would, we would have given them a wristband and made sure they were not on the photos uploaded on the wiki. After checking in, participants received a small bucket of snacks and their drinking voucher. During the rest of the evening, the head organizer kept track of the scoring of the participants and walked around to answer questions. We thought it was nice to have one person responsible for this, since it would assure that everything goes smoothly during the evening. We had six rounds of questions and did an interim score after round two and round four. Two team members were responsible for this and scored the teams according to a pre-made reviewing sheet. At the end of the quiz all the scorings per round were filled in at the bottom of the answering sheet and their place was confirmed. These sheets were then put in order so that the host could easily tell who ended at what place. As the winning team consisted of three members and we had four prizes to give out, we did a wheel of fortune to determine who would win the last card. Overall, the organization was a success.

6. Questions

As mentioned before, you need to determine your target group before starting to work on the questions. Since we decided that some of our team members would join the quiz, we felt like the level of questions could be little higher. However, not too high since there were also teams with no iGEMer in their team. We were aware that for some the questions would be really challenging, so we also incorporated a round of questions about our university and Eindhoven, where no higher level of education was needed and where all participants had equal chances. However, the goal was to learn people more about (synthetic) biology and other subjects within iGEM. That is why mostly included categories like bacteria, DNA and genetic modification, artificial intelligence and applications of synthetic biology. Within these categories we had some easier and harder questions and we alternated between open questions and multiple choice questions. As for our second to final category our theme was fun facts about the human body, which was a complete round of random facts and the participants had to tell which statement between four options was incorrect. We did this before the final round of questions, to freshen people's mind to be able to make the final sprint. People really enjoyed the second to final round, because it contained random, cool and fun facts which often were little bizarre, so it really kept their attention. Overall, we saw a lot of smiles during the evening and know for sure everyone had a great time. We also asked them to fill in a questionnaire at the end about how they enjoyed it and how we could do better next time. Their feedback will be discussed in section seven.

7. Feedback

Every participant answered yes to the question if they had a great time, so that is really positive. The questions however were too hard for the common public. Not everyone could clearly explain what synthetic biology is afterwards and from the ones who could, approximately half of them also knew it before the quiz, so it was not something they had learned during the quiz. For another edition, there should be more focus on what synthetic biology exactly is and the questions should be little easier. Not all questions have to be easy to answer, but for now we were a little too optimistic on what we thought they could handle. Almost every participant told us it was too hard for them. However, people did indicate that they learned something new about bacteria, random human body facts and Eindhoven.

As for the organization, we received the tip that they could fill in the questionnaire, when the scoring was being done, instead of afterwards. It gives them something to do while waiting for the winner and keeps them busy. That was a really great tip, and is something we will keep in our heads when organizing another event, such as the Challenge Day.

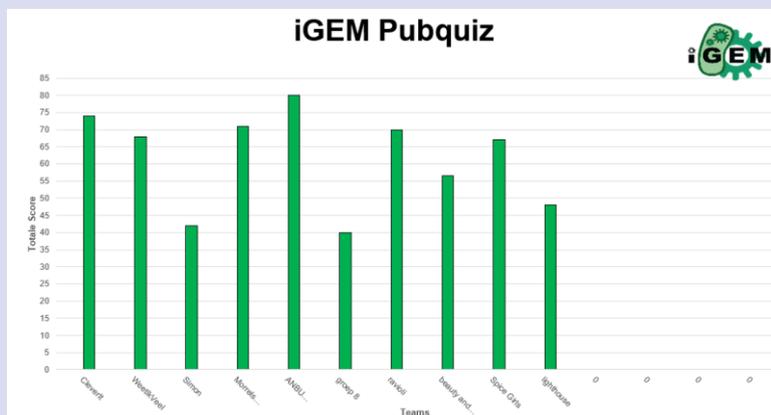
8. Materials

We used a PowerPoint presentation for the questions and handed out an answering form for the participants. Next to that, we made a scoring overview in excel where we could insert the registered teams and the number of correct questions per round. Next to that, we had a live overview of the number of points.

Excel sheet

Teamnaam	Deelnemer #1	foto?	Deelnemer #2	foto?	Deelnemer #3	foto?	Deelnemer #4	foto?	Deelnemer #5	foto?
1 Cleverit	Lucas	ok	Esmee	ok	Meriam	ok	Sanne	ok	Christian	ok
2 WeetkVeel	Marijn	ok	Deirdre	ok	Tony	ok				
3 Simon	Marianne	ok	Joost	ok	Anne	ok	Wiep	ok	Stephan	ok
4 Morrels morrels	Jaime	ok	Kasper	ok	Mart	ok	Aerin	ok		
5 ANBU NEVLO	Milou	ok	Merel	ok	Xavier	ok				
6 groep 8	Djessy	ok	Erik	ok	Ingrid	ok				
7 ravioli	Luna	ok	Annika	ok	Jasper	ok	Nenad	ok	Gordana	ok
8 beauty and Beast	Claudia	ok	Martin	ok						
9 Spice Girls	Nienke	ok	Maria	ok	Ginger	ok	Jade	ok	Joyce	ok
10 lighthouse	Bram	ok	Monique	ok						

Team	Goede vragen		Punten		Goede vragen		Punten		Totaal													
	Ronde 1	Ronde 1	Ronde 2	Ronde 2	Ronde 3	Ronde 3	Ronde 4	Ronde 4	Ronde 5	Ronde 5	Ronde 6	Ronde 6	Ronde 7	Ronde 7	Ronde 8	Ronde 8						
Cleverit	6	12	4	8	9	18	10	20	4	8	4	8					74	2				
WeetkVeel	2	4	5	10	10	20	8	16	5	10	4	8					68	5				
Simon	0	0	2,5	5	6	12	4,5	9	3	6	5	10					42	9				
Morrels morrels	5	10	5	10	8	16	6,5	13	5	10	6	12					71	3				
ANBU NEVLO	4	8	5	10	9	18	10	20	6	12	6	12					80	1				
groep 8	0	0	4,5	9	7	14	3,5	7	3	6	2	4					40	10				
ravioli	2	4	5	10	9	18	9	18	5	10	5	10					70	4				
beauty and Beast	1	2	4	8	10	20	4,25	8,5	5	10	4	8					56,5	7				
Spice Girls	2	4	4,5	9	8	16	8	16	7	14	4	8					67	6				
lighthouse	0	0	4,5	9	5	10	7,5	15	3	6	4	8					48	8				
	0	0	0	0	0	0	0	0	0	0	0	0					0	0				
	0	0	0	0	0	0	0	0	0	0	0	0					0	0				
	0	0	0	0	0	0	0	0	0	0	0	0					0	0				
	0	0	0	0	0	0	0	0	0	0	0	0					0	0				
maximum nr of points		14		14		22		22		14		14										



Questions and answers

We did the quiz in Dutch, but we translated the questions to English, so you could get inspiration from them. The answers are included as well.

Round 1: DNA & Genetic Modification

- What are the four nucleotides that form your DNA (letters?) – ACTG
- What percentage of DNA matches between people? – 99(.9)%
- In every cel of your body is 1.8 meters of DNA present. If you would take all DNA from every cell and make a straight line, how far would you come?
 - From New York to Paris
 - To Pluto and back
 - To Mars and back
 - 1.5 times around the earth
- How do you get a bacterium to make a protein that it does not naturally make?
 - You introduce the DNA that codes for the protein into the bacterium.
 - You give the bacteria a molecule that binds to that protein.
 - You give the bacterium a virus with the DNA that codes for the protein.
 - Bacteria cannot make proteins, only sugars.

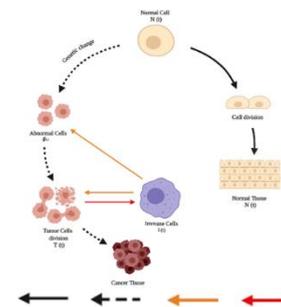
- When was DNA discovered. You are allowed to be 30 years off. – range 1839-1899
- What cells in your body do not contain DNA? – Red blood cells / erythrocytes
- Sometimes a doctor looks at your DNA to determine how much of a certain medicine you need, which genes does the doctor look at? – to genes for enzymes in your liver that convert the medication.

Round 2: AI and Modeling

- What does AI stand for? – Artificial Intelligence
- Who is considered to be the father of AI? – John McCarthy
- How can artificial intelligence help accelerate the discovery of new cancer therapies?
 - By fully automating clinical trials.
 - By analyzing large data sets to identify potential new drugs and predict how they will work.
 - By replacing human researchers.
 - By only optimizing existing treatments.
- With the help of artificial intelligence, some hospitals are trying to reduce the number of patients who do not show up. For example, they look at previous data and the distance between home and hospital. The UMC Utrecht has run a pilot in the pulmonary medicine department with the prediction model.
By what percentage did the number of stay-aways decrease?
You can be off by 5% – range 25-35%

- See the model below with the incomplete legend. Complete the legend by writing the correct description (I to IV) next to the arrows.

- Cell division unhealthy cell
- Suppression of immune cells
- Cell division healthy cell
- Inhibition or elimination



Answer left to right: III – I – IV – II

- The 2022 iGEM team has created a model that allows them to predict the IL-10 concentration over time. See the written code in the attachment and the output opposite. What do you expect when you increase “VIL10tsc”?
IL-new is higher than IL-original, because the transcription is faster.
- Why is the concentration of IL-10 inside the cell not the same as the concentration outside the cell? Hint: see the code in the attachment.
Due to the decay reaction. Over time, the concentration decreases again.

Round 3: TU/e and Eindhoven

- In what year was Eindhoven University of Technology founded? – 1956
- Which building on the TU/e campus is designed to promote the exchange of knowledge between students, student teams and the business community? – TU/e Innovation Space

3. What is the name of the annual technical career day organized by TU/e, where students and companies can come into contact with each other? – Wervingdagen/Career Expo
4. How many Bachelor Studies does TU/e offer? – 15
5. In which building is the iGEM office located? – Traverse
6. What is the name of the vibrant district of Eindhoven, where many bars, restaurants and clubs can be found? – Stratumseind
7. In what year did Eindhoven receive city rights? – 1232
8. What is the name of the annual light festival that takes place in Eindhoven? – GLOW Eindhoven
9. What is Eindhoven called during carnival? – Lampegat
10. Which famous electronics company is based in Eindhoven? – Phillips
11. What is the name of the former industrial area in Eindhoven that has been transformed into a creative and cultural center? – Strijp-S

Round 4: Bacteria

1. What is the scientific term for the study of bacteria? – Bacteriology
2. What is the name of the bacteria that causes tuberculosis? – Mycobacterium Tuberculosis
3. Which bacteria is often associated with food poisoning from contaminated chicken? – Salmonella
4. What is the name of the staining method used to identify bacteria under the microscope? – Gram staining
5. What is an endospore?
 - A. Particles that a bacterium secretes to exchange genetic material
 - B. A resting phase in which a bacterium is able to survive extreme conditions
 - C. Hairs on the outside of a bacterium that helps the bacterium to move
6. Which bacterium is often used in biotechnology and genetic engineering because of its simple genetic structure? – Escherichia Coli (E. Coli)
7. Bacteria can make you sick if:
 - A. You have too many
 - B. They end up in the wrong place in your body
 - C. They end up on your skin
8. Which statement is correct?
 - A. Using antibiotics too often can be dangerous
 - B. If you feel better thanks to antibiotics, you can stop taking them immediately
 - C. You can get antibiotics without a prescription from the drugstore in the Netherlands
9. Link the bacteria to the disease:
 - A. Streptococcus Pneumoniae – Pneumonia
 - B. Helicobacter Pylori – Stomach ulcers
 - C. Treponema Pallidum – Syphilis
 - D. Borrelia Burgdorferi – Lyme disease
10. What is the main difference between prokaryotes and eukaryotes? – Prokaryotes do not have a nucleus, while eukaryotes do

Round 5: Facts

1. What is NOT true?
 - A. A cell in your skin contains DNA that codes for the color of your eyes
 - B. The DNA in one cell is about 1.8 meters long
 - C. The N in DNA stands for nucleic
 - D. DNA of human cells is located in the cytoplasm
2. What is NOT true?
 - A. A plasmid is circular DNA
 - B. You can add DNA to an organism using plasmids
 - C. A plasmid can self-replicate
 - D. Plasmids can only be added to bacteria
3. What is NOT true?
 - A. The brain contains the most fat in your body.
 - B. Around 25% of all your bones are in your feet.
 - C. A human body has 7 organs.
 - D. A human body has 583 muscles.
4. What is NOT true?
 - A. Bacteria are the most common organisms on earth.
 - B. Bacteria die when you freeze them.
 - C. There are more bacteria in your mouth than there are people on earth.
 - D. Bacteria are unicellular.
5. What is NOT true?
 - A. People spend about five years of their lives eating.
 - B. When you sneeze, the 'droplets' fly about 100 kilometers per hour.
 - C. A person breathes approximately 10,000 times a day.
 - D. Your thumb is approximately the same size as your nose.
6. What is NOT true?
 - A. After twelve years you have a new skeleton.
 - B. The smallest bones are in your hand.
 - C. Your body has 206 bones.
 - D. The longest and strongest bone in your body is the femur.
7. What is NOT true?
 - A. Identical twins smell the same
 - B. Identical twins have the same fingerprint
 - C. One in 330 pregnancies results in identical twins.
 - D. The DNA of identical twins is identical.

Round 6: Applications of synthetic biology

1. Cosmetics and skin care products often contain ingredients that are obtained via animal and environmentally unfriendly ways. We can use bacteria to produce these ingredients. For example squalene, where is this extracted?
 - A. From the aloe vera plant
 - B. From Spanish snails
 - C. From the brain of a freshwater jellyfish
 - D. From shark liver

2. You probably know that silk is made by silkworms. There is also spider silk, but it is very difficult to produce spider silk on a large scale. Why?
 - A. There is no method to separate the silk threads from the spider shit.
 - B. The spiders in the factory eat each other.
 - C. It is difficult to find employees for a factory full of spiders.
 - D. The spiders die if they cannot live solitary.
3. In the 19th century, Frenchman Paul Camboué managed to pull the spider silk directly from the spider and spin it on a bobbin. They made gloves, tights...
...but how is spider silk produced today? – By expression in bacteria
4. Most materials are strongly repelled by your immune system when you implant them, but spider silk appears to be extremely suitable as a material for implants.
What do you call an implant of non-human origin?
 - A. Allograft
 - B. Autograft
 - C. Xenograft
5. A sneak peek into our project: why did William Coley give an injection full of pathogenic bacteria to his friend in the 20th century?
 - A. The friend had run off with Coley's wife
 - B. Coley thought the bacteria would attack his friend's tumor
 - C. Coley was wrong. He actually wanted to administer something else.
 - D. The friend wanted euthanasia, but this was not allowed.
6. Which of these companies conducts synthetic biology research?
 - A. Disney
 - B. Jumbo
 - C. NASA
 - D. Google
7. How can synthetic biology and cyanobacteria together help colonize Mars?
 - A. By using cyanobacteria to break down rocks and extract metals.
 - B. By developing genetically modified cyanobacteria that can produce oxygen and biomass for respiration and food.
 - C. By using cyanobacteria to warm Mars by storing and releasing heat from the sun.
 - D. By using cyanobacteria to create a magnetic field around Mars to protect the planet from radiation.

Answering sheet

We created an answering sheet in which the participants could write their answers. At the bottom of the sheet we also included a scoring per round so they could see how they were doing. Next to that, we included little space for feedback and comments. We printed the sheet on thick paper, which was really nice since it did not wrinkle.

Reflection sheet (translated to English)

Name:

Team:

Question	Yes	No
Did you have fun?		
Did you know up front what synthetic biology was?		
Could you tell in one sentence what synthetic biology is now?		
What was the most memorable moment of the pub quiz?		
Did you learn something new today?		
When you answered yes to question 5, what did you learn?		
Would you come again when we organize a new edition?		
What did you like about the pub quiz?		
What could we improve?		
Do you have any other remarks?		

9. Tips & Tops

TIPS / IMPROVEMENTS

1. Have around 40 questions instead of 50. It was little too long and people lost their attention after approximately 1.5 hour.
2. Think about whether or not you want to let your own team members join. The advantage was that the ambience was really nice and they could help their family and friends, but the teams who had no iGEM member clearly ended at the bottom. Consider the option to make an iGEM team who cannot win the quiz. When you decide to exclude iGEM members, make the questions easier!
3. Really think about the level of the questions. We were little ambitious with what we thought they could handle, but we got a lot of feedback it was too hard. However, the scoring was between 40-80 points from a maximum of 100, so we actually thought it was quite good. We think it is not nice too have all teams between 80-100 points for such a quiz. It should be challenging and fun. Try to really find the balance.
4. Make a group photo. We unfortunately forgot this, but it would have been nice!
5. For round five where we had the facts, also show them what is wrong about the statement. We knew why it was wrong, but we should have told them.
6. Make sure to include images they need on the answering sheet. We forgot this for one question and people had to come closer to see.
7. Maybe consider doing the quiz in a room you reserve yourself. It might look less vibrant, but you can decorate it how you want and it can possibly save a lot of costs if you can buy your own food and drinks upfront.
8. We got complaints about the bar crew not being nice, but this was outside our power.

TOPS / KEEP IT UP

1. The overall organization was good.
2. People liked the snacks and the fact that they could meet the team personally.
3. The answering sheet was printed on thick paper, which was really nice. It stayed neat when they were handed in for correction. It was also pretty organized and the scoring at the bottom was really nice to have. We could easily order the scorings and do the award ceremony.
4. The host and correctors had a sheet with the correct answers and explanation, which was nice, so the questions could be corrected fast and efficiently. When the correctors were busy, the host went through the correct answers with the participants. That worked well.
5. The Excel sheet was clear and provided an overview. The live scorings were shown after the seconds and fourth round.
6. By having a reflection sheet, we were able to incorporate the feedback of the participants to hopefully do better next time. Also, we know for sure people had a great time.
7. Working with vouchers was nice, since we knew upfront what our maximum costs would be, while the participants could still order themselves what they want at the bar.
8. Organizing the event with three people was enough. We had six rounds and everyone did questions for two rounds, which was not that much.